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Raghad Abdulkarim Alsudays

Department of Accounting, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh , Saudi Arabia.

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*Corresponding author: rasadais@imamu.edu.sa

The impact of FinTech on The Performance and Competitiveness of Saudi Banks

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Department of Accounting, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh , Saudi Arabia.

Article History

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Abstract

Current technological developments are upending banks' operations and impacting their competitiveness and performance. This study examines the role of three essential FinTech dimensions: Financial Inclusion (FI), Alternative Payment Methods ($APMs$), and Automation ($Auto$), in shaping the performance and competitiveness of Saudi banks. It proposes that these dimensions can significantly improve banking outcomes. The study employs multiple regression analysis to analyze data collected from 381 employees across Saudi banks.The findings confirmed that FinTech dimensions positively and significantly impact the performance and competitiveness of Saudi banks. The study highlighted the need to expand FinTech integration while addressing challenges such as security, privacy, and resistance to technological changes.This study enriches the literature by bridging research gaps and advancing the discourse on the relationship between FinTech and banking outcomes. Additionally, it provides practical guidance for bank managers in developing tailored FinTech strategies to enhance performance and competitiveness.

Keywords: FinTech ;Financial Inclusion ; Alternative Payment Methods ; Automation ;Bank performance ; Bank competitiveness.

1.1 Introduction:

Banks play a pivotal role in fostering economic development and prosperity in both developed and developing economies (Dwivedi et al., 2021; Kumari, 2017; Nath et al., 2020; Rastogi et al., 2023). By acting as a bridge between those who save and those who need capital, they facilitate the transfer of surplus funds from depositors to investors in the form of credit (Alam et al., 2021; Drigă & Dura, 2014; R. Wang et al., 2021; Y. Wang et al., 2021). This process enables the financing of modernization, infrastructure development, job creation, and overall economic growth (Nath et al., 2020). Consequently, the strength and progress of a nation's banking system are integral to its economic well-being (Omankhanlen, 2012).

Technological advancements have significantly transformed the operations of the banking industry (Chhaidar et al., 2022; Dwivedi et al., 2021), with innovations from tech companies disrupting traditional financial services (Ben Bouheni et al., 2023). To enhance performance

and maintain competitiveness, banks must redesign their processes and services to better meet customer needs (Dwivedi et al., 2021; Ho et al., 2009). Introducing technology-driven products and services simplifies customer interactions and addresses their needs effectively (Dwivedi et al., 2021; Kumar, 2020; Sharma, 2022). The integration of emerging technologies into financial service delivery, referred to as Financial Technology (FinTech), enables seamless transactions anytime and anywhere, offering enhanced flexibility for users. FinTech also impacts banks by shaping product development, business models, and lending practices (Akanbi et al., 2022; Ky et al., 2019; Lv et al., 2022; Metilda & Shamini, 2022; Salman, 2021; Untoro & Trinugroho, 2022).

Although FinTech's impact on bank performance and competitiveness has garnered significant attention globally, research in the Kingdom of Saudi Arabia remains limited. Therefore, this research aims to explore the perceived impact of FinTech adoption on the performance and competitiveness of Saudi banks, as evaluated by their employees.

1.2 Research problem:

The swift progress of technology and evolving market demands have placed traditional commercial banks in direct competition with both internet-based financial enterprises and industry peers (Lv et al., 2022). Banks encounter competition from innovative and technology-driven newcomers such as FinTech companies, which pose a potential threat by leveraging cutting-edge technology and prioritizing customer-focused solutions (Chen et al., 2021; Temelkov, 2018). FinTech companies offer cost-efficient services, increasingly attracting clients away from conventional banking institutions (Feyen et al., 2021). Traditional banking is increasingly at risk as individuals shift their approach to account management. Despite the challenges posed by FinTech companies, these entities also create potential opportunities. To remain competitive, banks must choose between continuing with conventional services, which may lead to declining market share, or actively seeking partnerships with FinTech firms to leverage their innovative capabilities (Temelkov, 2018).

Therefore, FinTech has catalyzed a shift in commercial banking toward digital and intelligent solutions, encouraging banks to move beyond static, conventional practices. This transformation has led to dynamic approaches, such as collaborating with telecommunications firms, launching independent FinTech initiatives, and integrating mobile-based technologies (Lv et al., 2022; Misati et al., 2020).

The integration of FinTech has produced diverse effects on bank performance. Ky et al. (2019) suggest that when FinTech products are successfully incorporated, they not only boost profitability and operational efficiency but also improve customer relationships and enable banks to tap into new market segments. Furthermore, R. Wang et al. (2021) emphasize that the integration of FinTech significantly supports banks in adopting a more proactive risk-taking approach to fulfill their strategic objectives. This adoption not only aids in acquiring and retaining customers through efficient and prompt services but also contributes to reducing customer expenses and boosting the bank's profitability. Also, Chen et al. (2021) argue that the integration of FinTech into banking operations results in multiple performance benefits, such as heightened customer satisfaction and better alignment with their expectations, enhanced quality of services provided by staff, increased operational efficiency, and improved overall

profitability. Additionally, Lv et al. (2022) suggest that leveraging advanced technologies (e.g., Artificial Intelligence (AI), blockchain, and cloud computing) enables FinTech firms to facilitate the direct execution of transactions, eliminating intermediaries. This transformation not only lowers transaction costs but also reduces information asymmetry, decreases entry barriers, extends service reach, and minimizes the risks associated with transactions.

Further, the influence of FinTech on the profitability and performance of commercial banks is not uniform and can vary depending on the stage of its integration. In the early stages, banks may experience a reduction in profitability due to substantial initial investments in research, the introduction of patented technologies, delays in technical advancements, and challenges in aligning technological innovations with business operations. However, as the adoption and deployment of FinTech progress, banks can expect to realize greater benefits, such as reduced operational costs, which ultimately contribute to improved profitability and enhanced performance over time (Lv et al., 2022).

Despite the positive aspects of FinTech, its implementation presents challenges, including a time-intensive process and considerable expenses for ongoing maintenance, system upgrades, and the necessary training for both customers and staff. Additionally, there is the potential risk of system failures during the integration process (Chen et al., 2021).

Despite Saudi Arabia's strong emphasis on digital technologies under its Vision 2030 initiative, research on the impact of FinTech adoption on the performance and competitiveness of Saudi banks has been relatively scarce. Consequently, this study seeks to bridge this gap by exploring the effects of FinTech adoption on the performance and competitiveness of Saudi banks. The research problem is encapsulated in the following primary research question:

"**What is the impact of Financial Technology (FinTech) on the performance and competitiveness of Saudi banks?**"

Answering the following subsidiary questions could provide valuable insights into resolving the main research question:

1- What is the impact of Financial Inclusion (FI) on the performance of Saudi banks (Bperf)?
2- What is the impact of Alternative Payment Methods (APMs) on the performance of Saudi banks (Bperf)?
3- What is the impact of Automation (Auto) on the performance of Saudi banks (Bperf)?
4- What is the impact of Financial Inclusion (FI) on the competitiveness of Saudi banks (Bcomp)?
5- What is the impact of Alternative Payment Methods (APMs) on the competitiveness of Saudi banks (Bcomp)?
6- What is the impact of Automation (Auto) on the competitiveness of Saudi banks (Bcomp)?

1.3 Research objective:

This study aims to conduct a survey of Saudi bank employees to capture their perceptions regarding the impact of FinTech (FI, APMs, and Auto) on Saudi bank performance and competitiveness. This requires:

1- Examining the impact of Financial Inclusion (FI) on the performance of Saudi banks (Bperf).
2- Investigating the impact of Alternative Payment Methods (APMs) on the performance of Saudi banks (Bperf).
3- Analyzing the impact of Automation (Auto) on the performance of Saudi banks (Bperf).
4- Studying the impact of Financial Inclusion (FI) on the competitiveness of Saudi banks (Bcomp).
5- Highlighting the impact of Alternative Payment Methods (APMs) on the competitiveness of Saudi banks (Bcomp).
6- Assessing the impact of Automation (Auto) on the competitiveness of Saudi banks (Bcomp).

1.4 Literature review and hypothesis development:

This section provides an overview of the literature concerning the impact of FinTech adoption on bank performance and competitiveness. The impact of FinTech on banks has been widely debated, with some studies highlighting its positive effects on performance and competitiveness (Baker et al., 2023; Chen et al., 2021; Chhaidar et al., 2022; Dilla et al., 2024; Dwivedi et al., 2021; Hidayat-ur-Rehman, 2024; Kemunto & Kagiri, 2018; Ky et al., 2019; Misati et al., 2020; Singh et al., 2021), while others present evidence of negative (Phan et al., 2020) or neutral outcomes (Untoro & Trinugroho, 2022).

Baker et al. (2023) investigated the influence of FinTech on the financial performance of banks through a study involving 115 employees and managers from banks in the United Arab Emirates (UAE). The results indicated that the adoption of FinTech had a significant positive effect on key financial metrics, including total deposits and net profits.

Similarly, Ky et al. (2019) explored the potential of FinTech to improve bank performance in Sub-Saharan Africa. Analyzing data from 170 financial institutions over the 2009-2015 period, the study revealed a significant positive relationship between FinTech adoption and various indicators of bank performance, including profitability, efficiency, and stability. Chhaidar et al. (2022) examined the influence of FinTech on the performance of banks, focusing on a sample of 23 European banks. The findings indicated a positive and significant relationship between the adoption of FinTech and improved bank performance.

Singh et al. (2021) also examined the effect of FinTech on bank profitability using a panel dataset of 8 Indian banks over the 2011 – 2018 period. Findings revealed a significant positive impact of FinTech on bank profitability. Misati et al. (2020) explored how FinTech affects bank performance in Kenya, comparing periods before and after the introduction of interest rate controls. The study utilized a panel dataset of all commercial banks in Kenya over

the 2009 – 2018 period. Findings revealed that FinTech had a significantly positive impact on the performance of large banks across both periods. In contrast, medium-sized banks only saw positive and significant effects during the period with interest rate caps, while small banks experienced a negative and significant impact following the implementation of these caps. Chen et al. (2021) explored how FinTech influences the non-financial performance of Chinese commercial banks. Drawing on data from 307 customers and 93 employees, the study identified a significant positive effect of FinTech adoption on enhancing the non-financial performance of these banks.

In contrast, Untoro and Trinugroho (2022) investigated the relationship between FinTech adoption, bank performance, and bank risk-taking within the Indonesian banking sector, analyzing data from 81 conventional banks over a five-year period (2017–2021). The results indicated no significant effect of FinTech adoption on bank performance. Similarly, Phan et al. (2020) explored the effect of FinTech adoption on bank performance, utilizing data from 41 Indonesian banks. The study concluded that FinTech had a notably adverse impact on bank performance.

In UAE, Dwivedi et al. (2021) investigated the influence of FinTech on the performance and competitiveness of banks. Their study, which included a sample of 67 banking professionals and executives, found that the adoption of FinTech had a significant positive effect on both the performance and competitive standing of banks. Relatedly, Dilla et al. (2024) investigated the impact of FinTech on banking competition by analyzing panel data from 118 Indonesian banks between 2018 and 2022. The findings indicated that the emergence of FinTech intensified competition among banks, suggesting that FinTech adoption enhances bank competitiveness. Similarly, Kemunto and Kagiri (2018) explored the link between FinTech adoption and bank competitiveness in Kenya. Based on data from 84 bank employees, their study concluded that adopting FinTech significantly improved the competitive edge of banks. Correspondingly, Hidayat-ur-Rehman (2024) investigated how FinTech adoption influences bank competitiveness in Pakistan. Analyzing data from 411 employees, the study revealed a significant positive effect of FinTech adoption on enhancing bank competitiveness.

Previous research largely agrees on the positive influence of FinTech on bank competitiveness, though its effect on bank performance remains debated. Studies have explored these impacts across diverse regions, such as Sub-Saharan Africa, Europe, the UAE, Kenya, India, China, Pakistan, and Indonesia. However, the context of Saudi Arabia (KSA) has been notably absent from this body of research. This study seeks to address this gap by contributing to the ongoing discourse with evidence on how FinTech affects bank performance and competitiveness within KSA. Based on this overview of the literature, the researcher develops the following research hypotheses:

"H_1*: Financial Technology (*$FinTech$*) has a significant impact on bank performance (*$Bperf$*).*"

"H_2*: Financial Technology (*$FinTech$*) has a significant impact on bank competitiveness (*$Bcomp$*).*"

To evaluate the validity of H_1 and H_2, the following supporting hypotheses must be examined:

"H_{1-1}*: Financial Inclusion (FI) has a significant impact on bank performance (*$Bperf$*).*"

"H_{1-2}*: Alternative Payment Methods (*$APMs$*) have a significant impact on bank performance (*$Bperf$*).*"

"H_{1-3}*: Automation (*$Auto$*) has a significant impact on bank performance (*$Bperf$*).*"

"H_{2-1}*: Financial Inclusion (FI) has a significant impact on bank competitiveness (*$Bcomp$*).*"

"H_{2-2} *: Alternative Payment Methods (*$APMs$*) have a significant impact on bank competitiveness (*$Bcomp$*).*"

"H_{2-3}*: Automation (*$Auto$*) has a significant impact on bank competitiveness (*$Bcomp$*).*"

1.5 Research importance:

The relationship between FinTech and the performance and competitiveness of banks remains underexplored within the Saudi context. This research seeks to fill this gap by examining how FinTech adoption influences the performance and competitiveness of Saudi banks. While existing literature generally agrees on FinTech's positive effect on bank competitiveness across various settings, its impact on bank performance remains a subject of debate. This study aims to contribute to this discussion by offering evidence specific to Saudi banks.

The study presents several practical implications, particularly in aligning with Saudi Vision 2030, which prioritizes incorporating emerging technologies like FinTech into the banking sector. It emphasizes equipping Saudi bank employees and customers with sufficient knowledge about FinTech's advantages. Additionally, the findings can guide bank managers in designing FinTech solutions tailored to their institutions. Addressing implementation challenges experienced by banks in other contexts can also assist Saudi banks in proactively mitigating similar issues.

1.6 Theoretical framework:

This section establishes the study's conceptual framework, offering theoretical insights into the research variables to enhance understanding of the research problem and their interconnections. The discussion is organized around two key themes: Financial Technology (FinTech), and its influence on bank performance (Bperf) and competitiveness (Bcomp).

1.6.1 Financial Technology (FinTech):

The definition of FinTech has sparked considerable debate within academic circles, with professional organizations also making efforts to conceptualize it. Despite these attempts, a universally agreed-upon definition has not emerged. Some scholars have approached FinTech by categorizing it along various dimensions, such as the degree, object, and scope of innovation, reflecting the complexity of the concept, while others concentrate on formulating a comprehensive and widely accepted definition.

The Financial Stability Board (FSB) describes FinTech as financial innovations powered by technology, which have the potential to reshape business models, introduce novel processes, applications, and products, significantly impacting financial institutions, markets, and how financial services are delivered (Dwivedi et al., 2021; FSB, 2017). According to Arner et al. (2015) and Desai (2015), FinTech involves leveraging technological advancements to develop and provide financial services in innovative ways. Similarly, Barberis (2014) described FinTech as the integration of technology into the financial sector to enhance its operations and services. Also, Almaqtari (2024) and Hidayat-ur-Rehman (2024) characterize FinTech as the integration of advanced technology to deliver financial services to clients.

Kim et al. (2016) argued that FinTech combines finance and technology, signifying the transformative impact of integrating information technology with financial services. Correspondingly, Dorfleitner et al. (2017a) characterized FinTech as a collection of companies that integrate financial services with cutting-edge and novel technologies. Likewise, Čižinská et al. (2016) identified FinTech as an economic sector comprising firms leveraging technology to enhance the efficiency of financial services. Micu and Micu (2016) and Shim and Shin (2016) also characterized FinTech as a segment of the financial services industry that applies technology to streamline and improve the delivery of financial services. Despite variations in definitions, most descriptions of FinTech converge on the idea that it centers around employing advanced technologies to optimize and enhance the delivery of financial services.

Regardless, Arner et al. (2015) and Setiawan and Maulisa (2020) described the progression of FinTech through three distinct phases: FinTech 1.0, FinTech 2.0, and the combined phases of FinTech 3.0 and 3.5. During FinTech 1.0 (1866 – 1967), financial services largely relied on analog processes. This was succeeded by FinTech 2.0 (1967 – 2008), a period marked by the integration of computational and digital technologies to enhance financial operations. The current stage (2008 till present), encompassing FinTech 3.0 (emphasizing startups in developed economies) and FinTech 3.5 (focusing on startups in emerging markets), reflects the increasing influence of financial startups and technology giants (TechFins) as key drivers of digital transformation and innovation.

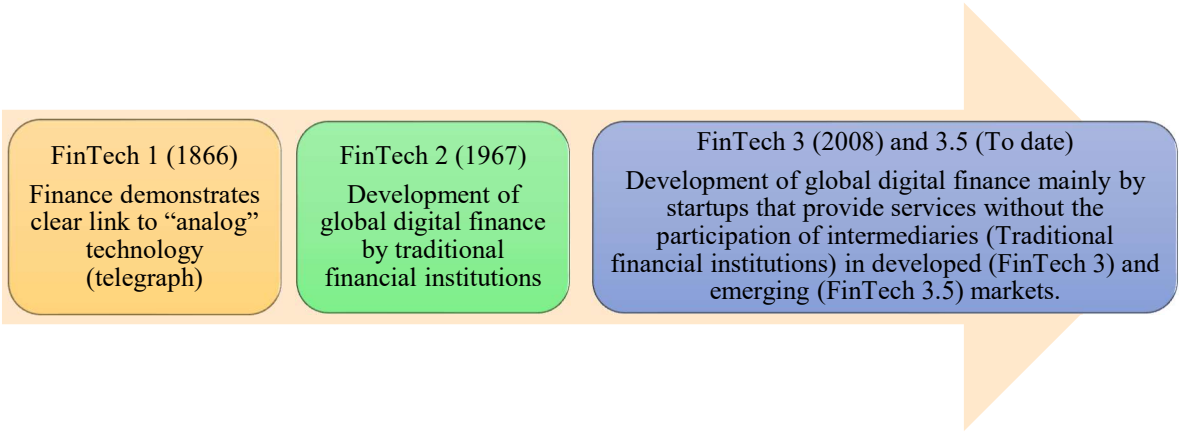

Figure 1: The 3-stage evolution of FinTech (Arner et al., 2015)

Conversely, some scholars propose that FinTech's evolution spans five distinct phases, addressing three key domains within the financial services sector: internal digitalization (encompassing phases 1 to 3), provider-focused digitization (phase 4), and customer-centric digitization (phase 5) (Alt & Puschmann, 2012; Nüesch et al., 2015; Puschmann, 2017). Similar to other financial innovations, FinTech revolves around three key aspects: the object, degree, and scope of innovation. The innovation object encompasses various elements such as business models, products or services, organizational structures, processes, or systems.

Table 1: The 5-stage evolution of FinTech (Puschmann, 2017)

Phases	Phase 1: until 1960	Phase 2: 1960–1980	Phase 3: 1980–2010	Phase 4: 2010–2020	Phase 5: from 2020
Strategy focus	Single customer channel	Two customer channels	Multi customer channels	Cross customer channels	Hybrid customer channels
Organization focus	Support processes	Back-office processes	Front-office processes	Provider processes	Customer processes
Systems focus	No systems integration	Partial internal systems integration	Internal systems integration	External financial services provider systems integration	External non-financial services provider systems integration

The degree of innovation relates to its influence on performance, which may either be incremental (focusing on enhancing existing systems) or disruptive (initially offering lower performance but eventually transforming the entire value chain). The scope of innovation can operate within organizations (intra-organizational) or extend across organizations (inter-organizational). While intra-organizational scope targets changes at a microeconomic level, inter-organizational scope impacts macroeconomic structures. (Frame & White, 2014; Haddad & Hornuf, 2019; Puschmann, 2017; Tufano, 2003).

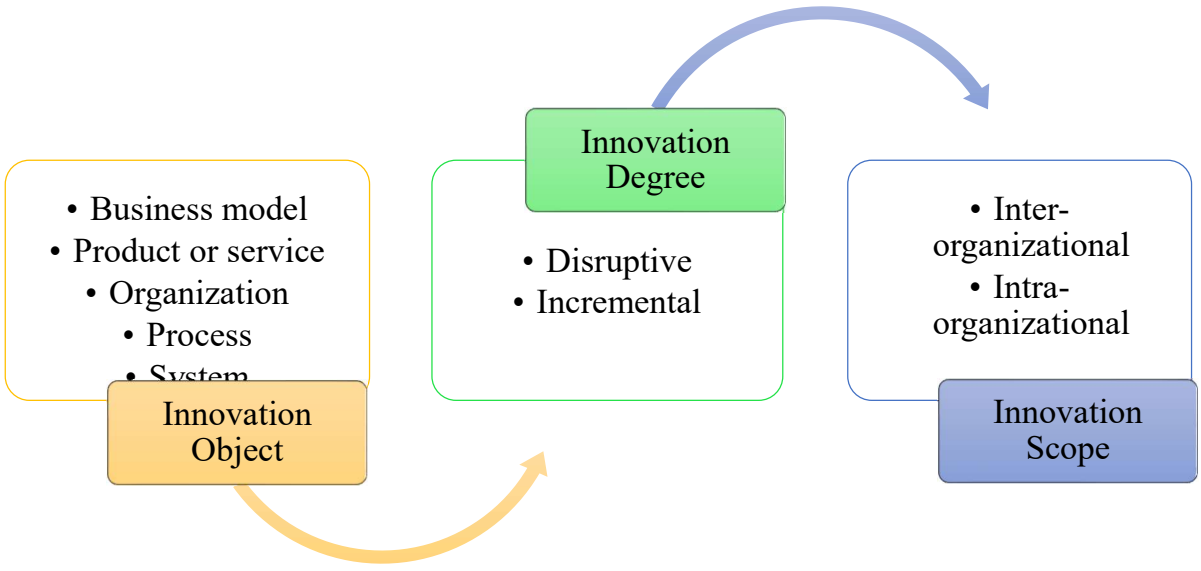

Figure 2: FinTech dimensions *(Puschmann, 2017)*

The FinTech sector can be categorized into four main areas: financing, asset management, payment transactions, and other FinTech. Financing FinTechs focus on improving access to funding for individuals and businesses. Asset management FinTechs offer a range of services, including investment advice, asset management, and tools for tracking personal wealth. Payment transaction FinTechs provide solutions for processing payments domestically and internationally, including alternative payment methods (APMs). Lastly, miscellaneous FinTechs cover diverse areas such as insurance technology, search and comparison platforms, and IT infrastructure services (Dorfleitner et al., 2017a, 2017b).

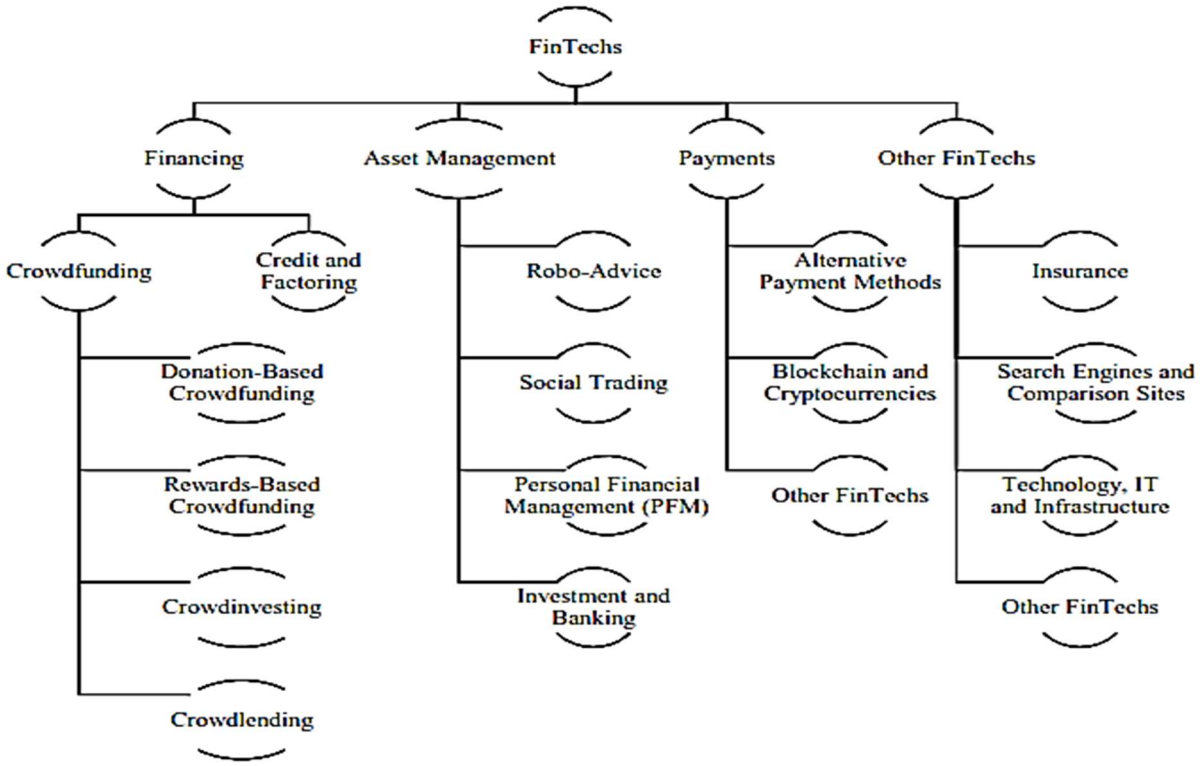

Figure 3: The FinTech industry (Dorfleitner et al., 2017a, 2017b)

To evaluate FinTech adoption, the study adopts the framework proposed by Baker et al. (2023), which categorizes FinTech into three core dimensions:

1- Financial Inclusion (FI):

Financial Inclusion (FI) focuses on ensuring that households and businesses can access secure, cost-effective, and reliable financial products and services. This is achieved while upholding the efficiency and transparency of the financial system
(Baker et al., 2023; Damane & Ho, 2024).

2- Alternative Payment Methods (APMs):

Alternative Payment Methods (APMs) encompass a variety of digital and cashless options for transactions. These include traditional tools like credit and debit cards, along with modern solutions such as e-wallets, electronic invoicing, mobile payment platforms, and cryptocurrencies (Baker et al., 2023).

3- Automation (*Auto*):

Automation involves the shift of work tasks, operations, or systems to automated control or operation. It goes beyond simply replacing human tasks with machines; rather, it entails a fundamental reorganization of workflows, leading to a redefinition of the roles and responsibilities of both human workers and machines *(Baker et al., 2023).*

1.6.2 The impact of FinTech on bank performance and competitiveness:

The collaboration between banks and FinTech companies offers substantial advantages for both sectors. Banks can leverage this partnership to tap into new customer bases, diversify their products and services, and enter emerging markets. Additionally, they gain access to advanced technologies and enhance operational efficiencies, leading to new revenue channels. On the other hand, FinTech firms benefit from the credibility of partnering with established banks, along with increased financial backing and access to critical infrastructure (Ky et al., 2019). Thus, the collaboration between banks and FinTech companies plays a crucial role in improving the banking sector's performance. It contributes to higher profitability, facilitates financial innovations, and enhances risk management practices, ultimately strengthening the competitiveness and overall performance of banks (Dwivedi et al., 2021). Correspondingly, Alshari and Lokhande (2022) stated that FinTech have several positive impacts on banks' performance, including:

1- Financial advantage: The financial benefits of FinTech are evident in increased revenue and reduced expenses for banks. By offering FinTech services, banks can capitalize on high demand, resulting in higher earnings. The adoption of FinTech also helps banks cut costs by eliminating the need for physical branches in underserved areas and reducing overall operational expenses. With the availability of FinTech services on mobile platforms, customers can access banking services anytime and anywhere, further reducing the need for in-person visits to branches. These factors combined, directly enhance bank performance by driving profitability and minimizing costs.

2- Competitive advantage: Certain banks can leverage FinTech to provide unique services not offered by their competitors. This strategic advantage enhances their competitive position, resulting in greater customer acquisition and financial gains, which in turn improves overall bank performance.

3- Services development: FinTech services streamline the delivery of financial products by utilizing advanced digital technologies, offering users efficient alternatives to traditional methods. Through these services, customers can easily carry out financial transactions using mobile phones, regardless of time or location. Additionally, FinTech provides considerable benefits such as saving time, effort, and money. By aligning with customer expectations and enhancing satisfaction, these services help banks broaden their range of offerings, which is essential for attracting new clients and expanding their market influence.

Similarly, Chen et al. (2021) stated that FinTech can help enhance bank performance via:

1- Process automation: Automation is the focus of intense interest in the global banking sector. Banks are prone to offer partially or totally automated machine services and move away from the labor-intensive business operational models. This improves the convenience and accessibility of bank services and reduces operational costs.
2- Customer satisfaction: FinTech enhances banks' ability to attract customers by offering self-service options that improve user involvement and experience. With greater transparency, customers perceive lower risks, boosting their trust. Furthermore, FinTech reduces costs; for instance, account opening fees common in traditional banking are waived, making the process more affordable. This reduction in costs encourages customers to favor FinTech services, thereby improving banks' competitiveness.
3- Competitive advantages: FinTech start-ups challenge the dominance of traditional commercial banks by offering more cost-effective and efficient solutions to customers. These innovations assist banks in regaining their competitive advantages, expanding their customer base, and diversifying their service offerings. Consequently, FinTech has become a valuable tool for bridging the gap between traditional banking institutions and online financial services.

1.7 Field study:

This study surveys employees of Saudi banks to assess their perceptions regarding the influence of financial technology (FinTech) on bank performance (Bperf) and competitiveness (Bcomp). The researcher begins with a discussion of the methodology employed to test the proposed hypotheses, followed by an analysis of the hypothesis testing results.

1.7.1 Research methodology:

Research methodology refers to a systematic approach used to address a problem. It represents the scientific study of the processes involved in conducting research. In essence, research methodology encompasses the procedures and techniques employed by researchers to describe, explain, and predict phenomena (Goundar, 2012). This section outlines the research methodology utilized for hypothesis testing. It provides a detailed discussion of the data sources, variables, measurement scales, data collection methods, target population and sample, as well as the statistical techniques applied in the study.

1.7.1.1 Data sources:

Data can be classified into two categories: primary data and secondary data. Primary data refers to data gathered firsthand by a researcher directly from original sources (e.g., interviews and questionnaires). In contrast, secondary data pertains to data that has already been collected by others and is readily accessible for use in subsequent research (e.g., books and journal articles) (Ajayi, 2017; Mwita, 2022).

The study utilized a survey as its primary data collection method, focusing on Saudi bank employees to explore their perceptions of the relationship between FinTech and the

performance and competitiveness of Saudi banks. Secondary data were obtained from scholarly sources, including academic books, journal articles, and dissertations.

1.7.1.2 Research variables and related measures:

This study examines how Financial Technology (FinTech) affects both Bank performance (Bperf) and competitiveness (Bcomp). Following Baker et al. (2023), FinTech is evaluated using three key dimensions: Financial Inclusion (FI), Alternative Payment Methods (APMs), and Automation (Auto). **Table 2** summarizes research variables and related measures.

1- Financial Technology [FinTech (x)]: is the study's main independent variable that evaluates the benefits of FinTech adoption for Saudi banks. This study assesses FinTech through three key dimensions proposed by Baker et al. (2023), which are:

a) Financial Inclusion [FI (x_1)]: evaluates the benefits of Financial Inclusion (FI) for Saudi banks. It is assessed using 10 items obtained from Baker et al. (2023).
b) Alternative Payment Methods [APMs (x_2)] : evaluates the benefits of Alternative Payment Methods (APMs) for Saudi banks. It is assessed using 10 items obtained from Baker et al. (2023).
c) Automation [Auto (x_3)]: evaluates the benefits of automation (Auto) for Saudi banks. It is assessed using 10 items obtained from Baker et al. (2023).

Table 2: Research variables and related measures

Variables	Dimensions	Items	Sources
Financial Technology $\boldsymbol{FinTech}$ $(\boldsymbol{x})$	Financial Inclusion FI (x_1)	10 items (1 – 10)	*Baker et al. (2023)*
	Alternative Payment Methods $APMs$ (x_2)	10 items (11 – 20)	*Baker et al. (2023)*
	Automation $Auto$ (x_3)	10 items (21 – 30)	*Baker et al. (2023)*
Bank performance $\boldsymbol{Bperf}$ $(\boldsymbol{y_1})$		18 items (31 – 48)	*Baker et al. (2023), Dwivedi et al. (2021), and Lamey et al. (2024)*
Bank competitiveness $\boldsymbol{Bcomp}$ $(\boldsymbol{y_2})$		5 items (49 – 53)	*Dwivedi et al. (2021)*

2- Bank performance [($Bperf$ (y_1)]: evaluates the impact of $FinTech$ adoption on bank performance using the balanced scorecard framework, which includes four perspectives: learning and growth, internal processes, customer satisfaction, and financial performance. It is measured using 18 items drawn from the studies of *Baker et al. (2023), Dwivedi et al. (2021), and Lamey et al. (2024).* Specifically, items 31–35 (5 items) evaluate the effect of $FinTech$ on internal processes, items 36–40 (5 items) address its influence on customer satisfaction, items 41–45 (5 items) focus on learning and growth, and items 46–48 (3 items) assess financial performance.

3- Bank competitiveness [$(Bcomp\ (y_2)]$: evaluates the impact of $FinTech$ adoption on bank competitiveness. It is measured using 5 items adapted from *Dwivedi et al. (2021).*

1.7.1.3 Data collection techniques:

The study utilized a survey questionnaire to obtain data from employees in Saudi banks regarding the effect of $FinTech\ (x)$ on $Bperf\ (y_1)$ and $Bcomp\ (y_2)$. The instrument is made up of the following two sections:

1- Sample demographics: This section presents the characteristics of the sample respondents, utilizing various demographic variables such as age, gender, education, and experience.
2- The impact of $FinTech\ (x)$ on $Bperf\ (y_1)$ and $Bcomp\ (y_2)$: This section employs a set of items to examine how employees of Saudi banks perceive the influence of $FinTech$ adoption on both the performance and competitiveness of Saudi banks.

The instrument utilizes a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). All items are positively phrased, such that higher scores denote more favorable outcomes, whereas lower scores signify less favorable results.

1.7.1.4 Research population and sample:

The study targets employees of Saudi banks as its research population. Due to the infinite nature of this population and the absence of a defined sampling frame, the researcher utilized a non-random Convenience Sampling Technique (CST) to select participants based on their availability and accessibility. A web-based questionnaire was designed and disseminated through Google Forms. Out of 413 responses collected, 32 were deemed invalid for several reasons (e.g., duplicate submissions), yielding a final sample size of 381 valid responses.

1.7.1.5* Statistical *techniques:

This study employs two multiple regression models: The first model tests the first hypothesis (H_1) regarding the impact of $FinTech\ (x)$ on $Bperf\ (y_1)$, while the second tests the second hypothesis (H_2) regarding the impact of $FinTech\ (x)$ on $Bcomp\ (y_2)$. Diagnostic checks for the models are also performed, encompassing tests for multicollinearity (Variance Inflation Factors (VIFs) and Tolerance), autocorrelation (Durbin-Watson test), homoscedasticity (Spearman's rho correlation between the absolute values of the standardized residuals and standardized predicted values), and the normality of residuals (Kolmogorov-Smirnov test). The regression models are as follows:

Model 1: $Bperf = \beta_0 + \beta_1 FI + \beta_2 APMs + \beta_3 Auto + e$

Model 2: $Bcomp = \beta_0 + \beta_1 FI + \beta_2 APMs + \beta_3 Auto + e$

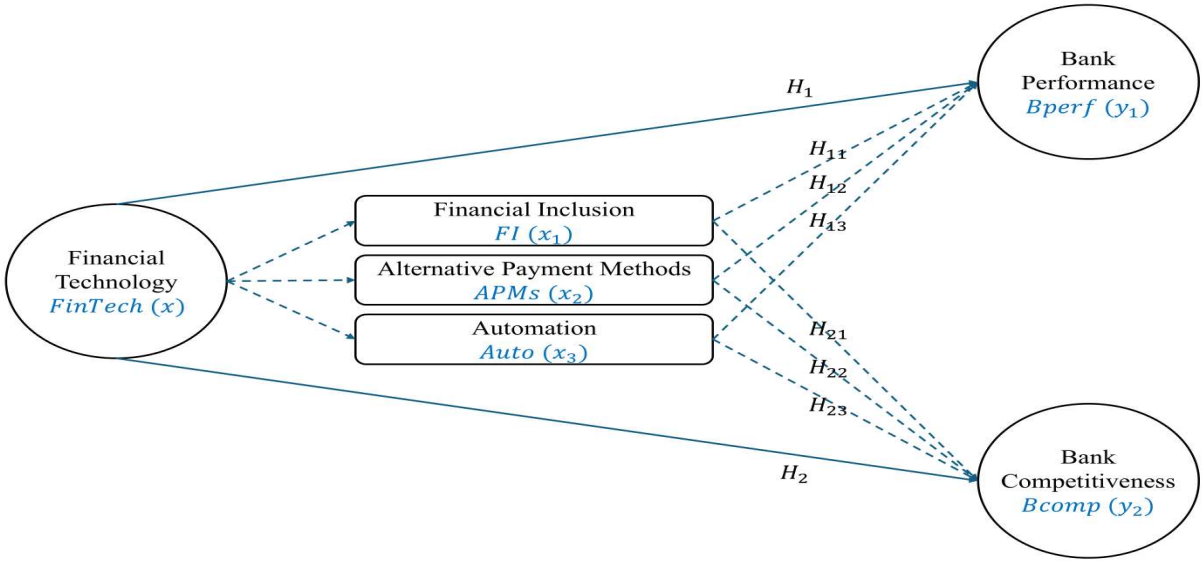

Figure 4: Research model

Furthermore, Pearson's correlation coefficient is used to assess the relationships between the research variables. The content validity of the instrument is assessed through expert evaluations, while its reliability is evaluated using Cronbach's α coefficient. The demographic characteristics of the sample are summarized using frequency tables and percentages. Descriptive analysis is performed utilizing measures of central tendency, such as the arithmetic mean (μ), and measures of variability, such as the standard deviation (σ). The research model is depicted in **Figure 4**.

1.7.2 Data analysis and hypothesis testing:

This section applies the previously outlined statistical techniques to analyze the data and test the hypotheses. The analysis begins with an evaluation of the instrument's validity and reliability, followed by a description of the sample's demographic characteristics. A descriptive analysis of the research variables is then conducted, culminating in the testing of the research hypotheses.

1.7.2.1 Validity and reliability:

The researcher conducted interviews with specialists, including scholars, bank managers, and FinTech specialists, to evaluate the content validity of the instrument. The specialists provided positive feedback, affirming that the items are clear, easy to comprehend, and appropriately represent the variables being assessed. Additionally, they highlighted that the measurement scales have been widely used in previous studies to measure similar variables, further supporting the instrument's content validity.

The reliability of the instrument is evaluated using the corrected item-total correlation and Cronbach's α coefficient. The corrected item-total correlation is initially calculated to assess the degree of convergence between each item and the overall scale. Items with a corrected item-total correlation below 0.30 are removed, and Cronbach's α is recalculated after deletion. Conversely, if all items achieve a corrected item-total correlation greater than 0.30,

no items are eliminated, and the Cronbach's α coefficient remains unchanged before and after item deletion.

Table 3 illustrates that all items exhibit corrected item-total correlations exceeding 0.30, signifying that no items require deletion. Consequently, the Cronbach's α coefficients remain consistent before and after deletion across all scales. Moreover, all scales exhibit a Cronbach's α coefficient above 0.7, demonstrating their reliability.

Table 3: Reliability analysis

Scale items	Corrected item-total correlation	Pre-deletion Cronbach's $\boldsymbol{\alpha}$	Deleted items	Post-deletion Cronbach's $\boldsymbol{\alpha}$
Financial Inclusion [$\boldsymbol{FI}$ $(\boldsymbol{x_1})$]				
$\boldsymbol{FI}$ 1	.430	0.750	———	0.750
$\boldsymbol{FI}$ 2	.409			
$\boldsymbol{FI}$ 3	.405			
$\boldsymbol{FI}$ 4	.418			
$\boldsymbol{FI}$ 5	.403			
$\boldsymbol{FI}$ 6	.434			
$\boldsymbol{FI}$ 7	.448			
$\boldsymbol{FI}$ 8	.399			
$\boldsymbol{FI}$ 9	.369			
$\boldsymbol{FI}$ 10	.387			
Alternative Payment Methods [$\boldsymbol{APMs}$ $(\boldsymbol{x_2})$]				
$\boldsymbol{APMs}$ 1	.408	0.760	———	0.760
$\boldsymbol{APMs}$ 2	.463			
$\boldsymbol{APMs}$ 3	.502			
$\boldsymbol{APMs}$ 4	.370			
$\boldsymbol{APMs}$ 5	.429			
$\boldsymbol{APMs}$ 6	.392			
$\boldsymbol{APMs}$ 7	.504			
$\boldsymbol{APMs}$ 8	.351			
$\boldsymbol{APMs}$ 9	.366			
$\boldsymbol{APMs}$ 10	.443			
Automation [$\boldsymbol{Auto}$ $(\boldsymbol{x_3})$]				
$\boldsymbol{Auto}$ 1	.414	0.761	———	0.761
$\boldsymbol{Auto}$ 2	.432			
$\boldsymbol{Auto}$ 3	.395			
$\boldsymbol{Auto}$ 4	.411			
$\boldsymbol{Auto}$ 5	.403			
$\boldsymbol{Auto}$ 6	.424			
$\boldsymbol{Auto}$ 7	.479			
$\boldsymbol{Auto}$ 8	.414			
$\boldsymbol{Auto}$ 9	.386			
$\boldsymbol{Auto}$ 10	.477			
Bank performance [$\boldsymbol{Bperf}$ $(\boldsymbol{y_1})$]				

$\boldsymbol{Bperf\ 1}$	.469			
$\boldsymbol{Bperf\ 2}$	.487			
$\boldsymbol{Bperf\ 3}$	.435			
$\boldsymbol{Bperf\ 4}$	.437			
$\boldsymbol{Bperf\ 5}$	.462			
$\boldsymbol{Bperf\ 6}$	.485			
$\boldsymbol{Bperf\ 7}$	.515			
$\boldsymbol{Bperf}$ 8	.490			
$\boldsymbol{Bperf}$ 9	.544	0.859	———	0.859
$\boldsymbol{Bperf}$ 10	.498			
$\boldsymbol{Bperf}$ 11	.459			
$\boldsymbol{Bperf}$ 12	.410			
$\boldsymbol{Bperf}$ 13	.434			
$\boldsymbol{Bperf}$ 14	.484			
$\boldsymbol{Bperf}$ 15	.478			
$\boldsymbol{Bperf}$ 16	.406			
$\boldsymbol{Bperf}$ 17	.413			
$\boldsymbol{Bperf}$ 18	.454			
Bank competitiveness [$\boldsymbol{Bcomp}$ $(\boldsymbol{y_2})$]				
$\boldsymbol{Bcomp}$ 1	.506			
$\boldsymbol{Bcomp}$ 2	.431			
$\boldsymbol{Bcomp}$ 3	.533	0.743	———	0.743
$\boldsymbol{Bcomp}$ 4	.517			
$\boldsymbol{Bcomp}$ 5	.543			

1.7.2.2 Sample demographics:

Table 4 presents the demographic characteristics of the sample. The majority of respondents are male (58.5%), fall within the 30 – 40 age group (42.3%), have 5 to 10 years of professional experience (36.7%), and hold a bachelor's degree (51.4%).

Table 4: Demographic composition of the sample

Factor	Characteristic	Frequency and Percentage (%)
Gender ($\boldsymbol{n = 381}$)	Male	223 (58.5%)
	Female	158 (41.5%)
Age ($\boldsymbol{n = 381}$)	Below 30	151 (39.6%)
	From 30 to 40	161 (42.3%)
	Above 40	69 (18.1%)
Experience ($\boldsymbol{n = 381}$)	Below 5 years	123 (32.3%)
	From 5 to 10 years	140 (36.7%)
	Above 10 years	118 (31.0%)
Education ($\boldsymbol{n = 381}$)	Bachelor	196 (51.4%)
	Master	125 (32.8%)
	Ph.D.	60 (15.7%)

1.7.2.3 Descriptive analysis:

Table 5 provides an overview of the research variables. Respondents from Saudi banks perceive that these institutions adopt and benefit from Financial Inclusion [$\boldsymbol{FI}$ $(\boldsymbol{x_1})$] (μ = 3.6071), Alternative Payment Methods [$APMs$ (x_2)] (μ = 3.5606), and Automation [$Auto$ (x_3)] (μ = 3.5803). Additionally, they affirm that Financial inclusion, alternative payment methods, and automation, collectively referred to as [$FinTech$ (x)], contribute to enhancing the performance [$Bperf$ (y_1)] (μ = 3.5575) and competitiveness [$Bcomp$ (y_2)] (μ = 3.4751) of Saudi banks.

Table 5: Descriptive analysis

Scale items	Arithmetic mean ($\boldsymbol{\mu}$)	Standard deviation ($\boldsymbol{\sigma}$)	Min	Max
Financial Inclusion [$\boldsymbol{FI}$ $(\boldsymbol{x_1})$]				
$\boldsymbol{FI}$ 1	3.6247	1.31322		
$\boldsymbol{FI}$ 2	3.6772	1.39103		
$\boldsymbol{FI}$ 3	3.6588	1.36270		
$\boldsymbol{FI}$ 4	3.5748	1.35639		
$\boldsymbol{FI}$ 5	3.6877	1.34148		
$\boldsymbol{FI}$ 6	3.5302	1.36969		
$\boldsymbol{FI}$ 7	3.4541	1.39967		
$\boldsymbol{FI}$ 8	3.6142	1.33602		
$\boldsymbol{FI}$ 9	3.6299	1.35804		
$\boldsymbol{FI}$ 10	3.6194	1.40095		
$\boldsymbol{FI}$ $(\boldsymbol{x_1})$	3.6071	.75584	1.40	5.00
Alternative Payment Methods [$\boldsymbol{APMs}$ $(\boldsymbol{x_2})$]				
$\boldsymbol{APMs}$ 1	3.6719	1.37648		
$\boldsymbol{APMs}$ 2	3.6562	1.41603		
$\boldsymbol{APMs}$ 3	3.4803	1.43738		
$\boldsymbol{APMs}$ 4	3.5591	1.43446		
$\boldsymbol{APMs}$ 5	3.5118	1.43930		
$\boldsymbol{APMs}$ 6	3.5669	1.43228		
$\boldsymbol{APMs}$ 7	3.6063	1.30681		
$\boldsymbol{APMs}$ 8	3.4514	1.44035		
$\boldsymbol{APMs}$ 9	3.5564	1.38416		
$\boldsymbol{APMs}$ 10	3.5459	1.43678		
$\boldsymbol{APMs}$ $(\boldsymbol{x_2})$	3.5606	.79351	1.30	5.00
Automation [$\boldsymbol{Auto}$ $(\boldsymbol{x_3})$]				
$\boldsymbol{Auto}$ 1	3.6430	1.37406		
$\boldsymbol{Auto}$ 2	3.5984	1.36455		
$\boldsymbol{Auto}$ 3	3.5906	1.39182		
$\boldsymbol{Auto}$ 4	3.5748	1.37947		
$\boldsymbol{Auto}$ 5	3.5879	1.39199		
$\boldsymbol{Auto}$ 6	3.5853	1.39026		
$\boldsymbol{Auto}$ 7	3.5118	1.43563		
$\boldsymbol{Auto}$ 8	3.6562	1.35332		
$\boldsymbol{Auto}$ 9	3.5171	1.38140		
$\boldsymbol{Auto}$ 10	3.5381	1.40366		
$\boldsymbol{Auto}$ $(\boldsymbol{x_3})$	3.5803	.78153	1.40	5.00

Bank performance [$\boldsymbol{Bperf}$ $(\boldsymbol{y_1})$]				
$\boldsymbol{Bperf\ 1}$	3.5643	1.31757		
$\boldsymbol{Bperf\ 2}$	3.4934	1.33302		
$\boldsymbol{Bperf\ 3}$	3.5354	1.34827		
$\boldsymbol{Bperf\ 4}$	3.6273	1.25978		
$\boldsymbol{Bperf\ 5}$	3.4357	1.32553		
$\boldsymbol{Bperf\ 6}$	3.4698	1.36005		
$\boldsymbol{Bperf\ 7}$	3.6063	1.39071		
$\boldsymbol{Bperf}$ 8	3.6535	1.27967		
$\boldsymbol{Bperf}$ 9	3.5066	1.40041		
$\boldsymbol{Bperf}$ 10	3.5039	1.37577		
$\boldsymbol{Bperf}$ 11	3.6378	1.39738		
$\boldsymbol{Bperf}$ 12	3.7507	1.31521		
$\boldsymbol{Bperf}$ 13	3.6010	1.33314		
$\boldsymbol{Bperf}$ 14	3.5591	1.36875		
$\boldsymbol{Bperf}$ 15	3.5276	1.38693		
$\boldsymbol{Bperf}$ 16	3.6010	1.37397		
$\boldsymbol{Bperf}$ 17	3.5066	1.27448		
$\boldsymbol{Bperf}$ 18	3.4541	1.35961		
$\boldsymbol{Bperf}$ $(\boldsymbol{y_1})$	3.5575	.73024	1.44	5.00
Bank competitiveness $Bcomp$ $(y2)$				
$\boldsymbol{Bcomp}$ 1	3.4121	1.31420		
$\boldsymbol{Bcomp}$ 2	3.4357	1.28111		
$\boldsymbol{Bcomp}$ 3	3.4882	1.32307		
$\boldsymbol{Bcomp}$ 4	3.6535	1.25054		
$\boldsymbol{Bcomp}$ 5	3.3858	1.27143		
$\boldsymbol{Bcomp}$ $(\boldsymbol{y_2})$	3.4751	.90457	1.00	5.00

1.7.2.4 Correlation analysis:

Table 6 presents the correlation coefficients among the research variables. Financial Inclusion, Alternative Payment Methods, and Automation are positively and significantly correlated with both bank performance (FI: 0.592; $APMs$: 0.610; $Auto$: 0.620; p-value = 0.000) and bank competitiveness (FI: 0.626; $APMs$: 0.643; $Auto$: 0.623; p-value = 0.000). These findings highlight a significant association between FinTech dimensions and the performance and competitiveness of banks.

Table 6: Correlation analysis

Variable	$\boldsymbol{FI\ (x_1)}$	$\boldsymbol{APMs(x_2)}$	$\boldsymbol{Auto\ (x_3)}$	$\boldsymbol{Bperf\ (y_1)}$	$\boldsymbol{Bcomp\ (y_2)}$
Financial Inclusion $\boldsymbol{FI\ (x_1)}$	1				
Alternative Payment Methods $\boldsymbol{APMs\ (x_2)}$	.479**	1			
Automation $\boldsymbol{Auto\ (x_3)}$	.445**	.527**	1		
Bank performance $\boldsymbol{Bperf\ (y_1)}$	.592**	.610**	.620**	1	
Bank competitiveness $\boldsymbol{Bperf\ (y_2)}$	.626**	.64.3**	.623**	.793**	1
**Correlation is significant at the 0.05 level (2-tailed).					

1.7.2.5 Diagnostic checks and model fit:

Although regression models are generally robust to minor assumption violations, certain assumptions must be satisfied to ensure reliable results. These include the absence of multicollinearity, autocorrelation, heteroscedasticity, and non-normality of residuals. **Table 7** presents the diagnostic checks for both models, confirming that they are free from multicollinearity and autocorrelation. Additionally, the models demonstrate homoscedasticity and normally distributed residuals.

Table 7: Diagnostic checks

Assumption	Test	Test result	Standard	Result
Model 1: $\boldsymbol{FinTech\ (x) \rightarrow Bperf\ (y_1)}$				
Multicollinearity	VIF	Range: 1.390 – 1.542	VIF < 10	Supported
	Tolerance	Range: 0.648 – 0.719	Tolerance > 0.1	
Autocorrelation	Durbin-Watson	2.042	1.5 – 2.5	Supported
Homoscedasticity	r between ZPR and ABSZRE	Non-significant (0.210) at $\alpha = 0.05$	Non-significant	Supported
Normality of residuals	Kolmogorov-Smirnov	Non-significant (0.060) at $\alpha = 0.05$	Non-significant	Supported
Model 2: $\boldsymbol{FinTech\ (x) \rightarrow Bcomp\ (y_2)}$				
Multicollinearity	VIF	Range: 1.390 – 1.542	VIF < 10	Supported
	Tolerance	Range: 0.648 – 0.719	Tolerance > 0.1	
Autocorrelation	Durbin-Watson	1.769	1.5 – 2.5	Supported
Homoscedasticity	r between ZPR and ABSZRE	Non-significant (0.955) at $\alpha = 0.05$	Non-significant	Supported
Normality of residuals	Kolmogorov-Smirnov	Non-significant (0.071) at $\alpha = 0.05$	Non-significant	Supported

ZPR: Standardized Predicted Values (ZPR).
ABSZRE: Absolute Values of Standardized Residuals (ABSZRE).

As shown in **Table 8**, $FinTech$ dimensions explain 56% of the variability in bank performance, and 60.4% of the variability in bank competitiveness. The models are also significant (p-value = 0.0000) at $\alpha = 0.05$.

Table 8: Model fit and significance

Model fit	Model 1	Adjusted $\boldsymbol{R^2}$	0.560
		S_e	0.48456
	Model 2	Adjusted $\boldsymbol{R^2}$	0.604
		S_e	0.56922
Model significance	Model 1	F	162.008**
	Model 2	F	194.209**
**Significant at $\boldsymbol{\alpha} = 0.05$			

1.7.2.6 Hypothesis testing:

Table 9 summarizes hypothesis testing results. H_1 states that FinTech dimensions have a significant impact on bank performance. It is tested using model 1. The sub-hypotheses H_{11}, H_{12}, and H_{13} tests the impact of each dimension individually. H_{11} states that Financial Inclusion (FI) has a significant impact on bank performance (Bperf). Results show that β_1 is positive and statistically significant at $\alpha = 0.05$ ($\beta_1 = 0.296$; p-value = 0.000), indicating that Financial Inclusion (FI) has a significant positive impact on bank performance (Bperf). In other words, a one unit increase in FI corresponds to a 0.296 increase in Bperf. Therefore, H_{11} is supported. The results also support H_{12} ($\beta_2 = 0.265$; p-value = 0.000), which states that Alternative Payment Methods (APMs) have a significant impact on bank performance (Bperf). A one unit increase in APMs corresponds to a 0.265 increase in Bperf. Therefore, Alternative Payment Methods (APMs) have a significant positive impact on bank performance (Bperf). Similarly, H_{13}, which states that Automation (Auto) has a significant impact on bank performance (Bperf), is supported ($\beta_2 = 0.311$; p-value = 0.000). A one unit increase in Auto corresponds to a 0.311 increase in Bperf. Thus, Automation (Auto) has a significant positive impact on bank performance (Bperf).

Table 9: Hypothesis testing

Result	***p***-values	***t***-values	Beta (***β***)	Analysis	Relationship	Hypothesis
Supported	.000	7.631	.296	Multiple regression model 1	$FI \rightarrow Bperf$	$\boldsymbol{H_{11}}$
Supported	.000	6.815	.265		$APMs \rightarrow Bperf$	$\boldsymbol{H_{12}}$
Supported	.000	8.020	.311		$Auto \rightarrow Bperf$	$\boldsymbol{H_{13}}$
Supported	.000	8.859	.403	Multiple regression model 2	$FI \rightarrow Bcomp$	$\boldsymbol{H_{21}}$
Supported	.000	8.044	.368		$APMs \rightarrow Bcomp$	$\boldsymbol{H_{22}}$
Supported	.000	7.704	.350		$Auto \rightarrow Bcomp$	$\boldsymbol{H_{23}}$

Correspondingly, H_2 states that FinTech dimensions have a significant impact on bank competitiveness. It is tested using model 2. The sub-hypotheses H_{21}, H_{22}, and H_{23} tests the impact of each dimension individually. H_{21} states that Financial Inclusion (FI) has a significant impact on bank competitiveness (Bcomp), which is supported by the results. β_1 is positive and statistically significant at $\alpha = 0.05$ ($\beta_1 = 0.296$; p-value = 0.000), indicating that Financial Inclusion (FI) has a significant positive impact on bank competitiveness (Bcomp). Specifically, a one unit increase in FI corresponds to a 0.403 increase in Bcomp. Similarly, the results support H_{22} ($\beta_2 = 0.368$; p-value = 0.000), which states that Alternative Payment Methods (APMs) have a significant impact on bank competitiveness (Bcomp). A one unit increase in APMs corresponds to a 0.368 increase in Bcomp. Thus, Alternative Payment Methods (APMs) have a significant positive impact on bank competitiveness (Bcomp). The results also support H_{23} ($\beta_2 = 0.350$; p-value = 0.000), which states that Automation (Auto) has a significant impact on bank competitiveness (Bcomp). A one unit increase in Auto enhances Bcomp by 0.350. Therefore, Automation (Auto) has a significant positive impact on bank competitiveness (Bcomp).

Overall, FinTech (x) has a positive and statistically significant impact on the performance (Bperf) and competitiveness (Bcomp) of Saudi banks, supporting H_1 and H_2.

1.8 Discussion:

This study explored the opportunities and challenges of adopting FinTech in Saudi banks, focusing on Financial Inclusion (FI), Alternative Payment Methods (APMs), and Automation (Auto). Through a survey of bank employees, it examined perceptions of how these FinTech dimensions (FI, APMs, and Auto) influence bank performance and competitiveness, contributing to the broader discourse on FinTech's impact in the banking sector.

The study found that incorporating Financial Inclusion (FI) into Saudi banks significantly boosts their performance (H_{11}) and competitiveness (H_{21}). Providing accessible, affordable, and secure financial services attracts previously unbanked individuals, increasing market share and profitability while potentially fostering economic growth. These findings align with existing research on the positive impact of FI on bank performance and competitiveness (Hidayat-ur-Rehman, 2024; Shihadeh, 2020; Shihadeh et al., 2018; Vo & Nguyen, 2021). They also underscore Saudi Arabia's focus on financial inclusion through initiatives like the Financial Sector Development Program 2020 and Vision 2030.

The study also revealed that utilizing Alternative Payment Methods (APMs) in Saudi banks positively and significantly influence their performance (H_{12}) and competitiveness (H_{22}). Alternative Payment Methods (APMs) offer cost-effective, efficient, and secure solutions compared to traditional payment systems, enhancing customer satisfaction while lowering operational costs. This can lead to improved profitability and a competitive advantage for banks offering such services. These results align with previous studies highlighting APMs' positive impact on bank performance and competitiveness (Hidayat-ur-Rehman, 2024; Mustapha, 2018). They also reflect Saudi Arabia's focus on digital payments and alternative methods under Vision 2030.

The study identified a significant positive effect of Automation (Auto) on both bank performance (H_{13}) and competitiveness (H_{23}). Automation enables banks to deliver efficient and timely financial services while reducing operational costs. Beyond performance improvements, automated banks are better positioned to achieve a competitive advantage compared to semi- or non-automated counterparts. These results are consistent with earlier studies affirming automation's positive impact on bank performance (Ciciretti et al., 2009; Hidayat-ur-Rehman, 2024; Malhotra & Singh, 2009; Uchida et al., 2011). They also highlight the strategic importance of digital automation in Saudi Arabia's Vision 2030.

1.9 Conclusions:

The study found that FinTech adoption enhances the performance and competitiveness of Saudi banks, as perceived by their employees. To capitalize on this, banks should expand FinTech initiatives, emphasizing Financial Inclusion (FI), Alternative Payment Methods (APMs), and Automation (Auto) to boost profitability and market share. Although FinTech requires substantial initial investment and its benefits may take time to materialize, they are sustainable once achieved. However, challenges such as security and privacy risks, employee resistance to technology, and the need for ongoing maintenance and updates must be addressed promptly. Additionally, Saudi banks should promote financial literacy by organizing

workshops to educate clients about FinTech benefits, helping to alleviate security and privacy concerns.

The study provides several practical implications for bank managers, employees, clients, and FinTech firms. For bank managers, the findings can guide decisions on FinTech investments to enhance performance and competitiveness while addressing implementation challenges encountered by other banks. The insights also assist managers in selecting skilled employees capable of thriving in a technology-driven environment. Bank employees can leverage the findings to equip themselves with the expertise needed to effectively interact with FinTech solutions. Additionally, the study informs bank clients about the advantages of using FinTech and alternative payment methods (APMs), helping to address concerns about security and privacy. Finally, FinTech firms can apply the findings to establish mutually beneficial, long-term partnerships with Saudi banks.

The study's findings are constrained by the limited sample size of 381 Saudi bank employees, which may affect their generalizability. To address this, future studies should explore similar topics in different contexts. Additionally, further research could investigate the impact of FinTech adoption on factors such as sustainability, risk-taking, stability, and liquidity. The study also highlights the need for empirical research to validate its conclusions.

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