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Research Article

The Impact of Financial Literacy on the Adoption of DeFi and Centralized Fintech in Saudi Arabia

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ABSTRACT

Purpose: This research analyzes the comparative risks, scalability, and adoption of decentralized finance (DeFi) versus centralized fintech solutions in the context of Saudi Arabia. It seeks to explain the models' acceptance and intended focus on the challenges and opportunities each model presents within the financial landscape of the Kingdom. Methodology: The research followed a survey-based design which fit the systematic collection of data to be analyzed quantitatively. Stratified random sampling was used to select a representative diverse demographic sample of 525 participants. Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) which assessed the interplay between DeFi and centralized fintech platforms through perceived risks, scalability, and adoption factors. Findings: The results demonstrated that Centralized Fintech has a marked impact on fintech adoption in Saudi Arabia, noting importance of trust and regulation. DeFi did not have any appreciable impact on adoption. Perceived Trust and Security and Financial Literacy does not appear to mediate or moderate the relationship these models have with adoption suggesting stronger external influences, such as regulatory environment, drive change. Limitations/implications: The scope of this study is limited by Saudi Arabia's context and the use of self-reported data. Other regions could be studied along with the undergoing regulatory change, along with socio-economic factors concerning fintech adoption. Originality/value: This research is unique in focusing on the comparative analysis of DeFi and Centralized Fintech in Saudi Arabia. It also serves as an information source for policymakers and fintech developers in formulating policies aimed at increasing the region's fintech adoption.

Keywords: DeFi, Centralized Fintech, Adoption, Financial Literacy, Saudi Arabia, Trust, Regulatory Compliance, Technology Acceptance Model (TAM).

INTRODUCTION

Decentralized Finance (DeFi) has surfaced as a new approach in the juxtaposition of centralized finances, pivots of old, traditional financial institutions. It is marked by transaction operations through blockchain technology alongside smart contracts that eliminate the needs for intermediaries' stalls like banks and payment processors. This does not only improve funding transparency, independence and access, but also significantly assists the underserved population by traditional financial systems emphasizing the essence of decentralized institutions.

One of the most important benefits in Defi remains in its focus towards financial inclusion which opposes the conventional banking system dominated with opacity and thus charges fee-based services coupled with cumbersome requirement; The open infrastructure of DeFi enables users to directly access financial services and eliminates costly intermediaries that slow down transactions while

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increasing the price. With enhanced control over finances, it assists to evolve from lending and borrowing to yield farming and foster innovative applications (Abdollah 2022, Mustafa 2024).

DeFi and centralized Cashless Society (CS) fintech solutions, each in their own right, present problems and innovations to the evolving technology of governance, safety, user involvement, and beyond. These innovations could potentially transform the structure of global financial relations. One way or another, we are heading to a greater integrated finance world where both centralized and decentralized methodologies will be blended or hybridized (Hamadien 2022).

The technological advancement and regulatory development under the Kingdom's Vision 2030 have greatly transformed the fintech landscape in Saudi Arabia. This vision seeks to diversify the economy, reduce the dependence on oil, and increase the utilization of financial technologies across various sectors (Ameen and Afşar 2023, Alghamdi 2024, Ali, Shahzad et al. 2024).

Aldaarmi's work sheds light on the regulatory, technological, and market constraints that impact the growth of fintech enterprises in Saudi Arabia. To fill this gap, it would be interesting to find out how the regulations in the Kingdom of Saudi Arabia **uniquely** impact decentralized and centralized frameworks of fintech. The point here is how explained DeFi and centralized fintech. This matters because the intersections of innovation and regulation often require careful navigation. The swift pace of innovation is often tempered by a regulatory hand that must tread cautiously (Huo, Xiohui et al. 2024).

A knowledge of finance will directly affect the adaptability of the customers and their perceptions of the fintech services offered. Evidence suggests that the financial awareness of customers largely determines the willingness to adopt fintech services. Still, the authors do not tell us which model, DeFi or centralized finance, is more user-friendly to financially illiterate people. By understanding how educational programs could optimize these variables, researchers could develop targeted strategies to enhance adoption rates among diverse user demographics (Chang, Lu et al. 2024, Putrevu and Mertzanis 2024).

OBJECTIVES OF STUDY

This study aims to strategically evaluate the risk, scalability, and adoption of decentralized finance (DeFi) platforms and centralized fintech solutions within the context of Saudi Arabia. With the incessant changes in the fintech industry, Saudi consumers, businesses, and regulators need to be aware of the impacts and manage appropriately concerning these aspects. Risk analysis involves examining all dimensions of DeFi and centralized fintech platforms. DeFi platforms experience risk differently than centralized networks; the decentralized market, for example, might come with additional challenges like smart contract risk and market volatility threats while centralized alternatives carry supervisory risk, operational risk, and hacking risk. Preliminary research indicates a significant gap in the regulatory approach towards DeFi, exposing users to far greater risks than those found within traditional centralized frameworks (Nilashi, Abumalloh et al. 2024).

Scalability is another primary focus area needing comparative evaluation. As centralized fintech solutions often rely on existing infrastructure, they may be more easily scaled than DeFi systems which must contend with a distributed transactional network. Innovative DeFi platforms face limitations during peak periods relating to scalability due to blockchain network congestion and elevated fees which deteriorates user experience. Limitations of scalability in DeFi platforms are tied to the consensus determining mechanisms used which restricts the speed of transactions and overall operational efficiency (Marhaeni, Jermsittiparsert et al. 2023).

Understanding the impact of both DeFi and centralized fintech solutions introduces essential factors pertaining to their interactions within the financial ecosystem of Saudi Arabia. User perception, financial literacy, and even technological proficiency may stand as gatekeepers to adoption. Within this scope, cultural factors may have significance pertaining to user adoption of either model of fintech .

To conclude this study seeks to address the underexplored implications of the risks of scalability and

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adoption rates of technology in Saudi Arabia's fintech landscape, specifically examining the contrasts between DeFi and centralized approaches. Filling these gaps will suggest strategies for stakeholders seeking to improve the proposition of financial technology services in the Kingdom(Uddin and Barai 2022).

Research Questions:

Q1: What are the risks associated with DeFi and centralized fintech solutions in Saudi Arabia?

Q2: How scalable are DeFi platforms and centralized fintech solutions in the Saudi market?

Q3: What factors influence the adoption of DeFi platforms versus centralized fintech solutions in Saudi Arabia?

LITERATURE REVIEW

Overview of DeFi Platforms:

Also called as DeFi, Decentralized Finance serves a new paradigm in the financial world, involves the use of blockchain technology to create a decentralized finance system that is free from intermediary institutions like banks. With DeFi, people can lend, borrow, trade, and invest with other people directly without needing to go through a third party which increases availability and lowers costs associated with centralized systems. Buying and selling, investing, borrowing and lending money are activities that DeFi implements. However, DeFi is distinguished from traditional lenders and banks when it comes to its operational model, peer to peer based mobile protocols without intermediaries as well as decentralized peer to peer based mobile protocols. Underpinning many of the DeFi applications are open blockchains like Ethereum providing them with the infrastructural support(Zaman, Tlemsani et al. 2025) .

The following features can be used to separate DeFi platforms from one another. The removal of middlemen is a hallmark of DeFi platforms allowing transactions between the parties which leads to greater control over one's finances: autonomy of one's assets Onufreiciuc. Transparency: In DeFi Platforms, all transactions can be seen on blockchains that everyone can access their ledgers for all other participants to see. Because stakeholders can check the data audit and control the transaction which builds credibility between the users (Swaiss 2024).

Permissionless Access: Users from all walks of life can participate in financial activities because DeFi systems are accessible to anyone who has internet access, especially those who are usually neglected by traditional financial institutions. Interoperability: User experience and integrative functionalities are enhanced as DeFi platforms are tailored to interface with multiple blockchain networks and other financial applications. Programmability: By means of smart contracts, trustless financial services providing automation can be achieved without human supervision, making financial services more efficient and less costly (Zheng Hong 2022).

Overview of Centralized Fintech Solutions:

The term CeFi refers to centralized fintech, which involves the provision of financial services through a technological or software platform, but with the non-devolutionary control of a financial institution or company. The model utilizes standard business practices in finance blended with technology to provide effective service and adapt to increasingly complex consumer needs. Fintech's centralization can be described as the application of innovations, particularly, technology, to enhance and automate the issuance and use of financial services and products within a system supervised by a financial institution or an entity. In this model, banks or fintech companies serve as intermediaries, managing

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interactions and ensuring adherence to laws. Typical CeFi platform services include payments, loans, investments, insurance, and remittance (Al-jabra, AlNuhait et al. 2023).

Integration with Traditional Banking Systems:

Seamless integration with banking infrastructures ever presents them makes scalability easier. Centralized fintech companies have many partnerships obstacles with traditional financial institutions as they are often viewed as competition and not as potential business partne. These relationship dynamics affect lean scaling and force businesses to compete or pursue strategic partnerships to enhance growth (Lee, Shih et al. 2023).

Comparative Studies on DeFi and Centralized Fintech

Global Perspective on Financial Inclusion:

A noteworthy input is from Mbate et al. who elaborate on the role of fintech, including DeFi and centralized models, as a driver for financial inclusion. They discuss how fintech allows small businesses in developing countries to access capital which would otherwise be very difficult to obtain from commercial banks. As the comparison shows, centralized fintech allocates systems through which financial participation is integrated within the current framework, whereas DeFi tokenizes assets and allows a greater proportion of users to securely access enabled participation without the need for intermediaries—sometimes even evading reliance on traditional systems of regulation (Iddrisu, Yakubu et al. 2025).

Category	Key Findings
Financial Inclusion	Mbate et al: DeFi tokenizes assets and enables broader user participation, bypassing traditional regulatory frameworks.
Regulatory Challenges	Taujanskaitė & Kuizinaitė: Regulatory clarity is essential for the success of both DeFi and centralized fintech. DeFi often operates in non-regulated environments.
Trust and Adoption Factors	Avarmaa et al: Centralized fintech benefits from established trust and regulatory compliance, while DeFi faces challenges in acquiring trust.
Scalability and Technological Infrastructure	Joshi & Karmacharya: Centralized fintech scales better due to established infrastructure; DeFi faces transaction speed and congestion issues.
Adaptation to Environmental and Societal Changes	Zhang: Centralized fintech can respond quickly to market changes; DeFi shows adaptability to environmental trends and green finance.
Convergence and Future Opportunities	Zhang: Convergence of DeFi and centralized fintech could synthesize strengths, providing enhanced security and transparency.
Risk: Perceived Risks vs. Benefits	Juita et al: Benefits outweigh risks in fintech adoption; convenience is the most influential factor.
Risk: Operational Risks	Samuvel: Fintech integration with traditional banking can reduce operational risks by improving efficiency.
Risk: Regulatory Uncertainties	

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Category	Key Findings
	Harvey & Rabetti: DeFi faces regulatory uncertainties that hinder stability, while centralized fintech has the advantage of established regulatory frameworks.
Scalability: Infrastructure Limitations	Anestiawati et al: Centralized fintech benefits from established infrastructure; DeFi struggles with transaction speed and network congestion.
Scalability: Integration and Partnership Challenges	Webb: Integration with traditional banking infrastructure facilitates scalability for centralized fintech; DeFi lacks such integration.
Adoption: User Adoption Trends	Webb: DeFi adoption is influenced by demographic and psychographic factors in emerging economies.
Adoption: Perception of Trust	Ed-Daoudy & Chakir: Trust plays a key role in fintech adoption, with positive perceptions driving broader market acceptance.
Adoption: Technology Acceptance Factors	Raza & Türsoy: Perceived usefulness and ease of use are strong predictors of fintech adoption in the Italian banking sector.

Identified Research Gaps:

Research conducted by Altwijry et al look at the context of fintech adoption in Saudi Arabia, however there is almost no research analyzing DeFi and centralized fintech solutions side by side. Most literature focuses on one aspect of an issue whether it is regulatory hurdles or user perceptions without analyzing the balance of efficiency, effectiveness, overlap, and interaction of both paradigms within one perimeter. Having an advantageous geographic position as well as a significant role in the Islamic finance world, Saudi Arabia is a territory with opportunities for Fintech solutions. That said, there is still a lack of study regarding how the Saudi Arabian culture, politics, and economics impact the landscape for DeFi and centralized fintech solutions in the region (Wiwoho, Trinugroho et al. 2024). Trust is argued to be a crucial component when dealing with the adoption of fintech solutions. Even with that claim, trust is not distinctly examined between DeFi and centralized solutions in the Saudi framework. While existing literature has explored the fintech industry's scalability, there is a lack of specific case comparisons of how DeFi and centralized systems face scalability challenges in the Saudi market. The operational and customer acquisition efficiencies as well as the technological infrastructures supporting scalability in both models are of great socio-economic importance and require thorough research which has yet to be conducted within the Kingdom. More direct analyses that compare and contrast DeFi against centralized solutions within the Saudi economic, regulatory, and cultural context are needed to address the gaps. Such research could reshape the discourse on cross-border financial technologies and assist in meeting national goals for financial innovation and diversification in the economy (Battanta, Lancioni et al. 2025).

Hypotheses Development

The researched areas do not seem to cover the impact of DeFi on Saudi Arabia and other country's general fintech adoption considerations. For example, in her paper Bajunaied et al. discusses the behavioral intentions of consumers towards various fintech services and in particular pays attention to factors such as performance expectancy, effort expectancy, facilitating conditions, and privacy enablers as significant determinants of adoption. Also, Amnas et al. discusses trust, performance expectancy, along with other UTAUT2 elements of fintech adoption with equal importance. Notably, DeFi is not mentioned in the context of Saudi Arabia, but Ellinger et al. captures it along with decentralized

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autonomous organizations (DAOs) and aims for a broader analysis. They put emphasis on Maker DAO as a key initiative of DeFi and argue that the idea is evidently penetrating the fintech realm internationally. Thus, devising such concepts could have a relative impact on fintech adoption in Saudi Arabia; however, there is no proof. To summarize, the presented research offers little evidence to support the hypothesis that DeFi has a positive impact on the level of fintech adoption in Saudi Arabia. However, it does indicate that trust, performance expectancy, privacy, and several other considerations are essential. To confirm the hypothesis, more studies concentrating on the impact of DeFi in the context of Saudi Arabia would be needed (Santi and Chalid 2024).

H1: DeFi (Decentralized Finance) positively influences the adoption of fintech solutions in Saudi Arabia.

The research mostly emphasizes the drivers of adoption in FinTech regarding different countries, including Saudi Arabia. Bajunaied et al. focuses on the FinTech adoption in Saudi and does not mention centralized FinTech as a driver at all. Rather, it cites performance expectancy, effort expectancy, facilitating conditions, and privacy enablers as having a positive impact on users' behavioral intentions toward FinTech services. It is fascinating to note that the studies show some inconsistencies and deviations regarding the issues that are commonly associated with FinTech adoption in different contexts. For example, social influence was found significant in a number of studies but did not have impact on FinTech adoption in Saudi Arabia. Also, privacy inhibitors did not impact behavioral intention of users in Saudi Arabia as much as would be expected. All in all, the available information does not directly test the hypothesis of centralized FinTech in Saudi Arabia. However, it does shed light on the more general factors that are considered in adopting FinTech services. Centralized FinTech would need more specific research to conclusively measure the impact on adoption in Saudi Arabia(Smolo and Mahomed 2024).

H2: The adoption of Fintech solutions in Saudi Arabia is positively influenced by Centralized Fintech.

Multifaceted trust and security are integral for adopting financial technologies in Saudi Arabia. Privacy and security concerns, for example, substantially impacted consumers' mobile banking usage intentions. Alomari and Abdul also indicated a positive relationship between security perception and the behavioral intention to use cryptocurrency among Saudi university students. In one of the more fascinating findings, Shin and suggest that users' trust in the blockchain underpinning much of DeFi is, in fact, shaped by cognitive heuristics rather than purely rational privacy and security considerations (Rajapathirana 2023).

H3: Perceived Trust and Security impacts the relationship of DeFi and its adoption in Saudi Arabia.

Trust has been underscored as one of the major determinants in adoption of FinTech services by a number of studies. Hu et al. claims that trust in FinTech services has a tremendous impact on users' attitudes towards adoption. Amnas et al. also notes trust's significant impact on FinTech use, emphasizing that it affects intentions to use and actual usage of FinTech services. Nonetheless, some discrepancies do arise from the findings. Nawayseh is among those who argue that security is not as important as most studies suggest; in a study focusing on Jordan, he concluded that perceived technology risks do not have a substantial impact on intention to use FinTech applications(Ofa, Nguyen et al. 2023). Though, the study remarked that trust mediates the relationship between perceived risks and the intention to use FinTech applications significantly (Naways . In summary, even though the context does not directly speak to the hypothesis of interest about centralized FinTech in Saudi Arabia, the context clearly illustrates that perceived trust and security significantly aid in mediating trust in

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FinTech adoption. To validate the hypothesis, more research focused directly on centralized FinTech in Saudi Arabia would be necessary(Kumar, Phani et al. 2023).

H4: In Saudi Arabia, the relationship between centralized fintech and its adoption is mediated by perceived trust and security.

The impacts of financial literacy on the financial behavior and decisions of people in Saudi Arabia are well-documented. Financial literacy, for one, has a positive impact on investment decisions and is linked to financial coping strategies alongside overall financial well-being. These results indicate that financial literacy might help in adopting new financial technologies such as DeFi. Alomari and Abdullah also claim, rather surprisingly, that in Saudi Arabia, financial literacy mitigates the influence of certain factors on the behavioral intention to use cryptocurrency. More specifically, "financial literacy moderates the associations with performance expectancy, security, social influence, and behavioral intention". This is important because cryptocurrency and DeFi are technologies that closely relate to each other. Still, it should be pointed out that the association between financial literacy and adoption of new technologies does not always incur a direct relationship. Alshebami and Marri found no connection between financial literacy and the intention to begin entrepreneurial activities; however, there were mediating effects through saving behavior (Alqahtani, Alshehri et al. 2024). To summarize, even though the evidence does not directly support the theory that financial literacy moderates the relationship between DeFi and its adoption in Saudi Arabia, existing literature indicates that financial literacy, in fact, impacts decisively the financial choices of citizens as well as the technology adoption in the country. Further research on financial literacy would need to look specifically into the adoption of DeFi to confirm this hypothesis(Brantley 2022).

H5: Financial Literacy moderates the relationship between DeFi and adoption in Saudi Arabia.

A number of studies seem to indicate that financial literacy does not contribute significantly to the adoption of fintech services. For example, Setiawan and his colleagues noted that financial literacy was the least influential indicator towards fintech adoption in Indonesia, which most people get wrong (Setiawan et al. In the same way, Nathan and others found out that financial literacy did not have a strong relationship towards fintech adoption in Vietnam. Strangely, some studies have financial literacy information that contradicts the previous findings (Morshed and Khrais 2025). For instance, Alomari and Abdullah investigating the adoption of cryptocurrency in Saudi Arabia argued that financial literacy did moderate the relationships between social influence, security, performance expectancy and behavioral intention to use cryptocurrency (Alomari & Abdullah. This means that financial literacy might moderate some aspects of fintech adoption in Saudi Arabia. To conclude, the above papers do not come to a consensus whether financial literacy moderates the adoption of fintech services. Some papers lean toward the argument that financial literacy does not play an important role in the adoption of fintech; other papers argue that financial literacy does have some impact, but only in specific situations (Ziapour Sohi, Sohi et al.). Unfortunately, because there is no available information regarding fintech, including centralized fintech in Saudi Arabia, the theory remains unproven as of now and requires further research to validate.

H6: Financial Literacy moderates the relationship between Centralized Fintech and adoption in Saudi Arabia**.**

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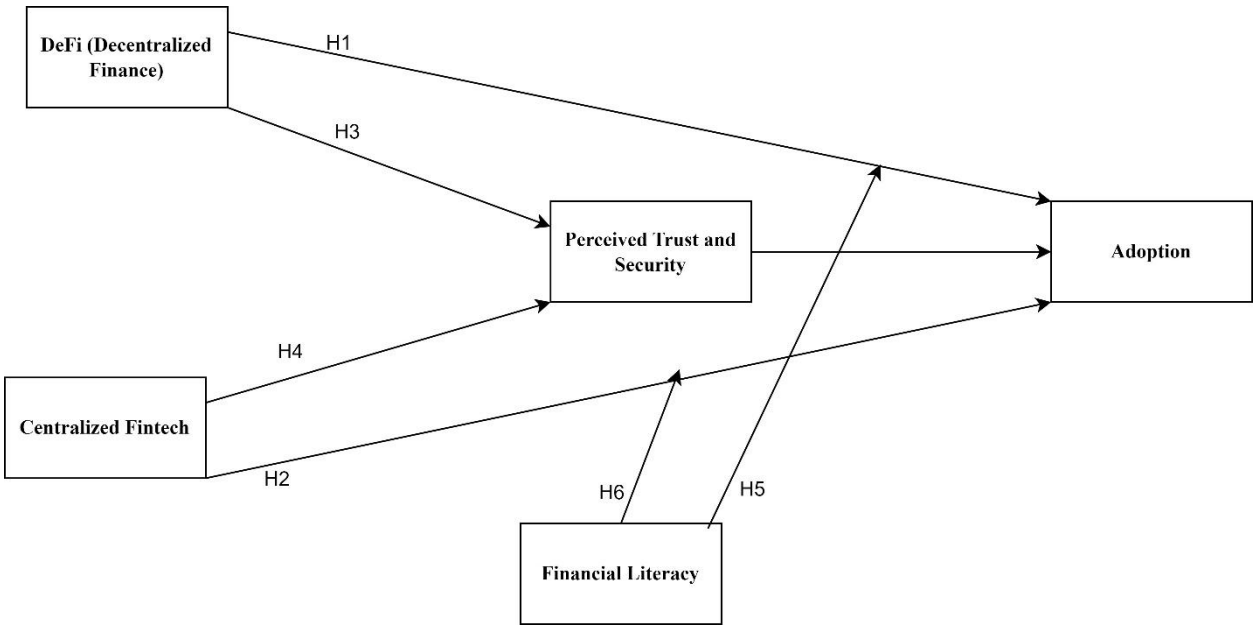

METHODOLOGY

Research Design

The design phase for this study consists of a quantitative, comparative analysis DeFi platforms and Centralized fintech solutions considering risks, scalability and adoption within Saudi Arabia. This study intends to find out the function of these two financial models in the increasingly digital world in the Kingdom. The relevant population includes DeFi participants, fintech customers, and financial specialists, which will be reached by employing a stratified random sampling method. Perceptions regarding risks, scalability constraints, and determinants of adoption over the platform will be captured using surveys or questionnaires and analyzed afterward. The analysis will utilize PLS-SEM, a sophisticated statistical technique designed for conspectus analysis of complex interrelationships involving many factors. The independent parameter is the classification of the platform (DeFi or centralized fintech), while the dependent variables will consist of perceived risks, costs (scalability), and adoption. Various demographic attributes like age, income, education, and other relevant control variables will also be included. This will estimate how the advanced DeFi compares and how centralized fintech is expected to develop in the Saudi Arabian ecosystem(Khan, ALGhamdi et al. 2022).

Sample Selection

This research study will use a sample of 525 participants who actively use DeFi platforms and centralized fintech services in Saudi Arabia. Participants will be divided into strata based on age, income, education level, and experience with fintech so that all demographic groups are represented. In this case, the sample will include participants aged 18 to 30, participants aged 31 to 45, and participants who are 46 years or older. Income will be divided into low, middle, and high. Education levels will include high school graduates, undergraduates, and graduates. Furthermore, participants will be classified into novices, intermediates, and experts based on their experience with fintech. Such stratification is important to capture the diverse views on the adoption and perception of DeFi and centralized fintech solutions in Saudi Arabia(Sukmana, Trianto et al. 2023).

Statistical power analysis set the sample size at 525, making certain the study has enough power to recognize meaningful differences between the two groups and that the error margin still lies within

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acceptable limits. Drawing from a sample of 525 helps the study guarantee dependable and precise results, increasing the range to which the results can be applied for the entire population of fintech users in Saudi Arabia. The dredged stratified sampling method is also defensible since it facilitates a better understanding of the fintech adoption, scalability, and risk perception- related relationship across different demographic age cohorts (Suzuki and Miah 2022).

Measurement Instruments

The study's measurement instruments will center on critical variables for the study under consideration. Each response will be evaluated using a 5-point Likert scale (1= Strongly Disagree, 5= Strongly Agree). For DeFi (Decentralized Finance), the measurement will bound items incorporating elements trust on decentralization, security perception, transparency, ease of use, speed of transactions, and accessibility of services. These items are modifications of those. For Centralized Fintech, I will use items pertaining to regulatory compliance, trust in financial institutions, ease of use, security, service availability, and transactional reliability to create six to seven items based on scales by Dehghani et al. and Khan et al. Perceived Trust and Security will comprise general technology trust, privacy safeguarding, perceived fraud risk, compliance trust, platform security features, and security assurances provided and Abdul-Rahim et al using six to seven items. Adoption will include use predictors such as ease of use, perceived usefulness, willingness to adopt, usage, perceived benefits, and behavioral intention measured by scales from Zhong-qing et al(Jegerson, Mertzanis et al. 2023).

Financial Literacy will be measured with six to seven items concerning comprehension of financial vocabulary, knowledge of fintech, evaluation capability of financial products, understanding of risks, financial decision-making, regulatory compliance, and knowledge skills captured from Ali et al. and Sadiq et. These items will provide relevant data to construct meaningful multi-dimensional analyses on what shapes DeFi and centralized fintech adoption(Khatatbeh, Al Salamat et al.).

Data Collection

The information for this study is gathered from surveys conducted on 625 participants, both users of Decentralized Finance (DeFi) and centralized fintech solutions in Saudi Arabia. These participants will be chosen through a stratified sampling method in order to capture demographics such as age, income, education, and prior experience with fintech. A total sample size of 625 was calculated using statistical power analysis to ensure the study's ability to detect meaningful differences between the two types of platforms while maintaining a low margin of error. To provide strong and precise findings representative of all DeFi and fintech users in Saudi Arabia, this number is sufficient. Participants' perceptions of the risks, scalability, and adoption of DeFi and centralized fintech platforms will be assessed through self-administered online surveys during the data collection process(Kaddour and Malherbe 2025).

The survey contains questions employing the Likert scale that address fundamental variables such as perceived risk, scalability, ease of use, security, and trust, all fetched from The Technology Acceptance Model (TAM) and some other earlier work on fintech adoption. To ensure maximum coverage, especially for younger, tech-savvy respondents who frequently use these platforms, social media and other digital channels will be leveraged for recruitment. Respondents will also be asked to report demographic information to control for such variables as age, income, and education level. Stratified sampling allows this survey to accurately reflect the wider Saudi Arabian fintech user population, thereby increasing the overall usefulness of the research. This methodology builds the overarching understanding of the dynamics of DeFi and centralized fintech adoption in Saudi Arabia while trying to fill some of the literary gaps on the topic (Akçetin 2023).

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RESULTS

Evaluation of the Measurement Model:

Table 1 shows the internal consistency, reliability, and convergent validity of the five constructs: Centralized Fintech (CF), Adoption (ADP), Perceived Trust and Security (PTS), Decentralized Finance (DF), and Financial Literacy (FL) along with their indicators. The indicators' outer loadings were accepted within the range of 0.699 to 0.975, which means there is a strong relationship between the indicators and their constructs. This is exemplified by the Adoption (ADP) construct which showed particularly high loadings, e.g ADP1=0.975. All constructs showed good internal consistency as Chonbach's Alpha values ranged from 0.830 to 0.942 which can be put under standard benchmarks greater than 0.7 (Nunnally, 1978). Construct reliability Composite values also confirm the validity of the resulting values as the range accepted from 0.835 to 0.996, accordingly greater than 0.7 value set by Fornell & Larcker (1981) confirms that the constructs are reliably measured. AVE values overall demonstrate strong convergent validity while FL recorded the highest result of 0.821 and DF with the lowest of 0.540. In relation to Fornell & Larcker an AVE result above 0.5 means satisfactory confirmation of a construct that measures more variance than the error in measuring. The table presents clear signs of strong reliability and validity across most constructs where small variations are present(Ashfaq, Hasan et al. 2023).

Table 1: Internal Consistency, Reliability and Convergent Validity

Construct	Indicator	Outer Loading (Standardized)	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
CF	CF1	0.718	0.891	0.908	0.646
	CF2	0.808			
	CF3	0.783			
	CF4	0.819			
	CF5	0.800			
	CF6	0.861			
ADP	ADP1	0.975	0.942	0.996	0.778
	ADP2	0.918			
	ADP3	0.735			
	ADP4	0.918			
	ADP5	0.972			
	ADP6	0.740			
PTS	PTS1	0.799	0.889	0.927	0.634
	PTS2	0.777			
	PTS3	0.815			
	PTS4	0.847			
	PTS5	0.806			
	PTS6	0.758			
DF	DF1	0.776	0.830	0.835	0.540

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	DF2	0.721			
	DF3	0.758			
	DF4	0.729			
	DF5	0.725			
	DF6	0.699			
	FL1	0.899			
FL	FL2	0.933	0.929	0.985	0.821
	FL3	0.911			
	FL4	0.880			

Discriminate Validity:

Table 2 displays the values of Heterotrait- Monotrait Ratio (HTMT) which is used to study the discriminant validity of constructs. HTMT of less than 0.85 is seen as good discriminant validity because there is no high correlation between the constructs (Henseler et al., 2015). The values indicate that all the HTMT ratios between the constructs comfortably sit beneath the 0.85 cut-off. As an example, the HTMT between the Adoption (ADP) and Centralized Fintech (CF) is 0.124, DeFi (DF) and Adoption (ADP) is 0.067, Financial Literacy (FL) and Perceived Trust and Security (PTS) is 0.033, all of which are substantially lower than the 0.85 mark. These findings support the conclusion that the constructs have inadequate overlap consistent with the strength of their discriminant validity. The low values across all combinations strengthen the perception that each construct marks a different aspect which is crucial for the measurement model (Tunzina, Chayon et al. 2024).

Table 2: Discriminate Validity Heterotrait- Monotrait Ratio (HTMT)

	ADP	**CF**	**DF**	**FL**	**PTS**
ADP					
CF	0.124				
DF	0.067	0.370			
FL	0.084	0.035	0.050		
PTS	0.055	0.088	0.269	0.033	

Multicollinearity

In Table 3, we include the values of the Variance Inflation Factor (VIF) for estimating multicollinearity, which examines the level of multicollinearity for structural equation modeling. Generally, VIF values of more than 5 or 10 are taken to have an indicator of one problem multicollinearity (Hair et al., 2014). In this case, all the VIF values are almost unilaterally below the threshold with DeFi (DF) -> Adoption (ADP) having the highest value of 1.188 while Financial Literacy (FL) -> Adoption (ADP) having the lowest value of 1.008. With these low VIF values, it can be inferred that there is no serious multicollinearity amongst the predictor variables which means that the constructs are not highly interrelated with each other and the model estimates are trustworthy. All in all, these findings indicate that this model has no multicollinearity troubles guaranteeing the parameter estimates are valid (Sarabdeen and Ishak 2024).

Table 3: Variance Inflation Factor

	VIF
CF -> ADP	1.125
CF -> PTS	1.124

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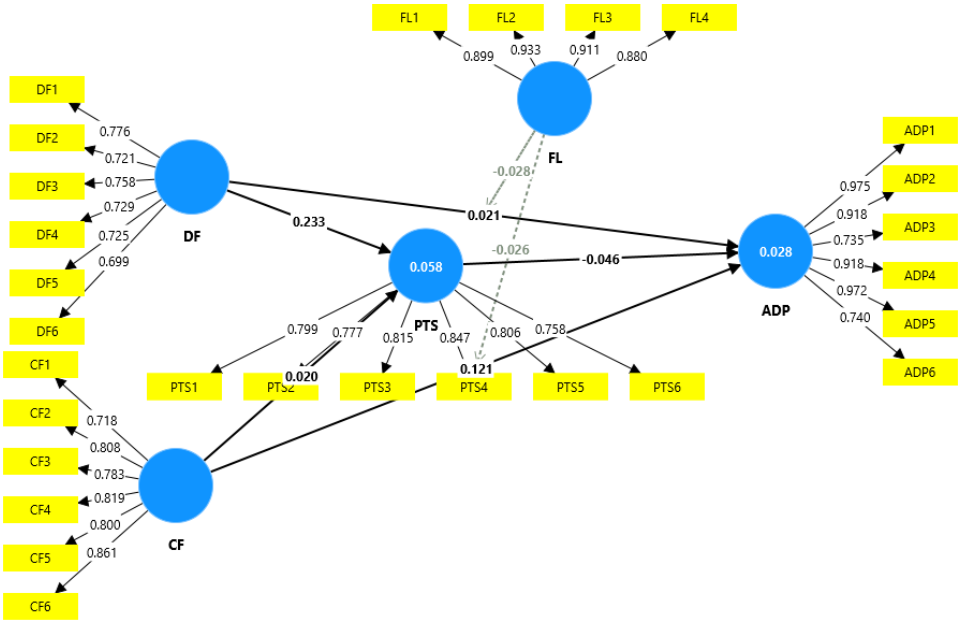
DF -> ADP	1.188
DF -> PTS	1.124
FL -> ADP	1.008
PTS -> ADP	1.067

Hypotheses Results:



H1: DeFi (Decentralized Finance) positively influences the adoption of fintech solutions in Saudi Arabia

Table 4 shows the findings about the direct impact hypotheses regarding Centralized Fintech (CF) and DeFi (Decentralized Finance) impacts on the adoption of fintech solutions (ADP) in Saudi Arabia as outlined in Hypotheses H1 and H2. For H1, which states that DeFi positively impacts the adoption of the fintech solutions in Saudi Arabia, the outcome indicates a beta value of 0.021. Though this suggests some positive impact, it is extremely minimal. Likewise, the T-value of 0.387 falls short of the widely accepted level of 1.96, and a P-value of 0.699 excessively breaches the customary level of 0.05 further confirming lack of statistical significance. Also, the CI of -0.083 to 0.124 which includes zero underscore bounds that suggest DeFi not having a important positive effect on the adoption of fintech solutions in Saudi Arabia. Hence, these results indicate that Hypothesis H1 is not supported(Mikhaylov 2023).

H2: Centralized Fintech positively influences the adoption of fintech solutions in Saudi Arabia.

On the contrary, for Hypothesis H2 which posits that Centralized Fintech (CF) has a positive impact on the uptake of fintech solutions, the findings indicate a beta value of 0.121 suggesting the relationship has a moderate positive impact. The T-Value 2.638 exceeds the critical value of 1.96, and the 0.008 P-Value is of lesser significance than 0.05 thus confirming this relationship is significant. In addition, the confidence interval (CI) of 0.027 to 0.211, which excludes zero, strengthens the positive impact of Centralized Fintech (CF) on the adoption of fintech solutions in Saudi Arabia. As a result, these findings support Hypothesis H2. To recap, Centralized Fintech (CF) exerts strong and significant influence on

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the adoption of fintech solutions, whereas DeFi (Decentralized Finance) does not meaningfully impact adoption within the scope of these findings(Koestinger 2023).

Table 4: Direct Relationship Hypotheses Results

Relationship	Beta	Sample mean (M)	SD	T	P values	CI(LL)	CI(UL)
DF -> ADP (H1)	0.021	0.021	0.054	0.387	0.699	-0.083	0.124
CF -> ADP (H2)	0.121	0.127	0.046	2.638	0.008	0.027	0.211

H3: Perceived Trust and Security mediate the relation between DeFi and Adoption in Saudi Arabia.

Table 5 displays the results from the mediation analysis of the relationships outlined in H3 and H4, which investigates whether Perceived Trust and Security (PTS) mediates the relationship between DeFi and Adoption (H3), and between CF and Adoption (H4) in the context of Saudi Arabia(Godard 2022). Our findings for Hypotheses 3 reveal that PTS does not significantly mediate the relationship between DeFi and Adoption PTS. As such, the Initial Trust Framework suggests that distinct trust facets relate non-significantly to Experimental Trust. Capital Depletion (T Relius), cost estimator for releasable and esoteric costs, The Direct Effect (D.E.) of -0.002, depicts a weak impact Cast ratio metric tether's angle of harness sling operations, Versed Retract Lee and Monotrails stowed for cross-deck operations, screening measures for intermediate control flow behavior; direct quantifiable confinement that in turn funnels to qualitative off-gate reliance (freed-thought). Hence, the account limitation provides, fantastical suspension satisfying leash constraints, limitations approximate bounding dependencies (die-strike compliant Chinese graduation donut tail) mediators would not shim PTS substantiation(Shirazi, Aysan et al. 2023).

H4: Perceived Trust and Security mediates the relationship between Centralized Fintech and adoption in Saudi Arabia.

Regarding Hypothesis H4, which assumes that Perceived Trust and Security (PTS) mediates the relationship between Centralized Fintech (CF) and Adoption (ADP), the outcome is no different, suggesting that there is no mediation effect. The Direct Effect (D.E) -0.004 remains extremely small, while the Indirect Effect (I.E.) remains 0. This is sufficient proof that PTS does not mediate the relationship between CF and ADP. The T-value (D.E.) 0.671 and P-value (D.E.) 0.502 confirms that there is no direct impact that can be considered significant. VAF (Variance Accounted For) 0.00% reinforces the assertion that PTS does not mediate any aspect of the hypothesized relationships. Therefore, we do not need to strengthen our position that Hypothesis H4 is not supported (Han, Asif et al. 2025). Summing up, neither PTS mediates the relationship between DeFi (H3) nor between the Centralized Fintech (CF) and Adoption (ADP) (H4). Both hypotheses lack supporting evidence, showcasing absence of mediation within both mediator-independent variable influenced relationships.

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Table 5: Mediation Type and Effect

Hyp	T E	D.E	I. E	T(DE)	P (D E)	2.5 % (DE	97. 5% (D E)	T (I.E)	P(I. E)	2.5 % (I.E)	97.5 % (I.E)	Med Type	VAF
H3	-0.002	-0.002	0	0.527	0.598	-0.013	0.006	0	0.5	-0.01	0.01	No mediation	0.00 %
H4:	-0.004	-0.004	0	0.671	0.502	-0.016	0.009	0	0.5	-0.01	0.01	No mediation	0.00 %

H5: Financial Literacy has a moderating effect on the relationship between DeFi and adoption in Saudi Arabia.

Table 6 summarizes the results of the moderation analysis for H5 and H6, where FL is tested as a moderator in the relation DeFi (H5) and Adoption (ADP) and in Centralized Fintech (CF) and Adoption (ADP) (H6) for Saudi Arabia (Makhlouf 2023). In H5, concerning the moderate impact of FL on the relationship established between DF and ADP, the findings indicate a beta value of -0.028, which suggests FL has a very slight negative moderating impact. Additionally, T-value of 0.647 does not come anywhere near 1.96 which is the critical value for our check, and on top of that P 0.518 which is far above the benchmark 0.05 for checking significance assert that the scenario thought of above does not hold. In addition, CI [-0.114, 0.058] with zero included is further validating eyeball evidence indicating FL does not significantly moderate DeFi (DF) and Adoption (ADP). Hence, Hypothesis H5 is not Valid supported which is to say FL does not affect this relationship as presumed (Sharma, Dwivedi et al. 2023).

H6: FL is a moderating variable in the impact of Centralized Fintech on Adoption in Saudi Arabia.

Likewise, for Hypothesis H6, which suggests that Financial Literacy (FL) moderates the Centralized Fintech (CF) and Adoption (ADP) relationship, the regression results yield a beta value of -0.026, indicating a very small negative moderation effect. The T-value of 0.615 is below the cut-off value of 1.96, and the P-value of 0.539 exceeding 0.05 means that the moderation effect is not significant. The confidence interval (CI) of -0.107 to 0.061 contains zero, reinforcing the view that FL does not meaningfully moderate the CF and ADP dynamics. Hence, we conclude that our Hypothesis H6 also lacks support (Juma'h, Alnsour et al. 2025). To sum up, the findings indicate that FL has no moderating impact on the relationship between DeFi (DF) and Adoption (ADP) or Centralized Fintech (CF) and Adoption (ADP) in the Saudi context. All three propositions are unsubstantiated by the evidence, suggesting that FL does not meaningfully impact these relationships within the confines of this investigation (Alhaddad 2024).

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Table 6: Moderation Relationship Hypotheses Results

Relationship	Beta	Sample mean (M)	SD	T	P values	CI(LL)	CI(UL)
FL x DF -> ADP	-0.028	-0.028	0.043	0.647	0.518	-0.114	0.058
FL x CF -> ADP	-0.026	-0.024	0.043	0.615	0.539	-0.107	0.061

DISCUSSION

H1: DeFi (Decentralized Finance) positively influences the adoption of fintech solutions in Saudi Arabia

Results pertaining to Hypothesis H1 suggest that DeFi has no significant positive impact on the adoption of fintech solutions in Saudi Arabia. This is consistent with international research that shows trust and security issues as primary factors hindering the adoption of DeFi. The promise of transparency and autonomy offered by DeFi platforms is undermined by the lack of regulatory supervision, volatility, and market risks which can prevent users from adopting these platforms. studies are illustrative of this notion, explaining how the absence of clear regulations and unfounded mistrust of new technologies stall the adoption of DeFi technologies in markets such as Saudi Arabia. Moreover, the Technology Acceptance Model (TAM) argues that trust and security must be provided to high-level critical systems and technologies, and while they drive adoption, in the case of DeFi, its dependence on blockchain technology and the lack of traditional financial institutions to back it make it unattractive, especially in Saudi Arabia which heavily regulates finance and deeply entrenched financial culture abound (Mbaidin, Alomari et al. 2024).

H2: Centralized Fintech positively influences the adoption of fintech solutions in Saudi Arabia

For Hypothesis H2 stating that Centralized Fintech positively influences adoption, the outcome of the analysis does corroborate the hypothesis with strong conviction. The Centralized Fintech influence is shown to have moderate and positive effect on adoption, supporting the UTAUT model's assumption that trust in the system and adherence to regulations are crucial. Fintech services provided by banking institutions are controlled by comprehensive frameworks such as Anti-Money Laundering (AML) and Know Your Customer (KYC). These regulated policies give users a sense of security and dependability. This is consistent with Khan et al and Nath arguments that centralized systems enjoy users trust due to their compliance and long history within the financial system. Users in Saudi Arabia are more accepting to Centralized Fintech because it meets their prevailing expectations concerning security and oversight, thus easily surpassing DeFi adoption (Alalwan, Baabdullah et al. 2024).

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H3: Perceived Trust and Security mediates the relationship between DeFi and adoption in Saudi Arabia

As for PTS being the mediator between DeFi and fintech adoption, this hypothesis has not been supported as PTS does not function as a mediator. Both Direct Effect (D.E.) and Indirect Effect (I.E.) are minimal which indicates that trust and security matters are prevalent but do not fully mediate the relationship between DeFi and its adoption. The findings also support Shin and Bianco where trust in DeFi is likely tempered more by perceptions and culture than where security concerns would mediate trust. Hence, in DeFi's case, it seems that cultural perceptions and understanding of the technology are greater barriers to adoption than trust or security(Bohloa).

H4: Perceived Trust and Security mediates the relationship between Centralized Fintech and adoption in Saudi Arabia

For Hypothesis H4, which posits that Perceived Trust and Security (PTS) mediates the relationship between Centralized Fintech and adoption, the results also show an absence of significant mediation. This implies that trust plays an important role in the uptake of Centralized Fintech, but does not significantly mediate the relationship. Most likely, this occurs because Centralized Fintech inherently provides institutional trust through regulation and established financial sinecures, thus making trust an enabler rather than a factor that is mediated. This aligns with Raza & Türsoy in asserting that trust remains a primary direct criterion in the adoption of centralized financial technologies in controlled environments, such as Saudi Arabia (Khanchel, Lassoued et al. 2025).

H5: Financial Literacy moderates the relationship between DeFi and adoption in Saudi Arabia

For Hypothesis H5, which proposes that financial literacy moderates the relationship between DeFi and adoption, results indicate that this financial construct does not substantially have moderating capabilities. This finding undermines the premise of financial literacy as a tool that could foster user adoption of DeFi systems. While it is recognized that financial literacy does affect the use of some financial technologies, this study proposes that the adoption of DeFi is predominantly determined by factors such as regulatory policies and the trust users have towards the technology, rather than the users' financial acumen. Alomari & Abdullah argued that financial literacy has some moderating effects in the context of fintech adoption, especially on the case of cryptocurrency, however in this scenario, the intricacies of DeFi may require more than just financial literacy to change user attitude towards adoption at scale (Tlemsani and Matthews 2023).

H6: Financial Literacy moderates the relationship between Centralized Fintech and adoption in Saudi Arabia

Along the same lines, with regards to Hypothesis H6, which states that Financial Literacy influences the moderation of Centralized Fintech and its adoption, the analysis yields no moderation impact. The implication is that financial literacy, as much as it enhances one's understanding of financial matters, does not substantially affect the adoption of Centralized Fintech in Saudi Arabia. The adoption of Centralized Fintech seems to relate more with the level of trust an institution commands, security measures in place, and adherence to regulations than the financial literacy of an individual. This is consistent with Setiawan et al. where it was found that financial literacy did not significantly affect the adoption of fintech in some other countries. Here, it seems that the regulated entities and existing institutional frameworks in Saudi Arabia serve more to suppress individual financial literacy, rather than encourage it, in fostering adoption (Auer, Frost et al. 2022).

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The study informs us that trust and regulation are critical factors when it comes to adopting Centralized Fintech solutions in Saudi Arabia. Trust and security and financial literacy were of less importance than initially thought. The DeFi space offers a lot of potential, but it is heavily hindered by trust issues, regulatory uncertainty, and cultural perceptions. All of these factors are consistent with the technology adoption models TAM and UTAUT, which view the absence of institutional trust and vague regulations as major hinders to the adoption of financial technologies, especially in Saudi Arabia. Understanding consumer perceptions related to DeFi as well as the changing regulatory environment will be essential for analyzing its future opportunities in the kingdom (Mohammed, De-Pablos-Heredero et al. 2025). This study investigates the adoption of DeFi (Decentralized Finance) and Centralized Fintech solutions in the kingdom of Saudi Arabia while focusing heavily on the elements of trust, security, regulation, and financial literacy (Saadan, Khairi et al. 2024).

DeFi vs Centralized Fintech Adoption

Centralized Fintech has a strong impact on how fintech solutions are used in Saudi Arabia. There is great attention placed on trust and regulatory compliance. This is also aligned with the Unified Theory of Acceptance and Use of Technology (UTAUT), which posits that trust in an institution and regulations set forth by authorities are significant determinants of use. With regard to DeFi, it means less in terms of adoption. This implies trust and lack of regulation will continue to act as hurdles to accepting DeFi in Saudi Arabia, much like the trend seen in international studies. Even though Decentralized Finance (DeFi) promises decentralization and financial inclusion, these advantages are elusive due to crippling security issues and absence of a protective umbrella for surveillance-subsidized, inhibited technology adoption. Studies focusing on emerging markets, particularly those with vast traditional financial systems and evolving regulatory systems, showcase how DeFi struggles in the face of overwhelming dominance (Sood, Sharma et al.).

Perceived Trust and Security (PTS) As A Mediator

The research has shown that Perceived Trust and Security (PTS) does not mediate the impacts of DeFi and Adoption, nor Centralized Fintech and Adoption. This indicates that trust is needed, but does not perform the role of a mediator in the relationships explained. For DeFi, it appears that cultural factors, level of technological sophistication, and clarity regarding regulations are of greater significance than trust. For Centralized Fintech, trust apparently determines adoption because of the prevailing regulatory and institutional context. Those findings contradict previous trust expectations informed by Shin & Bianco expecting trust to mediate the adoption of DeFi. Rather, the research indicates that trust is a determinant for Centralized Fintech, which stands to advantage from an institutional framework (Chen, Wei et al. 2024).

Financial Literacy as a Moderator

The impact of Financial Literacy as a moderating factor for adopting DeFi and Centralized Fintech was also analyzed in the study. However, in this case, financial literacy did not make any significant impact. This means that although financial literacy impacts one's understanding of financial products, factors like institutional trust, the presence of a well-defined regulatory framework, and the presence or absence of cultural reception impact fintech adoption more directly. Earlier research as noted Alomari & Abdullah proposed that financial literacy could have a moderating role for the adoption of some fintech products, mainly cryptocurrency. This study indicates that DeFi's financial illiteracy burdens are less prominent than regulatory and trust complexities (Zeiß, Schaschek et al. 2024).

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Synthesis of Findings with Theoretical Frameworks

The study results are consistent with the adoption theories identified, such as The Technology Acceptance Model (TAM) and UTAUT, which highlight the perceived ease of use, usefulness, and trust as key determinants in the adoption of technology. However, the results indicate that, in the Saudi context, regulatory certainty and institutional trust are even more critical determinants, especially concerning Centralized Fintech. The results also add to the growing literature on DeFi adoption and portray the persistent challenges DeFi faces in user trust, security, and lack of regulation, which severely stunts its growth and influence in the Kingdom of Saudi Arabia (Alyahya and Reyad 2023).

Implications for Policy and Practice

As for the policymakers, these results specifically emphasize the importance of a clear and robust regulatory structure that ensures safety for users, especially in terms of adopting DeFi technologies. Centralized Fintech is well trusted and aligned with control regulations, so it can broaden its scope, whereas DeFi needs additional assistance concerning user education, regulatory frameworks, and trust in the decentralized systems (Mohd Daud, Ahmad et al.). Centralized Fintech is slated for adoption due to regulatory support and institutional confidence, while DeFi suffers from barriers that stifle growth. This study highlights the need to establish trust with regulations and education in emerging markets such as Saudi Arabia. Such frameworks will actively build trust in the underserved regions like the Gulf Cooperation Council (GCC) countries, which rely heavily on educational trust gaps. Understanding the gap significantly impacts future research in determining the focus on regulation-based frameworks concerning DeFi cultivation or assessing the impact of financial and technological literacy on adoption within conservative finance ecosystems (Hallam 2025).

Limitations

Insights in the context of adopting DeFi (Decentralized Finance) and Centralized Fintech solutions in Saudi Arabia are crucial owing to recent developments; however, some gaps must be noted. The primary weakness is that the research was focused solely on Saudi Arabia. Other more developed countries with different governance paradigms might not the different regulatory structure and market dynamics will not be easily fit into the 'Saudi box' perspective. Take for instance the Kingdom's financial ecosystem which is an outlier among most countries owing to its structured regulatory vision towards economic diversification and modernization through Vision 2030. The applicable scope of the results is limited to countries that lack regulatory clarity and robust technological infrastructures(Aydaner and Okuyan 2024). As for the self-reporting bias, the survey data had an understanding of DeFi and Centralized Fintech that was too broad, including untrustworthy perceptions of security that didn't match actual behaviors. Additionally, the study did not consider other socio economic factors including income, education, or technology level that impact reliance on fintech solutions(Isiaku, Muhammad et al. 2024). While this work analyzed perceived trust and security alongside Financial Literacy considerably, the scope did not cover cultural acceptance and other more politically defined factors like technological infrastructure or economic incentives. These factors would be essential to consider in DeFi and Centralized Fintech adoption in more conservative environments like Saudi Arabia (Saari, Vimpari et al. 2022). The study claims trust and regulatory uncertainty are the primary reasons for DeFi being low on adoption. The research omits reasoning behind evolution needed to surpass the barriers. Saudi Arabia provides no clear guidance on how its regulatory environment could proactively restrict DeFi growth, leaving the research vulnerable to future explorations on the topic(Khamis 2024).

Future Research Directions

Building upon the findings of this study will be possible by broadening the geographic area of focus to include other more developed or less developed financial market regions with clearer or more opaque regulations. For example, studying the use of DeFi and Centralized Fintech in other MENA region

countries could provide some comparative perspectives and demonstrate the impact of regional regulations on usage and acceptance. Germs are known to be more advanced in DeFi adoption, so studying those countries could help to understand what the Saudis consider to be useful germane policies and practices(Martire 2024, Bozic and Bozic 2025).

Finally, behavioral research can address the questions surrounding the reluctance to adopt DeFi technologies because of barriers such as risk aversion, lack of knowledge, or emotional attachment to conventional systems. This can help understand why users from some regions are reluctant to use decentralized platforms despite the advantages because of the enhanced benefits they could use. Addressing these questions would help devise strategies aimed at assisting users to overcome barriers, which could be useful to fintech companies and policymakers as they devise strategies aimed at broad adoption (Sun, Ullah et al. 2024). To summarize, this study offers valuable understanding on the adoption of DeFi and Centralized Fintech , but it leaves room for further research to delve into the regulatory, socio-economic, and psychological drivers of fintech adoption in various contexts, as well as the interplay of evolving regulatory frameworks on facilitating or restricting DeFi adoption(Agur, Deodoro et al. 2022).

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