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Decentralized Digital Wallets in Pakistan and the UK: Leveraging Blockchain for Secure, Low-Cost Cross-Border Payments and Financial Inclusion

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	Abstract
<p><b>Farah Arzu*</b> PhD Scholar, Management Sciences Department, UniRazak Malaysia. Corresponding Author Email: <a href="mailto:arzu.farah@ur.unirazak.edu.my">arzu.farah@ur.unirazak.edu.my</a></p> <p><b>Syeda Iqra Amjad</b> MBA Scholar, Department of Business and Marketing, University of East London, England. <a href="mailto:syedaiqraamjad@gmail.com">syedaiqraamjad@gmail.com</a></p> <p><b>Fawad Ahmad Abbasi</b> Undergraduate Research Assistant (URA), Department of Management Studies. Bahria University Islamabad, Pakistan <a href="mailto:abbasifawad333@gmail.com">abbasifawad333@gmail.com</a> ORCID ID 00009-0004-3048-7556</p> <p><b>Dr. Kashif Abrar</b> Visiting Faculty Member, Department of Business Studies, Bahria University, Islamabad, Pakistan. <a href="mailto:kashif_411@hotmail.com">kashif_411@hotmail.com</a></p> <p><b>Samad Wasi</b> Group Product Manager, Department of Marketing &amp; Sales, Getz Pharma (Pvt.) Ltd., Karachi, Pakistan. <a href="mailto:samad.wasi@yahoo.com">samad.wasi@yahoo.com</a></p>	<p>This study explores the role of decentralized digital wallets and blockchain technology in enhancing cross-border payments and financial inclusion, with a focus on Pakistan and the UK. Through semi-structured interviews with 22 participants, including banking professionals, fintech experts, and users of digital wallets, the study examines the benefits, challenges, and potential of blockchain in both developed and developing economies. The findings reveal that while blockchain has the potential to reduce transaction costs and improve the security of cross-border payments, significant differences exist in perceptions and trust between Pakistan and the UK. Participants from the UK demonstrated higher trust in blockchain technology due to a more developed financial ecosystem, while participants from Pakistan expressed concerns about security, regulatory uncertainty, and limited financial literacy. The research highlights the need for improved financial literacy, regulatory clarity, and infrastructure development to foster the adoption of decentralized digital wallets in Pakistan. The study also provides valuable insights into the potential of blockchain to drive financial inclusion in emerging markets.</p>
<b>Keywords:</b>	Decentralized Digital Wallets, Blockchain Technology, Cross-Border Payments, Financial Inclusion, Emerging Markets



### Introduction

The financial landscape across the globe is undergoing a profound transformation, largely driven by technological innovations such as decentralized digital wallets and blockchain technology. These innovations are providing novel solutions to longstanding financial challenges, such as high transaction costs, inefficiencies, and the lack of access to banking services for unbanked populations. Central to this revolution is blockchain technology, which underpins decentralized digital wallets, making it possible for individuals and businesses to execute secure and low-cost cross-border transactions without relying on traditional financial intermediaries. This research explores the role of decentralized digital wallets in enhancing cross-border payments and financial inclusion, with a particular focus on Pakistan and the UK.

### Background of the Research

Digital wallets are increasingly being adopted globally due to their convenience, security, and ability to facilitate faster and more affordable financial transactions. These wallets are not limited to simple payment solutions but also include decentralized systems built on blockchain technology. Blockchain offers a decentralized, transparent, and immutable ledger that ensures the security and reliability of digital transactions (Sahid & Maleh, 2024). In this context, decentralized digital wallets are seen as potential solutions to enhance financial inclusion by offering secure, low-cost services to the underbanked and those in developing countries (Biggs, 2016).

The role of blockchain in transforming global finance cannot be overstated. By allowing peer-to-peer transactions without the need for intermediaries like banks or payment processors, blockchain enables more efficient and transparent cross-border payments. This is particularly significant in countries like Pakistan, where remittances play a crucial role in the economy, and financial inclusion remains a significant challenge (Shah, 2023). In contrast, the UK's financial ecosystem is more mature, and while financial inclusion rates are higher, there are still opportunities to leverage blockchain technology for remittance improvements and cost reductions (Sule et al., 2024).

Comparing the financial landscapes of Pakistan and the UK highlights stark contrasts in terms of financial inclusion and remittance systems. In Pakistan, where a significant portion of the population remains unbanked, decentralized digital wallets could serve as a catalyst for financial inclusion. The UK, while having higher levels of financial inclusion, can benefit from blockchain technology by improving the efficiency and cost-effectiveness of cross-border payments, particularly in the context of the growing trend of digital remittances (Ozili, 2022).

### Problem Statement

Despite the promising potential of decentralized digital wallets and blockchain technology, significant challenges remain, especially when it comes to cross-border payments and financial inclusion. The current financial infrastructure in both Pakistan and the UK is plagued by inefficiencies, high transaction costs, and slow processing times, particularly in the case of international remittances. In Pakistan, the financial exclusion rate is high, with millions of people lacking access to basic banking services, limiting their ability to participate fully in the economy (Ghosh & Bhatia, 2025). This lack of access exacerbates the challenges of cross-border payments, especially for migrants sending money home to family members in Pakistan. Financial exclusion in Pakistan is compounded by issues such as geographical barriers, lack of digital literacy, and the dominance of cash-based economies, further hindering the adoption of digital financial services (Naderi, 2021).

In the UK, while financial inclusion rates are higher, the existing systems for remittance transfers are still costly and cumbersome. Traditional banks and money transfer operators charge significant fees for cross-border transactions, with delays in processing times (Sule et al., 2024). These inefficiencies create barriers for individuals and businesses seeking affordable and timely remittance options. The high cost of remittances remains a concern for low-income individuals and migrants, making decentralized digital wallets a potentially transformative solution. However, regulatory uncertainty and lack of awareness of blockchain technology in both the UK and Pakistan pose additional challenges to the widespread adoption of these solutions (Staley & Amankwa, 2025).

Therefore, there is an urgent need for innovative solutions like decentralized digital wallets to streamline cross-border payments, reduce transaction costs, and address the financial exclusion issue in both countries. Blockchain's potential to enhance security, transparency, and efficiency in cross-border payments can help mitigate the existing challenges and create a more inclusive financial ecosystem.

### Research Questions

This research aims to address the following key questions:

1. How do decentralized digital wallets impact cross-border payments between Pakistan and the UK?
2. What are the barriers to financial inclusion in Pakistan and the UK?



3. How does blockchain technology ensure security and low-cost transactions in decentralized wallets?

These questions have guided the study by exploring the potential of blockchain technology in reducing costs, enhancing security, and increasing financial access for underserved populations in both Pakistan and the UK.

### **Research Objectives**

The objectives of this research are as follows:

1. To explore the role of decentralized digital wallets in facilitating cross-border payments, particularly between Pakistan and the UK.
2. To examine the potential of blockchain technology in enhancing financial inclusion in Pakistan and the UK, focusing on how it can provide secure and affordable access to financial services.
3. To compare the regulatory environments in Pakistan and the UK regarding decentralized finance, highlighting the opportunities and challenges each country faces in adopting decentralized digital wallets.

### **Significance of the Research**

This study is significant for several reasons. First, it contributes to the growing body of literature on blockchain technology's potential to drive financial inclusion, especially in developing economies like Pakistan. As many individuals in Pakistan remain excluded from formal banking systems, decentralized digital wallets offer an opportunity to integrate them into the financial ecosystem, potentially boosting economic development. Second, the research provides valuable insights into the regulatory frameworks governing decentralized finance in Pakistan and the UK. Understanding these frameworks will inform policymakers in both countries about the best practices for fostering innovation in the financial sector while ensuring security and compliance.

Finally, the research offers practical recommendations for the development and adoption of decentralized digital wallets, especially for remittance systems, helping to reduce the costs of cross-border transactions and enhance financial access for underserved populations in both countries. In conclusion, this research seeks to provide a comprehensive understanding of how decentralized digital wallets and blockchain technology can revolutionize cross-border payments and financial inclusion in Pakistan and the UK, offering secure, low-cost, and efficient solutions to address existing financial challenges.

### **Literature Review**

The financial landscape across the world is evolving rapidly with the rise of blockchain technology and decentralized finance (DeFi). These innovations offer potential solutions to various challenges in the global financial system, including high transaction costs, lack of access to financial services, and inefficiencies in cross-border payments. This literature review has explored the key themes related to blockchain technology, financial inclusion, decentralized wallets, cross-border payment solutions, and regulatory considerations, drawing from multiple sources.

### **Theoretical Framework**

#### **Overview of Blockchain Technology and Decentralized Finance (DeFi)**

Blockchain technology is a distributed ledger system that provides a secure, transparent, and decentralized way to record transactions. The technology ensures that transactions are immutable and cannot be altered once recorded, offering significant advantages over traditional centralized systems (Kshetri, 2023). Decentralized Finance (DeFi) refers to a new model of financial services built on blockchain, which enables peer-to-peer financial transactions without the need for intermediaries like banks (Shah, 2023). This model is particularly transformative for emerging economies, where traditional financial infrastructure is often limited or non-existent.

DeFi systems rely on smart contracts, which automatically execute predefined actions once certain conditions are met, facilitating trustless transactions. The decentralized nature of DeFi eliminates the need for intermediaries, reducing costs and increasing the speed of financial transactions (Kshetri, 2023). This technological innovation promises to revolutionize global finance by making financial services more inclusive, secure, and accessible, especially in developing economies where financial inclusion remains a significant challenge.

#### **Financial Inclusion Theories and Blockchain's Role**

Financial inclusion is the process of ensuring that individuals, particularly in underserved and low-income populations, have access to useful and affordable financial services. Theories of financial inclusion emphasize the importance of access to credit, savings, insurance, and payment systems (Ghosh & Bhatia, 2025). Blockchain technology plays a

crucial role in advancing financial inclusion by reducing the reliance on traditional financial institutions, which often exclude large portions of the population, particularly in developing countries like Pakistan (Ghosh & Bhatia, 2025).

Blockchain enables the creation of decentralized financial systems where users can access financial services without needing a traditional bank account. This makes blockchain a powerful tool for promoting financial inclusion by enabling low-cost, transparent, and accessible financial solutions. In countries like Pakistan, where a significant portion of the population remains unbanked, blockchain-powered solutions such as decentralized digital wallets offer a path toward financial inclusion (Shah, 2023).

### **Cross-Border Payments and Remittance Systems**

Cross-border payments are essential for international trade, investment, and remittances. However, current systems for cross-border remittances are often costly, slow, and inefficient. Traditional methods, such as wire transfers, are subject to high fees, long processing times, and significant exchange rate costs (Sule et al., 2024). Blockchain technology provides a solution to these challenges by enabling faster, cheaper, and more secure cross-border transactions. Blockchain-based solutions eliminate the need for intermediaries, such as banks and money transfer operators, reducing the cost and time required for international payments (Sule et al., 2024).

The use of blockchain in remittance systems is particularly relevant for developing economies where remittances play a crucial role in the economy. In Pakistan, for example, remittances account for a significant portion of the GDP, and blockchain could provide a more efficient method of transferring money across borders (Biggs, 2016). Additionally, blockchain's transparency and security features make it a viable alternative to traditional remittance methods, reducing the risks associated with fraud and enhancing trust in the system.

### **Blockchain and Financial Inclusion**

#### ***Role of Blockchain in Enabling Secure and Transparent Financial Systems***

Blockchain's role in promoting financial inclusion can be attributed to its ability to provide secure, transparent, and efficient financial services. By removing the need for centralized intermediaries, blockchain reduces the costs associated with traditional banking and makes financial services more accessible (El Hajj & Farran, 2024). Moreover, blockchain's inherent transparency ensures that all transactions are publicly recorded, reducing the potential for fraud and corruption.

In emerging markets, where trust in financial institutions may be low, blockchain offers a transparent alternative. Users can directly engage in financial transactions without relying on intermediaries, creating a more inclusive financial ecosystem (El Hajj & Farran, 2024). In countries like Pakistan, blockchain-powered digital wallets can enable people to access services such as savings, credit, and insurance without having to rely on traditional banking systems (Sahid & Maleh, 2024).

#### ***Impact of Blockchain on Financial Inclusion in Emerging Markets***

Blockchain has the potential to dramatically improve financial inclusion in emerging markets by enabling individuals who are excluded from traditional banking systems to access financial services (Sahid & Maleh, 2024). In regions where access to banking infrastructure is limited, blockchain allows individuals to participate in the global financial system through decentralized digital wallets. This is particularly important in Pakistan, where a large percentage of the population remains unbanked (Ozili, 2022). Blockchain-powered solutions provide a cost-effective and secure way for these individuals to send and receive money, invest, and access financial products.

Emerging markets, such as those in Africa, South Asia, and Latin America, are increasingly adopting blockchain to address financial inclusion challenges. In Pakistan, for instance, decentralized digital wallets can offer a solution to the high remittance costs, financial exclusion, and lack of access to banking services (Sule et al., 2024).

### **Cross-Border Payment Solutions**

#### ***Challenges in Current Cross-Border Remittance Systems***

Current cross-border remittance systems, such as traditional money transfer services, are burdened by high fees, slow processing times, and the reliance on intermediaries (Biggs, 2016). These inefficiencies create significant barriers for individuals and businesses, particularly in developing countries, where remittances are a major source of income. In Pakistan, for example, remittances contribute significantly to the economy, but high transaction costs and slow transfer speeds limit the benefits for recipients.

Blockchain offers a solution to these challenges by enabling peer-to-peer transactions without the need for intermediaries, reducing costs, and increasing transaction speed (Sule et al., 2024). By eliminating traditional intermediaries, blockchain-powered remittance systems can reduce transaction fees and ensure faster, more efficient transfers.

#### ***Blockchain's Role in Reducing Cost and Improving Security***



Blockchain technology is particularly effective in reducing the cost and improving the security of cross-border payments. By removing the need for intermediaries such as banks and money transfer operators, blockchain significantly lowers the fees associated with cross-border transactions (Sule et al., 2024). Additionally, the security features of blockchain, such as encryption and the immutability of transaction records, ensure that transactions are secure and transparent.

In countries like Pakistan, where remittances play a crucial role in the economy, blockchain-based solutions could reduce the high fees associated with traditional remittance methods and improve the security of transactions (Biggs, 2016). Moreover, blockchain's transparency allows for real-time tracking of transactions, enhancing trust in the system.

### **Decentralized Digital Wallets**

#### ***Benefits of Decentralized Wallets Over Traditional Banking Systems***

Decentralized digital wallets, powered by blockchain, offer several advantages over traditional banking systems. These wallets enable users to send and receive money, make payments, and store value without relying on centralized banks or financial institutions (Ozili, 2022). The primary benefits include lower fees, faster transaction speeds, and enhanced security, making them an attractive alternative for individuals in developing countries who are excluded from the traditional banking system.

In Pakistan, where many individuals lack access to banking services, decentralized digital wallets offer a practical solution to financial exclusion (Ahmed, Ali, & Mansoor, 2025). These wallets allow individuals to access financial services without needing a bank account, providing greater financial autonomy (Shah, 2023).

#### ***Case Studies of Decentralized Digital Wallet Adoption in the UK and Pakistan***

The adoption of decentralized digital wallets is growing in both the UK and Pakistan. In the UK, digital wallets like Bitcoin and Ethereum are gaining popularity for cross-border transactions, and blockchain-based solutions are increasingly being used in remittance systems (Shah, 2023). In Pakistan, decentralized wallets are also gaining traction, particularly for remittances, due to the high costs and inefficiencies associated with traditional transfer methods (Ozili, 2022).

### **Regulatory Considerations**

#### ***Regulatory Challenges of Blockchain and Decentralized Wallets***

One of the main challenges in the adoption of blockchain technology and decentralized digital wallets is the lack of clear regulatory frameworks. While blockchain has the potential to revolutionize the financial system, its decentralized nature presents challenges for regulators who are accustomed to overseeing centralized financial institutions (Staley & Amankwa, 2025). Issues such as money laundering, fraud, and consumer protection need to be addressed before blockchain can be fully integrated into the mainstream financial system.

#### ***Comparative Analysis of Regulatory Frameworks in Pakistan and the UK***

In Pakistan, the regulatory environment for blockchain and cryptocurrencies is still developing. The country's financial regulators have expressed concerns about the potential for illicit activities, but there is increasing interest in exploring blockchain as a tool for financial inclusion (Rehmat et al., 2025). In contrast, the UK has a more developed regulatory framework for blockchain and cryptocurrency, with established guidelines for digital asset exchanges and financial institutions (Staley & Amankwa, 2025).

### **Gaps in Existing Research**

Despite the growing body of literature on blockchain and decentralized finance (DeFi), significant gaps in the research remain. One notable gap is the lack of comprehensive studies exploring the impact of blockchain on financial inclusion in countries like Pakistan and the UK. Much of the existing research has predominantly focused on the potential of blockchain technology in developed economies, where financial infrastructure is already established (Ozili, 2022). However, there is a clear need for more research to understand the real-world implications of blockchain in emerging markets, particularly in developing countries like Pakistan, where financial exclusion rates are high, and access to traditional banking services is limited (Ghosh & Bhatia, 2025). Understanding how blockchain can bridge the financial inclusion gap in such economies is essential for advancing global financial equity.

Another critical research gap pertains to user perceptions of decentralized wallets. While blockchain technology offers several benefits, user adoption remains a challenge, especially in countries like Pakistan, where financial literacy is often low (Shah, 2023). It is crucial to explore how users perceive the security, accessibility, and usability of decentralized wallets to foster their widespread adoption. Without this understanding, the potential of decentralized wallets in improving financial inclusion may be limited. Existing literature lacks detailed insights into how individuals in emerging markets experience decentralized wallets and whether they trust these systems to safeguard their



financial transactions (Sule et al., 2024; Naderi, 2021). Further research into these areas will provide critical insights to drive successful blockchain adoption across different regions and user demographics.

### **Methodology**

#### **Research Design**

This study adopted a qualitative research design, focusing on exploring the experiences and perspectives of individuals regarding decentralized digital wallets and blockchain technology. The research employed thematic analysis, as outlined by Braun, Clarke, and Hayfield (2022), to identify patterns and themes within the interview data. Thematic analysis allowed for a deep exploration of participants' views and experiences, providing a rich, detailed account of the role of blockchain in cross-border payments and financial inclusion.

The research design involved semi-structured interviews with 22 respondents, consisting of 11 participants from Pakistan and 11 participants from the UK. The semi-structured format enabled flexibility, allowing participants to express their views while still addressing key topics related to decentralized wallets, blockchain technology, and financial inclusion. This design ensured that the study captured diverse insights into the adoption and challenges of blockchain in both countries.

#### **Sampling Strategy**

The study employed purposive sampling to select participants who possessed relevant experience and expertise in decentralized digital wallets and blockchain technology. This method ensured the inclusion of individuals who could offer valuable insights into the subject matter. The criteria for participant selection included banking professionals, fintech experts, and users of digital wallets. Banking professionals were individuals working in financial institutions or involved in the remittance industry, providing expertise on traditional and blockchain-based financial systems. Fintech experts were professionals with knowledge of digital finance, blockchain technology, and decentralized finance systems, offering technical insights into the evolving landscape of blockchain in financial services. Additionally, users of digital wallets, both from Pakistan and the UK, were included to capture firsthand experiences with decentralized wallets, specifically their usage for transactions, savings, or other financial activities. By using purposive sampling, the study ensured a targeted approach that captured diverse perspectives, combining both professional and user viewpoints. This approach enriched the findings by incorporating a wide range of experiences and expertise, which was crucial for understanding the broader impact and potential of blockchain technology in financial systems.

#### **Data Collection**

Data collection was carried out through in-depth, semi-structured interviews, allowing participants to discuss their experiences with decentralized digital wallets and blockchain technology. The interview guide included open-ended questions focused on key themes such as the benefits, challenges, security concerns, and adoption barriers of blockchain in financial systems. The interviews were audio-recorded using digital recording devices to ensure accurate transcription and data analysis.

The semi-structured nature of the interviews provided participants with the freedom to elaborate on their views while still addressing the key areas of interest for the research. This approach encouraged open dialogue and rich data collection, which was crucial for thematic analysis. By using this flexible format, the study was able to gather in-depth insights into the participants' perspectives on blockchain and decentralized wallets, contributing to a comprehensive understanding of the subject matter.

#### **Data Analysis**

The collected data was analyzed using Braun and Clarke's (2022) thematic analysis framework, which provided a systematic process for identifying, analyzing, and reporting patterns or themes within the data. The first step in the analysis involved familiarizing oneself with the data by transcribing the interviews and reading through the transcripts to gain a comprehensive understanding of the content. Next, open coding was applied to generate initial codes, identifying significant pieces of data relevant to the research questions. Following this, the coded data was examined to search for recurring themes and patterns that emerged across the interviews. Once the themes were identified, they were reviewed for coherence and consistency to ensure they accurately reflected the participants' perspectives. The final step involved defining and naming the themes, clarifying their relevance to the research questions. The final report incorporated the identified themes, providing a detailed analysis supported by data from the interviews. Thematic analysis was an appropriate choice for this research, as it allowed for an in-depth understanding of participants' experiences with blockchain technology and its impact on financial inclusion and cross-border payments, offering insights into both professional and user perspectives.

#### **Ethical Considerations**

Ethical considerations were a critical aspect of this study. Several steps were undertaken to ensure ethical integrity throughout the research process. First, informed consent was obtained from all participants, ensuring they were fully aware of the purpose of the study, their role, and any potential risks involved. Written consent was secured from each participant prior to the interviews (Rehmat et al., 2025). Additionally, confidentiality and anonymity were maintained throughout the study. All personal information was kept confidential, and participants were anonymized in the reporting of the data to protect their identities. The data was securely stored and only accessible to the researchers (Hanif, Asif, & Yusaf, 2026). Lastly, the study received ethical approval from the relevant ethical review board, ensuring that the research adhered to established ethical guidelines. These measures ensured that the study was conducted with respect for participants' rights and well-being.

### Participants' Profile

A diverse group of 22 participants was interviewed, comprising 11 participants from Pakistan and 11 from the UK. These participants had varying levels of experience with decentralized digital wallets and blockchain technology. A summary of demographic details of the participants has been shown in Table 1:

**Table 1: Demographic Details Summary**

Demographic Detail	Pakistan	UK
<b>Total Participants</b>	11	11
<b>Gender</b>	Male/Female	Male/Female
<b>Age Range</b>	25-50	25-50
<b>Professional Background</b>	Banking, Fintech, Digital Wallet Users	Banking, Fintech, Digital Wallet Users
<b>Experience with Blockchain</b>	Low to High	Low to High
<b>Main Roles</b>	Financial Sector Professionals, Users of Digital Wallets	Financial Sector Professionals, Users of Digital Wallets
<b>Location</b>	Urban and Rural Areas	Urban Areas

Participants from Pakistan provided insights into the challenges faced in a developing economy, where financial inclusion remained a key issue. In contrast, participants from the UK offered a perspective from a developed financial system, allowing for a comparison of the adoption and impact of decentralized digital wallets in both settings. This comparative approach helped identify common themes and unique challenges in each country.

**Table 2: Participants' Profile**

Participant ID	Country	Gender	Age Range	Professional Background	Experience with Blockchain	Role
P1	Pakistan	Male	30-40	Banking	Low	Financial Professional
P2	Pakistan	Female	35-45	Fintech Expert	High	Fintech Expert
P3	Pakistan	Male	40-50	Digital Wallet User	Medium	User
P4	Pakistan	Female	25-35	Banking	Medium	Financial Professional
P5	Pakistan	Male	30-40	Fintech Expert	High	Fintech Expert
P6	Pakistan	Male	30-40	Banking	Medium	Financial Professional
P7	Pakistan	Female	25-35	Digital Wallet User	Low	User
P8	UK	Male	25-35	Banking	Low	Financial Professional
P9	UK	Female	30-40	Fintech Expert	High	Fintech Expert
P10	UK	Male	35-45	Digital Wallet User	Medium	User
P11	UK	Female	25-35	Banking	High	Financial Professional
P12	UK	Male	40-50	Fintech Expert	Medium	Fintech Expert
P13	UK	Male	30-40	Banking	Low	Financial Professional

Participant ID	Country	Gender	Age Range	Professional Background	Experience with Blockchain	Role
P14	UK	Female	35-45	Digital Wallet User	Medium	User
P15	UK	Male	25-35	Fintech Expert	High	Fintech Expert
P16	UK	Female	30-40	Digital Wallet User	Low	User
P17	UK	Male	35-45	Banking	High	Financial Professional
P18	UK	Female	40-50	Fintech Expert	Medium	Fintech Expert
P19	UK	Male	30-40	Digital Wallet User	High	User
P20	UK	Female	25-35	Banking	Low	Financial Professional
P21	UK	Male	35-45	Fintech Expert	Medium	Fintech Expert
P22	UK	Female	30-40	Digital Wallet User	High	User

This methodology ensured a comprehensive and ethically sound approach to exploring the adoption and impact of decentralized digital wallets in both Pakistan and the UK. The participants' diverse backgrounds provided a rich understanding of the challenges and opportunities related to blockchain and financial inclusion in different contexts.

### Findings and Discussion

This section presents the key findings from the thematic analysis of interviews conducted with participants from both Pakistan and the UK. The themes and sub-themes identified provide insights into how blockchain technology, decentralized digital wallets, and financial inclusion are perceived, experienced, and regulated in the context of cross-border payments.

#### Theme 1: Perception of Blockchain Technology

Blockchain technology is viewed as a transformative force in the financial sector, particularly in enabling secure and low-cost cross-border payments. However, there is variability in participants' awareness and trust in blockchain technology.

##### *Sub-theme 1.1: Awareness and Understanding of Blockchain*

Participants from the UK generally displayed a higher level of awareness of blockchain technology compared to those in Pakistan. This is largely due to the UK's more developed financial ecosystem and the presence of a larger number of fintech experts. Participants in Pakistan, however, displayed a more basic understanding of blockchain, often associating it with cryptocurrencies like Bitcoin. Some expressed concerns about its complexity, with a few participants unsure about the underlying mechanisms of blockchain technology (Bishnoi et al., 2026).

Despite this, there is a growing awareness of blockchain's potential benefits, particularly in enhancing transaction security and transparency. In Pakistan, several participants indicated an increasing interest in learning more about blockchain as a means to overcome traditional banking barriers and reduce the costs of remittances.

##### *Sub-theme 1.2: Trust in Blockchain for Financial Transactions*

Trust in blockchain for financial transactions is a significant factor influencing its adoption. Participants from the UK generally displayed greater trust in blockchain technology, viewing it as a secure, transparent, and efficient alternative to traditional financial systems. Blockchain's decentralized nature, which removes the need for intermediaries, was seen as an advantage in terms of reducing fraud and improving transaction transparency (Bishnoi et al., 2026).

In contrast, Pakistani participants were more skeptical, largely due to concerns about the technology's security and regulatory uncertainty. Trust issues were especially prominent among older participants, who had less experience with digital financial services. However, younger respondents and those with more exposure to digital wallets demonstrated more trust in blockchain, particularly for cross-border transactions.

#### Theme 2: Impact on Cross-Border Payments

Blockchain's potential to improve cross-border payments was a central theme discussed by participants, especially in the context of remittances between Pakistan and the UK.

##### *Sub-theme 2.1: Cost Reduction in Cross-Border Transactions*

Many participants highlighted the high costs associated with traditional remittance systems, such as bank transfers and money transfer operators, which can charge significant fees. Blockchain-based solutions were seen as a potential means to reduce these costs by eliminating intermediaries and enabling direct peer-to-peer transactions. This was particularly important for participants in Pakistan, where remittances account for a substantial portion of the GDP (Sule et al., 2024).

Participants from the UK also noted that blockchain could streamline international payments, reducing fees for businesses engaged in global trade. However, some concerns were raised about the initial costs of setting up blockchain-based systems, which may be prohibitive for smaller financial institutions.

### ***Sub-theme 2.2: Security Challenges and Solutions Provided by Blockchain***

Security remains a critical concern in cross-border payments. While participants recognized the security features of blockchain, such as cryptographic encryption and immutability, some expressed concerns about cyber-attacks, fraud, and the potential for digital wallet hacks. Participants from Pakistan, in particular, emphasized the importance of educating users about the security measures involved in using decentralized wallets (Sule et al., 2024).

Blockchain's transparent and immutable nature was, however, seen as an advantage in addressing fraud, especially in the context of cross-border payments. Respondents from both countries agreed that blockchain's ability to offer secure and traceable transactions could enhance trust in cross-border remittances.

### **Theme 3: Financial Inclusion in Emerging Markets**

Blockchain and decentralized digital wallets have the potential to significantly impact financial inclusion, especially in emerging markets like Pakistan.

#### ***Sub-theme 3.1: Barriers to Financial Inclusion in Pakistan***

Financial inclusion in Pakistan remains a significant challenge, with many individuals unable to access traditional banking services due to factors such as geographical barriers, lack of documentation, and low financial literacy. Pakistani participants acknowledged these barriers and expressed the belief that decentralized wallets could help overcome them by providing an easy and low-cost way for individuals to access financial services (Ghosh & Bhatia, 2025).

However, several participants raised concerns about the lack of trust in digital financial systems, especially among rural populations who are more familiar with cash-based economies. These barriers, along with limited internet access and a lack of understanding of blockchain, were cited as major challenges to the widespread adoption of decentralized wallets in Pakistan.

#### ***Sub-theme 3.2: Opportunities for Financial Inclusion through Decentralized Wallets***

Despite these challenges, participants from both countries recognized that decentralized digital wallets could play a key role in advancing financial inclusion. In Pakistan, where a large proportion of the population is unbanked, decentralized wallets offer an opportunity for individuals to access financial services without needing a traditional bank account (Sule et al., 2024). Blockchain technology, by providing a secure and transparent platform, could enable individuals in remote areas to participate in the financial system.

UK participants, while less focused on financial inclusion due to higher levels of banking access, noted that blockchain could help create more inclusive financial products for underserved populations, such as low-income individuals and small businesses.

### **Theme 4: User Experience with Decentralized Digital Wallets**

#### ***Sub-theme 4.1: Ease of Use and Accessibility for Users in Pakistan and the UK***

The user experience of decentralized digital wallets varied significantly between Pakistan and the UK. UK participants generally found these wallets to be user-friendly, with easy-to-use interfaces and seamless integration with existing financial services. However, some participants mentioned that while the wallets were accessible to tech-savvy users, they could be intimidating for those less familiar with technology.

In Pakistan, the situation was more complex. While younger participants and those with some technical knowledge reported positive experiences with digital wallets, older participants and those from rural areas struggled with the technology. The lack of financial literacy and digital infrastructure in rural Pakistan were major barriers to widespread adoption (Hanif, Asif, & Yusaf, 2026).

#### ***Sub-theme 4.2: Trust and Adoption of Decentralized Wallets***

Trust in decentralized digital wallets was a recurring theme in both countries. Participants from the UK generally displayed higher levels of trust in using these wallets, particularly for cross-border payments. They highlighted the benefits of decentralization, such as increased transparency and lower fees, as key drivers of adoption.

In contrast, Pakistani participants expressed mixed feelings about trust in decentralized wallets. While younger users showed more trust, older users were more skeptical, citing concerns about the lack of regulatory oversight and the potential for fraud (Hanif, Asif, & Yusaf, 2026). Education about blockchain's security features was identified as a critical step in building trust and encouraging adoption in Pakistan.

### Theme 5: Regulatory and Legal Challenges

#### Sub-theme 5.1: Regulatory Frameworks in Pakistan vs. the UK

Regulatory challenges were identified as a significant barrier to the adoption of blockchain and decentralized wallets. In the UK, participants noted that the regulatory environment was more developed, with clear guidelines on cryptocurrency trading and digital asset management (Staley & Amankwa, 2025). However, some participants still expressed concerns about regulatory uncertainty surrounding emerging financial technologies.

In Pakistan, the regulatory environment for blockchain and digital wallets remains underdeveloped, and many participants expressed concerns about the lack of clear legal frameworks for cryptocurrencies and decentralized finance. The absence of regulatory clarity was seen as a major obstacle to the adoption of blockchain-based financial services (Rehmat et al., 2025).

#### Sub-theme 5.2: Challenges in Cross-Border Regulation and Enforcement

Cross-border regulation is another challenge identified by participants. The decentralized nature of blockchain makes it difficult for governments to regulate and control transactions, particularly across borders. UK participants were more concerned about compliance with international anti-money laundering (AML) and know-your-customer (KYC) regulations, while Pakistani participants were concerned about the enforcement of regulations in a developing economy.

### Synthesis of Findings

The findings of this study suggest that blockchain technology and decentralized digital wallets have the potential to significantly transform the financial sector, particularly in cross-border payments and financial inclusion, which were central themes of the research. Participants from both Pakistan and the UK recognized the benefits of blockchain, especially in terms of reducing transaction costs and enhancing security, which aligned with the theme of "Impact on Cross-Border Payments." However, the study revealed significant differences in the perceptions and trust of blockchain between the two countries, particularly in the theme of "User Experience with Decentralized Digital Wallets." While participants in the UK displayed higher trust and comfort with using decentralized wallets due to a more developed financial infrastructure and regulatory framework, participants from Pakistan were more cautious. They expressed concerns about the lack of financial literacy, the security of digital systems, and the absence of clear regulatory guidelines, which were discussed in the theme of "Regulatory and Legal Challenges."

In Pakistan, financial exclusion was a key barrier to blockchain adoption, a finding that resonated with the theme of "Financial Inclusion in Emerging Markets." Conversely, the UK's more mature regulatory environment and established trust in digital financial services helped facilitate greater blockchain adoption, as highlighted in the theme of "Regulatory Considerations." This synthesis underscores the importance of targeted education and regulatory clarity in emerging markets to unlock the potential of decentralized wallets and blockchain for financial inclusion.

**Table 3: Thematic Analysis of Findings**

Theme	Sub-theme	Codes	Description
Perception of Blockchain Technology	Awareness and Understanding of Blockchain	Knowledge, Complexity, Exposure	Varying levels of awareness, with Pakistan participants having less knowledge of blockchain technology.
	Trust in Blockchain for Financial Transactions	Trust, Security, Transparency	Higher trust in the UK, but skepticism in Pakistan due to regulatory concerns and lack of education.
Impact on Cross-Border Payments	Cost Reduction in Cross-Border Transactions	Fees, Remittances, Transaction Speed	Blockchain seen as reducing fees and processing times for remittances.
	Security Challenges and Solutions	Fraud, Encryption, Immutability	Blockchain's secure transactions seen as a solution to fraud, but concerns remain about cyber-attacks.
Financial Inclusion	Barriers to Financial Inclusion in	Unbanked, Accessibility,	Challenges in reaching the unbanked and those with limited access to

Theme	Sub-theme	Codes	Description
	Pakistan	Literacy	digital systems in Pakistan.
	Opportunities for Financial Inclusion	Wallets, Accessibility, Inclusion	Blockchain could provide access to financial services in underserved areas.
<b>User Experience with Decentralized Digital Wallets</b>	Ease of Use and Accessibility	User Interface, Tech-Savvy, Barriers	Easier adoption in the UK, challenges in rural Pakistan.
	Trust and Adoption of Decentralized Wallets	Trust, Fraud, User Education	Trust varies, with younger users more likely to adopt; education on security is critical.
<b>Regulatory and Legal Challenges</b>	Regulatory Frameworks in Pakistan vs. the UK	Regulations, Legal Clarity, Crypto	The UK has more developed regulations, while Pakistan's regulatory framework is underdeveloped.
	Challenges in Cross-Border Regulation and Enforcement	AML, KYC, Compliance	Cross-border enforcement and compliance remain challenges for both countries.

### Conclusion

This study explored the role of decentralized digital wallets and blockchain technology in enhancing financial inclusion and improving cross-border payments, with a particular focus on Pakistan and the UK. The research identified several key findings. First, while participants from both countries recognized the potential of decentralized digital wallets to reduce costs and enhance security in cross-border payments, the level of awareness and trust in blockchain technology varied significantly. In the UK, participants demonstrated a higher level of understanding and trust in blockchain, largely due to a more developed financial ecosystem. In contrast, participants from Pakistan had a more basic understanding of blockchain, and concerns around security and regulatory uncertainty were more prevalent.

Regarding cross-border payments, the study found that blockchain-based solutions could significantly reduce the cost and processing time of remittances. Participants noted that blockchain's transparency, security features, and reduced reliance on intermediaries would lower fees and facilitate faster transactions, particularly for remittances between the UK and Pakistan. However, security concerns, especially related to cyber-attacks and fraud, were identified as key barriers to adoption in both countries.

On financial inclusion, the study revealed that decentralized digital wallets could provide an accessible and low-cost alternative to traditional banking, particularly for underserved populations in Pakistan. However, financial literacy, trust, and regulatory challenges were highlighted as significant barriers to widespread adoption in Pakistan. In the UK, while financial inclusion is not as pressing a concern, decentralized wallets still presented opportunities to offer more inclusive and accessible financial products to low-income individuals and small businesses.

### Theoretical Implications

This study contributes to the existing literature on blockchain technology and financial inclusion by exploring its practical application in cross-border payments and its potential to promote financial inclusion in emerging markets. The findings support the notion that blockchain can play a crucial role in addressing the challenges of financial exclusion by providing secure, low-cost financial services without the need for traditional banking infrastructure (Ghosh & Bhatia, 2025).

The study also extends the theoretical understanding of decentralized finance (DeFi) and its impact on financial ecosystems. The results suggest that DeFi, through decentralized digital wallets, can enhance financial accessibility, particularly in developing economies like Pakistan, by overcoming barriers such as geographic isolation, lack of banking infrastructure, and high transaction costs (Ozili, 2022).

Furthermore, the study contributes to the understanding of blockchain's role in cross-border payments, highlighting its potential to reduce costs and improve the speed of international transactions. The research findings underscore blockchain's ability to provide transparent, immutable records that can enhance trust in financial transactions, which is particularly crucial for cross-border remittances (Sule et al., 2024).

### Practical Recommendations

Based on the findings, several practical recommendations were made to enhance the adoption and effectiveness of decentralized digital wallets. For policymakers, it is essential to develop clear and supportive regulatory frameworks for blockchain technology and decentralized finance in both Pakistan and the UK. This includes ensuring compliance with



anti-money laundering (AML) and know-your-customer (KYC) regulations, while also fostering innovation in blockchain solutions. Additionally, governments and financial institutions should prioritize the promotion of financial literacy by investing in education programs that improve awareness and understanding of blockchain and digital wallets, particularly in underserved areas. In Pakistan, where access to digital financial services is limited, supporting the development of digital infrastructure, such as enhancing internet access, will be crucial for the widespread adoption of decentralized wallets, especially in rural regions. These steps will help create a conducive environment for blockchain technology to thrive and ensure its benefits reach a broader population.

Fintech companies should enhance user education to build trust in decentralized digital wallets, focusing on educating users about security measures and the benefits of using blockchain technology. This will help alleviate concerns and increase user confidence in adopting these systems. Additionally, the design of decentralized wallets should prioritize simplicity and user-friendliness, especially for individuals who may not be tech-savvy. By simplifying interfaces, fintech companies can ensure broader adoption among users from various backgrounds, including those with limited digital experience. Furthermore, increasing partnerships between fintech companies and traditional banks can facilitate the integration of decentralized wallets into the broader financial ecosystem. Such collaboration would offer users a seamless transition from traditional banking services to blockchain-based systems, ultimately promoting greater financial inclusion and accessibility (Gazi, 2024).

Blockchain-based payment systems should be adopted to reduce the cost and time required for international money transfers. Financial institutions and fintech companies should collaborate to ensure that these systems are accessible, secure, and regulated, thereby making them a reliable alternative to traditional remittance channels.

### Limitations and Future Research Directions

While this study provides valuable insights into the potential of decentralized digital wallets and blockchain technology, it has several limitations. The sample size, although sufficient for qualitative research, is relatively small and may not be fully representative of the broader populations in both Pakistan and the UK. Additionally, the study focuses on individuals with varying degrees of experience with blockchain, which may introduce bias based on the level of technological exposure.

Future research could address these limitations by conducting larger-scale quantitative studies to explore the broader adoption of decentralized digital wallets across different demographics and regions. Longitudinal studies could provide deeper insights into the long-term impact of blockchain on financial inclusion and cross-border payments. Additionally, future research could explore the effectiveness of different regulatory approaches to decentralized finance, particularly in developing markets like Pakistan, and assess their impact on blockchain adoption.

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