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عنوان البحث

The Impact of Payment Initiation Service (PIS) Interface Design on User Experience in Instant Payments: A Case Study of the Saudi Financial Market

"أثر تصميم واجهة خدمة بدء الدفع (PIS) على تحسين تجربة المستخدم في المدفوعات الفورية : دراسة على السوق المالي السعودي"

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The financial services sector in Saudi Arabia is undergoing rapid digital transformation, driven by the advancement of Financial Technology (FinTech) and regulatory initiatives such as the Open Banking Framework issued by the Saudi Central Bank (SAMA). One of the most impactful innovations in this space is the introduction of instant payment systems, which allow users to transfer funds in real-time or near real-time.

A key component of this ecosystem is the Payment Initiation Service (PIS) — a regulated service that enables third-party providers to initiate payments directly from a user's bank account, with the user's consent, without the need for traditional card-based payment methods.

While PIS has the potential to simplify transactions, reduce processing costs, and enhance financial inclusion, its success largely depends on how intuitive and efficient the user interface (UI) and user experience (UX) are. Poorly designed interfaces can lead to user frustration, mistrust, and abandonment of the service.

This study aims to investigate how the design of PIS interfaces affects user experience in the context of instant payments in the Saudi financial market. It seeks to identify the critical UI/UX factors that enhance usability, trust, and satisfaction, ultimately contributing to greater adoption of PIS-enabled instant payment solutions.

• **Payment Initiation Service (PIS):**

A regulated financial technology (FinTech) service that allows third-party providers (such as FinTech applications) to initiate a payment transaction directly from a user's bank account, with the user's explicit consent. PIS operates under open banking regulations (such as those issued by SAMA) and removes the need for traditional card networks. Its role is limited to initiating the transaction, not holding or managing funds.

• **Instant Payments:**

A form of electronic payment that enables the transfer of funds from the payer to the payee in real-time or near real-time, 24/7/365. Instant payments are characterized by speed, finality, and immediate confirmation, making them ideal for e-commerce, peer-to-peer, and business-to-consumer use cases. In Saudi Arabia, instant payments are facilitated by systems like "Sarie."

• **User Experience (UX):**

The overall perception and response of a user resulting from their interaction with a system, product, or service. In the context of PIS and instant payments, UX includes factors such as interface simplicity, response time, clarity of steps, trust in security, and overall satisfaction with the payment process. Good UX contributes to increased adoption, retention, and user trust.

• **PIS Interface Design:**

Refers to the visual and functional structure of the user-facing components (web or mobile interface) or APIs used to initiate a payment via PIS. It includes layout design, button placement, feedback mechanisms, error handling, and overall flow of the payment process. Effective interface design ensures a smooth, secure, and intuitive user journey that reduces cognitive load and minimizes user errors.

Although Saudi Arabia has made significant regulatory progress through its Open Banking Framework — particularly with the implementation of Payment Initiation Services (PIS) — the adoption of instant payments continues to face usability challenges. Many users encounter friction during the payment journey, not because of technical limitations in transaction speed or infrastructure, but due to poorly designed user interfaces.

Issues such as unclear navigation, lack of visual feedback, confusing error messages, or overwhelming steps often result in user frustration, reduced trust in the payment system, and in some cases, abandonment of the transaction.

Moreover, while user interface (UI) and user experience (UX) design are widely recognized as critical factors in digital financial services, there is a notable lack of empirical research that evaluates how PIS interface design impacts user satisfaction and trust specifically within the Saudi financial ecosystem. This gap in the literature limits the ability of designers, developers, and policy makers to create truly user-centered payment experiences that encourage broader adoption of instant payment solutions.

- Facilitates the Adoption of Instant Payments:

By focusing on the design of Payment Initiation Service (PIS) interfaces, the study directly contributes to the success of instant payment systems within the Open Banking ecosystem in Saudi Arabia. Enhancing user experience can remove barriers to adoption and foster confidence in real-time digital transactions.

- Delivers Practical Value to Stakeholders:

The research offers actionable insights for banks, FinTech companies, UI/UX designers, and developers, helping them create more intuitive, secure, and user-centered payment interfaces. These insights can guide future product development and design strategies.

- Supports National Digital Transformation Goals:

The study aligns with Saudi Vision 2030, particularly in its objective to build a robust, inclusive, and digitally advanced financial sector. Improving the quality and accessibility of FinTech solutions contributes to economic diversification and digital empowerment.

- Bridges a Critical Research Gap:

By addressing the lack of empirical studies on UI/UX in PIS systems within the Saudi context, this research adds academic value and lays the groundwork for future studies in FinTech usability and digital finance.

- Promotes Trust and User Engagement:

A well-designed PIS interface improves not only usability but also enhances user trust, which is essential for repeated usage and long-term adoption of digital payment platforms.

1. To analyze existing PIS interface design practices in the Saudi financial sector:

This includes identifying common design patterns, interaction flows, and visual elements currently used by banks and FinTech providers offering Payment Initiation Services.

2. To evaluate the influence of UI/UX design on user satisfaction, usability, and trust in instant payments:

The study aims to measure how specific design elements (e.g., simplicity, clarity, feedback, visual hierarchy) affect users' perception and interaction with PIS-enabled payment systems.

3. To develop user-centered design recommendations for effective PIS interfaces:

Based on both the literature review and empirical findings, the study will propose practical design principles that enhance user experience and encourage wider adoption.

4. To design and test a functional PIS interface prototype:

A prototype interface will be developed using design tools (such as Figma or Adobe XD) and evaluated through usability testing with target users to assess its performance, usability, and acceptance.

1. What are the key UI/UX elements that influence user experience in PIS-based instant payment systems?
2. How do users in Saudi Arabia perceive the usability and trustworthiness of current PIS interfaces provided by banks and FinTechs?
3. What design-related factors cause user friction or abandonment during the instant payment process?
4. How can the design of PIS interfaces be improved to increase user satisfaction, trust, and adoption rates?
5. Are there significant differences in user experience across different user segments (e.g., age, digital literacy, frequency of usage)?
6. What role does visual feedback (e.g., confirmation messages, error indicators) play in the overall user trust and confidence during the transaction process?
7. To what extent does the clarity of payment flow and screen layout influence users' decision to complete a transaction via PIS?
8. How effective is a user-centered prototype compared to existing PIS interfaces in terms of task completion time and user satisfaction?

- A payment initiation interface that follows principles of clear layout, intuitive interaction flow, and consistent visual design will significantly enhance user trust in instant payment services. This hypothesis is based on the assumption that trust is closely linked to users' perception of system transparency, predictability, and control during the transaction process.
- User satisfaction with PIS-based instant payments is directly influenced by the usability of the interface — particularly the ease of navigation, clarity of instructions, and minimization of cognitive load. Interfaces that reduce complexity and provide clear feedback are expected to yield higher satisfaction ratings.
- A prototype PIS interface, developed using user-centered design methods and UX best practices (e.g., iterative design, usability testing, accessibility guidelines), will achieve better performance metrics — such as faster task completion, fewer user errors, and higher satisfaction scores — when compared to currently available PIS solutions in the Saudi market.
- Users with higher digital literacy are expected to adapt more quickly to new PIS interfaces, while users with lower digital experience may require more guidance and support features to achieve the same level of trust and satisfaction.

- Several studies have examined the influence of UI/UX design in FinTech applications and instant payment systems.
- Ghazali et al. (2018) emphasized that usability and interface clarity strongly impact user satisfaction in mobile payment systems.
- van der Aalst et al. (2020) analyzed PSD2-based PIS platforms in Europe and concluded that simplified authentication flows improve conversion rates.
- Khalil & Abdallah (2021) explored trust factors in instant payments and found that a clean interface increases perceived security.
- Reports by the European Banking Authority (EBA, 2021) and Nielsen Norman Group (2020) also highlighted the role of intuitive UI in enhancing user adoption and engagement.

However, most of these studies focus on European or North American markets. There is still limited academic research that specifically investigates how PIS interface design affects user experience in the Saudi financial ecosystem, especially in the context of instant payments under SAMA's Open Banking regulations.

This study is grounded in two key theoretical frameworks that guide both the research design and the interpretation of findings:

1. Technology Acceptance Model (TAM):

Developed by Davis (1989), TAM is one of the most widely used models to explain and predict user acceptance of new technologies. It posits that two primary factors — Perceived Usefulness and Perceived Ease of Use — directly influence an individual's intention to use a system. In the context of this study, TAM helps to understand how users' perceptions of the PIS interface affect their willingness to use instant payment services.

Perceived Usefulness refers to the degree to which a user believes that using the system will enhance their task performance (e.g., speed and convenience of payments).

Perceived Ease of Use refers to how effortless and intuitive the user finds the system to operate.

2. User-Centered Design (UCD) Principles:

UCD is a design philosophy that places the user at the center of the design process. It emphasizes the importance of understanding users' needs, goals, preferences, and limitations through continuous feedback, testing, and iteration.

In this study, UCD principles are applied to the design and evaluation of the PIS interface prototype, with the aim of improving usability, trust, and satisfaction among users engaging in instant payment transactions.

UCD promotes empathy-driven design, ensuring that systems are accessible, inclusive, and aligned with user behavior in real-world contexts.

Together, these frameworks support the study's approach to analyzing how interface design affects user experience and adoption of PIS-based instant payments.

This study will utilize a mixed-methods approach, combining both qualitative and quantitative techniques to gain a comprehensive understanding of user experience in PIS-based instant payments. The methodology is structured as follows:

1. Qualitative Phase – Exploratory Analysis:

This phase will involve conducting semi-structured interviews with selected users to explore their experiences, expectations, and challenges when using PIS interfaces.

In addition, usability testing sessions will be conducted using both current PIS solutions and a newly developed prototype to observe real-time interactions, identify usability issues, and capture qualitative feedback regarding design elements.

2. Quantitative Phase – Empirical Validation:

A structured questionnaire will be distributed to a broader sample of users to quantify perceptions related to the interface. The survey will include Likert-scale items measuring key dimensions such as: Perceived Ease of Use, Perceived Usefulness, User Trust, Interface Satisfaction, Intention to Reuse.

Data will be statistically analyzed to validate the hypotheses and identify correlations between interface design and user experience factors.

3. Prototype Development and Testing:

A high-fidelity PIS interface prototype will be created based on user-centered design principles and insights from the qualitative phase.

The prototype will be tested using usability evaluation techniques, including: Task completion rates, Error frequency, User satisfaction scores, Time on task.

The prototype's performance will be compared to existing solutions to determine improvements in usability and engagement.

To ensure comprehensive data collection and analysis, the study will employ the following research tools:

1. Survey Questionnaire:

A structured questionnaire will be developed based on the Technology Acceptance Model (TAM). It will include Likert-scale items to measure core variables such as: Perceived Ease of Use, Perceived Usefulness, Trust in the Interface, User Satisfaction, Intention to Continue Use

The questionnaire will help quantify users' perceptions and attitudes toward PIS interface design.

2. Usability Testing Tools:

Digital tools such as Maze, Lookback.io, or similar platforms will be used to observe real-time user interactions with the PIS prototype. These tools allow researchers to:

Track user behavior during specific tasks

Identify navigation patterns and drop-off points

Collect video/audio feedback and usage heatmaps

3. Prototyping Software (Figma / Adobe XD):

These tools will be used to design and develop high-fidelity interface prototypes for PIS. The interactive designs will reflect user-centered design principles and will be used for testing in both qualitative and quantitative phases.

4. Data Analysis Software (SPSS / Excel):

Collected quantitative data from the survey will be analyzed using statistical tools such as:

SPSS for correlation, regression, and hypothesis testing

Microsoft Excel for data cleaning, visualization, and basic descriptive statistics

These tools will support validation of the research hypotheses and help interpret relationships between design factors and user experience outcomes.

To ensure clarity and manage expectations, the following limitations of the study are acknowledged:

1. Geographical Scope:

The study is geographically restricted to the Saudi Arabian financial market. Findings and conclusions may not be directly generalizable to other regions with different regulatory, technological, or user-behavioral contexts.

2. Target Population:

The research focuses on digitally active users who are familiar with, or potential adopters of, Payment Initiation Services (PIS) within instant payment platforms. This may exclude less tech-savvy or non-digital users, whose experiences could differ significantly.

3. Technical and Environmental Constraints:

The study will primarily utilize sandbox environments and prototype interfaces rather than production-level systems. As such:

- i. Real-world variables such as actual transaction delays, bank authentication procedures, and network reliability may not be fully replicated.
- ii. User stress levels and behavioral responses in a controlled environment may differ from those in real financial decision-making scenarios.
- iii. The prototype's performance may not reflect integration challenges or compliance issues faced in live deployment.

4. Time and Resource Limitations:

Due to the academic nature and duration of the study, the scope of testing, sample size, and depth of technical implementation may be limited. Full-scale development, rollout, and long-term behavioral tracking are beyond the scope of this research.

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