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Review Article

The Evolution of User-Centered Design in Mobile Application Development: A Systematic Literature Review

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Abstract: The development of mobile applications has driven a shift in system development approaches from a technology-oriented focus toward a more user-centered approach. In this context, User-Centered Design (UCD) has evolved into an approach that emphasizes not only usability but also the quality of the user experience and the sustainability of application use. However, existing research still shows variations in approaches and has not provided an integrated understanding of the relationship between User-Centered Design, User Experience (UX), and User Adoption. This study aims to identify the evolution of User-Centered Design in mobile application development and to explain the relationship between design, user experience, and the success of application usage. The research was conducted using the Systematic Literature Review (SLR) method, adopting the PRISMA 2020 guidelines. The search process was conducted through the Scopus database using publication criteria from 2021 to 2026, yielding 61 articles that met the selection criteria. The results indicate that User-Centered Design has evolved from a usability-based approach toward a more human-centered, adaptive, and user-experience-oriented approach. Additionally, User Experience was found to act as a mechanism linking design decisions to User Adoption. This study produced a conceptual synthesis demonstrating the relationship between User-Centered Design, User Experience, and User Adoption as the primary pattern explaining the success of mobile application implementation.

Keywords: Human-Centered Design; Mobile Applications; User Adoption; User Experience; User-Centered Design.

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1. Introduction

The development of mobile applications has driven changes in how digital systems are designed and used in various aspects of life. The increasing complexity of user needs and rising expectations regarding the quality of interactions mean that an application's success is no longer determined solely by technical performance and feature completeness, but also by the system's ability to provide a user experience that aligns with user needs. These changes indicate that modern application development is shifting from a technical orientation toward an approach that places people at the center of the design process[1] .

These changes have spurred the development of the User-Centered Design (UCD) approach, which places the user at the center of the system design and development process. This approach emphasizes understanding user needs, evaluating usage, and iteratively refining the design so that the resulting system delivers a more relevant and effective user experience. Previous studies indicate that the implementation of user-centered design has evolved from a focus on usability attributes toward the integration of user experience, user engagement, usage context, and interaction quality throughout the design process[2] ,[3] .

Furthermore, recent research indicates that the quality of the user experience is increasingly recognized as a key indicator of an application's success. Integrating User Experience (UX) into the design process enables applications not only to fulfill system functions but also to enhance the quality of interaction, perceived benefits, and long-term usage. Research shows that the user

experience is shaped from the early stages of development through prototyping, user experience evaluation, and ongoing user involvement throughout the system development process[4] ,[5] .

Although research on user-centered design continues to evolve, there are still some limitations in the available literature. Most studies address user-based design ( ) and user experience separately, thus failing to explain how design decisions influence the overall success of application adoption. Additionally, variations in implementation contexts and evaluation methods make it difficult to systematically compare research findings. These conditions highlight the need for a systematic literature review capable of synthesizing developments in User-Centered Design and elucidating the conceptual relationships between design, user experience, and user adoption.

This study aims to identify the evolution of User-Centered Design in mobile application development and to explain the relationship between User-Centered Design, User Experience, and User Adoption through a Systematic Literature Review (SLR) based on PRISMA 2020, thereby yielding a more integrated conceptual synthesis.

2. Literature Review

User-Centered Design

User-Centered Design (UCD) is a design approach that places the user at the center of the decision-making process during system development. This approach emphasizes understanding user needs, evaluating usage, and developing solutions iteratively to produce systems that are better suited to the context of use.

Recent literature indicates that the implementation of User-Centered Design is no longer limited to usability testing but has evolved into an approach that takes into account user experience, user perception, and user engagement throughout the design process. Previous studies have shown that this user-centered approach has evolved from a focus on system functionality toward the integration of user needs and the quality of the user experience as integral components of the digital product development process.

In the context of mobile apps, this approach is becoming increasingly important because app usage is influenced by dynamic usage environments and changing user expectations. Therefore, User-Centered Design is understood as a mechanism that allows designs to be more adaptive to users' actual needs.

User Experience

User Experience (UX) describes the overall perceptions, responses, and experiences formed as users interact with a system. In mobile app development, the quality of the experience is influenced not only by ease of use but also by the perceived benefits, the quality of interactions, and the system's ability to meet user needs.

Research shows that user experience is increasingly being recognized as a key indicator of design success because it has a direct impact on perceptions of quality and continued app usage. Design approaches that integrate user experience evaluation throughout the development process tend to result in apps that are more relevant to user needs[4] .

Additionally, research on expected experience indicates that users' perceptions before and during use play a role in shaping their evaluation of an application's quality and influence acceptance of the developed system[6] .

User Adoption and Technology Acceptance

User adoption refers to the process by which users accept and use a system following its implementation. From the perspective of the Technology Acceptance Model (TAM), the decision to use a system is influenced by perceptions of its benefits and ease of use, which are formed during interactions with the system.

In the context of mobile applications, the quality of the user experience has become an increasingly dominant factor in explaining adoption success. Previous research indicates that user involvement during the design process contributes to improved quality of use and sustained use of the application[7] .

In addition, research on accessibility shows that an inclusive and accessible user experience increases the likelihood of user retention and enhances the long-term success of the app[8] .

Research Conceptual Framework

Based on the literature, this study employs a conceptual framework that explains how design quality influences the formation of user experience, which in turn contributes to the decision to use the application.

This relationship is formulated as follows:

User-Centered Design → User Experience → User Adoption

This conceptual framework serves as the basis for a synthesis explaining how the evolution of design approaches in mobile applications contributes to improved user experience and the success of application usage.

3. Proposed Method

Research Design

This study employs a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize the development of User-Centered Design (UCD) in mobile application development, as well as the relationship between User Experience (UX) and User Adoption. The SLR method was chosen because it allows for the systematic integration of scientific evidence, thereby yielding a more comprehensive understanding of the development of design concepts and practices within the digital application environment.

The study was conducted in accordance with the PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure transparency in the selection process, consistency in evaluation, and the reproducibility of the research. The research stages included literature identification, initial screening, eligibility assessment, and thematic synthesis.

Literature Search Strategy

The literature search was conducted using the Scopus database due to its extensive coverage of publications in the fields of computer science and information systems.

The search strategy was formulated using a combination of primary keywords representing the concepts of User-Centered Design, User Experience, and design processes with the following Boolean operators:

("User-Centered Design" OR "human-centered design") AND (usability OR "User Experience" OR UX OR "user participation") AND ("design framework" OR "design process")

To improve the relevance of the results, the search is filtered using the following criteria: (a) Publication year: 2021–2026, (b) Subject Area: Computer Science, (c) Language: English (d) Document type: Scientific articles

The search process yielded 1,557 initial documents prior to the selection process.

Inclusion and Exclusion Criteria

Selection criteria were determined prior to the screening process to ensure the quality of the synthesis.

Inclusion Criteria: (a) Articles published between 2021 and 2026, (b) Articles were written in English, (c) Articles are indexed in Scopus, (d) The article discusses User-Centered Design, User Experience, usability, or the design process, (e) Articles are available in full text.

Exclusion Criteria: (a) Articles outside the scope of mobile applications, (b) Non-journal articles or incomplete documents, (c) Articles that lack conceptual relevance to the research objectives, (d) Articles with insufficient methodological information.

Selection and Quality Assessment Procedures

The selection process was conducted using the PRISMA 2020 approach.

The identification phase yielded 1,557 documents from the Scopus search results. Subsequently, filtering was performed based on publication year, subject area, language, and relevance to the research topic. After the screening and eligibility evaluation processes were completed, 61 studies that met all criteria were identified and used in the final synthesis phase.

Quality assessment was conducted narratively to ensure that the selected studies demonstrated conceptual relevance, methodological transparency, and a contribution to understanding the relationship between User-Centered Design, User Experience, and User Adoption.

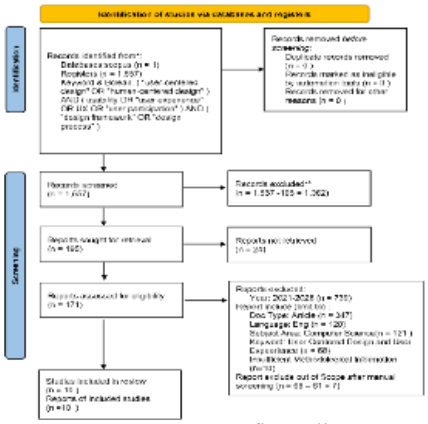


Figure1 . PRISMA flow diagram

Figure1 **.** PRISMA flow diagram illustrates the systematic steps used in the process of identifying, screening, evaluating the suitability of, and selecting literature for this study. The process began with a search for articles in the Scopus database using predetermined keywords aligned with the study's focus on User-Centered Design, User Experience, and mobile applications. The initial search results then undergo a screening process based on publication criteria, language, scope of research, and relevance to the study's objectives. The next stage involves a feasibility evaluation to ensure that the retained articles possess adequate methodological quality and conceptual contribution. From the entire selection process, 61 articles that met all criteria were identified and used in the synthesis process. However, to simplify the presentation of results and strengthen the focus of the analysis, only 10 representative journals are presented in the synthesis table because they have the highest level of conceptual relevance to the development of User-Centered Design, its relationship with User Experience, and its implications for User Adoption. Nevertheless, all articles that passed the selection process were still used as the basis for interpretation, theme identification, and the formulation of research conclusions.

4. Results and Discussion

Although the final selection process yielded 61 articles that met all inclusion criteria and were used in the synthesis phase,Table1 **.** A Synthesis of Representative Studies on the Evolution of User-Centered Design in Mobile Applications displays only 10 representative journals selected for their highest conceptual relevance to the research objectives. This selection was made to simplify the presentation of results without compromising the overall scope of the analysis. The ten studies presented were selected because they most clearly represent the evolutionary patterns of User-Centered Design, its relationship with User Experience, and its implications for User Adoption in the context of mobile applications. Meanwhile, the other articles were still used as supporting sources in the narrative synthesis process, theme identification, validation of findings, and reinforcement of research result interpretations, ensuring that all 61 articles contributed to the formation of the research conclusions. The literature review indicates that the evolution of mobile application design is moving toward a more integrative approach. Previous research shows that the user experience in mobile applications is influenced by a combination of user needs, usage context, interaction quality, and the evaluation mechanisms employed during the design process. Additionally, technological advancements such as personalization, virtual environments, and experience-based evaluation methods are expanding the scope of UCD implementation in modern application development.

Table1 . A Synthesis of Representative Studies on the Evolution of User-Centered Design in Mobile Applications

No	Study	Year	Context	Gaps
1.	Palomar-Garcia et al. [9]	2023	Mobile applications	Traditional UCD approaches remain focused on usability; research indicates the need to

				integrate ethical aspects and user values into app design.
2.	Heo & Lee. [10]	2023	Mobile health	User engagement in multi-channel service environments remains limited; designs that are more responsive to user experience are needed.
3.	Lawani et al. [2]	2023	Human-centered applications	User-centered design implementations have not yet fully integrated the active user decision-making process.
4.	Ilhan. [4]	2025	Mobile prototyping	User experience evaluations are often conducted in the final stages; design iterations have been found to improve UX quality.
5.	Chung et al. [6]	2024	Experience-driven design	User experience perceptions are still underutilized as a basis for product design.
6.	Akram et al. [11]	2025	Interaction design	Emotional factors have not been consistently integrated into experience evaluations.
7.	Duarte et al. [7]	2023	Mobile application	The relationship between design and sustained use remains limited; user engagement enhances adoption.
8.	Omar et al. [8]	2025	Accessibility	Accessibility has not yet become a core component of user-centered design.
9.	Taherysayah et al. [5]	2025	Virtual reality integration	Traditional evaluation methods fail to capture dynamic user behavior.
10.	Ren et al. [12]	2026	Adaptive systems	AI-based personalization shows potential for enhancing user experience and interaction.

Based onTable1 **.** A Synthesis of Representative Studies on the Evolution of User-Centered Design in Mobile Applications , it is evident that the most notable shift in the literature has occurred in how application quality is understood and evaluated. While previous approaches linked design success primarily to system efficiency and usability, recent research indicates that an application's success is increasingly determined by the quality of the user experience formed during user interaction with the system. A literature synthesis indicates that User Experience (UX) research on mobile applications has evolved from a focus on usability attributes toward the integration of user acceptance, user needs, usage context, and the utilization of new technologies such as virtual reality and artificial intelligence[13] . Furthermore, human-centered and experience-driven approaches position user engagement as a key component in the system development process through needs exploration, iterative evaluation, and experience validation to produce applications that are more responsive to users' actual conditions. These findings indicate that user experience is no longer understood as the final outcome of design but rather as

an element that is continuously shaped throughout the development process. In the context of sustained usage, the quality of experience serves as a mechanism linking design decisions to the success of application usage through factors such as accessibility, perceived benefits, interaction quality, and personalization, which contribute to increased user engagement and retention. These findings reinforce the argument that the relationship between User-Centered Design, User Experience, and User Adoption forms a mutually reinforcing mechanism in determining the success of mobile applications[14] [15]. Recent developments also indicate that app design is moving toward more adaptive systems through the integration of artificial intelligence, personalized experiences, and more dynamic evaluation approaches. Consequently, the direction of app development no longer focuses solely on creating user-friendly interfaces but also on the system's ability to deliver relevant, sustainable experiences that align with evolving user needs.

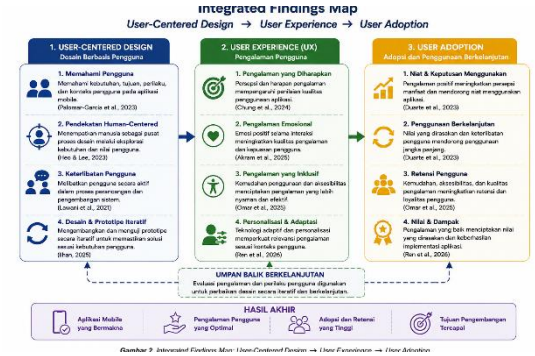


Figure 2. Integrated Findings Map

Figure **2.** Integrated Findings Map illustrates a conceptual synthesis that explains the relationships among the main themes identified in the literature review: User-Centered Design, User Experience (UX), and User Adoption in the context of mobile application development. The diagram shows that the development process begins with the application of User-Centered Design through an understanding of user needs, the implementation of a human-centered approach, user involvement throughout the development process, and iterative design evaluation. This approach subsequently influences the formation of User Experience through expected experiences, emotional responses, inclusive experiences, and the system's ability to adapt to user needs. Furthermore, the quality of the resulting experience contributes to User Adoption, as evidenced by the intention to use, sustained usage, user retention, and the perceived benefits of the application. The diagram also illustrates a continuous feedback mechanism, confirming that user experience evaluations are reused to continuously refine design decisions. This synthesis demonstrates that the success of mobile app implementation is not solely influenced by design quality or usability in isolation, but is determined by the interconnectedness of User-Centered Design, User Experience, and User Adoption as a continuous and mutually reinforcing development cycle.

5. Conclusions

This study employs a Systematic Literature Review (SLR) approach based on the PRISMA 2020 guidelines to analyze the evolution of User-Centered Design (UCD) in mobile application development and to elucidate the relationship between User Experience (UX) and User Adoption. Based on the literature selection process, 61 articles meeting the inclusion criteria were identified and used in the synthesis process, while 10 journals were highlighted as representative studies due to their highest conceptual relevance to the research focus. The findings indicate that the evolution of User-Centered Design has shifted from a usability-oriented approach toward a more human-centered, adaptive, and user-experience-oriented approach. The research findings indicate that design quality is no longer determined solely by technical aspects but also by user engagement, experience evaluation, personalization, accessibility, and the system's ability to generate sustainable interactions. Furthermore, User Experience was found to act as a mechanism linking design decisions to User Adoption, thereby forming a conceptual relationship among User-Centered Design, User Experience, and User Adoption as the primary explanation for the success of mobile application implementation. Based on these findings, future research is

recommended to expand the scope of the database, develop a more comprehensive synthesis approach, and explore the integration of artificial intelligence, service personalization, and longitudinal user experience evaluation. From a practical perspective, app developers are advised to consistently apply User-Centered Design principles throughout all stages of development so that the resulting applications are more relevant, adaptive, and capable of enhancing long-term usage success

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