



People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research



University of Setif1 – Ferhat Abbas

Faculty of Economics, Commerce and Management Sciences

Department: Commercial Sciences

Thesis Submitted in Partial Fulfillment of the Requirements for the
Master's Degree in Commercial Sciences
Specialization: Digital Marketing

Topic:

Assessing the Impact of Mobile banking App Usability on Customer Engagement in E-banking

An empirical study of Algerian e-banking app users

Supervised by:

Prepared by:

Dr. Anoune Hanane

Mami Oussama Brahim Yacine

Date of defense:

Defense Committee		
Professor	Messalta Sofiane	Chairperson
Class B Professor	Anoune Hanane	Supervisor
Class B Professor	Zerouati Maouahib	Examiner

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Most Gracious, the Most Merciful

Acknowledgments:

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Dedication:

To my dear father, may Allah grant him jannah and surround him with mercy and peace. His memory is a constant light guiding me.

To my mother, whose unwavering love, patience, and sacrifices have been the foundation of my strength. Your endless support, gentle encouragement, and boundless care have carried me through every challenge and inspired me to persevere.

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I dedicate to you the fruit of this humble work.

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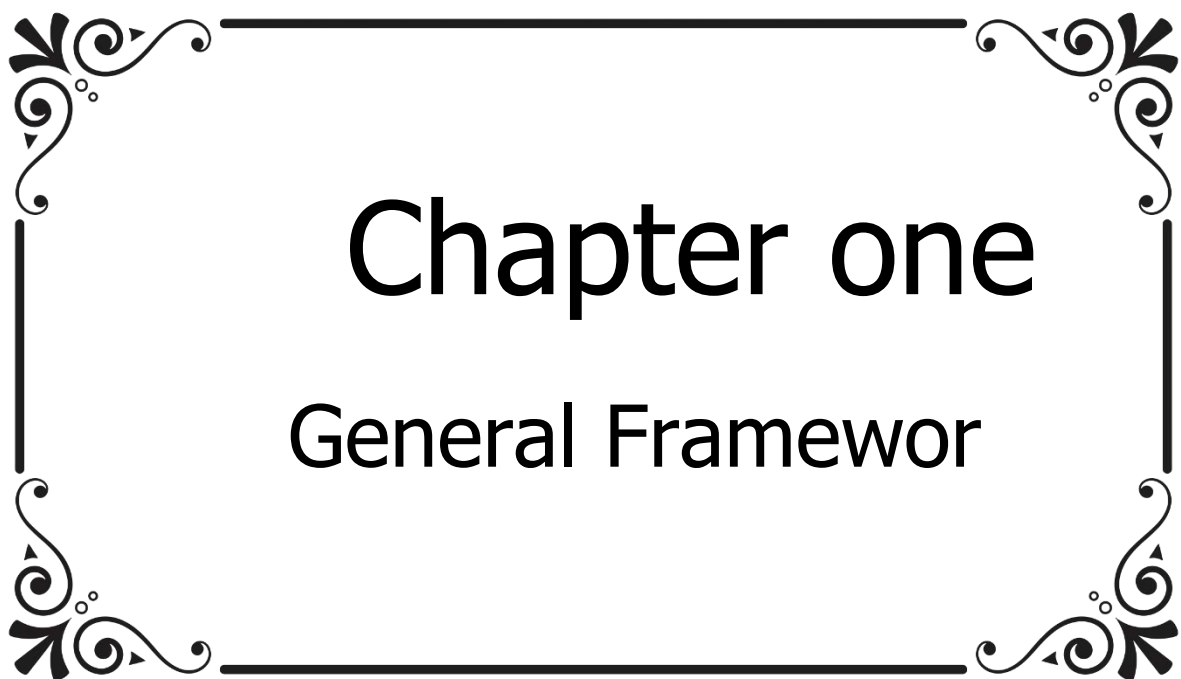
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Chapter one

General Framewor

Overview

The world is currently witnessing rapid technological transformations that have reshaped how individuals' access, share, and consume services and information. Among the most prominent innovations in recent years is the widespread use of smartphones and mobile applications, which have revolutionized the interaction between businesses and consumers across numerous industries — banking being a key example. As mobile technology becomes increasingly integrated into daily routines, mobile banking applications have emerged as vital tools that empower users to conduct financial operations with ease, flexibility, and autonomy, regardless of time or place (Kim, Lin, & Sung, 2013; Al-Baltah et al., 2024).

These digital applications serve not only as transactional platforms but also as strategic touchpoints for delivering user-centric experiences that foster customer satisfaction and loyalty (Purcell, Entner, & Henderson, 2010; Sharma & Bhargav, 2023). In response to growing customer demand and rising competition, banks worldwide — including in Algeria — have invested heavily in mobile app development. Yet, despite the high download rates, studies have shown that app usage often declines after initial adoption due to usability challenges or unmet expectations (Hong, Thong, & Tam, 2006; McLean, 2018). This highlights a critical issue: the gap between acquiring users and meaningfully engaging them.

Usability is a central factor in determining whether customers continue to use a banking app over time. It comprises three major dimensions: learnability (the ease with which users can understand and use the app), convenience or efficiency (how quickly and effectively users can complete tasks), and aesthetics (the design and visual appeal of the interface) (Hoehle & Venkatesh, 2015; McLean, 2018). When these dimensions are addressed properly, they improve the user experience and create conditions conducive to deeper engagement.

Customer engagement, in turn, is a key concept in modern marketing research. It is widely defined as a multidimensional psychological state that includes cognitive, emotional, and behavioral components (Brodie et al., 2011; Vivek et al., 2012). In the context of mobile banking, cognitive engagement reflects the user's mental focus and

attention, affective engagement relates to emotional connection and satisfaction, while conative engagement denotes behavioral intentions such as repeated use and brand advocacy (Hollebeek, Glynn, & Brodie, 2014).

While global interest in mobile usability and customer engagement has grown, most empirical studies have concentrated on advanced economies, leaving a significant gap in the literature regarding emerging markets like Algeria. The unique challenges and opportunities in North African financial sectors, coupled with rapid digitalization, demand closer examination of what drives successful digital banking experiences in this regional context.

Against this backdrop, the present study aims to assess the impact of mobile banking app usability — specifically through the lenses of learnability, convenience, and aesthetics — on the levels of cognitive, emotional, and behavioral customer engagement among Algerian users. The findings are expected to inform banks, app developers, and marketers on how to better align digital service design with user expectations, thereby enhancing retention and trust in mobile banking services.

1. Problem Statement and Research questions

Although mobile banking applications have become increasingly popular, many users discontinue their use shortly after downloading. This reflects a clear gap between initial adoption and sustained engagement. In Algeria, limited research has explored the specific factors that influence this continued use, particularly in relation to app usability and customer engagement.

Understanding how usability—through aspects such as learnability, convenience, and design—affects user interaction is essential, especially as mobile banking grows in importance. At the same time, customer engagement is recognized as a multi-faceted concept, involving how users think, feel, and behave toward the app.

Accordingly, this study seeks to explore the influence of mobile banking app usability on customer engagement in Algeria. The central research question is as follows:

To what extent does mobile app usability influence customer engagement in the context of Algerian mobile banking applications?

In order to comprehensively address the main research question and problem statement, the following sub-questions have been formulated:

Q1: Does the usability of mobile banking apps influence the cognitive engagement of Algerian customers?

Q1.a: Does the learnability of mobile banking apps influence the cognitive engagement of Algerian customers?

Q1.b: Does the convenience of mobile banking apps influence the cognitive engagement of Algerian customers?

Q1.c: Does the aesthetics of mobile banking apps influence the cognitive engagement of Algerian customers?

Q2: Does the usability of mobile banking apps influence the affective engagement of Algerian customers?

Q2.a: Does the learnability of mobile banking apps influence the affective engagement of Algerian customers?

Q2.b: Does the convenience of mobile banking apps influence the affective engagement of Algerian customers?

Q2.c: Does the aesthetics of mobile banking apps influence the affective engagement of Algerian customers?

Q3: Does the usability of mobile banking apps influence the conative engagement of Algerian customers?

Q3.a: Does the learnability of mobile banking apps influence the conative engagement of Algerian customers?

Q3.b: Does the convenience of mobile banking apps influence the conative engagement of Algerian customers?

Q3.c: Does the aesthetics of mobile banking apps influence the conative engagement of Algerian customers?

Q4: Are there statistically significant differences in customer engagement with mobile banking apps based on demographic characteristics?

Q4.a: Are there significant differences based on age?

Q4.b: Are there significant differences based on gender?

Q4.c: Are there significant differences based on income level?

Q4.d: Are there significant differences based on occupation?

Q4.e: Are there significant differences based on educational level?

2. Hypothesis

Based on the research problem these hypotheses have been formulated:

Main Hypothesis: Higher levels of mobile app usability positively influence customer engagement in the Algerian mobile banking apps context.

Sub-hypothesis:

H1: Usability of mobile banking apps positively influences the **cognitive engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H1.a: Learnability of mobile banking apps positively influences the **cognitive engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H1.b: Convenience of mobile banking apps positively influences the **cognitive engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H1.c: Aesthetics of mobile banking apps positively influences the **cognitive engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H2: Usability of mobile banking apps positively influences the **affective engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H2.a: Learnability of mobile banking apps positively influences the **affective engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H2.b: Convenience of mobile banking apps positively influences the **affective engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H2.c: Aesthetics of mobile banking apps positively influences the **affective engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H3: Usability of mobile banking apps positively influences the **conative engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H3.a: Learnability of mobile banking apps positively influences the **conative engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H3.b: Convenience of mobile banking apps positively influences the **conative engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H3.c: Aesthetics of mobile banking apps positively influences the **conative engagement** of Algerian customers, at a significance level of ≤ 0.05 .

H4: There are statistically **significant differences** in **customer engagement** with mobile banking apps based on **demographic characteristics**, at a significance level of $\alpha \leq 0.05$.

H4.a: There are statistically significant differences in customer engagement with mobile banking apps based on **age**, at a significance level of $\alpha \leq 0.05$.

H4.b: There are statistically significant differences in customer engagement with mobile banking apps based on **gender**, at a significance level of $\alpha \leq 0.05$.

H4.c: There are statistically significant differences in customer engagement with mobile banking apps based on **income level**, at a significance level of $\alpha \leq 0.05$.

H4.d: There are statistically significant differences in customer engagement with mobile banking apps based on **occupation**, at a significance level of $\alpha \leq 0.05$.

H4.e: There are statistically significant differences in customer engagement with mobile banking apps based on **educational level**, at a significance level of $\alpha \leq 0.05$.

3. Purpose and Objectives of the Study

In order to fulfill the main purpose of this study, which is to assess the impact of mobile app usability on customer engagement in the context of Algerian mobile banking applications, the following specific objectives have been formulated:

- To understand the effect of mobile app usability on customer engagement among Algerian mobile banking app users.
- To assess the influence of the three usability dimensions—learnability, convenience, and aesthetics, on each of the three customer engagement dimensions: cognitive, affective, and conative.
- To examine whether there are statistically significant differences in customer engagement based on demographic characteristics (such as age, gender, income level, occupation, and education), in order to provide practical recommendations tailored to different user segments within the Algerian market.

4. Importance of the Study

The significance of this study lies in both its theoretical (scientific) and practical (applied) contributions, as explained below:

4.1. Scientific Importance

- This study contributes to enriching the literature on mobile banking usability and customer engagement, particularly in the Algerian context, which remains underrepresented in current research. While many studies have been conducted in

developed markets, few have addressed these dynamics within North African or Arab economies.

- The study adds to the body of knowledge on digital consumer behavior, with a focus on how usability features of mobile apps—such as learnability, convenience, and aesthetics—impact cognitive, emotional, and behavioral engagement in financial service settings.
- By targeting Algerian mobile banking users, the research helps close a gap in the literature concerning emerging markets and offers a foundational reference for future scholars interested in digital transformation in financial services within the region.

4.2. Practical Importance

- The findings of this study can assist banking institutions and app developers in Algeria in optimizing mobile app interfaces and functionalities to improve user experience and engagement, thus enhancing customer satisfaction and loyalty.
- The insights derived can guide digital banking strategies, enabling decision-makers to prioritize the usability dimensions that have the most significant impact on customer engagement, an essential metric in today's competitive financial sector.
- Banks and financial institutions can utilize the study's findings to segment users more effectively based on their demographic characteristics and tailor services and app features accordingly, increasing inclusivity and adoption across diverse user groups.
- Finally, this study supports the development of customer-centered mobile banking solutions, by aligning app design with the behavioral expectations, emotional needs, and usage patterns of Algerian consumers.

5. Study Limitations

This study is subject to a number of limitations, which are outlined below:

5.1. Geographical Scope

The study does not specify a particular geographic region within Algeria. Instead, it targeted Algerian nationals regardless of their country of residence. The

online questionnaire was distributed digitally via various platforms, making the sample geographically dispersed but not regionally categorized.

5.2. Temporal Scope

The data collection was confined to a specific time period, namely between April and May 2025. As such, the results reflect user perceptions and behaviors during this limited timeframe, which may not capture longer-term trends or changes in usability and engagement over time.

5.3. Sampling Constraints

The study relied on non-probability sampling methods—specifically, convenience and snowball sampling—which may limit the generalizability of the findings to the broader Algerian population.

Despite these limitations, the study provides valuable insights into the relationship between mobile app usability and customer engagement within the context of Algerian mobile banking services, and serves as a foundation for future research in this area.

6. Study Difficulties

Throughout the preparation and execution of this research, several challenges were encountered, which are summarized as follows:

6.1. Fragmentation of References

A significant portion of the references used in this study were derived from peer-reviewed journal articles. While these sources offer high academic value and credibility, their specialized nature, often focusing on specific dimensions such as usability, engagement, or mobile banking in isolation, made it difficult to find comprehensive frameworks or cohesive theoretical models that address all variables of interest in an integrated manner. This required substantial effort in synthesizing and aligning the fragmented literature to construct a coherent conceptual framework.

6.2. Limited Contextual Studies in Algeria

There is a noticeable scarcity of empirical research addressing the relationship between mobile banking app usability and customer engagement in the Algerian context. This posed a challenge in establishing a strong contextual basis for comparison and benchmarking.

6.3. Time Constraints

The study was conducted within a tight timeframe, which placed limitations on expanding the sample size and conducting more in-depth statistical analysis or qualitative follow-up.

6.4. The active user base of mobile banking applications in Algeria remains relatively small. Fears about data privacy, and a general reluctance to engage in academic research. These factors made it difficult to obtain a sufficiently large and representative sample.

Despite these difficulties, the research succeeded in achieving its primary objectives and offers meaningful contributions to both theory and practice.

7. Research Model

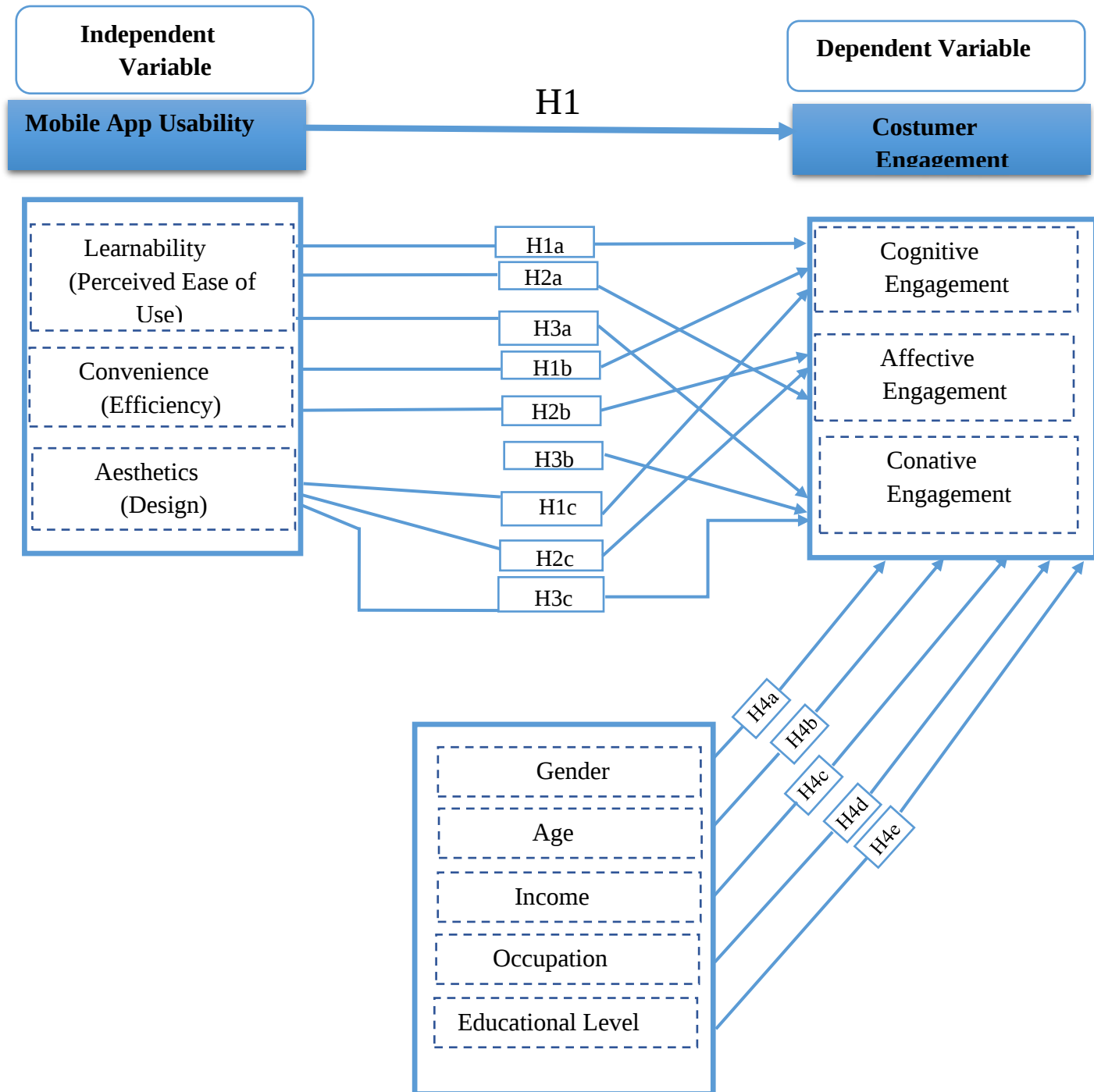
Figure (1-1) illustrates the proposed conceptual model of the study, which has been developed based on the research problem, hypotheses, and theoretical analysis of the key variables—namely, mobile app usability and customer engagement.

The model reflects the assumption that mobile banking app usability, represented by three key dimensions—learnability (ease of use), convenience (efficiency), and aesthetics (design)—is associated with different levels of customer engagement, which is analyzed through its cognitive, affective, and conative dimensions.

This model serves as a framework to test the formulated hypotheses and to examine the strength and significance of the relationships between usability dimensions and customer engagement within the context of Algerian mobile banking app users.

Figure (1-1): Conceptual Framework of the Study

variables, which include mobile banking app usability and customer engagement.



The source: prepared by the student

8. Structure of the Study

To address the research topic and achieve its objectives, this thesis is organized into five main chapters. Below is an overview of the content covered in each chapter:

Chapter One: General Framework

This chapter introduces the overall theme of the study. It begins with a contextual background to the research topic, followed by the articulation of the research problem and the formulation of the main research question, from which a set of sub-questions are derived. The study's hypotheses are then presented, consisting of one primary hypothesis and several sub-hypotheses. The purpose and objectives of the study are outlined, along with the study's significance, which is discussed from both academic and practical perspectives. The chapter also defines the spatial and temporal boundaries of the study, presents the main obstacles encountered during the research process, and concludes by outlining the proposed research model, followed by a summary of the thesis structure.

Chapter Two: Literature Review

This chapter reviews the literature relevant to mobile app usability and customer engagement. It begins by defining usability and narrowing the focus to mobile app usability, with emphasis on the three selected dimensions: learnability, convenience, and aesthetics. Recommendations for improving mobile usability—based on the Mobile Application Usability Index (MAUI)—are presented, followed by a discussion of common usability challenges in app development. The chapter then transitions to the concept of customer engagement, detailing the cognitive, affective, and conative dimensions that are central to the current study. A review of previous empirical and theoretical studies is also provided, identifying key contributions and highlighting gaps in the existing literature. The chapter concludes by justifying the need for further research within the context of Algerian mobile banking.

Chapter Three: Methodology

This chapter explains the methodological approach used in the study. It outlines the rationale for adopting a quantitative research design and describes the research procedures

in detail. The chapter covers the development of the study model, the target population, the sampling technique (including sample size determination), and the tools used for data collection. The structure and content of the questionnaire are explained, including the six-point Likert scale used for measurement. The operationalization of the variables is described, followed by a summary of the items used and their academic sources. The chapter concludes by describing the statistical tools applied for hypothesis testing and assessing the validity and reliability of the instrument.

Chapter Four: Study Results

This chapter presents the results of the empirical analysis. It begins with a descriptive analysis of the demographic data and participants' responses related to mobile app usability and customer engagement. Next, inferential statistical methods are used to test the research hypotheses and explore the relationships between variables. The results are supported with tables and figures, followed by a discussion that interprets the findings in relation to the research questions.

Chapter Five: Results Discussion and Recommendations

This final chapter synthesizes the findings from both theoretical and empirical perspectives. It highlights the contributions of the study, both to academic literature and to practical applications in banking. Based on the results, a set of recommendations is proposed for enhancing mobile banking app usability and fostering customer engagement. The chapter concludes by outlining the study's limitations and suggesting directions for future research.

9. Operational Definitions

To ensure clarity and consistency throughout this study, the following operational definitions are provided for the key concepts and variables examined:

9.1. Mobile App Usability

Mobile app usability refers to the degree to which users perceive a mobile banking application as easy to use, efficient, and visually appealing. It is operationalized in this study through three key dimensions:

- **Learnability (Perceived Ease of Use):** Defined as the user's ability to quickly understand and use the mobile banking application without external guidance. It includes simplicity and familiarity of the interface.
- **Efficiency (Convenience):** Measured by the speed and accuracy with which users complete tasks on the app, including compatibility across devices, loading time, and task execution.
- **Aesthetics (Design):** Refers to the visual appeal and emotional response elicited by the app interface, including layout, color schemes, and iconography.

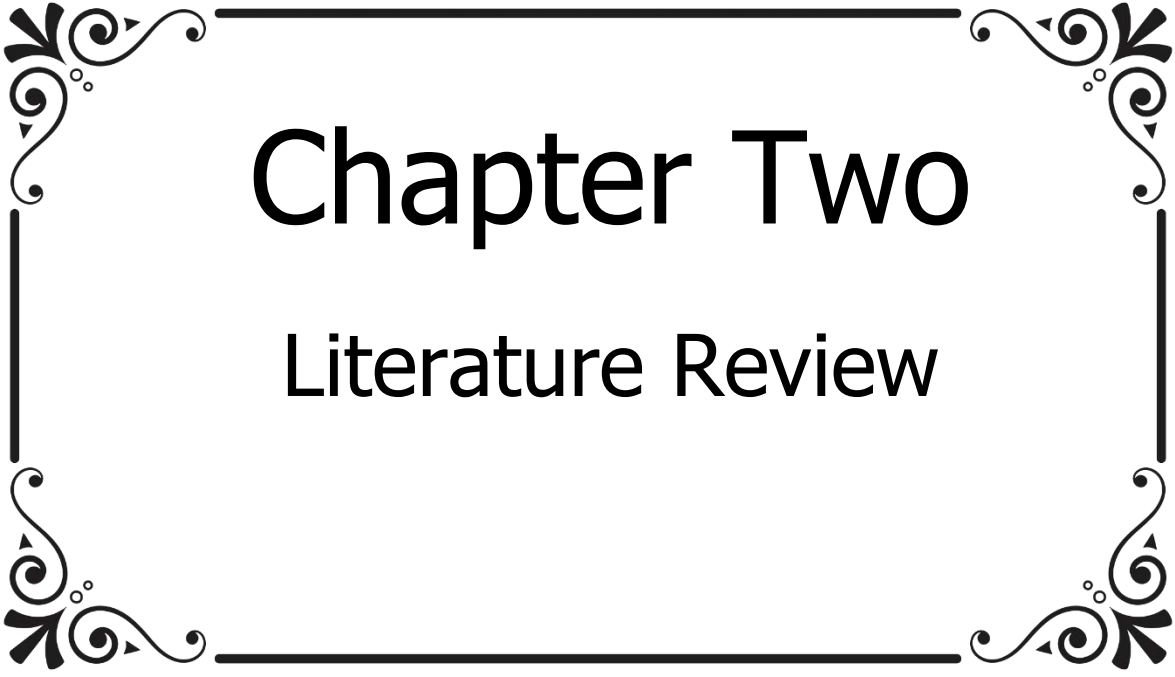
9.2. Customer Engagement

Customer engagement is defined as a multidimensional psychological state reflecting a user's active involvement with the mobile banking app. It is operationalized through three interrelated dimensions:

- **Cognitive Engagement:** The degree of mental focus, attention, and interest users dedicate to interacting with the app's features and services.
- **Affective Engagement:** The emotional bond users develop with the app, reflected in feelings of satisfaction, trust, or attachment during use.
- **Conative (Behavioral) Engagement:** Users' intentions and actions toward continued app usage, including the effort invested in using the app or recommending it to others.

10. Algerian Mobile Banking App Users:

Individuals of Algerian nationality who use mobile applications provided by banks operating in Algeria, regardless of whether they reside inside or outside the country.



Chapter Two

Literature Review

Introduction:

The increasing integration of mobile technologies into everyday life has transformed how financial services are delivered, particularly through mobile banking applications. As user expectations continue to evolve in line with technological advancements, the usability of mobile applications has emerged as a central factor in determining the quality of customer experiences and the level of engagement with digital financial platforms. Understanding how users interact with these technologies is crucial for improving mobile banking services, especially in regions where adoption is growing steadily, such as Algeria.

This chapter provides a comprehensive review of the theoretical and empirical literature related to mobile app usability and customer engagement. It begins by exploring the key definitions and conceptual models of usability, including its dimensions such as learnability, convenience, and aesthetics, as proposed by leading scholars and standards organizations. The chapter then transitions into the construct of customer engagement, detailing its cognitive, affective, and behavioral dimensions and their relevance in digital banking contexts.

Following the conceptual framework, a synthesis of previous empirical studies is presented to highlight the current state of knowledge regarding the relationship between mobile app usability and customer engagement. These studies are drawn from various international contexts, offering comparative insights and revealing consistent trends as well as divergent findings.

Finally, the chapter identifies the existing gaps in the literature, particularly in the Algerian banking context, where few studies have empirically examined how usability features influence the engagement of mobile app users. This gap underscores the need for further research and provides a foundation for the present study, which seeks to contribute to the field by offering context-specific insights and recommendations.

1. Conceptual Framework of Mobile App Usability

According to numerous researchers such as Coursaris (2007), usability is a key factor in determining the success of mobile applications, especially in the context of mobile banking. As mobile banking apps become essential tools in modern financial services, their effectiveness depends on how easily users can navigate, understand, and complete transactions. Despite their growing importance, there is a lack of mobile usability research related to the technology beyond the interface (Coursaris, 2007).

1.1. Definition of Mobile App Usability

1.1.1. Usability

Shackel (1991) first defined usability in human functional terms as a system's capability to be used both easily and effectively. Building on this foundation, Nielsen (1999) adds that ease of use and ease of learning are essential elements of usability.

Years later, the International Organization for Standardization (ISO 9241-11:2018[En]) defined usability as “*the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*” (Rocha, 2024, p. 24) This definition highlights the degree to which users can achieve their goals effectively, efficiently, and with satisfaction within a particular context of use.

Expanding on the ISO definition, Hussain, Abubakar, & Hashim (2014) emphasize that usability involves not only ease of use but also the system's suitability for a specific user group performing defined tasks in a given environment. This ease of use directly influences user performance and satisfaction, while overall acceptability affects whether users will continue to engage with the product.

More recently, Hariyanti (2023) described usability as a measurement method for evaluating user experience when using system products such as software, websites, and mobile phones. It refers to how users experience the product and their level of satisfaction with it.

Drawing from these established definitions and perspectives, usability can be defined as the system's ability to help users achieve their goals effectively, efficiently, and with satisfaction, through an interface that is easy to use, easy to learn, and appropriate for their specific context and needs. It plays a key role in enhancing user performance, satisfaction, and continued use.

1.1.2. Mobile App Usability

Mobile applications are now central to how users interact with digital services, especially in banking. Usability plays a key role in ensuring these apps are easy to navigate, efficient, and satisfying to use. To better understand the concept, this section presents key definitions from the literature.

Hoehle (2015) defined mobile app usability as *“drawing from the International Standards Organization's (ISO) definition of usability, as the extent to which a mobile application can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use”* (Hoehle, 2015, pp. 6-7). This definition emphasizes the core usability elements—effectiveness, efficiency, and satisfaction—within a mobile context.

Similarly, Hariyanti (2023) highlighted that mobile app usability refers to the interaction experience that allows even novice users to navigate and use the application quickly and consider it as the main key that determines the success of an application system.

In conclusion, mobile app usability can be understood as the degree to which an application's design and interaction flow enable any user—even new users—to achieve their intended goals effectively, efficiently, and with a high level of satisfaction within the specific context of use, thus serving as a critical factor in the app's overall success.

1.2.Dimensions of Mobile App Usability

In the study of mobile application usability, numerous dimensions have been identified, including learnability, efficiency, design and aesthetics, flexibility-in-use, satisfaction, simplicity, intuitiveness, understandability, and attractiveness. Previous research has

extensively examined these aspects and proposed various frameworks to categorize them in order to better understand their impact on customer engagement.

For instance, McLean (2018) identified seven usability measures, with ease of use and convenience among the most frequently cited. Nielsen (1994) further contributed to this field by classifying usability dimensions into efficiency, learnability, and memorability. Another study by Tarute (2017) emphasized the importance of design as a key component of mobile application usability.

Given the recurring prominence of learnability, efficiency, and design & aesthetics across these studies, this section will focus specifically on these three dimensions to provide a clearer understanding of how they influence customer engagement in the context of mobile banking applications.

1.2.1. Perceived Ease of Use and Learnability

While learnability and perceived ease of use are distinct concepts in usability theory, they are often treated similarly within the context of mobile app usability due to their overlapping focus on the user's initial interaction and the effort required to use the application. This overlap has led many researchers to use the two terms interchangeably or to discuss them as a unified concept in their studies (Baek, 2018; McLean, 2018), this is supported by Weichbroth (2024), who states that ease of use has often been considered synonymous with learnability. Specifically, learnability refers to how easily a user can interact with a newly encountered mobile application without the need for guidance or consulting documentation.

Davis (1989) defines perceived ease of use as “*the degree to which a person believes that using a particular system would be free of effort*” (Davis F. D., 1989, p. 320). Building on this idea, Zhu and Wang (2022) describe perceived ease of use (PEU) as the minimal additional effort required to use new technologies, particularly mobile innovations, which is crucial for engaging customers in co-creating value experiences in banking.

Hussain, Abubakar, & Hashim (2014) claimed that learnability can be conceptualized as comprising two primary elements; simplicity refers to how easily users can complete tasks with minimal effort and clear language, and familiarity which involves

recognizable elements that help users navigate the interface intuitively. Both are interconnected, as simple interfaces often rely on familiar cues to reduce cognitive load and improve learning. Together, they determine how easily users learn and feel comfortable with the application, enhancing satisfaction.

In conclusion, based on the various definitions discussed in this section, learnability and perceived ease of use can be regarded as closely related concepts, often considered synonymous within usability research. Both refer to the ease with which users can acquire the skills to use and interact with an application, requiring minimal cognitive effort. Specifically, they reflect how effortlessly users can master an app without external guidance, facilitated by interface elements such as simplicity and familiarity in the interface.

1.2.2. Efficiency and Convenience

In usability research, efficiency and convenience are often used interchangeably or viewed as closely related dimensions, particularly in the context of mobile applications. Both concepts emphasize minimizing the time, effort, and complexity required to complete tasks, which is crucial for enhancing the user experience in mobile banking apps.

Baek (2018) refers to the International Organization for Standardization (ISO) definition of usability, which identifies efficiency as a core component: “*effectiveness, efficiency, and satisfaction with which specified users can achieve specified goals in a specified context.*” More specifically, efficiency is defined as “*the resources used in relation to the results achieved*” (ISO 9241-11, 2018, p.1).

In a similar vein, Alhejji (2022) describes efficiency as the degree to which effectiveness is attained with minimal waste of time and effort. Hussain, Abubakar, and Hashim (2014) further break down efficiency into three key elements: compatibility, loading time, and accuracy. Compatibility refers to how well the user interface performs across different mobile devices and aligns with users’ capabilities. Loading time measures how quickly the app responds during tasks such as launching or logging in and out. Accuracy reflects the app’s ability to correctly complete tasks within an acceptable timeframe. Together, these elements capture the overall efficiency of a mobile banking application’s interface.

Therefore, efficiency (and by extension, convenience) can be broadly defined as the ability to complete tasks with minimal time and effort. It reflects how quickly users can complete tasks, how effectively the app responds, and how accurately it performs actions, all contributing to a smooth and resource-effective user experience.

1.2.3. Design and Aesthetics

Beyond functional dimensions such as perceived ease of use and efficiency, the visual and emotional appeal of a mobile application plays a decisive role in shaping the overall user experience—particularly in mobile banking, where first impressions often determine continued use.

Moshagen and Thielsch (2010) defined aesthetics "*as an immediate pleasurable subjective experience that is directed toward an object and not mediated by intervening reasoning*" (Moshagen, 2010, p. 690). According to Thielsch et al. (2014), recent findings show that aesthetics has become a core component of website evaluation, as user experience design has expanded beyond usability to include visual appeal and overall experiential factors, and they mentioned that aesthetics had the largest influence on first impressions. In line with this, Perrig (2023) proposed that aesthetics can be divided into two categories: classic aesthetics, classic which encompasses qualities like cleanliness, visual appeal, and symmetry, and expressive aesthetics, which involves traits such as creativity, originality, and sophistication. Moreover, Perrig (2023), quoting Postrel (2004), suggested that aesthetics fulfils basic human needs for pleasure and well-being from a psychological perspective.

From a mobile banking perspective, Tarute et al. (2017) highlight that design (aesthetics) solutions are frequently included in usability taxonomies as one of the most critical features influencing consumer behavior and engagement. Several prior studies support this claim, such as Lee and Benbasat (2004), Vrechopoulos et al. (2009), and Kennedy-Eden and Gretzel (2012). Tarute et al. further assert that individual perceptions of the app interface directly influence engagement levels, and that key design elements—such as colors, layout, icons, and visual style—aid users in navigation while also evoking emotional responses. These features are not only aimed at enhancing usability but are deliberately crafted to generate positive emotional experiences. Additionally, Zhang and

Adipat (2005) and Eshet and Bouwman (2015) emphasize that mobile app usability is context-sensitive, varying depending on whether the app is used for education, entertainment, or banking, and whether the context is public or private.

In conclusion, aesthetics or visual design can be understood as an immediate sensory and emotional response to an application's interface. It integrates both visual clarity and emotional resonance, fulfilling deeper human needs for meaning and enjoyment. In mobile banking apps, well-executed design not only facilitates usability but significantly boosts user satisfaction and engagement.

1.3. Importance of Mobile App Usability

Usability is widely recognized as a critical factor in the success and adoption of mobile applications. It significantly shapes user satisfaction, behavior, and engagement within increasingly complex and fast-evolving mobile environments.

According to Alotaibi (2016), mobile app usability is essential to system development, although it presents unique challenges due to the limitations and specific contexts of mobile environments.

Rocha (2024) supports this view, emphasizing that usability influences user behavior and technology adoption, making it a vital consideration in mobile app development. In line with this, O'Brien (2008) asserts that usability is interwoven with the user experience of engagement, highlighting its central role in achieving user satisfaction and long-term interaction with the application.

Alhejji (2022) reinforces the argument by stating that usability is among the most important success factors for mobile apps, and that effective app design should account for users' needs, expectations, and previous experiences. Similarly, Hoehle (2015) notes that *"the lack of usability has been identified as the most important factor influencing consumers decisions to reject mobile applications"* (Hoehle, 2015, p. 3).

Taken together, these perspectives underline the multifaceted role of usability in shaping not only the user experience but also the overall success and retention of mobile applications.

In conclusion, mobile app usability is essential for the success of applications, as it directly influences user behavior, satisfaction, and adoption. A well-designed app that prioritizes usability helps ensure better user engagement and retention, while poor usability can lead to user rejection. Moreover, mobile environments present unique challenges that must be addressed in the design process to meet users' needs and expectations effectively. Overall, usability is a key factor in developing successful mobile apps that encourage long-term use and positive user experiences.

1.4. Mobile Banking App Usability Challenges

According to a survey conducted by Lalit Mohan (2015), involving 1,434 participants from diverse backgrounds, along with an analysis of over 26,000 user comments on the Google Play Store, several usability-related challenges in mobile banking were identified. The analysis showed that difficult activation processes led to customer disinterest and perceptions of being untrustworthy, while apps with better usability received positive feedback and higher satisfaction. Overall, the survey supports the idea that improved usability enhances adoption and ultimately boosts bank revenues.

Alhejji (2022) follow the same idea by conducting a study analyzing user reviews of mobile banking apps from 11 Saudi banks, focusing on usability challenges affecting effectiveness. The study identified three main issues: frequent functional failures such as login errors and app crashes, which hinder users from completing essential tasks; problems caused by new updates, which often disrupted app performance and accounted for over 20% of some reviews; and the lack of responsive customer support, with many users reporting unanswered questions and complaints. These challenges collectively led to user frustration, decreased satisfaction, and reduced trust and loyalty toward the apps.

Zhu (2022) highlighted that new mobility-related challenges complicate the usability of mobile apps. These include mobile context, connectivity issues, small screen sizes, varying display resolutions, limited processing power, and difficult data entry methods.

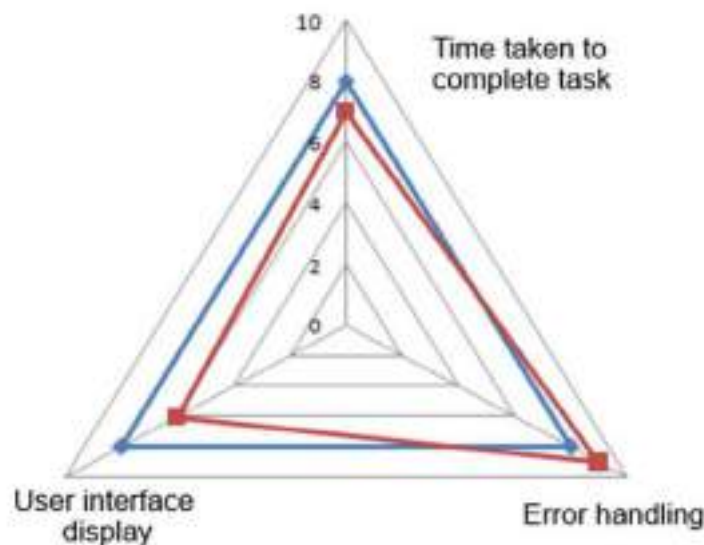
In conclusion, mobile banking apps face a range of significant usability challenges that affect user satisfaction and adoption. Issues such as complex activation processes, frequent functional failures, disruptive updates, and lack of effective customer support lead to frustration and reduced trust. Furthermore, mobility-related challenges like limited

processing power, small screen sizes, and varying and non-uniform display resolutions complicate the user experience.

1.5. Recommendations for Improving Usability

Mohan, Mathur, and Reddy (2015) proposed a heuristic-based evaluation method known as MAUI (Mobile App Usability Index) to assess and enhance usability in mobile banking applications. The framework focuses on key parameters such as task completion time, user interface display, and error handling. Each parameter is prioritized based on user feedback gathered from the Google Play Store, using a rating scale from 1 to 3 to reflect its influence on overall usability improvements.

Figure (2-1): MAUI parameters



Source: Mohan, L., Mathur, N., & Reddy, Y. R. (2015, April). Improving mobile banking usability based on sentiments. In *International Conference on Evaluation of Novel Approaches to Software Engineering* (pp. 190). Cham: Springer International Publishing

1.5.1. Time Taken to Complete Task

According to Mohan, Mathur, and Reddy (2015), it refers to the duration and number of interactions needed to complete actions in a mobile app, like adding a beneficiary or transferring money. To reduce task completion time, apps should simplify

processes, such as providing essential information without login and limiting the number of form fields. Navigation should begin with familiar fields, and features like default favorites, breadcrumbs, and pre-populated data can further streamline tasks. Overall, minimizing steps and making the app more intuitive enhances user efficiency and satisfaction.

1.5.2. User Interface Display

According to Mohan, Mathur, and Reddy (2015), the selection of font style, size, color scheme, button size, and labels plays a crucial role in shaping how users perceive and interact with an app. While individual preferences for these visual elements can vary widely, adhering to design best practices can significantly enhance the user experience. In the context of a mobile banking app, thoughtful consideration of these factors can lead to a more intuitive and accessible interface, ultimately improving usability and user satisfaction. By carefully balancing aesthetic appeal with functionality, developers can create an environment that is both visually appealing and easy to navigate for a broad range of users.

1.5.3. Error Handling

According to Mohan, Mathur, and Reddy (2015), due to the smaller screen size of mobile devices, users may struggle to focus on details. As such, it is essential to thoroughly test apps across various devices, screen sizes, and connectivity conditions. Additionally, timely and clear error messages are crucial in shaping the user's perception of usability. For example, if a user enters an incorrect PIN, the app should display an error message immediately, rather than waiting until all information is input, to improve the overall user experience.

2. Conceptual Framework of Costumer Engagement

The rise of mobile applications in today's digital era has transformed the way businesses connect with their customers. This transformation has brought increased attention to customer engagement, a multi-dimensional and evolving concept that plays a crucial role in marketing. Consequently, it has become a central focus in contemporary marketing research.

2.1. Definition of Costumer Engagement

According to Harmeling et al (2017), customer engagement (CE) research has grown exponentially over the last decade (Lim, Rasul, Kumar, & Ala, 2022). While 'engagement' has received considerable attention across a number of academic disciplines, including social psychology and organizational behavior, the concept has transpired in the marketing literature only relatively recently. In this emerging literature, 'engagement' has been viewed as a promising concept expected to provide enhanced predictive and explanatory power of focal consumer behavior outcomes, including brand loyalty (Hollebeek, 2014, p. 150).

Building on this foundation, understanding consumer engagement is essential for researchers as well as practitioners. Extant literature has described it as consumers' attitudes, activities, psychology, the state of involvement, the emotions of interested consumers (Pagani and Mirabello 2011). It also relates to the consumers' interactions with the service (Tak & Gupta, 2021, p. 5).

Expanding the scope further, Van Doorn (2010) describes costumer engagement as *"the behavioral manifestation from a consumer toward a brand or a firm which goes beyond purchase behavior."* (Van Doorn, 2010, p. 254), focusing on how engagement extends beyond traditional transactional behaviors.

In a similar vein, Cheung (2011) claims that consumer engagement can be viewed as a set of behaviors expressed by a customer toward a brand or firm, extending beyond mere purchasing actions, it also represents a psychological process that contributes to the development of customer loyalty over time.

To provide a more structured perspective, Brodie et al. (2013) define customer engagement as: “*A multidimensional concept comprising cognitive, emotional, and/ or behavioral dimensions, [which] plays a central role in the process of relational exchange where other relational concepts are engagement antecedents and/or consequences in iterative engagement processes within the brand community*” (Hollebeek, 2014, p. 151).

Reflecting this multidimensionality in digital contexts, Tarute (2017) found that customer engagement positively influenced users’ intention to continue using mobile applications, further dividing it into cognitive, emotional, behavioral, and social dimensions, thus illustrating its multifaceted impact in digital contexts.

In conclusion, customer engagement can be understood as a multifaceted state and set of behaviors encompassing cognitive, emotional, and behavioral dimensions that reflect a customer's active relationship with a brand. It extends beyond simple purchase actions to include ongoing psychological involvement, which fosters stronger emotional connections and gradually builds long-term loyalty.

2.2. Dimensions of Customer Engagement

According to Brodie et al (2011), the most comprehensive definitions acknowledging the existence of cognitive, emotional, and behavioral dimensions comprising the CE concept are provided by authors including Patterson, Yu, and de Ruyter (2006), Vivek, Beatty, and Morgan (2010), Hollebeek (2011), and Mollen and Wilson (2010) (Brodie, Hollebeek, Juric, & Ilic, 2011).

Building on these conceptual foundations, Hepola (2016) and Hollebeek (2014) developed a consumer engagement scale, defining its three core dimensions as cognitive processing, affection, and activation. More broadly, many researchers identify behavioral, cognitive, and emotional aspects as fundamental to consumer engagement (e.g.; Hollebeek et al., 2014; Dessart et al., 2015).

In support of this multidimensional view, Brodie (2011) further introduces customer engagement as a multidimensional construct that manifests differently depending on the context and the specific stakeholder, encompassing cognitive, emotional, and behavioral components.

Nevertheless, expanding on this foundational model, several researchers have proposed additional or alternative dimensions. For example, Calder, Malthouse, and Schaedel (2009) identified eight dimensions of engagement, including elements such as stimulation and inspiration.

However, for the purposes of this study, we adopt the widely accepted perspective that customer engagement consists of three core dimensions: cognitive, emotional, and behavioral, as supported by a substantial body of research.

2.2.1. Cognitive Engagement

Brodie et al. (2011) consider cognitive engagement as a core dimension and component of customer engagement.

Expanding on this view, Tarute (2017) defines cognitive engagement as “*the consumer’s level of engagement object related through processing, concentration and interest in specific object (business enterprise, brand, online social network, brand community)*” (Tarute, 2017, p. 147). This concept is clearly observable in the mobile app context, where cognitive engagement refers to a customer’s focused attention and interest while navigating app features or exploring product details within the app.

Consistently, Hollebeek (2014) states that cognitive engagement is the amount of thinking and attention a customer devotes to a brand during a specific interaction.

Furthermore, Kulta (2016) added that the cognitive dimension reflects how customers mentally process and evaluate a brand. Means that it involves the way customers think about and understand a brand and focuses on the mental processes, such as analyzing, interpreting, and forming judgments that customers use when interacting with brand-related information. These cognitive efforts include assessing the brand's qualities, value, and relevance during their engagement.

In conclusion, cognitive engagement in the context of mobile banking apps can be defined as the user's mental involvement with the app, demonstrated through focused attention, interest, and active processing of its features and services. It reflects how users

concentrate on and evaluate the app's functionality while performing tasks such as checking balances, transferring funds, or exploring financial tools.

2.2.2. Affective Engagement

Tarute (2017) states that the emotional engagement dimension represents a state of emotional involvement, often expressed through feelings such as inspiration or pride, which arises in relation to the engagement object. In the context of brand engagement, it reflects the customer's emotional connection, sense of dedication, or commitment to a particular brand.

In alignment with this view, Kulta (2016) mentioned that the affective dimension reflects the emotional connection established between the customer and the brand. In context of mobile banking app, it is the positive feelings like trust and satisfaction through the app strengthen this connection, encouraging loyalty and continued use.

Additionally, Hollebeek (2014) argues that affective engagement refers to how strongly a customer feels positive emotions toward a brand during a specific interaction, creating an emotional bond that enhances loyalty and connection.

In conclusion, affective engagement is the customer's emotional involvement with a brand, experienced as positive feelings like trust, pride, and satisfaction, which together create a strong emotional bond that drives loyalty and ongoing commitment.

2.2.3. Conative or Behavioral Engagement

According to Hollebeek (2014), conative engagement is “*a consumer's level of energy, effort and time spent on a brand in a particular consumer/brand interaction*” (Hollebeek, 2014, p. 154). This reflects the customer's willingness to actively engage with the brand such as using a service, making a purchase, or participating in brand-related activities demonstrating their motivation and commitment.

Supporting this view, Tarute (2017) states that the behavioral dimension refers to a state of consumer behavior related to the engagement object and is understood as the endeavor and energy given for interaction. This perspective aligns with the notion of

conative engagement, which reflects the customer's intention and motivation to act toward a brand. It involves purposeful behaviors such as seeking information, making a purchase, or recommending the brand to others.

Additionally, Mollen, (2010) reinforce the definition by referring to conative engagement as the level of unconscious emotions a person experiences while viewing an advertisement, which means that when someone sees an ad, they often have feelings they aren't fully aware of, but these emotions still influence how they respond to the ad and the brand.

In conclusion, conative engagement can be defined as the customer's intentional and motivated behavior toward a brand, expressed through the energy, effort, and time invested in purposeful actions such as using a service, making purchases, seeking information, or recommending the brand to others. These behaviors are driven not only by conscious intent but also, at times, by unconscious emotional responses that shape engagement outcomes.

3. Previous studies

The topic of this study has recently attracted the attention of a number of researchers, particularly international ones. Based on the students' review and desk research, several studies directly related to the subject of the current research can be identified. The following section presents a selection of the most prominent and relevant previous studies.

The table below summarizes selected previous studies related to the “**Usability**” variable. Each study is presented with essential details, including its aim, methodology, key findings, implications, and limitations. This structured overview helps to contextualize the current research within the broader academic landscape.

Study 1: Nawir & Hendrawan (2024)

Study Title	The Impact of Website Usability and Mobile Optimization on Customer Satisfaction and Sales Conversion Rates in E-commerce Businesses in Indonesia
Authors	Fadliyani Nawir, Satya Arisena Hendrawan
Publication Source	The Eastasouth Journal of Information System and Computer Science (ESISCS)

Year	August 2024
Research Objective / Aim	This study investigates the impact of website usability and mobile optimization on customer satisfaction and sales conversion rates in ecommerce businesses in Indonesia.
Methodology	Using a quantitative method, data were gathered from 170 respondents through a questionnaire utilizing a Likert scale ranging from 1 to 5
Key Findings	The study reveals that enhancing website usability and mobile optimization boosts customer satisfaction, which in turn leads to higher sales conversion rates. The key findings highlight the importance of a user-friendly design, intuitive navigation, fast loading speeds, and a smooth mobile experience. Additionally, customer satisfaction plays a mediating role in the relationship between these factors and sales conversions.
Implications	Businesses should focus on strategies that enhance customer satisfaction, such as improving customer service, offering high quality products, and providing personalized shopping experiences, as satisfied customers are more likely to make repeat purchases and recommend the business to others, thus driving higher sales conversion rates. Theoretical implications indicate that this study provides further evidence supporting the mediating role of customer satisfaction in the relationship between website usability, mobile optimization, and sales conversion rates, adding depth to the understanding of these dynamics in the e-commerce context.
Limitations	The sample size of 170 respondents may not fully represent Indonesia's diverse e-commerce market, limiting the generalizability of the findings. Additionally, the reliance on self-reported survey data introduces potential biases, such as inaccuracies in responses or social desirability effects. The study primarily focuses on website usability and mobile optimization, overlooking other influential factors

	like product quality, pricing strategies, and customer service. Furthermore, its cross-sectional design captures data at a single point in time, preventing an analysis of long-term trends or evolving consumer behaviors. Lastly, the rapid advancements in e-commerce technology and shifting market dynamics may affect the long-term applicability of the findings.
Study 2: Sulistiyanı & Nurchayati & Narariya Dita (2024)	
Study Title	User Experience of Mobile Banking Application in Indonesia: New Technology of Banking.
Authors	Sulistiyanı; Nurchayati; Narariya Dita
Publication Source	Global Business & Finance Review (GBFR)
Year	March 2024
Research Objective / Aim	This research delves into the user experiences associated with ten mobile banking applications in Indonesia. The study aims to highlight the technological innovations that drive user satisfaction, pinpoint areas requiring enhancement, and offer foresight into the evolving landscape of mobile banking in the region.
Methodology	This study utilized quantitative text mining to analyze extensive feedback from Google Play Store reviews of mobile banking apps (2015–2023). A custom web-scraping algorithm collected over 10,000 reviews, which were refined to 5,720 for analysis. Using KH Coder software. This approach transformed raw textual data into structured insights, enhancing the understanding of user feedback
Key Findings	The study reveals that user satisfaction in mobile banking apps depends on technical reliability, ease of use, transaction efficiency, and customer service quality. Addressing login issues, app speed, and frequent errors could significantly improve user ratings and overall app reputation.
Implications	This study bridges traditional analytical techniques with modern digital challenges by applying methods such as KMO, Bartlett’s test, LDA, and PCA to the analysis of user feedback in mobile banking,

	demonstrating their relevance in digital contexts. It emphasizes the significance of language in capturing user sentiment and uncovers the multifaceted factors that shape user satisfaction. Practically, the findings suggest key areas for improvement in mobile banking services in Indonesia, including resolving technical issues, enhancing app speed, and improving customer service. Additionally, banks are encouraged to focus on usability, actively gather user feedback, and refine marketing strategies to foster trust and build long-term customer loyalty.
Limitations	The study is geographically centered on Indonesia, potentially limiting its applicability to other regions. Relying on user reviews may not encompass the entirety of user experiences, given the potential bias towards extreme sentiments. The findings highlight the importance of technological advancements and user feedback in mobile banking's future, urging stakeholders to address areas of concern identified by users to enhance satisfaction and engagement.
Study 3: De Albuquerque Ferreira (2024)	
Study Title	Usability impact on Customer Loyalty and Trust in Mobile Banking
Authors	Maria Durães Rocha de Albuquerque Ferreira
Research Type	Thesis for Master Degree Program in Data-Driven Marketing Universidade Nova de Lisboa
Year	February 2024
Research Objective / Aim	This study aims to evaluate mobile banking applications from a user-centered perspective, focusing on usability as a critical factor in customer retention. Specifically, it seeks to examine the mediating role of trust in the relationship between usability and customer loyalty, in order to better understand how user-friendly design and intuitive navigation can foster trust and strengthen customer loyalty in the mobile banking context.
Methodology	Quantitative, by using a survey on 336 persons, 71% of the questionnaire participants were female and 29%

	were male. Concerning age, the sample was comprised between 18 and 72 years old.
Key Findings	The findings indicate that higher usability enhances trust, which positively influences customer loyalty, highlighting the crucial role of user-friendly design and intuitive interfaces in fostering a secure and trustworthy mobile banking experience.
Implications	This study demonstrates the effectiveness of text mining and topic modeling in analyzing user experiences with mobile banking apps, confirming that ease of use, transaction reliability, and security concerns are key drivers of user satisfaction. From a practical standpoint, it underscores the need for banks and app developers to address common user concerns such as bugs, slow performance, and poor customer service. Enhancing internet connectivity, improving interface usability, and strengthening security features are also essential strategies to boost customer satisfaction and retention.
Limitations	This study has limitations, as it only captures data from one point in time and relies on self-reported responses, which may be biased. Future research should track user behavior over time, combine surveys with real usage data, and explore other financial services like online investing or insurance. Using larger samples and qualitative methods, such as interviews, could provide a deeper understanding of usability, trust, and loyalty in mobile banking.
Study 4: Mathur & Mohan & Karre & Reddy (2018)	
Study Title	Analysis of FinTech Mobile App Usability for Geriatric Users in India
Authors	Neeraj Mathur, Lalit Mohan S, Sai Anirudh Karre, Y. Raghu Reddy
Publication Source	International Journal of Advanced Research in Computer Science and Software Engineering
Year	2018
Research Objective / Aim	The paper investigates the usability of FinTech mobile applications among different age groups in

	India, with a specific focus on the geriatric population. It aims to identify challenges elderly users face in adopting FinTech mobile apps and proposes a usability evaluation framework called UMETRIX to assess and improve app usability.
Methodology	Using a quantitative method, data were gathered from 1147 respondents with 6 questions through a survey using Social Media platforms (WhatsApp, Facebook, and LinkedIn) and physical forms
Key Findings	Elderly users (65+) face significant challenges in using FinTech apps, particularly with readability, navigation, and task comprehension. They struggle with reading text, navigating interfaces, understanding required actions, and recognizing progress within the app. The controlled experiment further emphasized these difficulties, revealing that geriatric users took more steps than necessary to complete financial transactions, highlighting critical usability barriers that hinder their seamless adoption of FinTech services.
Implications	FinTech apps require design adjustments to enhance accessibility for elderly users, ensuring a seamless and user-friendly experience. Developers should integrate usability guidelines to simplify financial transactions for the geriatric population, addressing challenges like readability, navigation, and task comprehension. Additionally, policy-makers and businesses must prioritize digital literacy initiatives and promote user-friendly designs to encourage FinTech adoption among older populations, fostering greater financial inclusion and ease of use.
Limitations	The controlled usability testing had a small sample size of only six participants, limiting the generalizability of the findings. Additionally, since the study focused specifically on India, the results may vary across different socio-economic and cultural contexts. Moreover, the proposed usability enhancements were tested only on a model app,

	necessitating further validation in real-world applications to confirm their effectiveness and broader applicability.
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Study 5: Shareef & Baabdullah & Dutta & Kumar & Dwivedi (2018)	
Study Title	Consumer adoption of mobile banking services: An empirical examination of factors according to adoption stages
Authors	Mahmud Akhter Shareef, Abdullah Baabdullahb , Shantanu Duttac , Vinod Kumard , Yogesh K. Dwivedie
Publication Source	Journal of Retailing and Consumer Services
Year	March 2018
Research Objective / Aim	Investigate consumers' behavioral intentions to adopt mobile banking at three distinct service stages—static, interaction, and transaction. It aims to examine these behavioral patterns using the GAM model and considers various factors from behavioral, technological, social, cultural, and organizational perspectives.
Methodology	The study used a quantitative research methodology, collecting data through 800 distributed questionnaires, with 201 valid responses. The sample included individuals from four cities in Bangladesh, selected randomly to ensure diversity. Participants consisted of various demographics, including students, private and government employees, businesspeople, and homemakers.
Key Findings	The study found that different factors influence mobile banking adoption at each stage. At the static stage, functional benefits and trust are key factors. At the interaction stage, information quality is the strongest predictor of adoption. At the transaction stage, security and users' ability to use the system play the most significant roles. Overall, trust and perceived functional benefits drive adoption across all stages,

	while security becomes crucial in the transaction phase.
Implications	Financial service providers, technology developers, and mobile banking strategists can gain valuable insights from this study. Banks must recognize that service delivery varies across static, interaction, and transaction stages, requiring tailored security measures and trust-building strategies. A generalized approach to online consumer behavior and channel design would be ineffective. Technology designers and mobile operators should consider diverse consumer needs to enhance mobile banking usability. Security risks, including privacy breaches, service disruptions, and authentication issues, differ across service levels, necessitating targeted risk management strategies.
Limitations	This study is limited to a developing country, and findings may not apply to developed nations due to different security and privacy concerns. Future research should consider cultural and demographic factors like age, education, gender, and income for deeper insights.
Study 6: Mohan & Mathur & Reddy (2015)	
Study Title	Mobile App Usability Index (MAUI) for improving mobile banking adoption
Authors	Lalit Mohan, Neeraj Mathur, Y. Raghu Reddy
Publication Source	International Conference on Evaluation of Novel Approaches to Software Engineering (ENASE)
Year	2015
Research Objective / Aim	Propose the Mobile App Usability Index (MAUI) as a framework to improve the usability of mobile banking applications, thereby increasing their adoption. It aims to identify key usability challenges, establish measurable usability parameters, and validate the proposed index through industry feedback, ultimately

	helping banks enhance user experience and drive higher mobile banking engagement.
Methodology	The authors used a mixed-method approach, combining both quantitative and qualitative methods. They conducted quantitative analysis through surveys with 1,434 participants and sentiment analysis of 26,131 user comments from Google Play Store. They also used qualitative methods, such as expert feedback from 51 industry professionals, heuristic evaluation, and review of existing usability models to develop and validate the Mobile App Usability Index
Key Findings	The study found that usability is a key factor affecting mobile banking adoption, with issues related to task completion time, user interface design, and error handling. The results suggest also that improving usability can enhance user experience, increase mobile banking adoption, and reduce transaction costs for banks.
Implications	The study shows that improving mobile banking app usability can increase user adoption, reduce costs, and improve customer experience. It provides a simple framework (MAUI) for banks to measure and improve app usability. The findings suggest that regulators like Reserve Bank of India and Bureau of Indian Standards should set usability standards, and better-designed apps can make mobile banking easier for everyone, including less tech-savvy users.
Limitations	The study's limitations include validating the MAUI index through expert feedback rather than real-world testing, a limited sample of 51 professionals, and a focus on Indian banking apps, which may not apply globally. Additionally, it does not deeply analyze security concerns, which are crucial for mobile banking adoption.

The table below summarizes selected previous studies related to the “**Customer Engagement**” variable. Each study is presented with essential details, including its aim, methodology, key findings, implications, and limitations. This structured overview helps to contextualize the current research within the broader academic landscape.

Study 1: Enyejo & Obani & Afolabi & Igba & Ibokette (2024)	
Study Title	Effect of Augmented Reality (AR) and Virtual Reality (VR) experiences on customer engagement and purchase behavior in retail stores.
Authors	Joy Onma Enyejo , Omotoyosi Qazeem Obani , Olusegun Afolabi , Emmanuel Igba and Akan Ime Ibokette
Publication Source	Magna Scientia Advanced Research and Reviews
Year	2024
Research Objective / Aim	The paper examines how augmented reality and virtual reality enhance customer engagement and purchasing behavior in retail. AR improves shopping with virtual try-ons and interactive displays, while VR offers immersive store experiences, leading to higher conversion rates and brand loyalty. Despite challenges like high costs and user adaptation barriers, these technologies are reshaping retail by bridging digital and physical shopping, with future research focusing on usability and privacy concerns.
Methodology	The study employs a qualitative research methodology through a comprehensive literature review, analyzing existing studies on AR and VR in retail. It examines theoretical frameworks, trends, and case studies to understand their impact on customer engagement and purchase behavior. While some quantitative data from previous research is referenced, the approach remains qualitative, focusing on insights rather than statistical analysis.
Key Findings	The study finds that AR and VR enhance customer engagement, increase conversion rates, and strengthen brand loyalty in retail. AR enables virtual try-ons and interactive displays, while VR provides immersive shopping experiences. Despite challenges like high costs and user adaptation, these technologies are reshaping retail by bridging digital and physical shopping.

Implications	The study's implications suggest that retailers can leverage AR and VR to enhance customer engagement, improve shopping experiences, and drive sales. These technologies offer a competitive advantage by bridging digital and physical retail, increasing conversion rates, and fostering brand loyalty. However, successful implementation requires addressing challenges such as high costs, technological integration, and user adoption. Future research should focus on optimizing usability, reducing costs, and ensuring data privacy to maximize the effectiveness of AR and VR in retail.
Limitations	The study identifies several limitations, including high implementation costs, technological integration challenges, and user adoption barriers. Limited accessibility to AR/VR hardware and software may restrict widespread use, and privacy concerns related to data collection pose additional challenges. The study also relies on existing literature rather than primary data, which may limit the depth of analysis. Future research should address these issues to enhance the effectiveness and adoption of AR and VR in retail.
Study 2: Sharma & Bhargav (2023)	
Study Title	Unlocking Customer Engagement: The Power of Mobile Apps in Enhancing Customer Experience
Authors	Parul Sharma , Dr. Shreya Bhargav
Publication Source	International Journal for Multidisciplinary Research
Year	June 2023
Research Objective / Aim	The study explores how mobile apps enhance customer engagement and satisfaction by examining their benefits, challenges, and best practices. It analyzes existing research, case studies, and expert insights to help businesses optimize app usage for better interaction, loyalty, and personalization.
Methodology	Literature review methodology, analyzing existing studies, case studies, and expert opinions to explore

	the impact of mobile applications on customer engagement and satisfaction.
Key Findings	The study found that mobile apps significantly enhance customer engagement, satisfaction, and brand loyalty by providing convenience, personalization, Omni channel experiences, and improved communication. Features like push notifications, gamification, and loyalty programs drive user retention. However, businesses must address UI/UX design, security, performance, and user adoption challenges to maximize app effectiveness.
Implications	Businesses should focus on personalization, Omni channel integration, and interactive features to improve user experience and drive brand loyalty. Additionally, addressing challenges such as UI/UX design, security, and user adoption is crucial for maximizing app effectiveness. The study also emphasizes the need for continuous adaptation to emerging technologies like AI, machine learning, and 5G to stay competitive. Future research should incorporate empirical data and diverse industry perspectives to validate and expand on these findings.
Limitations	The study's limitations include reliance on secondary data, industry-specific findings, and the fast-evolving nature of mobile technology. Additionally, its insights may not be universally applicable across regions, and the lack of empirical validation limits the confirmation of its conclusions. Future research should incorporate real-time user feedback and broader industry comparisons.
Study 3: Bitrián & Buil & Catalán (2021)	
Study Title	Enhancing user engagement: The role of gamification in mobile apps
Authors	Paula Bitrian, Isabel Buil b , Sara Catalan
Publication Source	Journal of Business Research
Year	April 2021

Research Objective / Aim	The study aims to investigate how gamification fosters user engagement with mobile apps and influences positive marketing outcomes. It analyze how different categories of game elements (achievement and progression, social, and immersion) impact psychological needs (competence, autonomy, relatedness), engagement, and behavioral outcomes such as continued use intention, word-of-mouth intention, and app ratings.
Methodology	The study used an online survey conducted via Amazon Mechanical Turk, targeting U.S. users of the Fitbit mobile app. After filtering out incomplete responses and those failing attention checks, the final sample consisted of 276 participants (61% male, 39% female, average age 36).
Key Findings	Achievement and progression elements positively influence competence, autonomy, and relatedness, which in turn promote user engagement. While social-oriented elements enhance relatedness, they negatively affect autonomy, potentially reducing engagement. Immersion elements primarily strengthen relatedness but do not significantly affect competence or autonomy. Overall, user engagement strongly predicts behavioral outcomes, particularly continued use intention.
Implications	This study offers practical insights for mobile app developers and marketers aiming to enhance user engagement and app store rankings. Since engagement drives continued use, recommendations, and positive ratings, apps should be designed to satisfy users' psychological needs—competence, autonomy, and relatedness. Achievement and progression elements, like points, badges, challenges, and real-time feedback, are most effective in fostering engagement. Immersion elements, such as avatar customization, help build social connections. However, social-oriented elements should be optional, as they can reduce autonomy. Creating in-

	app communities, integrating social media sharing, and introducing voluntary challenges can further boost engagement while preserving user autonomy.
Limitations	The study relies on a cross-sectional design using a one-time survey rather than longitudinal data, which limits the ability to track long-term engagement. Additionally, since the findings are based solely on the Fitbit app, their generalizability to other types of apps may be limited. While control variables were included to address potential biases, endogeneity concerns remain, as statistical methods like Gaussian copula could not be applied. Furthermore, although usability was considered a component of engagement, future research should explore its broader impact on gamified mobile apps.
Study 4: Tarute & Nikou & Gatautis (2017)	
Study Title	Mobile application driven consumer engagement
Authors	Asta Tarute , Shahrokh Nikou, Rimantas Gatautis
Publication Source	Elsevier
Year	2017
Research Objective / Aim	Examine how different features of mobile applications influence consumer engagement and their continued usage, providing insights for businesses to design apps that effectively retain users.
Methodology	The authors used a quantitative methodology. They collected data from 246 respondents through an online questionnaire and analyzed it using Structural Equation Modeling (SEM) to examine relationships between mobile app features, consumer engagement, and continued usage.

Key Findings	The study found that design solutions and information quality enhance consumer engagement, leading to continued app usage, while functionality and interaction features have no significant effect.
Implications	Businesses should prioritize design quality and informative content in mobile applications to enhance user engagement and retention. Developers should focus on usability and relevant information rather than relying solely on functionality or interactive features to drive continuous app usage.
Limitations	The sample restricted to frequent mobile app users, which may not represent all user types, and data collected only from Lithuania, limiting generalizability across different cultural contexts. Additionally, the study focuses mainly on emotional engagement, leaving other dimensions like behavioral and cognitive engagement underexplored.
Study 5: Kulita & Karjaluo (2016)	
Study Title	Conceptualizing engagement in the mobile context: A systematic literature review
Authors	Hannu-Pekka Kulita, Heikki Karjaluo
Publication Source	Academic Mindtrek
Year	2016
Research Objective / Aim	The paper examines how engagement is defined and conceptualized in the mobile service and technology context through a systematic literature review. It identifies two perspectives: one viewing mobile engagement as user interaction with mobile services, and the other as a multidimensional concept encompassing behavioral, emotional, and cognitive aspects. The study proposes a holistic conceptual model to clarify mobile engagement and highlights the need for further research in this emerging field.
Methodology	The study uses a qualitative approach, conducting a systematic literature review to analyze and interpret existing research on mobile engagement. It categorizes different conceptualizations and provides

	a holistic model rather than measuring engagement statistically.
Key Findings	Mobile engagement is not just user interaction but a multidimensional concept involving cognitive, emotional, and behavioral aspects. The study proposes a holistic model integrating these dimensions and emphasizes that engagement can occur even without active use. It highlights the need for clearer definitions and standardized measurement methods in future research.
Implications	Businesses and researchers should view mobile engagement as more than just user interactions, considering cognitive and emotional factors as well. Companies should design mobile experiences that align with customer values to foster deeper engagement. Academically, the study calls for more research to refine engagement measurement methods and better integrate marketing and human-computer interaction perspectives.
Limitations	A small number of published studies on mobile engagement, leading to fragmented discussions and a lack of consensus on its definition. Only a portion of the reviewed studies comes from academic journals, limiting the depth of analysis. The research focuses primarily on business and human-computer interaction fields, excluding potential insights from other disciplines. The dataset is not exhaustive, and broader keyword searches or additional databases might reveal studies that are more relevant.

The table below summarizes selected previous studies related to both the “**Usability**” and “**Customer Engagement**” variables. Each study is presented with essential details, including its objective, methodology, key findings, implications, and limitations. This structured overview provides a contextual foundation for the current research by highlighting how prior work has explored the interplay between usability and customer engagement within digital and mobile application environments.

Study 1: Shahid & Islam & Malik & Hasan (2022)	
Study Title	Examining consumer experience in using m-banking apps: A study of its antecedents and outcomes
Authors	Shadma Shahid, Jamid Ul Islam, Shehla Malik, Uzma Hasan
Publication Source	Elsevier
Year	2022
Research Objective / Aim	The paper explores how factors like trust, convenience, and social influence impact consumer experience (CX) with mobile banking apps and how this experience affects customer loyalty and continued use. Using the S–O–R framework, it highlights that trust, convenience, and social influence significantly enhance CX, offering guidance for banks to improve digital engagement and retention.
Methodology	The study used a quantitative research methodology with data collected of 473 respondents who were actual users of mobile banking apps. Participants were selected through an online survey, with a focus on individuals who reported frequent use of m-banking services. The majority of respondents were young, educated working professionals, with 63% aged between 22 and 33 years and about 80% employed. The sampling aimed to capture real user experiences to ensure the relevance and accuracy of the findings.
Key Findings	The paper show that trust, convenience, and social influence have a significant positive impact on consumer experience (CX) with mobile banking apps. App attributes also influence CX, but to a lesser extent, while customer support has no significant effect. The study also finds that a positive consumer experience strongly enhances customer loyalty and increases the intention to continue using m-banking apps. Additionally, customer loyalty further boosts continued usage intention, confirming a chain of effects from experience to loyalty to ongoing use

Implications	The implications of the paper are both theoretical and practical. Theoretically, it extends the understanding of consumer experience in mobile banking by applying the S–O–R framework to identify key drivers and outcomes, emphasizing the importance of actual user experiences rather than just adoption intent. Practically, the findings guide banks and financial institutions to focus on enhancing trust, convenience, and social influence to improve customer experience, which in turn fosters loyalty and continued app usage. The study also suggests that customer support may not be as critical for experienced users, helping banks prioritize resource allocation more effectively.
Limitations	The study is limited to Indian users, mainly young and tech-savvy, which may affect generalizability. The study is cross-sectional, capturing responses at a single point in time, and may not account for changes in behavior over time. Lastly, the research does not include other potentially influential factors such as personalization, satisfaction, service quality, or innovation, leaving room for future studies to expand the model.
Study 2: McLean (2018)	
Study Title	Examining the determinants and outcomes of mobile app engagement - A longitudinal perspective
Authors	Graeme McLean
Publication Source	Elsevier
Year	2018
Research Objective / Aim	Investigate the factors that influence customer engagement with branded mobile commerce applications and to examine the outcomes of that engagement, such as customer attitudes and brand loyalty, over time using a longitudinal study.
Methodology	The study used a quantitative research methodology, collecting data from 474 consumers at two points in time: one month and twelve months after

	downloading a retailer's mobile commerce app. Structural equation modeling (SEM) was used to analyze the relationships between variables, with measurement scales adapted from established models to assess constructs like ease of use, usefulness, convenience, enjoyment, engagement, and brand loyalty.
Key Findings	The study found that perceived ease of use, usefulness, convenience, and enjoyment all positively influence customer engagement with mobile commerce apps. Over time, usefulness and convenience became more important, while enjoyment became less influential. Customization enhanced the impact of all four factors on engagement. Engagement itself led to greater brand loyalty and, after extended use, also improved attitudes toward the brand. Additionally, the location of app use affected these relationships, with enjoyment being more influential when the app was used at home, and usefulness and convenience having a stronger impact when used on the go.
Implications	The study's implications suggest that m-commerce app providers should focus on improving ease of use, usefulness, and convenience to boost long-term customer engagement. Customization features are crucial, as they enhance users' perceptions and interaction with the app. While enjoyment plays a role in initial engagement, long-term retention depends more on functional benefits. Retailers should also consider where users typically use the app, as location affects which features matter most. Overall, sustained engagement through a well-designed and personalized app can strengthen brand loyalty and improve customer attitudes.

Limitations

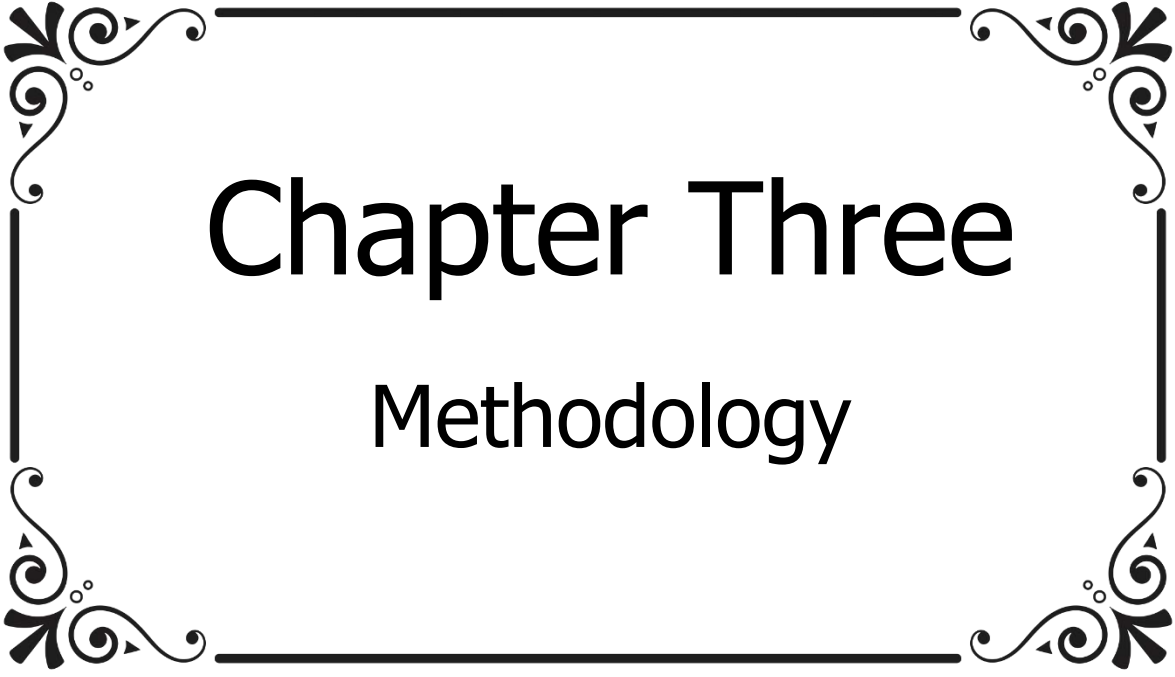
The limitations of the study include focusing on a homogeneous sample of active daily users of mobile applications, which may not represent the broader population of app users. The study also relied on self-reported data, which can be prone to biases. Additionally, the study did not explore how different categories of mobile apps or user demographics might affect engagement patterns. Finally, the study examined engagement with just one app category, potentially limiting the generalizability of the findings to other app types.

4. Research gap

- Most previous studies that examined the relationship between mobile app usability and customer engagement were conducted in foreign contexts. It is well established that consumer engagement in general—and customer engagement with mobile banking apps in particular—varies significantly depending on nationality and cultural background. Accordingly, our study differs by focusing specifically on Algerian customers.
- Unlike many prior studies that rely on secondary data or platform-generated analytics, our research is based on primary data collected directly from Algerian mobile banking app users through a structured survey. This first-hand data enhances the reliability and contextual relevance of the findings, offering grounded insights into user perceptions and behaviors.
- Our study focuses on the Algerian market. This emphasis on Algerian mobile banking app users is an important step, as each market has its own distinct characteristics, user expectations, and influencing factors. By concentrating on this specific user base, the research offers practical insights that can support financial institutions in improving the usability and engagement strategies of their mobile banking applications within the Algerian context.
- Rather than presenting a narrowly focused study that examines the impact of a single usability dimension on customer engagement, our research provides a comprehensive assessment of multiple usability dimensions—such as ease of use, efficiency, and design aesthetics—and their influence on customer

engagement. This broader approach allows for a more nuanced and in-depth understanding of the key factors that sustain user interaction with mobile banking apps.

- While many existing studies explore usability or engagement independently, few investigate how usability contributes to customer engagement as an integrated process. Our study bridges this gap by explicitly linking usability dimensions to the behavioral, cognitive, and emotional components of customer engagement in a banking app environment.
- In addition to its academic relevance, this study provides actionable insights for banks and mobile app developers in Algeria. By identifying specific usability features that influence engagement, the findings can inform future app design and customer experience strategies tailored to the expectations and needs of Algerian users.



Chapter Three

Methodology

Introduction

The methodological foundation of scientific research plays a vital role in ensuring the credibility, accuracy, and reliability of its findings. It serves as a roadmap that guides the research process by employing systematic procedures and drawing on accurate data from relevant sources. Moreover, a well-defined methodology provides the basis for conducting appropriate tests to examine and validate the study's hypotheses.

In this chapter, the research methodology adopted for the study is presented in detail. It outlines the overall research approach, describes the study population, explains the sampling techniques used, and introduces the data collection instruments. Additionally, the chapter identifies the sources of data, elaborates on the statistical methods applied for data analysis, and concludes with an assessment of the validity and reliability of the research instrument.

1. Research Design and Approach

According to Tavakoli (2012) Methodology refers to the section of a research report that explains the procedures used during the study. It outlines how data was collected, analyzed, and interpreted to address the research problem.

1.1. Research Purpose

Every researcher has specific motivations for conducting a scientific study. Yin (1994) classifies research purposes into three main categories: exploratory research, descriptive research, and explanatory (or causal) research.

In this study, the descriptive research approach was adopted to achieve the study's objectives and answer its research questions. This approach is particularly suitable for studies that aim to present an accurate and detailed depiction of a specific phenomenon, either in qualitative or quantitative form.

Descriptive research is particularly useful when aiming to understand the characteristics, behaviors, or opinions of a specific population. In this case, it allowed for a systematic description of the perceptions and experiences of Algerian mobile banking app users concerning app usability and customer engagement. The results provide insight into current practices and user expectations, serving as a foundation for further analysis and interpretation.

1.2. Research Approach

Choosing the appropriate research approach, whether quantitative, qualitative, or mixed, is very crucial, as it is closely tied to the nature, objectives, and questions of the study. In alignment with the aims of this research and to effectively address its questions, a quantitative method was adopted.

Numerous researchers have defined quantitative research. For instance, Cohen (1980) described it as a type of social inquiry that utilizes empirical data and methods. He also defined an empirical statement as a descriptive account of "what is" in the real world, in contrast to "what ought to be."

According to Creswell (2014), “*quantitative research is a means for testing objective theories by examining the relationship among variables*” (Creswell, 2009, p. 1).

Williams (2021) sees that quantitative research quickly and objectively studies behaviors across populations using numerical data. It tests hypotheses, makes predictions, and generalizes results, but requires careful design and analysis for reliability.

Quantitative research enables the collection of numerical data, which can be rigorously analyzed to identify relationships between variables. In this study, survey research was selected as the main method, focusing on sampling, questionnaire design, and distribution. The aim was to collect structured information from a sample of Algerian mobile banking app users in order to explore their characteristics and gather their perspectives on app usability and its influence on engagement.

An online questionnaire was used, composed mainly of multiple-choice questions and a six-point Likert scale. This tool was distributed to a sample of users in Algeria to understand their experiences and opinions regarding the usability of mobile banking apps and how it affects their engagement.

Additionally, correlational research was employed as part of the quantitative methodology to determine whether relationships exist between two or more variables, and to what extent these relationships occur. This approach aimed to identify correlations between various usability dimensions and customer engagement dimensions.

The collected data were coded and analyzed using the Statistical Package for the Social Sciences (IBM SPSS 29). This statistical software allowed the researchers to answer the study’s research questions and to test its hypotheses with accuracy and methodological rigor.

2. Sources of Data

2.1. Secondary sources

This study draws upon a range of secondary sources to establish a solid theoretical foundation. Peer-reviewed articles from reputable scientific journals were consulted, particularly those addressing topics such as mobile application usability and customer

engagement. In addition, books authored by recognized scholars in the fields of marketing and research methodology were utilized to provide deeper conceptual and analytical insights.

2.2. Primary sources

To collect original data for this study, a self-administered online questionnaire was employed. Tavakoli (2012) defines a questionnaire as “*a set of methods used to gather data in a systematic way from a range of individuals, organizations, or other units of interest.*” (Tavakoli, 2012, p. 645)

The questionnaire served three main purposes:

- To accurately translate the required information into clear and understandable questions;
- To engage participants and encourage full and thoughtful responses;
- To minimize response errors and thereby enhance the reliability and validity of the collected data (Malhotra, Décaudin, Bouguerra, & Bories, 2011).

The questionnaire was developed using Google Forms, a digital tool that facilitates the creation and distribution of user-friendly surveys. It was shared online through various platforms, including social media networks, allowing for broader reach and easier participation. This method was selected after reviewing several prior studies that confirm the effectiveness of web-based surveys in behavioral research exploring opinions, attitudes, and preferences.

According to Callegaro (2015), online surveys offer several advantages, including lower implementation costs, faster data collection, and logistical flexibility. They allow respondents to complete the survey at their convenience, from any location, making them especially suitable for geographically diverse samples. Furthermore, the digital format supports automated validation, skip logic, and optional multimedia integration—all of which contribute to higher data quality and increased respondent engagement (Mario Callegaro, 2015).

3. Population and Sampling

3.1. Study Population

According to Keller (2017), a population in statistics refers to the complete set of individuals or items relevant to a particular study. A population includes parameters—summary measures such as means or proportions—that describe specific characteristics of that group. The primary goal of statistical analysis is often to estimate or test these parameters based on data collected from a sample.

In this study, the statistical population comprises all Algerian nationals who use mobile banking applications, whether they reside within Algeria or abroad. This population is considered hard-to-reach or hidden, which is typically characterized by two challenges:

- Difficulty in identifying or accessing members of the target group;
- The absence of a reliable sampling frame (i.e., a complete list of all individuals in the population).

Due to the lack of a comprehensive list of Algerian mobile banking users, a targeted sampling strategy was necessary to gather sufficient and relevant data.

3.2. Sampling Method

Given the nature of the research population, a non-probability sampling approach was adopted, combining two specific techniques:

- **Convenience Sampling:** As defined by Etikan (2016): “*a type of nonrandom sampling where members of the target population that meet certain practical criteria, such as geographical proximity, availability at a given time, or the willingness to participate are included for the purpose of the study.*” (Etikan, 2016, pp. 1-4).
- **Snowball Sampling:** Also known as chain-referral sampling, this method was used to extend the sample beyond immediate contacts. Naderifar et al. (2017) describe snowball sampling as a non-probability technique particularly useful for reaching hidden or hard-to-reach populations. In this approach, initial participants were

asked to refer other individuals who also meet the study criteria—namely, Algerian mobile banking app users.

This combined sampling approach was considered appropriate for this research context, where user data is dispersed and lacks a centralized registry.

3.3. Sample size

Due to the nature of the target population and the time constraints of the study period, a sample size of 145 respondents was used. While this number does not aim to represent the entire population statistically, it was considered sufficient to identify patterns and correlations relevant to the study's objectives.

Given that the research focused on a hard-to-reach group—Algerian users of mobile banking applications—and used non-probability sampling methods, the sample was designed to capture a range of perspectives and experiences rather than to achieve full generalizability. The collected data still offer valuable insights into user engagement and usability perceptions within the Algerian context.

4. Survey Design and Administration

4.1. Survey Structure

To ensure clarity and accessibility for all participants, the questionnaire was prepared in both Arabic and English. The questions and statements were organized into four main sections:

Section One: Mobile Banking Usage

This section identifies whether respondents use a mobile banking application and confirms their eligibility by verifying Algerian nationality. It also determines their current residence (inside or outside Algeria) and asks them to indicate which mobile banking application(s) they primarily use.

Section Two: Usability Dimensions (Independent Variable)

This section addresses the independent variable, mobile app usability, and consists of three sub-dimensions: Perceived ease of use (Learnability), convenience (Efficiency), and Aesthetics (Design). Each dimension contains four statements.

Section Three: Customer Engagement (Dependent Variable)

This section covers the dependent variable, customer engagement. It includes three sub-dimensions: Cognitive Engagement, Affective Engagement, and Conative Engagement. Each sub-dimension contains three statements, except for cognitive engagement, which includes four statements.

Section Four: Demographic Information

This final section collects background information about the respondents, including gender, age, educational level, occupation, and income level.

4.2. Scale used

A six-point Likert scale was employed to measure participants' responses to items related to both usability and customer engagement. The six-point format (Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree), was selected for its effectiveness in capturing varying degrees of agreement while eliminating a neutral midpoint, thus encouraging respondents to express a clearer stance.

The response options and corresponding numeric values are shown in Table 3-1:

Table (3-1): Numbering of the Six-Point Likert Scale

Degree	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
Number	6	5	4	3	2	1

To interpret the mean scores, the interval width was calculated using the formula:

$$\text{Interval} = \frac{\text{Range}}{\text{Number of scale point}} = \frac{6 - 1}{6} = 0,83$$

Based on this, the following interpretation scale was developed:

Table (3-2): Estimation Scale According to the Six-Point Likert Scale

Verbal interpretation	Scale Value	Weighted Mean Interval	Interval
Strongly Agree	6	5,17- 6	0,83
Agree	5	4,33- 5,16	0,83
Somewhat Agree	4	3,49- 4,32	0,83
Somewhat Disagree	3	2,67- 3,50	0,83
Disagree	2	1,83- 2,66	0,83
Strongly Disagree	1	1,00- 1,82	0,82

Source: Prepared by the student

One significant benefit of using a six-point scale is the exclusion of a neutral category, a design choice supported by many researchers. According to Nemoto (2014), there are several reasons for avoiding the use of neutral midpoints:

1. The structure of Likert-type scales should mirror physical measurement tools. Just as a ruler does not include a “neutral length,” a scale designed to measure attitudes should not include a neutral point;
2. Neutral options can introduce statistical complications and obscure analytical clarity.
3. Well-designed questionnaire items should be sufficiently clear and specific to enable respondents to form a clear opinion—something that should be confirmed during a pilot study (Nemoto, 2014, p. 4).

5. Measurement of Variables

5.1. Mobile App Usability Dimensions

This study focused on measuring three key dimensions of mobile app usability: Learnability, Convenience, and Aesthetics. These dimensions were selected based on their relevance to the mobile banking context and their prominence in previous usability literature.

Table 3-3 presents the questionnaire items corresponding to each usability dimension. These items were adapted from established research instruments and modified slightly to suit the Algerian context and the specific objectives of the current study.

The adaptation process aimed to ensure linguistic clarity, contextual relevance, and cultural appropriateness for the target population. All items were phrased in a way that would be easily understood by users of varying educational backgrounds while maintaining the integrity of the original constructs.

Table (3-3): Items Measuring Usability Dimensions and Key Source Studies

Dimension	Items	Source Reference
Perceived Ease of Use / Learnability	Learning to use the mobile banking app is easy for me ان تعلم استخدام تطبيق الخدمات البنكية سهل بالنسبة لي	Adapted from: McLean, G. (2018) Davis, F. D. (1989) Maria Durães. (2024) Baek & Yoo. (2018)
	Using the mobile banking app is clear and understandable.	Adapted from: McLean, G. (2018) Davis, F. D. (1989)

	استخدام تطبيق البنك على الهاتف المحمول واضح وسهل الفهم	Maria Durães. (2024) Baek & Yoo. (2018) Roy, Dewit, & Aubert (2001) Thakur (2016)
	It is easy to find the information I need using mobile banking app. من السهل على ايجاد المعلومات التي احتاجها عند استعمال تطبيق البنك على الهاتف المحمول	Adapted from: Roy, Dewit, & Aubert (2001) Thakur (2016)
	Overall, the mobile banking app is easy to use. بشكل عام، تطبيق الخدمات البنكية عبر الهاتف المحمول سهل الاستخدام.	Adapted from: McLean, G. (2018) Davis, F. D. (1989) Maria Durães (2024) Baek & Yoo. (2018) Roy, Dewit, & Aubert (2001) Thakur2016
Convenience/ Efficiency	While using the mobile banking app I find what I am looking for in the	Adapted from: McLean, G. (2018)

least amount of time. عند استعمال تطبيق الخدمات البنكية على الهاتف المحمول، أجد ما ابحت عنه في اقل وقت ممكن	Szymanski & Hise (2000) Maria Durães. (2024) Baek & Yoo. (2018) Mathwick, C., Malhotra, N., & Rigdon, E. (2001). Thakur (2016)
The solutions provided by mobile banking app is fast and reliable الحلول المقدمة من طرف الخدمات البنكية على الهاتف المحمول سريعة وموثوقة	Adapted from: Zhu, J., & Wang, M. (2022)
The banking service is provided with little effort الخدمة البنكية تُقدَّم بسهولة وبدون جهد كبير	Adapted from: Zhu, J., & Wang, M. (2022)
Using the mobile banking app makes my life easier. استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول يجعل حياتي أسهل.	Adapted from: McLean, G. (2018) Mathwick, C., Malhotra, N., & Rigdon, E. (2001)

Design / Aesthetics	The visual appeal of a mobile banking app is important for me. الاجاذبية البصرية لتطبيق الخدمات البنكية عبر الهاتف المحمول مهمة بالنسبة لي	Adapted from: Tarute, A., Nikou, S., & Gatautis, R. (2017) Ballantine, P. W., Jack, R., & Parsons, A. G. (2010)
	I can easily browse/navigate because the mobile banking app has a convenience interface. يمكنني التصفح/التنقل بسهولة لأن تطبيق الخدمات البنكية عبر الهاتف المحمول يحتوي على واجهة مريحة	Adapted from: Tarute, A., Nikou, S., & Gatautis, R. (2017) Ballantine, P. W., Jack, R., & Parsons, A. G. (2010)
	Mobile banking apps are aesthetically appealing to me تطبيقات الخدمات البنكية عبر الهاتف المحمول جذابة بصرياً بالنسبة لي.	Adapted from: O'Brien, H. L., Cairns, P., & Hall, M. (2018)
	The design of mobile banking apps is visually pleasing to me تصميم تطبيقات الخدمات البنكية عبر الهاتف المحمول جذاب بالنسبة لي	Adapted from: O'Brien, H. L., Cairns, P., & Hall, M. (2018)

5.2. Costumer Engagement Dimensions

This study relied on a set of previous works to identify the three dimensions related costumer engagement. Table (3-4) lists the items related to costumer engagement, which were included in the study questionnaire. These items were derived and adapted from a number of prior studies to suit the context and objectives of the current research.

To measure customer engagement, the study adopted a three-dimensional model based on insights from previous literature. The selected dimensions are : Cognitive Engagement, Affective Engagement, Conative Engagement

These dimensions capture the mental focus, emotional involvement, and behavioral intention of users in relation to their experience with mobile banking applications.

Table 3-4 presents the questionnaire items used to measure each dimension of customer engagement. The items were derived and adapted from established studies to fit the Algerian context and the specific objectives of this research. Care was taken to ensure that the items were both theoretically grounded and practically relevant for assessing users' engagement levels.

Table (3-4): Items Measuring Customer Engagement Dimensions and Key Source Studies

Dimension	Items	Source Reference
Cognitive Engagement	I am fully absorbed when using the mobile banking app أكون منغمساً تماماً عند استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	Adapted from: Hepola, J., Karjaluoto, H., & Shaikh, A. A. (2016)
	Using the mobile banking app fully	Adapted from:

	captures my attention. يستحوذ تطبيق الخدمات البنكية عبر الهاتف المحمول على انتباهي بالكامل عند استخدامه.	Hepola, J., Karjaluoto, H., & Shaikh, A. A. (2016) McLean, G. (2018) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)
	Using the mobile banking app gets me thinking about the brand. استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول يجعلني أفكر تلقائياً في العلامة التجارية للبنك	Adapted from: Hepola, J., Karjaluoto, H., & Shaikh, A. A. (2016) McLean, G. (2018) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)
	Using the mobile banking app stimulates my interest to learn more about the app. استخدام تطبيق الخدمات البنكية للهاتف المحمول يحفز اهتمامي للتعرف أكثر على التطبيق.	Adapted from: Hepola, J., Karjaluoto, H., & Shaikh, A. A. (2016) McLean, G. (2018) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)
Affective Engagement	I find using the mobile banking app to be enjoyable	Adapted from: McLean, G. (2018)

	أجد أن استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول ممتعا	Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992)
	I feel very positive when I use the mobile banking app أشعر بإيجابية كبيرة عند استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	Adapted from: Hepola, J., Karjaluto, H., & Shaikh, A. A. (2016)
	I'm proud to use the mobile banking app أنا فخور باستخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	Adapted from: Hepola, J., Karjaluto, H., & Shaikh, A. A. (2016) Tarute, A., Nikou, S., & Gatautis, R. (2017) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014) So, K. K. F., King, C., & Sparks, B. (2014)
Behavioral or Conative Engagement	I spend a lot of time using the mobile banking app compared to other mobile financial services applications.	Adapted from: Hepola, J., Karjaluto, H., & Shaikh, A. A. (2016)

	أقضي وقتًا طويلًا في استخدام تطبيق الخدمات البنكية مقارنة بتطبيقات الخدمات المالية الأخرى عبر الهاتف المحمول.	Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)
	The mobile banking app is one of the services I usually use when I use mobile applications for financial and insurance services تطبيق الخدمات البنكية هو أحد الخدمات التي أستخدمها عادةً عندما أستخدم تطبيقات الهاتف المحمول للخدمات المالية والتأمينية.	Adapted from: Hepola, J., Karjaluo, H., & Shaikh, A. A. (2016) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)
	Whenever I'm using mobile financial applications, I usually use my mobile banking app. عندما أستخدم التطبيقات المالية على هاتفي، غالبًا ما أستخدم تطبيق البنك للهاتف المحمول.	Adapted from: Hepola, J., Karjaluo, H., & Shaikh, A. A. (2016) Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014)

Source: Prepared by the student

6. Statistical Methods Used

To test the study's hypotheses and address its research questions, the data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 20. A variety of descriptive and inferential statistical techniques were applied, as outlined below:

- Cronbach's Alpha coefficient was used to assess the internal consistency and reliability of the questionnaire.
- Frequencies and percentages were used to describe the demographic characteristics of the sample.
- Arithmetic Means were calculated to determine the overall degree of agreement with each questionnaire item.
- Standard Deviations were used to assess the dispersion and variability of responses around the mean.
- Skewness and Kurtosis Coefficients were computed to test the normality of data distribution, ensuring that the assumptions of parametric tests were met.
- Multiple Linear Regression Analysis was conducted to examine the relationships between the combined dimensions of mobile app usability and customer engagement.
- Simple Linear Regression Analysis was used to test individual relationships between each usability dimension and each engagement dimension.
- Independent Samples t-Test was employed to explore potential differences in customer engagement based on gender.
- One-Way ANOVA (Analysis of Variance) was used to test for differences in customer engagement based on other personal characteristics (e.g., age, education level, income).

7. Validity and Reliability of the Study Instrument

To ensure the validity and reliability of the study instrument, and that the questionnaire items truly measure what they are intended to measure, the following steps were taken:

7.1. Face Validity:

To verify the appropriateness and consistency of the questionnaire items and their relevance to the overall study topic, the preliminary version of the questionnaire was presented to a group of expert academic reviewers (See Appendix 02). Their opinions and suggestions were taken into account to refine the instrument. This process helped verify the linguistic and scientific accuracy of the items, the alignment of items with their

respective domains, and the extent to which the questionnaire serves the study objectives. Based on the feedback provided by the reviewers, some items were reformulated.

7.2. Construct Validity of the Study Instrument:

To evaluate construct validity, the internal consistency of each dimension in the questionnaire was tested by examining the correlation between each item and the overall dimension mean. High correlation values indicate that the items consistently measure the same underlying construct.

The results, shown in Table 3-5, demonstrate that all dimensions achieved statistically significant correlations at the 0.01 level, confirming that each dimension is internally consistent and contributes meaningfully to the measurement of its respective construct.

Table (3-5): Internal Consistency Coefficients for Questionnaire Dimensions

Dimensions	Significance Level (p)	Correlation Coefficient (r)	Interpretation
Perceived Ease of Use/Learnability	0,000	0,745**	There is a statistically significant correlation.
	0,000	0,882**	There is a statistically significant correlation.
	0,000	0,911**	There is a statistically significant correlation.
	0,000	0,853**	There is a statistically significant correlation.
Convenience/Efficiency	0,000	0,745**	There is a statistically significant correlation.
	0,000	0,722**	There is a statistically significant correlation.
	0,000	0,751**	There is a statistically significant correlation.
	0,000	0,668**	There is a statistically significant correlation.
Aesthetics/Design	0,000	0,515**	There is a statistically significant correlation.
	0,000	0,787**	There is a statistically significant correlation.

	0,000	0,872**	There is a statistically significant correlation.
	0,000	0,787**	There is a statistically significant correlation.
Cognitive Engagement	0,000	0,785**	There is a statistically significant correlation.
	0,000	0,791**	There is a statistically significant correlation.
	0,000	0,596**	There is a statistically significant correlation.
	0,000	0,613**	There is a statistically significant correlation.
Affective Engagement	0,000	0,823**	There is a statistically significant correlation.
	0,000	0,804**	There is a statistically significant correlation.
	0,000	0,789**	There is a statistically significant correlation.
Conative/Behavioural Engagement	0,000	0,697**	There is a statistically significant correlation.
	0,000	0,843**	There is a statistically significant correlation.
	0,000	0,784**	There is a statistically significant correlation.

Source: Prepared by the student based on the outputs of SPSS V.29

These results support the construct validity of the instrument, confirming that the items within each group effectively reflect their intended dimension.

7.3. Reliability of the Research Instrument

The reliability of a questionnaire refers to the consistency and stability of its results, the extent to which it yields similar outcomes when administered repeatedly under the same conditions and within a defined time interval.

To assess the internal consistency reliability of the instrument, Cronbach's alpha coefficient was calculated for each dimension of the questionnaire, as well as for the

overall instrument. The analysis was conducted using SPSS Version 20, and the results are summarized in Table 3-6 below.

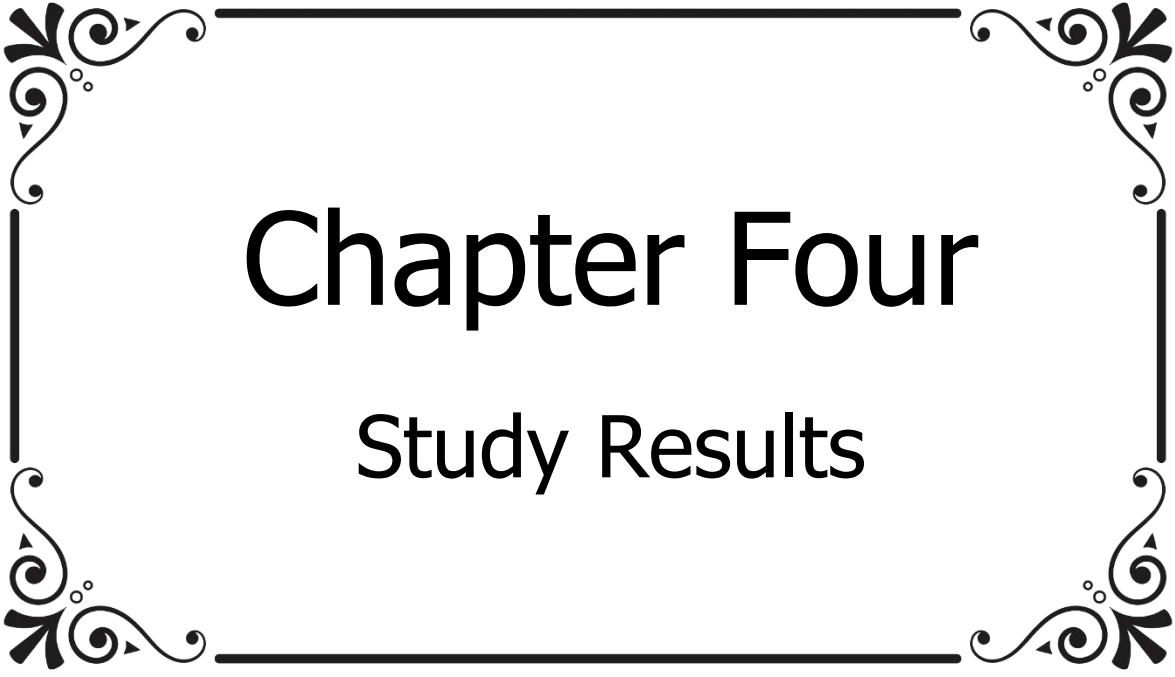
Table (3-6): Cronbach's Alpha Coefficient for Internal Consistency

Dimension	Number of items	Cronbach's Alpha Coefficient
Mobile App Usability		
Perceived Ease of Use / Learnability	4	0,870
Convenience/ Efficiency	4	0.690
Design/Aesthetics	4	0,737
Costumer Engagement		
Cognitive Engagement	4	0,651
Affective Engagement	3	0,723
Behavioural/Conative Engagement	3	0,643
Total Questionnaire	22	0,864

Source: Prepared by the student based on the outputs of SPSS V.29

The overall Cronbach's alpha for the full instrument was **0.864 (86.4%)**, which is well above the commonly accepted threshold of **0.60**, indicating a high level of reliability. The individual dimensions produced alpha values ranging from **0.643 to 0.870**, which reflect acceptable to excellent levels of internal consistency.

Based on these findings, it can be confidently stated that the questionnaire demonstrates a high degree of internal reliability, making it a stable and dependable tool for data collection, hypothesis testing, and interpretation of results. These outcomes further validate the accuracy and coherence of the research instrument in measuring the intended constructs.



Chapter Four

Study Results

Introduction

This chapter presents the statistical analysis and interpretation of the data collected to examine the research hypotheses and address the core objectives of the study. The study aims to assess the impact of mobile banking app usability on customer engagement within the context of Algerian e-banking users. The chapter systematically outlines the results obtained from applying various statistical techniques, including descriptive statistics, normality and multicollinearity diagnostics, and inferential tests such as regression analysis, t-tests, and ANOVA.

The analysis begins by describing the demographic characteristics of the study sample, followed by an evaluation of the distribution nature of the data to verify the assumptions necessary for applying parametric tests. Thereafter, the chapter assesses the internal structure and relationships among the study variables by testing the formulated hypotheses. These hypotheses explore the influence of usability dimensions—namely learnability, convenience, and aesthetics—on the cognitive, affective, and conative aspects of customer engagement.

The findings are presented through detailed tables and corresponding narrative interpretations, ensuring clarity and alignment with the research framework. The results provide insight into the strength and significance of the associations between the usability features of mobile banking applications and the levels of user engagement, offering valuable implications for both theory and practice in the field of digital banking experience design.

1. Description of Study Variables

The empirical analysis in this study is based on a final sample of **145** participants. The use of a programmed electronic questionnaire—designed to reject incomplete submissions—ensured that only fully completed responses were included in the dataset. This approach enhanced data quality and reliability.

In this section, the characteristics of the study sample are described in detail, focusing on key demographic variables: gender, age group, income level, educational attainment, and employment status. These variables provide essential context for interpreting the participants' responses and for understanding potential differences in perceptions of mobile app usability and customer engagement across demographic groups.

Descriptive statistics are used to summarize the distribution of participants across these personal attributes.

1.1. Demographic characteristics

1.1.1. Sample distribution by gender

Table (4-1) presents the distribution of study participants according to their gender:

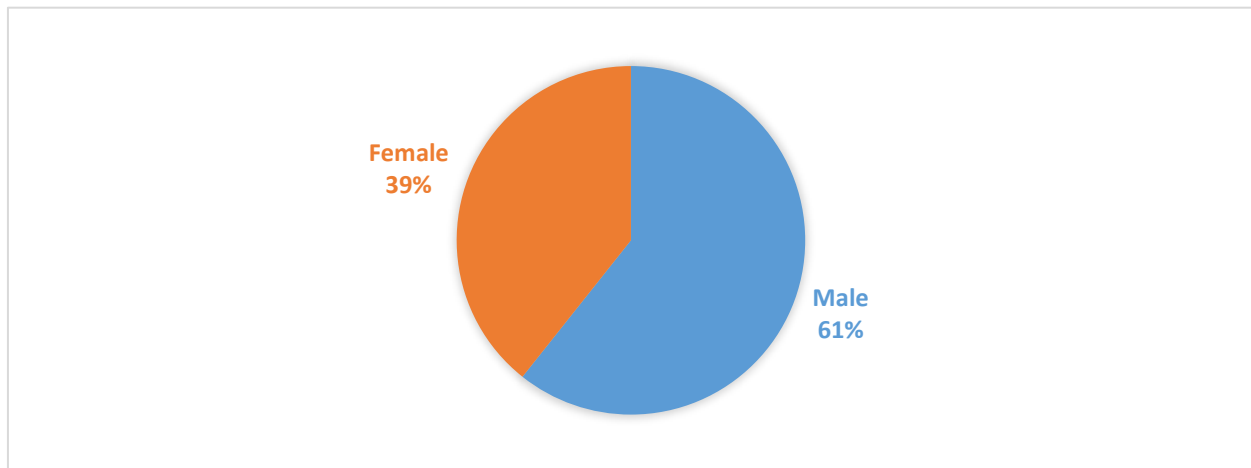
Figure (4-1): Distribution of participants by gender

	Frequencies	Percentages
Male	88	61%
Female	57	39%
Total	145	100%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

As shown in the table above, males constitute the majority of the study sample, representing **61%**, while females account for **39%**. The following figure provides a visual representation of this distribution.

Figure (4-1): Distribution of the sample according to gender



Source: Prepared by the student based on the outputs of the Excel program

1.1.2. Sample distribution by age

Table (4-2) presents the distribution of the study sample according to the age variable:

Table (4-2): Distribution of participants by age

	Frequencies	Percentages
Under 25 years	65	45%
Between 25 and 35 years	46	32%
Between 36 and 45 years	23	16%
Between 46 and 55 years	8	6%
Between 56 and 65 years	3	2%
Over 65 years	0	0
Total	145	100%

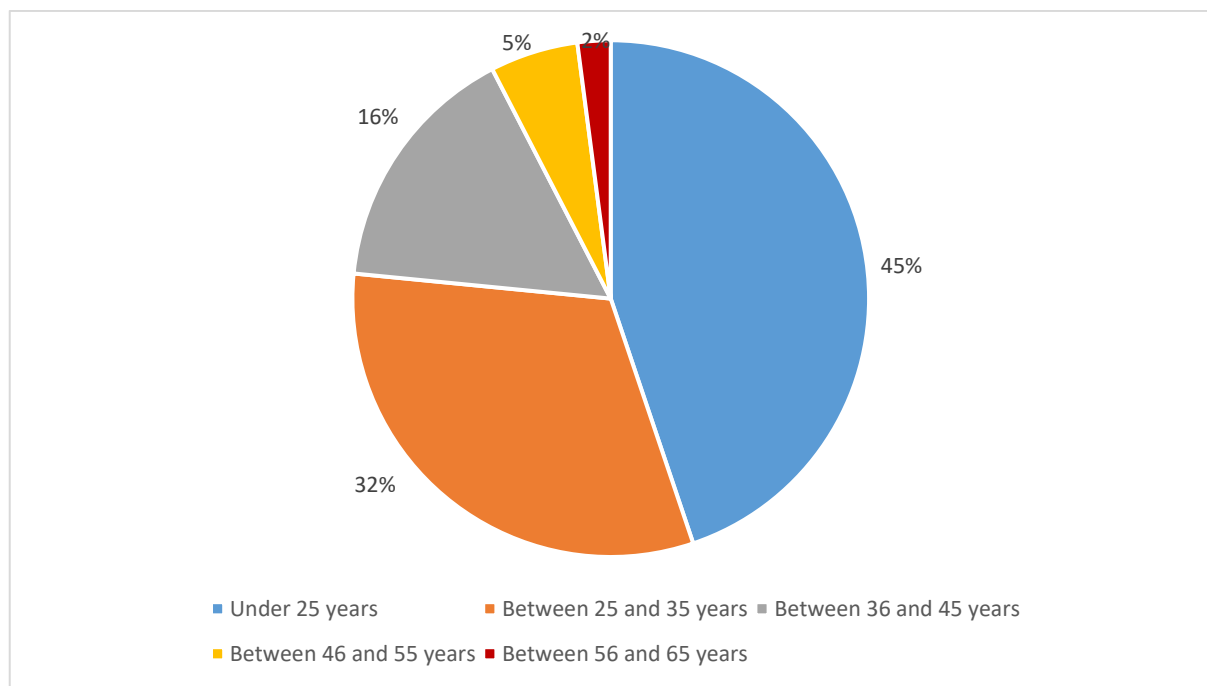
Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

As reflected in the table, the majority of the sample falls within the younger age brackets. Respondents under the age of 25 constitute the largest group, accounting for

45% of the sample, followed by those aged 25 to 35 years at 32%. The age group 36 to 45 years represents 16%, while the 46 to 55 years and 56 to 65 years categories contribute 5% and 2%, respectively. Notably, there were no respondents aged over 65 years, representing 0% of the sample.

This distribution suggests that mobile banking applications are predominantly utilized by younger demographics, reflecting their higher levels of digital literacy and greater tendency to adopt mobile financial services. A visual summary of this data is provided in the following figure.

Figure (4-2): Distribution of the Sample According to Age



Source: Prepared by the student based on the outputs of the Excel program

1.1.3. Sample distribution by income

Table (4-3) presents the distribution of the study sample according to their monthly income:

Table (4-3): Distribution of the sample according to income

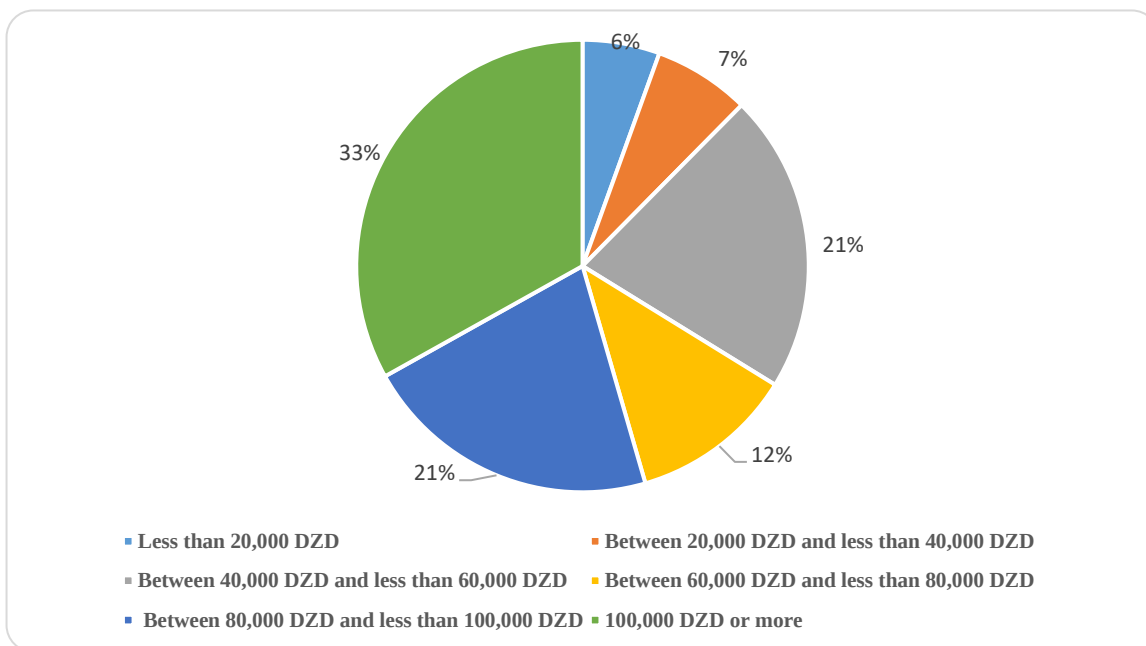
	Frequencies	Percentages
Less than 20,000 DZD	8	6%
Between 20,000 DZD and less than 40,000 DZD	10	7%
Between 40,000 DZD and less than 60,000 DZD	31	21%
Between 60,000 DZD and less than 80,000 DZD	17	12%
Between 80,000 DZD and less than 100,000 DZD	31	22%
100,000 DZD or more	48	33%
Total	145	100%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

The data presented in the table reveals that the largest share of respondents—**33%**—report a monthly income of **100,000 DZD** or more, followed by **22%** who earn between **80,000** and less than **100,000 DZD**, and **21%** earning between **40,000** and less than **60,000 DZD**. Meanwhile, **12%** of respondents fall into the **60,000 to less than 80,000 DZD** bracket. The lower income categories are less represented, with **7%** earning between **20,000** and less than **40,000 DZD**, and only **6%** earning less than **20,000 DZD**.

This distribution indicates that a majority of the study participants belong to middle- and upper-income brackets, which may reflect a higher level of financial stability and access to mobile banking services. A graphical representation of this data is provided in the following figure.

Figure (4-3): Distribution of the sample according to income



Source: Prepared by the student based on the outputs of the Excel program

1.1.4. Sample distribution by educational level

Table (4-4) provides the distribution of study participants according to their highest attained level of education:

Table (4-4): Distribution of the sample according to educational level

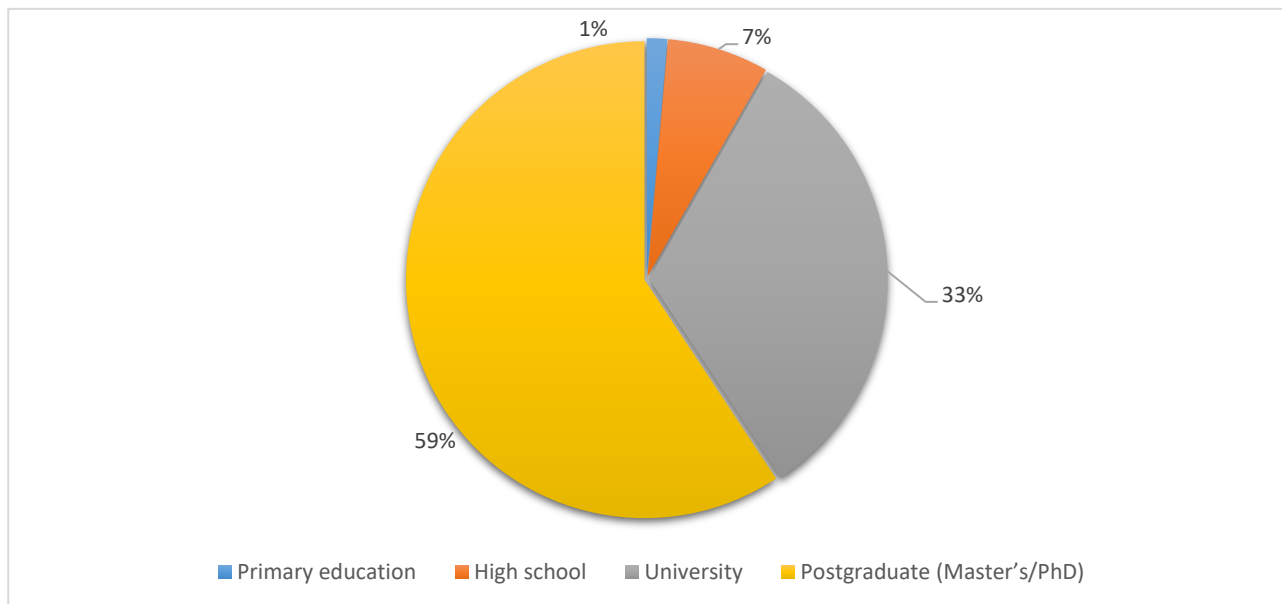
	Frequencies	Percentages
Primary education	2	1%
Middle school	0	0
High School	10	7%
University	47	33%
Postgraduate (Master's/PhD)	86	59%
Total	145	100%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

The previous table shows that the vast majority of the study sample, **92%**, hold university-level qualifications or higher (including postgraduate degrees). Respondents with high school education represent **7%**, while those with only primary education make up a small proportion of **1%**. No participants reported having only a middle school level of education.

This distribution suggests a highly educated sample population, which may reflect a stronger predisposition among more educated individuals to engage in research surveys or familiarity with mobile banking technologies. A graphical representation of these results is presented in the following figure.

Figure (4-4): Distribution of the sample according to educational level



Source: Prepared by the student based on the outputs of the Excel program

1.1.5. Sample distribution by nationality

Table (4-5) presents the distribution of the study sample according to the nationality variable:

Table (4-5): Distribution of the sample according to nationality:

	Frequencies	Percentages
Algerian nationality	145	100%
Non-Algerian nationality	0	0%
Total	145	100%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

As indicated in the table, **100%** of the respondents hold Algerian nationality. This uniformity is consistent with the scope and purpose of the study, which is explicitly focused on evaluating the usability of mobile banking applications used by Algerian customers. As such, the questionnaire was designed and distributed with the intent of reaching only Algerian users of e-banking services.

1.1.6. Sample distribution by country of residence

Table (4-6) provides the distribution of respondents according to their current place of residence:

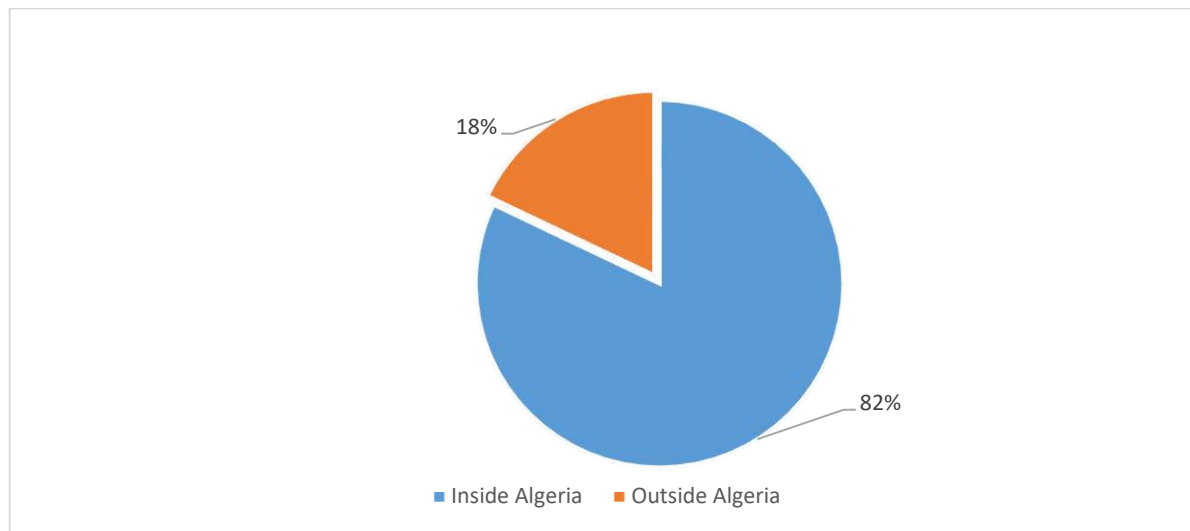
Table (4-6): Distribution of Participants by Country of Residence

	Frequencies	Percentages
Inside Algeria	119	82%
Outside Algeria	26	18%
Total	145	100%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

As shown in the table above, a significant majority of participants (**82%**) reside within Algeria, while the remaining **18%** live abroad. This distribution reflects the primary target population of the study—Algerian users of mobile banking applications—regardless of their physical location. The inclusion of respondents residing outside Algeria enriches the dataset by incorporating the perspectives of users who may interact with Algerian e-banking services from a distance, potentially under different contextual conditions.

Figure (4-5): Distribution of the sample according to country of residence



Source: Prepared by the student based on the outputs of the Excel program

1.1.7. Sample distribution by occupation

Table (4-7) presents the distribution of the study sample according to their current occupational status:

Table (4-7): Distribution of Participants by Occupation

	Frequencies	Percentages
Employee	91	62.8%
Student	7	4.8%
Freelancer	30	20.7%
Retired	0	0%
Businessman/Businesswoman	14	9.7%
Unemployed	3	2.1%
Total	145	100%

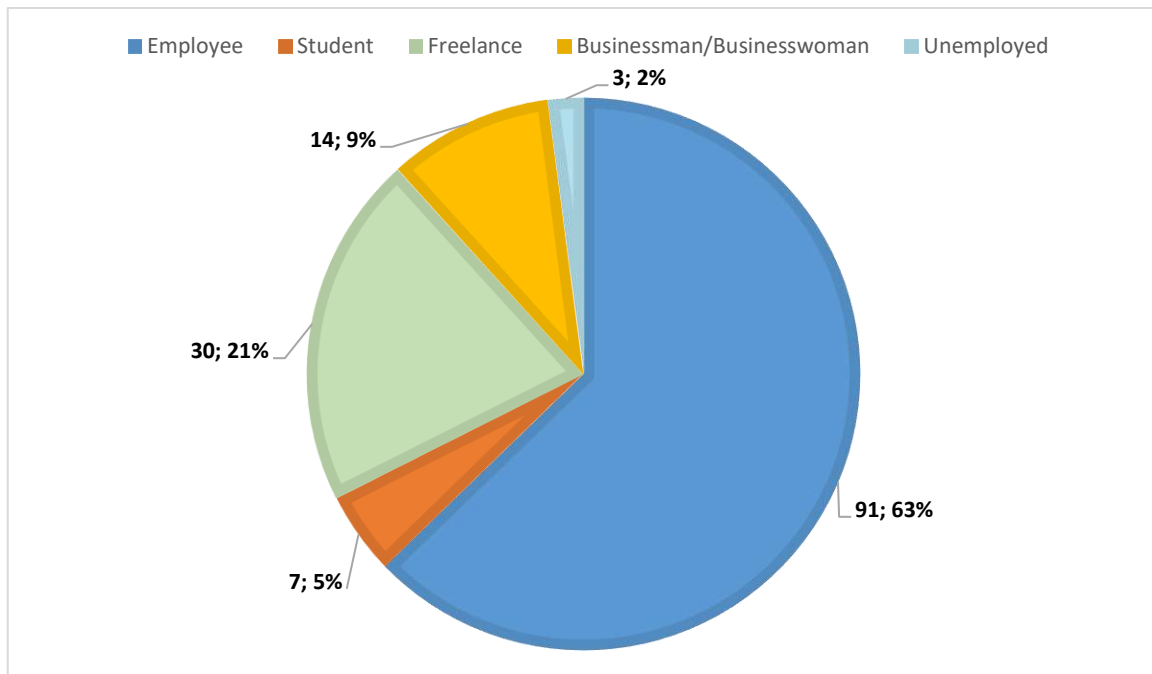
Source: Prepared by the student based on the outputs of the SPSS (V.29) software.

As shown in the table above, the majority of respondents (**62.8%**) are employees, indicating that mobile banking applications are predominantly used by individuals with stable employment. Freelancers form the second-largest group, accounting for **20.7%**,

which suggests that self-employed or independently working professionals also constitute a significant segment of mobile banking users. Business owners make up **9.7%** of the sample, followed by students at **4.8%**, and the unemployed at **2.1%**. Notably, no participants in the sample were retired.

This distribution may reflect the fact that e-banking mobile apps are more commonly used by individuals with a regular income or professional responsibilities, as they are more likely to require frequent banking transactions. The following figure summarizes the results presented in the table.

Figure (4-6): Distribution of the sample according to Occupation



Source: Prepared by the student based on the outputs of the Excel program

1.1.8. Description of the Study Sample by Primary Mobile Banking Application Used

Table (4-8) below displays the frequency and percentage distribution of the study participants based on the primary mobile banking application(s) they reported using:

Table (4-8): Distribution of the Study Sample by Mobile Banking Application Used

	Answer	Frequencies	Percentages
Baridi Mob	Yes	70	48,3%
	No	75	51,7%
L’application SG	Yes	6	4,1%
	No	139	95,9%
Wise	Yes	34	23,4%
	No	111	76,6%
Paysera	Yes	28	19,3%
	No	117	80,7%
MyFin	Yes	17	11,7%
	No	128	88,3%
Binance	Yes	43	29,7%
	No	102	70,3%
Banxy	Yes	10	6,9%
	No	135	93,1%
CNEP Connect	Yes	11	7,6%
	No	134	92,4%
Bea Mobile	Yes	3	2,1%
	No	142	97,9%
MyBadr	Yes	5	3,4%
	No	140	96,6%
RedotPay	Yes	28	19,3%
	No	117	80,7%
Mobile CPA	Yes	8	5,7%
	No	137	94,3%
MXC	Yes	1	0,7%
	No	144	99,3%

Revolut Bank	Yes	13	9%
	No	132	91,0%
Chase Bank App	Yes	1	0,7%
	No	144	99,3%
Paypal	Yes	1	0,7%
	No	144	99,3%
LCL	Yes	1	0,7%
	No	144	99,3%
Boursobank	Yes	1	0,7%
	No	144	99,3%
Bnatic	Yes	18	12,4%
	No	127	87,6%
Al Baraka Dz	Yes	2	1,4%
	No	143	98,6%
Trust Connect	Yes	3	2,1%
	No	142	97,9%
MyDigiBank	Yes	5	3,4%
	No	140	96,6%
AGB Online	Yes	2	1,4%
	No	143	98,6%
BDL Bank	Yes	3	2,1%
	No	142	97,9%
Boursorama Banque	Yes	3	2,1%
	No	142	97,9%
La Banque Postale	Yes	3	2,1%
	No	142	97,9%

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results indicate that **Baridi Mob** is by far the most commonly used mobile banking application among participants, with **48.3%** of the respondents reporting its use. This high adoption rate is likely due to the widespread reliance on Algeria Post accounts, especially among government employees and public sector workers.

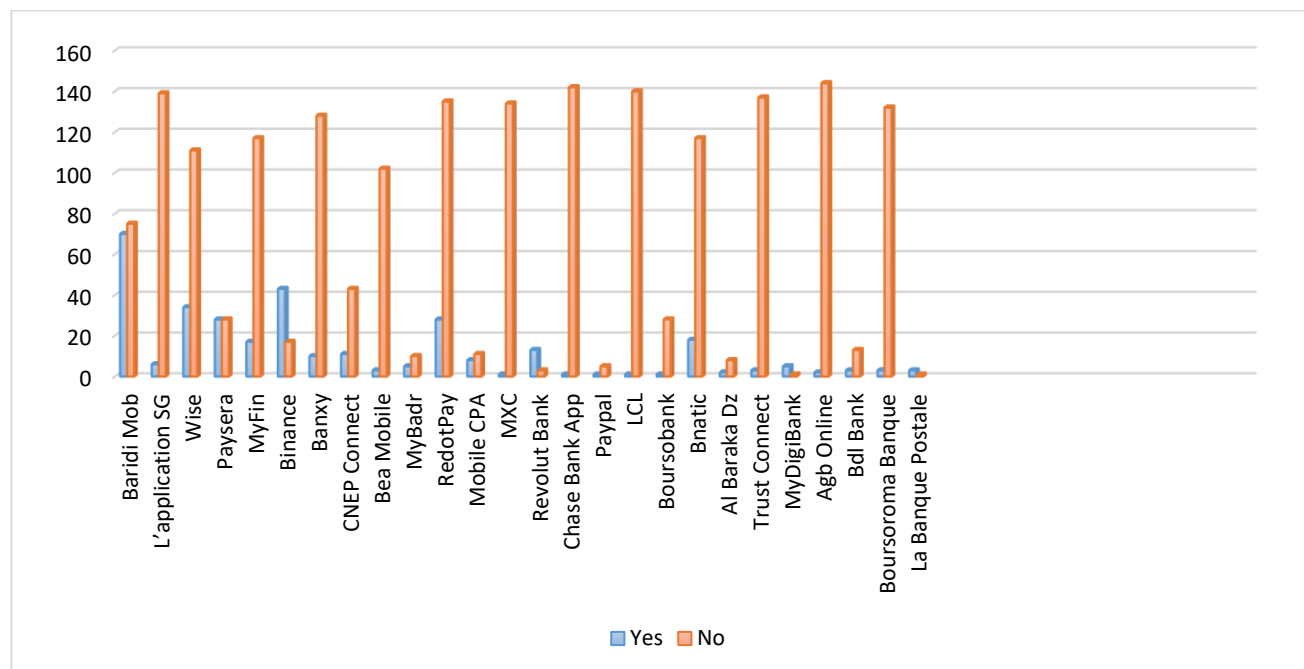
Following Baridi Mob, **Binance** is the second most frequently used app (**29.7%**), suggesting a notable interest among users in cryptocurrency and blockchain-based financial services. Applications such as **Wise** (23.4%) and **Paysera** (19.3%) also show considerable usage, reflecting user engagement with international money transfer and multi-currency platforms.

Other mobile banking applications recorded moderate to low usage levels. For instance, **MyFin** (11.7%) and **Bnatic** (12.4%) show some presence in the market, while apps such as **Banxy** (6.9%), **CNEP Connect** (7.6%), and **Mobile CPA** (5.7%) demonstrate more limited adoption. A number of applications—including **Bea Mobile**, **MyBadr**, **Trust Connect**, and **MyDigiBank**—were used by less than 5% of respondents.

Furthermore, several international or niche banking apps such as **MXC**, **Paypal**, **LCL**, and **Boursobank** exhibit minimal usage, with only **0.7%** reporting engagement with each. These low figures reflect limited market penetration or relevance to Algerian users.

The data thus illustrates a strong concentration of usage around a few key applications, particularly local platforms like Baridi Mob, as well as global digital finance apps such as Binance and Wise. The following figure summarizes the results of the previous table as follows:

Figure (4-7): Distribution of the sample according to mobile banking application used



Source: Prepared by the student based on the outputs of the Excel program

1.2. Analysis of the Study Sample's Responses According to the second axis questions

In this section, we will analyze the responses of the study sample based on the questions of the second axis related to the dimensions of mobile app usability through the following points:

1.2.1. Analysis of the study sample's responses according to the first dimension: *Learnability*

Table (4-9) below summarizes the participants' responses regarding the *learnability* dimension of mobile banking applications:

Table (4-9): Descriptive Statistics for the learnability dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	Learning to use the mobile banking app is easy for me	0,68	5.42	Strongly agree
02	Using the mobile banking app is clear and understandable.	0,75	5.42	Strongly agree
03	It is easy to find the information I need using mobile banking app.	0,83	5.25	Strongly agree
04	Overall, the mobile banking app is easy to use.	0,84	5.28	Strongly agree
Weighted mean / Standard deviation		0,77	5,34	

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results presented in Table (4-9) indicate a very strong positive perception of learnability among the study participants. The weighted mean for this dimension is **5.34**, which lies within the range of **[5.17 – 6.00]**, corresponding to a "**Strongly Agree**" level of agreement. This implies that users find the mobile banking applications easy to learn. All standard deviations remain below **0.85**, indicating minimal variability in responses and suggesting a shared positive outlook.

These findings reinforce the significance of learnability as a fundamental component of mobile app usability, as perceived by Algerian users of mobile banking applications.

1.2.2. Analysis of the study sample's responses according to the second dimension: *Convenience*

Table (4-10) below summarizes the participants' responses regarding the **convenience** dimension of mobile banking applications:

Table (4-10): Descriptive Statistics for the convenience dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	While using the mobile banking app I find what I am looking for in the least amount of time.	0,68	5	Agree
02	The solutions provided by mobile banking app is fast and reliable	0,81	5,15	Agree
03	The banking service is provided with little effort	0,87	5,10	Agree
04	Using the mobile banking app makes my life easier.	0,64	5,53	Strongly Agree
Weighted mean / Standard deviation		0,75	5,20	

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results presented in Table (4-10) indicate a strong positive perception of convenience among the study participants. The weighted mean for this dimension is **5.20**, which falls within the range of **[5.17 – 6.00]**, corresponding to a "**Strongly Agree**" level of agreement. This suggests that users perceive mobile banking apps as time-efficient and easy to use in their daily financial tasks.

All standard deviations are below **0.90**, reflecting low variability in responses and indicating a generally shared positive outlook among the participants. These findings underscore the relevance of convenience as a crucial dimension of mobile app usability from the perspective of Algerian users.

1.2.3. Analysis of the study sample's responses according to the third dimension: *Aesthetics*

Table (4-11) below summarizes the participants' responses regarding the aesthetics dimension of mobile banking applications:

Table (4-11): Descriptive Statistics for the Aesthetics Dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	The visual appeal of a mobile banking app is important for me.	0,93	4,86	Agree
02	I can easily browse/navigate because the mobile banking app has a convenience interface.	1,11	4,73	Agree
03	Mobile banking apps are aesthetically appealing to me.	1,11	4,62	Agree
04	The design of mobile banking apps is visually pleasing to me.	1,07	4,64	Agree
Weighted mean / Standard deviation		1,05	4,71	

Source: Prepared by the student based on the outputs of the SPSS (V.20) software

The results presented in Table (4-11) indicate a strong positive perception of the aesthetics dimension among the study participants. The weighted mean is **4.71**, which falls within the range of **[4.33 – 5.16]**, corresponding to a " **Agree**" level of agreement. This suggests that users consider the visual appeal and interface design of mobile banking apps to be very important.

Although the standard deviations are slightly higher—ranging between **0.93** and **1.11**—they still reflect acceptable variability, indicating that the participants generally share a favorable view of the aesthetic quality of the apps they use.

1.3. Analysis of the study sample's responses according to the third axis questions

In this section, we will analyze the responses of the study sample based on the questions of the third axis related to the dimensions of customer engagement as follows:

1.3.1. Analysis of the study sample's responses according to the first dimension: *Cognitive Engagement*

Table (4-12) below presents the responses of the study sample regarding the cognitive engagement dimension of mobile banking applications:

Table (4-12): Descriptive Statistics for the Cognitive Engagement Dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	I am fully absorbed when using the mobile banking app	1,38	4,27	Somewhat Agree
02	Using the mobile banking app fully captures my attention.	1,28	4,37	Agree
03	Mobile banking apps are aesthetically appealing to me.	1,26	4,16	Somewhat Agree
04	The design of mobile banking apps is visually pleasing to me.	1,11	4,48	Agree
Weighted mean / Standard deviation		1,25	4,32	

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results in Table (4-12) indicate a generally high level of cognitive engagement among participants. The weighted mean is **4.32**, which falls within the interval [**3.49 – 4.32**], corresponding to the interpretation “**Somewhat Agree.**” This suggests that users are mentally involved and reasonably focused when using mobile banking applications, though not to the highest degree of engagement.

Individual item means range from **4.16** to **4.48**, while standard deviations range from **1.11** to **1.38**, indicating a moderate level of variability in responses. The item with the lowest mean (**4.16**) just falls below the cutoff for “Agree,” pulling the weighted mean slightly below the next verbal category.

1.3.2. Analysis of the study sample's responses according to the second dimension: *Affective Engagement*

Table (4-13) below presents the responses of the study sample regarding the affective engagement dimension of mobile banking applications:

Table (4-13): Descriptive Statistics for the Affective Engagement Dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	I find using the mobile banking app to be enjoyable.	1,31	4,11	Somewhat Agree
02	I feel very positive when I use the mobile banking app.	1,09	4,63	Agree
03	I'm proud to use the mobile banking app.	1,32	4,51	Agree
Weighted mean / Standard deviation		1,24	4,42	

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results in Table (4-13) reveal a strong affective engagement among respondents. The weighted mean of **4.42** falls within the range [**4.33 – 5.16**], corresponding to the interpretation “**Agree**”. This suggests that participants generally experience positive emotions while interacting with mobile banking apps.

The mean scores for individual items range from **4.11** to **4.63**, while standard deviations range from **1.09** to **1.32**, indicating moderate variability in responses but an overall positive emotional association with the apps.

These findings highlight the emotional connection and satisfaction users feel toward mobile banking services, which are important components in fostering loyalty and ongoing engagement.

1.3.3. Analysis of the study sample's responses according to the third dimension: *Conative Engagement*

Table (4-14) below presents the responses of the study sample regarding the conative engagement dimension of mobile banking applications:

Table (4-14): Descriptive Statistics for the conative engagement dimension

Item No.	Statement	Standard deviation	Mean	Verbal explanation
01	I spend a lot of time using the mobile banking app compared to other mobile financial services applications.	1,48	3,62	Somewhat Agree
02	The mobile banking app is one of the services I usually use when I use mobile applications for financial and insurance services	1,20	4,35	Agree
03	Whenever I'm using mobile financial applications, I usually use my mobile banking app.	1,13	4,53	Agree
Weighted mean / Standard deviation		1,27	4,17	

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results in Table (4-14) indicate a moderate level of conative engagement among the study participants. The weighted mean of **4.17** lies at the upper bound of the range [3.49 – 4.32], which corresponds to “**Somewhat Agree**”. This implies that while participants generally engage behaviorally with mobile banking apps, the strength of their engagement is modest rather than strong.

Item means range from **3.62** to **4.53**, and standard deviations from **1.13** to **1.48**, reflecting moderate variation in responses. The highest engagement was seen in regular usage behavior (**4.53**), while time investment was comparatively lower (**3.62**), indicating differentiated levels of behavioral commitment across actions.

These findings suggest that although mobile banking apps are commonly used, users may still vary in how intensely and consistently they engage with them

2. Testing the study model and hypotheses

To test the validity of the study's hypotheses, a series of appropriate statistical techniques were employed using the Statistical Package for the Social Sciences (SPSS). The analysis aimed to examine the effect of mobile banking app usability on customer engagement by testing both main and sub-hypotheses. Specifically, multiple linear regression was applied to assess the overall influence of the three usability dimensions—learnability, convenience, and aesthetics—on each of the three engagement dimensions: cognitive, affective, and conative. Additionally, simple linear regression was used to test the individual impact of each usability dimension on each engagement dimension. To investigate whether customer engagement levels vary across different demographic characteristics, independent-sample T-tests were conducted for the gender variable, while one-way ANOVA tests were used for age, income, occupation, and educational level. To ensure the accuracy and validity of parametric test results, key assumptions were examined, including the normality of data distribution, linearity of relationships, independence of observations, homoscedasticity, and the absence of multicollinearity among variables.

2.1. Condition of the distribution nature of the study variables

To verify whether the study variables and dimensions follow a normal distribution, skewness and kurtosis coefficients were calculated. According to statistical literature, skewness values falling between **-1 and +1** are generally considered strong indicators of normality, suggesting a symmetrical distribution of responses. Similarly, kurtosis values ranging between **-2 and +2** are deemed acceptable and consistent with the assumptions of normality. These thresholds are supported by the guidelines proposed by George and Mallery (2009) and Hair et al. (2010), and serve as a basis for evaluating the distribution nature of the data used in this study (Darren George, 2009; Hair, 2010).

The results are presented in the table below:

Table (4-15): Results of the Normality Test

Variables	Skewness coefficients		Kurtosis coefficients		Conclusion
	The standard convention	Value	The standard convention	Value	
Mobile app usability	<i>The skewness value should range between -1 and +1</i>	-0,440	<i>The kurtosis value should range between -2 and +2</i>	0,607	Follow a normal distribution
Costumer Engagement		-0,152		0,281	Follow a normal distribution

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results in Table (4-15) show that both the mobile app usability and customer engagement variables meet the criteria for normal distribution. The skewness coefficient for mobile app usability is **-0.440**, and for customer engagement is **-0.152**, both of which lie within the acceptable range of **-1 to +1**, indicating a balanced distribution. Additionally, the kurtosis coefficients—**0.607** for mobile app usability and **0.281** for customer engagement—fall within the acceptable range of **-2 to +2**, suggesting the data distributions are mesokurtic and close to normal. Based on these findings, it can be concluded that the data satisfy the assumptions required for conducting parametric tests with confidence.

2.2.Assumption of independence of the study variables

To assess the assumption of independence among the study variables, the Variance Inflation Factor (**VIF**) and tolerance values were examined. According to standard statistical guidelines, multicollinearity is considered absent when the **VIF** is less than **10** and the tolerance exceeds **0.10**. The results obtained are presented in the following table:

Table (4-16): Variance Inflation Factor (VIF) and Tolerance Values

	Tolerance	Variance inflation factor (VIF)
Learnability	0,619	1,615
Convenience	0,577	1,732
Design / Aesthetics	0,754	1,326

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

From the table above, we find that the learnability dimension has a VIF value of **1.615** and a tolerance value of **0.619**; the convenience dimension has a VIF of **1.732** and a tolerance of **0.577**; and the design/aesthetics dimension has a VIF of **1.326** and a tolerance of **0.754**. All VIF values are below 5, indicating no issues of multicollinearity, which confirms that the model is reliable and that we can trust the results of the hypothesis tests.

2.3. Model fit condition

To verify the model fit condition, the results of the ANOVA test for multiple regression analysis were examined. The output is presented in the table below:

Table (4-17): ANOVA Results for Multiple Regression Analysis

Source of Variation	Degrees of Freedom	Mean Squares	Sum of Squares	Calculated F value	Significance level
Regression	1	171,75	171,75	44,9	0,001 ^b
Residuals	143	3,82	546,92		
Total	144	/	718,67		

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

From As shown in Table (4-17), the calculated F value is **44.9**, with a significance level of **0.001**. Since this p-value is lower than the predetermined threshold of $\alpha = 0.05$, we can conclude that the regression model is statistically significant. This result confirms that the model is suitable for testing the research hypotheses and implies that at least one of the independent variables significantly affects the dependent variable, i.e., customer engagement.

2.4. Testing the main hypothesis

The main hypothesis stated: “**Higher levels of mobile app usability positively influence customer engagement in the Algerian mobile banking apps context.**”

To test this, the null and alternative hypotheses were formulated as follows:

- **H₀**: There is no statistically significant effect of mobile app usability on customer engagement in the Algerian mobile banking apps context.
- **H₁**: There is a statistically significant positive effect of mobile app usability on customer engagement in the Algerian mobile banking apps context.

To evaluate the validity of this hypothesis, a Multiple Linear Regression analysis was conducted. The results are summarized in the table below:

Table (4-18): Multiple Regression Analysis for the Main Hypothesis

Partial significance of regression coefficients								Explanatory Power		Overall significance of the multiple regression model	
Significance level (sig)	Calculated T-Value		Standardized coefficients	Unstandardized coefficients			Model	Coefficient of determination (R-squared)	Correlation coefficient R	Significance level sig	Calculated F-Value
	Value	Symbol		Standard error	Value	Symbol					
0,012	2,552	T ₀	/	1,533	3,913	B ₀	Constant	0,284	0,533 ^a	0,000 ^b	18,644
0,833	0,211	T ₁	0,019	0,305	0,064	B ₁	Learnability				
0,125	1,542	T ₂	0,145	0,355	0,548	B ₂	Convenience				
0,000	5,351	T ₃	0,439	0,231	1,234	B ₃	Aesthetics				

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

From the table above:

- The Pearson correlation coefficient (**R**) between mobile app usability and customer engagement is **0.533**, indicating a moderate positive correlation, significant at **p = 0.000**.
- The coefficient of determination (**R²**) is **0.284**, which means that **28.4%** of the variance in customer engagement is explained by the usability dimensions (learnability, convenience, aesthetics).
- The overall regression model is statistically significant, with an **F-value** of **18.644** and a significance level of **0.000**, which is less than the study's threshold (**$\alpha = 0.05$**).

While the overall model is significant, it is important to note that only the **aesthetics dimension** has a statistically significant individual effect on customer engagement (**p = 0.000**). The other dimensions (learnability and convenience) do not show a significant effect at the **0.05** level.

The regression equation derived from the model is as follows:

$$\text{Customer Engagement} = 3.913 + (1.234 \times \text{Aesthetics}) + \text{Error term}$$

Based on these findings, the **main hypothesis (H₁)** is **partially supported**. The overall usability construct significantly affects customer engagement, with **aesthetics** emerging as the most influential dimension in the Algerian mobile banking apps context.

2.5. Testing the first hypothesis (H1)

The hypothesis stated: “**Usability of mobile banking apps positively influences the cognitive engagement of Algerian customers, at a significance level of ≤ 0.05 .**”

Accordingly, the null and alternative hypotheses are defined as follows:

- **H₀**: There is no statistically significant effect of mobile app usability on the cognitive engagement of Algerian customers.
- **H₁**: There is a statistically significant positive effect of mobile app usability on the cognitive engagement of Algerian customers.

To test this hypothesis, a simple linear regression analysis was conducted, treating mobile app usability as the independent variable and cognitive engagement as the dependent variable.

Table (4-19): Multiple Regression Analysis for Hypothesis (H1)

Partial significance of regression coefficients								Explanatory Power		Overall significance of the multiple regression model	
Significance level (sig)	Calculated T-Value		Standardized coefficients	Unstandardized coefficients			Model	Coefficient of determination (R-squared)	Correlation coefficient R	Significance level sig	Calculated F-Value
	Value	Symbol		Beta	Standard error	B					
			Value			Symbol					
0,011	2,589	T ₀	/	0,646	1,674	B ₀	Constant	0,106	0,326 ^a	< 0,001 ^b	17,029
< 0,001	4,127	T ₁	0,326	0,042	0,174	B ₁	Usability				

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient (**R**) between mobile app usability and cognitive engagement is **0.326**, which reflects a moderate positive correlation. The relationship is statistically significant at **p < 0.001**, indicating that higher usability is associated with increased cognitive engagement among Algerian customers.

The coefficient of determination (**R²**) is **0.106**, meaning that **10.6%** of the variance in cognitive engagement is explained by mobile app usability. While this suggests a meaningful relationship, it also indicates that **89.4%** of the variance is due to other factors not included in the model.

The regression equation derived from the analysis is as follows:

$$\text{Cognitive Engagement} = 1,674 + (0,174 \times \text{Usability}) + \text{Error term}$$

The **F-statistic** is **17.029** with a significance level of **< 0.001**, confirming that the overall model is statistically significant.

Since the regression model is statistically significant and the slope coefficient for usability is positive and significant, the null hypothesis is **rejected**, and the alternative hypothesis is **accepted**.

Accordingly, Usability of mobile banking apps **positively and significantly influences** the cognitive engagement of Algerian customers at the 0.05 significance level.

2.5.1. Testing the first sub hypothesis (H1a)

This section examines the first sub-hypothesis, which tests the significance of the relationship between the **learnability** dimension of mobile app usability and **cognitive engagement** among Algerian customers.

The hypothesis is stated as follows:

- **H₀**: Learnability of mobile banking apps has no effect on the cognitive engagement of Algerian customers.
- **H₁**: Learnability of mobile banking apps has an effect on the cognitive engagement of Algerian customers.

To assess this relationship, a **simple linear regression** analysis was conducted. The results are summarized in the table below:

Table No. (4-20): Results of Simple Linear Regression Test for Hypothesis H1.a

Learnability dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,129	0,017	2,410	0,172	3,407	0,123

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The results indicate that the correlation coefficient (**R**) is **0.129**, showing a weak positive correlation between learnability and cognitive engagement. The coefficient of

determination (R^2) is **0.017**, meaning that only **1.7%** of the variance in cognitive engagement is explained by learnability.

However, the **F-value** is **2.410** with a significance level of **0.123**, which is greater than **0.05**. Additionally, the **t-test** for the regression coefficient of learnability is also **not significant** ($p = 0.123$).

Therefore, the regression model is not statistically significant, and we fail to reject the null hypothesis.

Although there is a weak positive relationship, the findings do not provide statistically significant evidence to support the claim that learnability influences cognitive engagement among Algerian mobile banking users. Thus, **H1.a is rejected**.

2.5.2. Testing the second sub hypothesis (H1b)

This section addresses the second sub-hypothesis, which aims to test the significance of the relationship between the **convenience** dimension of mobile app usability and **cognitive engagement** among Algerian customers.

The hypothesis is formulated as follows:

- **H₀**: Convenience of mobile banking apps has no effect on the cognitive engagement of Algerian customers.
- **H₁**: Convenience of mobile banking apps has an effect on the cognitive engagement of Algerian customers.

To test this, a simple linear regression analysis was conducted. The results are shown in the table below:

Table No. (4-21): Results of the Simple Linear Regression Test for the second hypothesis H1b

Convenience dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,273	0,075	11,539	0,410	2,194	<.001 ^b

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The regression results indicate a positive correlation between the convenience of mobile banking apps and cognitive engagement, with a Pearson correlation coefficient of **R = 0.273**. The coefficient of determination (**R²**) is **0.075**, suggesting that 7.5% of the variance in cognitive engagement can be explained by convenience.

The **F-value** is **11.539** with a significance level of **<.001**, which is well below the threshold of **0.05**. Additionally, the **t-value** for the regression coefficient (**B = 0.410**) is significant at **t = 3.397, p < .001**.

Thus, the model is statistically significant and reliable, and we **reject the null hypothesis**.

The analysis supports the second sub-hypothesis. **Convenience has a statistically significant positive effect on the cognitive engagement** of Algerian users of mobile banking apps. The simple regression equation derived from the model is:

$$Y_{\text{CogEng}} = 2,194 + 0,410 X_{\text{convenience}}$$

Where:

Y_{CogEng}: Represents the cognitive engagement of Algerian customers.

X_{convenience}: Represents the convenience dimension.

2.5.3. Testing the third sub hypothesis (H1c):

This section addresses the third sub-hypothesis, which aims to examine the impact of the **aesthetics** dimension of mobile banking app usability on **cognitive engagement** among Algerian customers.

The hypothesis is formulated as follows:

- **H₀**: Aesthetics of mobile banking apps has no effect on the cognitive engagement of Algerian customers.
- **H₁**: Aesthetics of mobile banking apps has an effect on the cognitive engagement of Algerian customers.

To test this, a simple linear regression analysis was performed. The results are summarized in the table below:

Table No. (4-22): Results of the Simple Linear Regression Test for the third hypothesis H1c

Aesthetic dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,372	0,138	22,912	0,414	2,376	<.001 ^b

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient between the aesthetics of mobile banking apps and cognitive engagement is **R = 0.372**, indicating a moderate positive relationship. The coefficient of determination (**R²**) is **0.138**, meaning that **13.8%** of the variation in cognitive engagement is explained by changes in the aesthetics of mobile apps.

The regression coefficient (**B = 0.414**) is statistically significant, with **t = 4.787**, **p < .001**, and the **F-value** is **22.912**, also highly significant at **p < .001**. These results confirm that the model is statistically valid.

Accordingly, the regression equation derived from the model is:

$$Y_{\text{CogEng}} = 2,376 + 0,414 X_{\text{Aesthetics}}$$

Where:

Y_{CogEng} : Represents the cognitive engagement of Algerian customers.

$X_{\text{Aesthetics}}$: Represents the aesthetics dimension.

The analysis supports the third sub-hypothesis. Aesthetics has a statistically significant and positive effect on the cognitive engagement of Algerian mobile banking app users. This dimension alone accounts for **13.8%** of the variance in their cognitive engagement.

2.6. Testing the second hypothesis (H2)

The hypothesis stated: “**Usability of mobile banking apps positively influences the cognitive engagement of Algerian customers, at a significance level of ≤ 0.05 .**” The null and alternative hypotheses can be formulated as follows:

- **H₀**: There is no statistically significant effect of mobile app usability on the cognitive engagement of Algerian customers.
- **H₁**: There is a statistically significant positive effect of mobile app usability on the cognitive engagement of Algerian customers.

To test the validity of this hypothesis, we conducted a **Multiple Linear Regression analysis**. The results of this test are presented in the following table:

Table (4-23): Multiple Regression Analysis for Hypothesis (H2)

Partial significance of regression coefficients								Explanatory Power		Overall significance of the multiple regression model	
Significance level (sig)	Calculated T-Value		Standardized coefficients	Unstandardized coefficients			Model	Coefficient of determination (R-squared)	Correlation coefficient R	Significance level sig	Calculated F-Value
	Value	Symbol		Standard error	Value	Symbol					
0,122	1,558	T ₀	/	0,723	1,127	B ₀	Constant	0,128	0,358 ^a	< 0,001 ^b	21,015
< 0,001	4,584	T ₁	0,358	0,047	0,216	B ₁	Usability				

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient of **0.358** indicates a moderate positive correlation between mobile app usability and affective engagement. This relationship is statistically significant (**p < 0.001**), which supports the proposed link between these two variables.

The coefficient of determination (R²) is 0.128, meaning that **12.8%** of the variance in affective engagement is explained by the perceived usability of the mobile banking app. While this is a meaningful proportion, it also suggests that **87.2%** of the variation is due to other factors not captured in this model.

The regression equation is:

$$\text{Affective Engagement} = 1.127 + 0.216 \times \text{Usability} + \text{error}$$

The overall regression model is significant (**F = 21.015**, **p < 0.001**), supporting the conclusion that the model is statistically reliable for inference.

As the regression coefficient for usability is **positive and statistically significant**, we **reject the null hypothesis and accept the alternative hypothesis**.

So, usability of mobile banking apps **significantly and positively influences** the affective engagement of Algerian customers at the 0.05 significance level.

2.6.1. Testing the fourth sub hypothesis (H2a)

This section examines the effect of the **learnability** dimension of mobile banking app usability on the **affective engagement** of Algerian customers.

The hypothesis is formulated as follows:

- **H₀**: Learnability of mobile banking apps has no effect on the affective engagement of Algerian customers.
- **H₁**: Learnability of mobile banking apps has an effect on the affective engagement of Algerian customers.

A simple linear regression analysis was conducted to test this relationship, and the results are presented in the table below:

Table No. (4-24): Results of the Simple Linear Regression Test for the fourth hypothesis H2a

Learnability dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,262	0,069	10,546	0,396	2,304	0,001

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient is **R = 0.262**, indicating a positive but modest relationship between learnability and affective engagement. The coefficient of determination is **R² = 0.069**, which implies that **6.9%** of the variation in affective engagement is explained by changes in the learnability dimension.

The regression equation is:

$$Y_{\text{AffEng}} = 2,304 + 0,396 X_{\text{Learnability}}$$

Where:

Y_{AffEng}: Represents the affective engagement of Algerian customers.

X_{Learnability}: Represents the learnability dimension.

The regression is statistically significant, with an **F-value** of **10.546** and a **p-value** of **.001**, which is less than the threshold of **0.05**. This confirms that the model is valid and that learnability has a statistically significant effect on affective engagement.

The fourth sub-hypothesis (H2.a) is **accepted**. The learnability of mobile banking apps **positively influences the affective engagement** of Algerian customers, explaining **6.9%** of its variance.

2.6.2. Testing the fifth sub hypothesis (H2b)

This section examines the effect of the **convenience dimension** of mobile banking app usability on the **affective engagement** of Algerian customers.

The sub-hypothesis is formulated as follows:

- **H₀**: Convenience of mobile banking apps has no effect on the affective engagement of Algerian customers.
- **H₁**: Convenience of mobile banking apps has an effect on the affective engagement of Algerian customers.

A simple linear regression analysis was performed to test this hypothesis. The results are summarized in the table below:

Table No. (4-25): Results of the Simple Linear Regression Test for the fifth hypothesis H2b

Convenience dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,209	0,044	6,528	0,355	2,576	0,012

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient is $R = 0.209$, indicating a positive and modest correlation between convenience and affective engagement. The coefficient of determination (R^2) is 0.044 , suggesting that the convenience dimension explains 4.4% of the variance in affective engagement.

The regression equation is as follows:

$$Y_{\text{AffEng}} = 2,576 + 0,355 X_{\text{Convenience}}$$

Where:

Y_{AffEng} : Represents the affective engagement of Algerian customers.

$X_{\text{Convenience}}$: Represents the convenience dimension.

The model is statistically significant, as the **F-value is 6.528** with a **p-value of .012**, which is less than the conventional threshold of **0.05**. This confirms that the convenience dimension significantly contributes to the prediction of affective engagement.

The fifth sub-hypothesis (H2.b) is **accepted**. The convenience of mobile banking apps **positively influences the affective engagement** of Algerian customers, although it explains only 4.4% of the variance in this type of engagement.

2.6.3. Testing the sixth sub hypothesis (H2c)

This section examines the effect of the **aesthetics dimension** of mobile banking app usability on the **affective engagement** of Algerian customers.

The hypothesis is formulated as follows:

- **H₀**: Aesthetics of mobile banking apps has no effect on the affective engagement of Algerian customers.
- **H₁**: Aesthetics of mobile banking apps has an effect on the affective engagement of Algerian customers.

A simple linear regression analysis was conducted to test this hypothesis. The results are presented in the table below:

Table No. (4-26): Results of the Simple Linear Regression Test for the sixth hypothesis H2c

Aesthetic dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,374	0,140	23,320	0,476	2,197	0,001

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient is $R = 0.374$, indicating a moderate positive correlation between app aesthetics and affective engagement. The coefficient of determination (R^2) is **0.140**, which means that **14.0%** of the variance in affective engagement is explained by the aesthetics dimension.

The regression equation derived from the analysis is:

$$Y_{\text{AffEng}} = 2,197 + 0,476X_{\text{Aesthetic}}$$

Where:

Y_{AffEng} : Represents the affective engagement of Algerian customers.

$X_{\text{Aesthetic}}$: Represents the aesthetic dimension.

The model's **F-value** is **23.320** with a **p-value** < 0.001 , indicating strong statistical significance. This allows us to reject the null hypothesis and accept the alternative: **aesthetics of mobile banking apps significantly influence the affective engagement** of Algerian users.

The sixth sub-hypothesis (H2.c) is **accepted**. Aesthetics significantly and positively influence affective engagement, explaining **14.0%** of the variability in user emotional response to mobile banking apps.

2.7. Testing the third hypothesis (H3)

The hypothesis stated that: “**Usability of mobile banking apps positively influences the conative engagement of Algerian customers, at a significance level of ≤ 0.05 .**”

Accordingly, the hypotheses are formulated as follows:

- **H₀ (Null Hypothesis):** There is no statistically significant effect of mobile app usability on the conative engagement of Algerian customers.
- **H₁ (Alternative Hypothesis):** There is a statistically significant positive effect of mobile app usability on the conative engagement of Algerian customers.

Table (4-27): Multiple Regression Analysis for Hypothesis (H3)

Partial significance of regression coefficients								Explanatory Power		Overall significance of the multiple regression model	
Significance level (sig)	Calculated T-Value		Standardized coefficients	Unstandardized coefficients			Model	Coefficient of determination (R-squared)	Correlation coefficient R	Significance level sig	Calculated F-Value
	Value	Symbol	Beta	Standard error	Value	Symbol					
0,896	0,131	T ₀	/	0,676	0,089	B ₀	Constant	0,205	0,453 ^a	< 0,001 ^b	36,921
< 0,001	6,076	T ₁	0,453	0,044	0,268	B ₁	Usability				

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

In light of the results presented in the table above, the Pearson correlation coefficient between the dimensions of mobile app usability and conative engagement was found to be **R = 0.453** with a significance level of **p < 0.001**. This indicates a **moderately positive correlation** between the independent variable (mobile app usability) and the dependent variable (conative engagement of Algerian customers).

Furthermore, based on the outcomes of the multiple linear regression analysis, the relationship between mobile app usability and conative engagement of Algerian customers can be expressed through the following regression equation:

$$\text{Conative Engagement} = 0.089 + 0.268 \times \text{Usability} + \text{error}$$

To confirm the statistical significance of the resulting regression model, the analysis shows an **F-value** of **36.921** with a significance level < 0.001 , which is lower than the threshold of 0.05. This indicates that the model is statistically significant. Accordingly, the third main hypothesis: **Usability of mobile banking apps positively influences the conative engagement of Algerian customers** is accepted.

Regarding the explanatory power of the model, the analysis reveals that the **R²** (coefficient of determination) is **0.205**, indicating an explanatory rate of **20.5%**. This means that the studied mobile app usability dimensions account for **20.5%** of the total variance in the conative engagement of Algerian customers.

2.7.1. Testing the seventh sub hypothesis (H3a)

This section examines the effect of the **learnability dimension** of mobile banking app usability on the **conative engagement** of Algerian customers.

The hypothesis is stated as follows:

- **H₀**: Learnability of mobile banking apps has no effect on the conative engagement of Algerian customers.
- **H₁**: Learnability of mobile banking apps has an effect on the conative engagement of Algerian customers.

A simple linear regression analysis was conducted to test this hypothesis, and the results are presented below:

Table No. (4-28): Results of the Simple Linear Regression Test for Hypothesis H3.a

Learnability dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,264	0,070	10,734	0,391	2,081	0,001

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient is **R = 0.264**, indicating a weak to moderate positive correlation between learnability and conative engagement. The coefficient of determination (**R²**) is **0.070**, meaning that **7.0%** of the variation in conative engagement is explained by the learnability dimension.

The regression equation derived from the model is:

$$Y_{\text{ConaEng}} = 2,081 + 0,391 X_{\text{Learnability}}$$

Where:

Y_{ConaEng}: Represents the conative engagement of Algerian customers.
X_{Learnability}: Represents the learnability dimension.

The model's **F-value** is **10.734**, with a **p-value** of **0.001**, which is lower than the significance level of **α = 0.05**. This confirms the statistical significance of the regression model. Thus, the **null hypothesis is rejected**, and the alternative is accepted: **learnability has a significant positive effect on conative engagement**.

The seventh sub-hypothesis (H3.a) is **accepted**. Learnability of mobile banking apps has a **significant and positive effect** on conative engagement, explaining **7.0%** of the variation in this type of engagement among Algerian users.

2.7.2. Testing the eighth sub hypothesis (H3b)

This section assesses the effect of the **convenience** dimension of mobile banking app usability on the **conative engagement** of Algerian customers.

The hypothesis is stated as follows:

- **H₀**: Convenience of mobile banking apps has no effect on the conative engagement of Algerian customers.
- **H₁**: Convenience of mobile banking apps has an effect on the conative engagement of Algerian customers.

To test this hypothesis, a simple linear regression analysis was performed. The results are shown in the following table:

Table No. (4-29): Results of the Simple Linear Regression Test for Hypothesis H3.b

Convenience dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,366	0,134	22,148	0,610	1,004	0,001

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient (**R**) is **0.366**, indicating a moderate positive correlation **between convenience and conative engagement**. The **coefficient of determination (R²)** is **0.134**, meaning that **13.4%** of the variation in conative engagement is explained by the convenience dimension.

The resulting regression equation is:

$$Y_{\text{ConaEng}} = 1,004 + 0,610 X_{\text{Convenience}}$$

Where:

Y_{ConaEng}: Represents the conative engagement of Algerian customers.

X_{Convenience}: Represents the convenience dimension.

The **F-value** is **22.148** with a **p-value** **< 0.001**, which is statistically significant at the **$\alpha = 0.05$** level. This confirms that the model is statistically valid, and the null hypothesis is rejected.

The eighth sub-hypothesis (H3.b) is **accepted**. The results demonstrate that **convenience significantly and positively affects conative engagement**, explaining **13.4%** of the variance in this engagement dimension among Algerian mobile banking users.

2.7.3. Testing the ninth sub hypothesis (H3b)

This section presents the analysis of the ninth sub-hypothesis, which examines the relationship between the **aesthetic** dimension of mobile banking app usability and the **conative engagement** of Algerian customers.

The hypothesis is formulated as follows:

- **H₀**: Aesthetics of mobile banking apps have no effect on the conative engagement of Algerian customers.
- **H₁**: Aesthetics of mobile banking apps have an effect on the conative engagement of Algerian customers.

To test this hypothesis, a simple linear regression analysis was conducted. The results are summarized in the table below:

Table No. (4-30): Results of the Simple Linear Regression Test for Hypothesis H3.c

Aesthetic dimension	Correlation coefficient (R)	Coefficient of determination (R ²)	Calculated F-Value	Parameter value (A)	Constant value (B)	Significance level
	0,455	0,207	37,254	0,561	1,527	0,001

Source: Prepared by the students based on the outputs of the SPSS (V.29) software

The Pearson correlation coefficient (**R**) is **0.455**, indicating a moderate to strong positive relationship between app aesthetics and conative engagement. The coefficient of determination (**R²**) is **0.207**, suggesting that **20.7%** of the variance in conative engagement can be explained by the aesthetic dimension alone.

The regression equation based on the unstandardized coefficients is:

$$Y_{\text{ConaEng}} = 1,527 + 0,561 X_{\text{Aesthetic}}$$

Where:

Y_{ConaEng} : Represents the conative engagement of Algerian customers.

$X_{\text{Aesthetic}}$: Represents the convenience dimension.

The **F-statistic** is **37.254** with a **p-value** < 0.001 , which is statistically significant at $\alpha = 0.05$. This confirms the validity of the model and leads to the rejection of the null hypothesis.

The ninth sub-hypothesis (**H3.c**) is **accepted**. The findings indicate that the **aesthetic quality of mobile banking apps significantly and positively influences conative engagement** among Algerian users, with the model explaining **20.7%** of the variance.

2.8. Testing the Fourth hypothesis H4

The fourth hypothesis posited that: "**There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on their demographic characteristics.**" In alignment with this, the null and alternative hypotheses are formulated as follows:

- **H₀**: There are no statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on demographic characteristics.
- **H₁**: There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on demographic characteristics.

To evaluate the validity of this hypothesis, **Independent Samples T-Test** and **One-Way ANOVA** were applied. These tests were selected to assess variations in customer engagement levels across different demographic categories.

Given the variety of demographic characteristics under investigation, the fourth hypothesis was subdivided into several sub-hypotheses, each addressing a specific demographic variable (e.g., age, gender, income level, education, and occupation).

The results of the statistical analyses for each sub-hypothesis are presented and interpreted in the following sections.

2.8.1. Testing the tenth Sub-Hypothesis H4a

The tenth sub-hypothesis stated: “There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on their age.”

To assess this hypothesis, a **One-Way ANOVA** was conducted. The results are shown in the table below:

Table (4-31): One-Way ANOVA Results for Customer Engagement by Age Group

Levene's Test Significance Level	Source of Variance	Sum of Squares	Degrees of Freedom (df)	Mean Square	F value	Significance level of the ANOVA test
0,643	Between Groups	38,838	4	9,710	1,999	0,098
	Within Groups	679,839	140	4,856		
	Total	718,677	144			

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The **Levene's Test significance level** was **0.643**, which is **greater than 0.05**, indicating that the assumption of **homogeneity of variances** is met.

The **ANOVA test** yielded a significance value (**p = 0.098**) which is greater than the significance threshold (**$\alpha = 0.05$**). This means that there are no statistically significant differences in customer engagement among the various age groups in the study sample.

As a result, we **fail to reject the null hypothesis (H0)** and **reject the alternative hypothesis (H1)**. Thus, **age does not appear to have a significant effect** on customer engagement with mobile banking apps among Algerian users, according to the current study data.

2.8.2. Testing the eleventh sub-hypothesis H4b

The eleventh sub-hypothesis stated: “**There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking apps based on their gender.**”

To assess this hypothesis, an Independent Samples **T-Test** was conducted. The results are summarized below:

Table (4-32): Independent Samples T-Test Results for Differences in Customer Engagement Based on Gender

Variable	Levene's F		Sample Size	Mean	Std. Deviation	t-test	df	Sig. (2-tailed)
Gender	F	Sig	Male: 88	Male: 12.96	Male: 2.47	Equal variances assumed	143	0.756
	5.126	0.025	Female 57	Female 12.84	Female: 1.82	Equal variances not assumed	140.61	0.741

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

Levene’s Test for Equality of Variances yielded a significance value of **0.025**, which is less than 0.05. Therefore, the assumption of equal variances is **not met**, and we interpret the t-test results accordingly.

Using the row where equal variances are **not assumed**, the **p-value (two-tailed)** is **0.741**, which is greater than the significance threshold of 0.05. Thus, there is **no statistically significant difference** in customer engagement scores between male and female respondents.

As a result, we **fail to reject the null hypothesis (H_0)** and reject the alternative hypothesis (H_1). This suggests that **gender does not significantly influence** customer engagement with mobile banking apps among Algerian users in this study.

2.8.3. Testing the twelfth Sub-Hypothesis H4c

The twelfth sub-hypothesis stated: “**There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on income level.**”

To test this hypothesis, a **One-Way ANOVA** was conducted to determine whether customer engagement with mobile banking differs significantly across various income groups. The results are summarized in the table below:

Table (4-33): One-Way ANOVA Results for Customer Engagement by Income Level

Levene's Test Significance Level	Source of Variance	Sum of Squares	Degrees of Freedom (df)	Mean Square	F value	Significance level of the ANOVA test
0,592	Between Groups	21,520	5	4,304	0,858	0,511
	Within Groups	679,158	139	5,016		
	Total	718,677	144			

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

The Levene’s Test for homogeneity of variances produced a significance level of **0.592**, which is greater than **0.05**, indicating that the assumption of equal variances across income groups holds.

The ANOVA test yielded an **F-value** of **0.858** with a significance level of **p = 0.511**, which exceeds the alpha threshold of **0.05**. This result demonstrates that there are **no statistically significant differences** in customer engagement across income groups in the study sample.

Therefore, we **fail to reject the null hypothesis (H0)** and **reject the alternative hypothesis (H1)**. It can be concluded that **income level does not significantly influence** customer engagement with mobile banking apps among Algerian users.

2.8.4. Testing the thirteenth Sub-Hypothesis H4c

The thirteenth sub-hypothesis stated that: **“There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on occupation.”**

To examine this hypothesis, a One-Way ANOVA test was performed to determine whether customer engagement significantly varies across different occupational groups. The results are presented in the table below:

Table (4-34): One-Way ANOVA Results for Customer Engagement by Occupation

Levene's Test Significance Level	Source of Variance	Sum of Squares	Degrees of Freedom (df)	Mean Square	F value	Significance level of the ANOVA test
0,482	Between Groups	34,572	4	8,643	1,769	0,138
	Within Groups	684,105	140	4,886		
	Total	718,677	144			

Source: Prepared by the student based on the outputs of the SPSS (V.20) software

The Levene's Test for homogeneity of variances produced a significance level of **0.482**, which is greater than **0.05**, confirming that the assumption of equal variances across occupational categories is satisfied.

The ANOVA results reveal an **F-value** of **1,769** with a corresponding **p-value** of **0.138**, which is significantly above the **0.05** threshold. This implies that there are **no statistically significant differences** in customer engagement across the different occupational groups.

Consequently, the **null hypothesis (H0) is retained**, and the **alternative hypothesis (H1) is rejected**. Thus, **occupation does not significantly affect customer engagement** with mobile banking apps among Algerian users in the context of this study.

2.8.5. Testing the fourteenth Sub-Hypothesis H4d

The fourteenth sub-hypothesis stated that: **“There are statistically significant differences at the 0.05 significance level in customer engagement with mobile banking based on education level.”**

To assess this hypothesis, a One-Way ANOVA test was conducted to evaluate whether customer engagement with mobile banking differs significantly among users with varying levels of educational attainment. The results are presented in the following table:

Table (4-35): One-Way ANOVA Results for Customer Engagement by Education Level

Levene's Test Significance Level	Source of Variance	Sum of Squares	Degrees of Freedom (df)	Mean Square	F value	Significance level of the ANOVA test
0,234	Between Groups	68,174	3	22,725	4,926	0,003
	Within Groups	650,504	141	4,614		
	Total	718,677	144			

Source: Prepared by the student based on the outputs of the SPSS (V.29) software

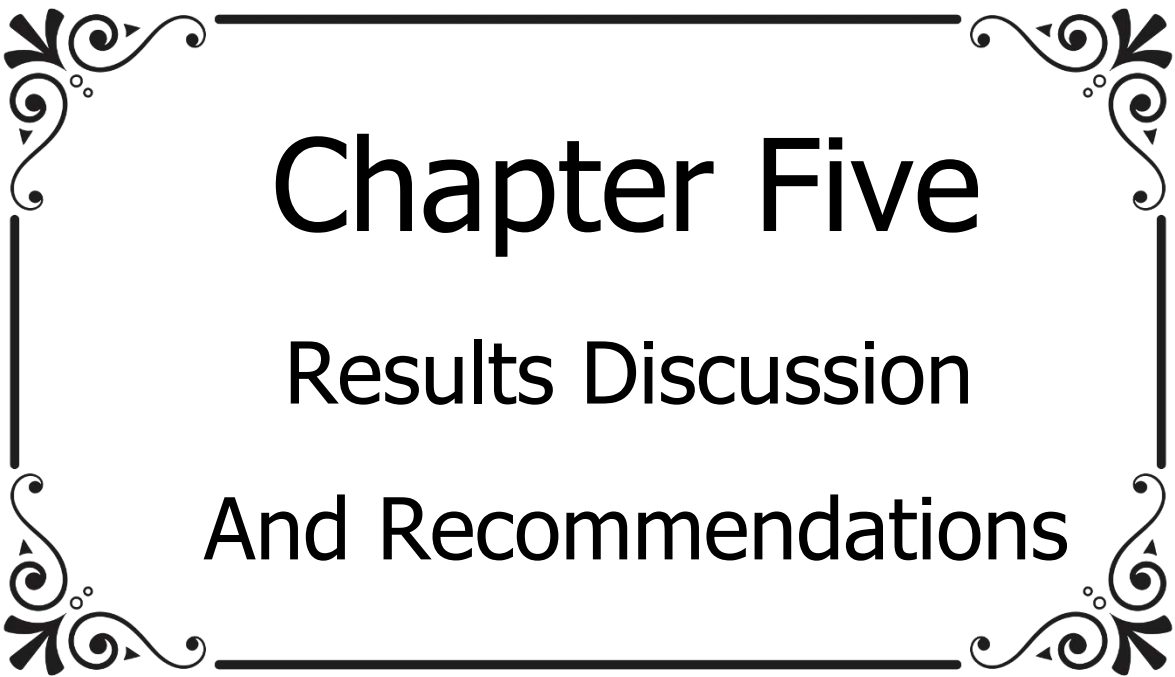
The Levene's Test produced a significance value of **0.234**, which is greater than **0.05**. This confirms that the assumption of homogeneity of variances is not violated, validating the use of ANOVA for group comparison.

The ANOVA results reveal an **F-value** of **4.926** with a significance level of **0.003**, which is less than **0.05**. This indicates that there **are statistically significant differences**

in customer engagement with mobile banking among respondents with different education levels.

As such, the **null hypothesis (H0) is rejected**, and the **alternative hypothesis (H1) is accepted**. These findings suggest that **education level significantly influences customer engagement** with mobile banking apps among Algerian users.

Based on the results of the statistical analyses conducted, it was found that among the various demographic characteristics examined, only **education level** showed statistically significant differences in customer engagement with mobile banking apps. In contrast, no significant differences were observed based on age, gender, income level, or occupation. Therefore, the fourth hypothesis (**H4**) is **partially accepted**, as differences in customer engagement were confirmed for one demographic variable but not for the others.



Chapter Five

Results Discussion

And Recommendations

This study has investigated the influence of mobile app usability on customer engagement within the Algerian e-banking context. The results revealed that these usability dimensions play a pivotal role in shaping user perceptions, emotions, and behaviors. Well-designed apps that are easy to learn, visually attractive, and convenient to navigate significantly enhance user interaction, leading to stronger cognitive, affective, and conative engagement. These findings underscore the necessity for banks and app developers to prioritize usability as a strategic tool to foster meaningful and sustained customer relationships.

In response to the research problem: **“To what extent does mobile app usability influence customer engagement in the context of Algerian mobile banking applications?”**, this study demonstrates that usability exerts a statistically significant and multidimensional impact on customer engagement. The effects were especially notable in the aesthetic and convenience dimensions, highlighting the importance of visual design and functional ease in driving user engagement.

In alignment with the study's objectives, this research offers both theoretical and empirical contributions. The theoretical framework consolidated key concepts and definitions from the literature, offering a clear understanding of the constructs of usability and engagement. Empirically, the study validated these concepts through rigorous quantitative analysis, revealing practical insights into how Algerian users interact with mobile banking apps. The results not only reflect actual user behavior but also provide a foundation for making informed design and development decisions within the digital banking industry.

The remaining sections of this chapter present a summary of the study's theoretical contributions, a discussion of the practical findings, actionable recommendations, and proposals for future research directions.

First: Theoretical Results

Based on the literature reviewed and the conceptual foundations established in this study, the following key theoretical results can be identified:

1. Usability is widely defined as the extent to which a system can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a particular context of use. This comprehensive definition reflects a shift from purely technical performance to user-centered design principles.
2. Mobile app usability, as adapted from the ISO definition, focuses specifically on how easily mobile banking apps can be navigated and operated by users to achieve financial tasks effectively. It is considered a foundational factor for the success and adoption of mobile financial technologies.
3. Learnability, often discussed interchangeably with perceived ease of use, refers to the simplicity and intuitiveness of an application's interface. It determines how easily users—especially first-time users—can understand and begin using the app without external assistance.
4. Efficiency and convenience in usability research are defined as completing tasks with minimal time, cognitive load, and physical effort. Alhejji (2022) and ISO 9241-11 highlight this through components such as loading speed, task accuracy, and device compatibility, which are essential for a smooth mobile banking experience.
5. Aesthetics, as discussed by Moshagen & Thielsch (2010) and Perrig (2023), play a vital role in user experience by triggering immediate emotional responses. Visual design elements—like layout symmetry, color schemes, and icon clarity—not only enhance usability but also satisfy deep psychological needs for pleasure and well-being.
6. Usability is integral to user satisfaction and behavioral intention, as noted by researchers such as Alotaibi (2016) and O'Brien (2008). Poor usability is a primary reason for mobile application rejection, making it essential for customer retention and long-term engagement.
7. Mobile banking usability faces context-specific challenges, including small screen sizes, limited processing power, and varying device resolutions. These constraints, identified by Zhu (2022) and Alhejji (2022), significantly affect usability and must be addressed during app development and testing.
8. Functional issues, such as login failures and system crashes, along with disruptive updates and poor customer support, reduce user trust and satisfaction. These were highlighted through large-scale user review analyses by Mohan et al. (2015) and Alhejji (2022).

9. Customer engagement is conceptualized as a multidimensional construct involving cognitive, affective, and behavioral dimensions. It extends beyond purchases to include mental involvement, emotional connections, and active brand interaction.
10. Cognitive engagement is defined as users' focused attention and interest while using a mobile app (Tarute, 2017), affective engagement refers to emotional responses like trust and satisfaction (Kulta, 2016), and conative engagement reflects the user's behavioral intent and effort toward continued usage.

Second: Practical Results Discussion

The present study aimed to assess how the usability of mobile banking applications influences customer engagement among Algerian users. The findings offer valuable insights that are largely aligned with prior empirical and theoretical studies:

1. Usability and Cognitive Engagement

- The results indicate a statistically significant moderate relationship between overall usability and cognitive engagement ($R = 0.326$, $R^2 = 10.6\%$), suggesting that well-designed and user-friendly mobile banking apps enhance users' mental focus and attentiveness. This aligns closely with findings from Ferreira (2024), who emphasized that user-centered design contributes to trust and engagement, particularly by simplifying navigation and improving the interface. Additionally, McLean (2018) confirmed that perceived ease of use and usefulness significantly enhance engagement, particularly in terms of attentiveness and cognitive processing.
- Among usability dimensions, aesthetics had the strongest impact on cognitive engagement ($R = 0.372$, $R^2 = 13.8\%$), confirming the results of Bitrián et al. (2021), who found that immersive and aesthetically pleasing interfaces improve users' psychological involvement and continued usage intention. Similarly, Tarute et al. (2017) highlighted that high-quality app design significantly contributes to user attention and focus.
- Interestingly, learnability was not found to have a statistically significant impact on cognitive engagement, diverging from Mohan et al. (2015) who emphasized that ease of learning enhances user comprehension and adoption. This discrepancy may reflect

contextual differences or the maturity level of Algerian users in adapting to digital banking services.

2. Usability and Affective Engagement

- The relationship between usability and affective engagement was also significant ($R = 0.358$, $R^2 = 12.8\%$), indicating that usability features elicit emotional responses such as satisfaction and enjoyment. This corroborates with Sharma & Bhargav (2023), who reported that mobile apps improve emotional engagement through personalization, convenience, and interface design. Likewise, Sulistiyani et al. (2024) found that ease of use and app speed are key drivers of emotional satisfaction.
- Within the usability dimensions, aesthetics again had the most substantial effect ($R = 0.374$, $R^2 = 14\%$), aligning with Bitrián et al. (2021) who emphasized the emotional influence of visually immersive designs. Learnability and convenience, although with smaller effect sizes, were also statistically significant, confirming the role of ease and efficiency in generating positive emotional experiences as shown in Ferreira (2024) and Shahid et al. (2022).

3. Usability and Conative Engagement

- The most robust relationship emerged between usability and conative engagement ($R = 0.453$, $R^2 = 20.5\%$), reflecting that usability significantly influences user behavior and intentions, such as repeat usage and recommending the app to others. This supports Ferreira (2024), who reported that usability boosts loyalty by fostering trust and behavioral commitment. Similarly, McLean (2018) demonstrated that engagement, influenced by usability, leads to stronger brand loyalty and favorable behavioral outcomes.
- Aesthetics again stood out as the strongest predictor of conative engagement ($R = 0.455$, $R^2 = 20.7\%$), reinforcing the findings of Mathur et al. (2018) and Bitrián et al. (2021) who stressed that visual clarity and simplicity encourage continued use among both younger and older users. Furthermore, the significant effects of learnability and convenience on behavioral engagement echo the conclusions of Mohan et al. (2015) and Shahid et al. (2022), both of whom emphasized the impact of intuitive design and system reliability on adoption and sustained interaction.

4. Demographic Differences

The demographic analysis showed that only education level significantly influenced customer engagement, whereas age, gender, income, and occupation did not show statistically significant differences. This partially supports the findings of Shareef et al. (2018), who highlighted that mobile banking adoption can vary based on demographic characteristics, although not all dimensions exert a consistent influence. Furthermore, Mathur et al. (2018) emphasized age-specific challenges in usability, particularly for elderly users, but this was not reflected in the Algerian context. The effect of education may stem from higher digital literacy levels, enabling more effective use of mobile banking features.

Third: Recommendations

Based on the set of findings obtained in this research, both theoretical and practical, the following recommendations can be made to assist banks, app developers, and institutions aiming to improve the usability and user engagement of mobile banking applications:

1. Mobile banking applications should prioritize aesthetic design, as it significantly influences users' cognitive, emotional, and behavioral engagement. Visually appealing layouts, color harmony, and intuitive design elements help foster a strong first impression and enhance user satisfaction.
2. Simplifying the interface and enhancing learnability is essential, especially for new users. This can be achieved by including familiar icons, minimal steps, and intuitive navigation flows that reduce the learning curve and improve emotional satisfaction.
3. Improving efficiency and convenience should be a core design goal. Features like quick login, smart search, saved preferences, and task shortcuts minimize effort and enhance overall usability, contributing to higher behavioral engagement.
4. Ensuring technical reliability and robust error handling is critical. Developers should thoroughly test the app across devices and network conditions, and implement clear, immediate feedback when users encounter issues such as login failures or transaction errors.

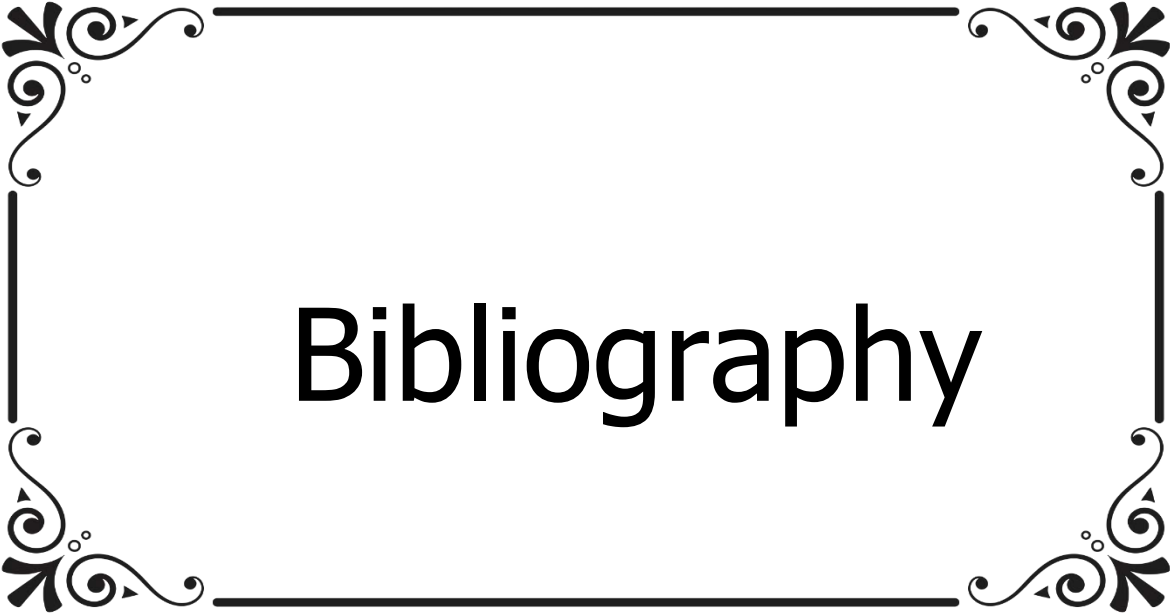
5. Integrate live chat for real-time support to address the lack of direct communication channels in most apps, reducing user frustration and resolving issues quickly to boost engagement and satisfaction.
6. Adapting content and user experience based on education level is advisable, as it was the only demographic factor found to significantly affect engagement. This may involve offering tutorials, help sections, or varying interface complexity to suit users with different educational backgrounds.
7. Building emotional trust and satisfaction through secure, responsive, and user-focused design will help strengthen users' emotional connection with the app, encouraging loyalty and continued use.
8. Banks managers should regularly monitor reviews and comments on the Play Store and App Store, and respond promptly to both positive and negative feedback. This demonstrates their commitment to customer satisfaction and helps enhance the overall perception and credibility of the bank and its mobile application.
9. Usability should be regularly assessed using structured evaluation models such as the Mobile App Usability Index (MAUI), which focuses on key areas like task duration, interface clarity, and error frequency based on user feedback.
10. Training customer service staff to assist users in navigating and understanding the app can help improve user experience, particularly for those with lower digital literacy or unfamiliarity with mobile banking technologies.
11. Applying user-centered design practices based on established standards (e.g., ISO 9241-11, Nielsen's usability principles) will ensure that apps are tailored to meet real user needs, expectations, and behaviors.

Fourth: Future research

Based on the scope and limitations of the current study, several potential research avenues are suggested for future scholars interested in expanding the understanding of mobile banking usability and customer engagement:

1. The impact of e-banking service quality on customer satisfaction.
2. The Mediating Role of Trust and Digital Literacy in the Relationship Between Mobile App Usability and Customer Engagement.

3. Tracking Customer Engagement Over Time: A Longitudinal Study on the Evolution of Mobile Banking App Use.
4. Enhancing Customer Engagement through Interface Innovation: The Role of AI and Voice Navigation in Mobile Banking Apps.
5. The impact of cybersecurity concerns on consumer trust in mobile banking apps.
6. The Influence of Aesthetic Interface Design on Emotional and Behavioral Engagement in Mobile Banking Applications.



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Appendix

List of Appendix:

Appendix No. (01): Study Questionnaire

في إطار البحث والدراسة التي نقوم بها حالياً، وفي إطار استيفاء متطلبات الحصول على شهادة الماستر في العلوم التجارية تخصص التسويق الرقمي، حول موضوع "تقييم أثر قابلية استخدام تطبيقات البنوك على الهاتف المحمول على تفاعل العملاء في الخدمات البنكية الإلكترونية: دراسة ميدانية على مستخدمي التطبيقات البنكية الإلكترونية في الجزائر"

وفي هذا الصدد يرجى من سيادتكم المحترمة التكرم بالإجابة على فقرات هذا الاستبيان في الخانة التي تتفق مع رأيكم.

علماً أن مساهمتكم مهمة للغاية من أجل استكمال هذه الدراسة، نحن نأمل منكم الإجابة بكل موضوعية ودقة وهذا بهدف المساهمة في إثراء البحث العلمي، كما أن كل المعلومات المقدمة من طرفكم ستبقى سرية وأن نتائج الدراسة ستستخدم لأغراض علمية بحتة.

يرجى قراءة التعليمات والإجابة بعناية وبكل صدق، إذ لا توجد إجابات صحيحة أو خاطئة. هدفنا الوحيد معرفة رأيكم الصريح.

As part of the research and study we are currently undertaking, and in fulfillment of the requirements for obtaining the Master's degree in Digital Marketing, on the topic of **"Assessing the impact of banking mobile app usability on customer engagement in e-banking: An empirical study of Algerian e-banking app users"**

In this regard, we kindly request your esteemed cooperation in answering the items of this questionnaire in the space that best reflects your opinion.

Please note that your contribution is significant for the completion of this study. We kindly ask you to respond with full objectivity and accuracy to help enrich scientific research. All information you provide will remain confidential, and the study results will be used strictly for scientific purposes. Please read the instructions carefully and answer

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honestly, as there are no right or wrong answers. Our sole objective is to understand your opinion.

Part 1: Screening questions المحور الأول اسئلة الفحص

		Items	Answers
English	1	Are you of Algerian nationality? (If no, thank you for your time. This survey is intended for Algerian citizens.)	☐ Yes ☐ No
	2	Where do you currently live?	☐ Inside Algeria ☐ Outside Algeria
	3	Do you currently use a mobile banking app? (If no, thank you for your time. This survey is intended for users of mobile banking apps.)	☐ Yes ☐ No
	4	If yes, which bank's mobile app do you primarily use? (You can choose multiple choices.)	☐ Bnatic (BNA) ☐ Baridi Mob ☐ Banxy ☐ MobileCPA ☐ Cnep Connect ☐ MyDigiBank ☐ L'appli SG ☐ MyBadr ☐ BeaMobile ☐ AlbarakaDZ

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			☐ AGB Online ☐ Trust Connect ☐ Wise ☐ Paysera ☐ RedotPay ☐ MyFin ☐ Binance ☐ Revolut ☐ Others (Please specify)
العربية	1	هل أنت من الجنسية الجزائرية؟ (إذا كانت الإجابة لا، شكرًا لوقتك. هذا الاستبيان مخصص للمواطنين الجزائريين).	☐ نعم ☐ لا
	2	أين تقيم حالياً؟	☐ داخل الجزائر ☐ خارج الجزائر
	3	هل تستخدم حالياً تطبيق البنك للهاتف المحمول؟ (إذا كانت الإجابة لا، نشكر على وقتك. هذا الاستبيان مخصص لمستخدمي تطبيقات الخدمات للهاتف المحمول).	☐ نعم ☐ لا
	4	إذا كانت الإجابة نعم، ما هو تطبيق البنك للهاتف المحمول الذي تستخدمه بشكل أساسي؟ (يمكنك اختيار أكثر من إجابة)	☐ Bnatic (BNA) ☐ Baridi Mob ☐ Banxy ☐ MobileCPA ☐ Cnep Connect ☐ MyDigiBank ☐ L'appli SG ☐ MyBadr ☐ BeaMobile

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			AlbarakaDZ 0
			AGB Online 0
			Trust Connect 0
			Wise 0
			Paysera 0
			RedotPay 0
			MyFin 0
			Binance 0
			Revolut 0
			اخرى (يرجى التحديد) 0

Part 2: Usability Dimensions أبعاد قابلية الاستخدام

Please indicate the extent to which you agree or disagree with the following statements.

("1" Strongly Disagree, "2" Disagree, "3" Somewhat Disagree, "4" Somewhat Agree, "5" Agree, "6" Strongly Agree).

يرجى الإشارة إلى مدى موافقتك أو عدم موافقتك على العبارات التالية.

("1" غير موافق على الإطلاق، "2" غير موافق، "3" غير موافق إلى حد ما، "4" موافق إلى حد ما، "5" موافق جداً، "6" موافق للغاية).

Perceived Ease of Use / Learnability سهولة الاستخدام المدركة / سهولة التعلم	موافق للاغاية Strongly Agree						غير موافق على الإطلاق Strongly disagree
Learning to use the mobile banking app is easy for me	6	5	4	3	2	1	

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ان تعلم استخدام تطبيق الخدمات البنكية سهل بالنسبة لي						
Using the mobile banking app is clear and understandable استخدام تطبيق البنك على الهاتف المحمول واضح وسهل الفهم	6	5	4	3	2	1
It is easy to find the information I need using mobile banking app من السهل عليا ايجاد المعلومات التي احتاجها عند استعمال تطبيق البنك على الهاتف المحمول	6	5	4	3	2	1
Overall, the mobile banking app is easy to use بشكل عام، تطبيق الخدمات البنكية عبر الهاتف المحمول سهل الاستخدام	6	5	4	3	2	1

Convenience / Efficiency الملاءمة / الكفاءة	موافق للمغاية Strongly Agree غير موافق على الإطلاق Strongly disagree					
While using the mobile banking app I find what I am looking for in the least amount of time عند استعمال تطبيق الخدمات البنكية على الهاتف المحمول، اجد ما ابحت عنه في اقل وقت ممكن	6	5	4	3	2	1
The solutions provided by mobile banking app is fast and reliable الحلول المقدمة من طرف الخدمات البنكية على الهاتف المحمول سريعة و موثوقة	6	5	4	3	2	1
The banking service is provided with little effort الخدمة البنكية تُقدّم بسهولة وبدون جهد كبير	6	5	4	3	2	1
Using the mobile banking app makes my life easier يجعل استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول حياتي أسهل	6	5	4	3	2	1

Appendix

Design / Aesthetics التصميم / الجماليات	غير موافق على الإطلاق						موافق للمغاية					
	Strongly disagree			Strongly Agree								
The visual appeal of a mobile banking app is important for me. الاجاذبية البصرية لتطبيق الخدمات البنكية عبر الهاتف مهمة بالنسبة لي المحمول	6	5	4	3	2	1						
I can easily browse/navigate because the mobile banking app has a convenience interface. يمكنني التصفح/التنقل بسهولة لأن تطبيق الخدمات البنكية يحتوي على واجهة مريحة عبر الهاتف المحمول	6	5	4	3	2	1						
Mobile banking apps are aesthetically appealing to me تطبيقات الخدمات البنكية عبر الهاتف المحمول جذابة بصرياً بالنسبة لي	6	5	4	3	2	1						
The design of mobile banking apps is visually pleasing to me تصميم تطبيقات الخدمات البنكية عبر الهاتف المحمول جذاب بالنسبة لي	6	5	4	3	2	1						

Part 3: Costumer engagement dimensions أبعاد تفاعل الزبون

Please indicate the extent to which you agree or disagree with the following statements.

("1" Strongly Disagree, "2" Disagree, "3" Somewhat Disagree, "4" Somewhat Agree, "5" Agree, "6" Strongly Agree).

يرجى الإشارة إلى مدى موافقتك أو عدم موافقتك على العبارات التالية.

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("1" غير موافق على الإطلاق، "2" غير موافق، "3" غير موافق إلى حد ما، "4" موافق إلى حد ما، "5" موافق جداً، "6" موافق للغاية).

Cognitive Engagement الارتباط المعرفي	موافق للاغاية Strongly Agree						غير موافق على الإطلاق Strongly Disagree
I am fully absorbed when using the mobile banking app أكون منغمساً تماماً عند استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	6	5	4	3	2	1	
Using the mobile banking app fully captures my attention. يستحوذ تطبيق الخدمات البنكية عبر الهاتف المحمول على انتباهي بالكامل عند استخدامه.	6	5	4	3	2	1	
Using the mobile banking app gets me thinking about the brand. استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول يجعلني أفكر تلقائياً في العلامة التجارية للبنك	6	5	4	3	2	1	
Using the mobile banking app stimulates my interest to learn more about the app. استخدام تطبيق الخدمات البنكية للهاتف المحمول يحفز اهتمامي للتعرف أكثر على التطبيق.	6	5	4	3	2	1	

Affective Engagement الارتباط العاطفي	موافق للاغاية Strongly Agree						غير موافق على الإطلاق Strongly Disagree

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I find using the mobile banking app to be enjoyable أجد أن استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول ممتعاً	6	5	4	3	2	1
I feel very positive when I use the mobile banking app أشعر بإيجابية كبيرة عند استخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	6	5	4	3	2	1
I'm proud to use the mobile banking app أنا فخور باستخدام تطبيق الخدمات البنكية عبر الهاتف المحمول	6	5	4	3	2	1

Behavioural or Conative Engagement الارتباط السلوكي	موافق للغاية Strongly Agree					غير موافق على الإطلاق Strongly Disagree
I spend a lot of time using the mobile banking app compared to other mobile financial services applications. أقضي وقتاً طويلاً في استخدام تطبيق الخدمات البنكية مقارنة بتطبيقات الخدمات المالية الأخرى عبر الهاتف المحمول.	6	5	4	3	2	1
The mobile banking app is one of the services I usually use when I use mobile applications for financial and insurance services تطبيق الخدمات البنكية هو أحد الخدمات التي أستخدمها عادةً عندما أستخدم تطبيقات الهاتف المحمول للخدمات المالية والتأمينية.	6	5	4	3	2	1
Whenever I'm using mobile financial applications, I usually use my mobile banking app. عندما أستخدم التطبيقات المالية على هاتفي، غالباً ما أستخدم تطبيق البنك للهاتف المحمول.	6	5	4	3	2	1

Appendix

Part 4: Personal questions الأسئلة الشخصية

		Items	Answers
English	1	What is your gender?	☐ Male ☐ Female
	2	What is your age?	☐ Under 25 years ☐ Between 25 and 35 years ☐ Between 36 and 45 years ☐ Between 46 and 55 years ☐ Between 56 and 65 years ☐ Over 65 years
	3	What is your educational level?	☐ Primary education ☐ Middle school ☐ High school ☐ University ☐ Postgraduate (Master's/PhD)
	4	What is your occupation?	☐ Employee ☐ Student ☐ Freelancer ☐ Retired ☐ Businessman/Businesswoman ☐ Unemployed ☐ Other (please specify):

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	5	What is your monthly income?	☐ Less than 20,000 DZD ☐ Between 20,000 DZD and less than 40,000 DZD ☐ Between 40,000 DZD and less than 60,000 DZD ☐ Between 60,000 DZD and less than 80,000 DZD ☐ Between 80,000 DZD and less than 100,000 DZD ☐ 100,000 DZD or more
Arabic عربية	1	ما هو جنسك؟	☐ ذكر ☐ انثى
	2	ما هو سنك؟	☐ اقل من 25 سنة ☐ بين 25 و 35 سنة ☐ بين 36 و 45 سنة ☐ بين 46 و 55 سنة ☐ بين 56 و 65 سنة ☐ اكثر من 65 سنة
	3	ما هو مستواك التعليمي؟	☐ ابتدائي ☐ متوسط ☐ ثانوي ☐ جامعي ☐ ما بعد التدرج (ماستر/ دكتوراه)
	4	ما هي مهنتك؟	☐ موظف ☐ مهن حرة ☐ رجل/امراة أعمال ☐ طالب ☐ متقاعد ☐ بطال ☐ أخرى:
	5	ما هو دخلك الشهري؟	☐ اقل من 20000 دج ☐ بين 20000 دج وأقل من 40000 دج ☐ بين 40000 وأقل من 60000 دج ☐ بين 60000 وأقل من 80000 دج ☐ بين 80000 وأقل من 100000 دج ☐ 100000 دج وأكثر

Appendix

Appendix

Appendix No. (02): List of professors who reviewed the questionnaire

Professor's Last Name and First Name	University
Zarouati Maouahib	Setif university 1-Farhat Abbas
Haichour Sarah	Setif university 1-Farhat Abbas
Djahnit Amira	Setif university 1-Farhat Abbas
Djafari Asma	Setif university 1-Farhat Abbas

Appendix

Appendix No. (03): Statistical analysis outputs using SPSS version 29

Correlations

		Learnability
Learnability1	Pearson Correlation	.745**
	Sig. (2-tailed)	.000
	N	145
Learnability2	Pearson Correlation	.882**
	Sig. (2-tailed)	.000
	N	145
Learnability3	Pearson Correlation	.911**
	Sig. (2-tailed)	.000
	N	145
Learnability4	Pearson Correlation	.853**
	Sig. (2-tailed)	.000
	N	145
Learnability	Pearson Correlation	1
	Sig. (2-tailed)	
	N	145

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Convenience
Convenience1	Pearson Correlation	.745**
	Sig. (2-tailed)	.000
	N	145
Convenience2	Pearson Correlation	.722**
	Sig. (2-tailed)	.000
	N	145
Convenience3	Pearson Correlation	.751**
	Sig. (2-tailed)	.000
	N	145
Convenience4	Pearson Correlation	.668**
	Sig. (2-tailed)	.000

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	N	145
Convenience	Pearson Correlation	1
	Sig. (2-tailed)	
	N	145

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Aesthetic
		s
Aesthetics1	Pearson Correlation	.515**
	Sig. (2-tailed)	.000
	N	145
Aesthetics2	Pearson Correlation	.787**
	Sig. (2-tailed)	.000
	N	145
Aesthetics3	Pearson Correlation	.872**
	Sig. (2-tailed)	.000
	N	145
Aesthetics4	Pearson Correlation	.787**
	Sig. (2-tailed)	.000
	N	145
Aesthetics	Pearson Correlation	1
	Sig. (2-tailed)	
	N	155

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Cognitive
Cognitive1	Pearson Correlation	.785**
	Sig. (2-tailed)	.000
	N	145
Cognitive2	Pearson Correlation	.791**

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	Sig. (2-tailed)	.000
	N	145
Cognitive3	Pearson Correlation	.596**
	Sig. (2-tailed)	.000
	N	145
Cognitive4	Pearson Correlation	.613**
	Sig. (2-tailed)	.000
	N	145
Cognitive	Pearson Correlation	1
	Sig. (2-tailed)	
	N	145

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Affective
Affective1	Pearson Correlation	.823**
	Sig. (2-tailed)	.000
	N	145
Affective2	Pearson Correlation	.804**
	Sig. (2-tailed)	.000
	N	145
Affective3	Pearson Correlation	.789**
	Sig. (2-tailed)	.000
	N	145
Affective	Pearson Correlation	1
	Sig. (2-tailed)	
	N	145

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix

Correlations

		Conative
Conative1	Pearson Correlation	.697**
	Sig. (2-tailed)	.000
	N	145
Conative2	Pearson Correlation	.843**
	Sig. (2-tailed)	.000
	N	145
Conative3	Pearson Correlation	.784**
	Sig. (2-tailed)	.000
	N	145
Conative	Pearson Correlation	1
	Sig. (2-tailed)	
	N	145

** . Correlation is significant at the 0.01 level (2-tailed).

Reliability Statistics		
Cronbach's Alpha	N	of Items
.870	4	

Reliability Statistics		
Cronbach's Alpha	N	of Items
.690	4	

Reliability Statistics		
Cronbach's Alpha	N	of Items
.737	4	

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Reliability Statistics		
Cronbach's Alpha	N of Items	
.723	3	

Reliability Statistics		
Cronbach's Alpha	N of Items	
.643	3	

Reliability Statistics		
Cronbach's Alpha	N of Items	
.864	22	

gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	88	60.7	60.7	60.0
	femal e	57	39.3	39.3	100.0
	Total	145	100.0	100.0	

age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25	65	44.8	44.8	44.8
	Between 25 and 35 years	46	31.7	31.7	76.6
	Between 36 and 45 years	23	15.9	15.9	92.4

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	Between 46 and 55 years	8	5.5	5.5	97.9
	Between 56 and 65 years	3	2.1	2.1	100
	Over 65 years	0	0	0	
	Total	145	100.0	100.0	

Nationality					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Algeran	145	100.0	100.0	100.0

Country of residence					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inside Algeria	119	82.0	82.0	82.0
	Outside Algeria	26	18.0	18.0	100.0

Appendix

Education_level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary education	2	1.4	1.4	1.4
	High school	10	6.9	6.9	8.3
	University	47	32.4	32.4	40.7
	Postgraduate (Master/PhD)	86	59.3	59.3	100.0
	Total	145	100.0	100.0	

Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20,000 DZD	8	5.5	5.5	5.1
	Between 20,000 DZD and less than 40,000 DZD	10	6.9	6.9	12.4
	Between 40,000 DZD and less than 60,000 DZD	31	21.4	21.4	33.8
	Between 60,000 DZD and less than 80,000 DZD	17	11.7	11.7	45.5
	Between 80,000 DZD and less than 100,000 DZD	31	21.4	21.4	66.9
	100,000 DZD or more	48	33.1	33.1	100.0
	Total	145	100.0	100.0	

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	employee	91	62.8	62.8	62.8
	Student	7	4.8	4.8	67.6

Appendix

	Freelancer	30	20.7	20.7	88.3
	Retired		0	0	
	Businessman/Bussinesswoman	14	9.7	9.7	97.9
	Unemployed	3	2.1	2.1	100.0
	Total	145	100.0	100.0	

Bank Frequencies				
		Responses		Percent of Cases
		N	Percent	
Bank	Baridi_Mob	70	21.9%	48.3%
	Lappli_SG	6	1.9%	4.1%
	Wise	34	10.6%	23.4%
	Paysera	28	8.8%	19.3%
	MyFin	17	5.3%	11.7%
	Binance	43	13.4%	29.7%
	Banxy	10	3.1%	6.9%
	CNEP_Connect	11	3.4%	7.6%
	BEA_Mobile	3	0.9%	2.1%
	MyBadr	5	1.6%	3.4%
	RedotPay	28	8.8%	19.3%
	Mobile_CPA	8	2.5%	5.5%
	MXC	1	0.3%	0.7%
	Revolut_Bank	13	4.1%	9.0%
	Chase_bank_app	1	0.3%	0.7%
	Paypal	1	0.3%	0.7%
	LCL	1	0.3%	0.7%
	Boursobank	1	0.3%	0.7%
	Bnatic	18	5.6%	12.4%
	Al_Baraka_DZ	2	0.6%	1.4%
	Trust_Connect	3	0.9%	2.1%
	MyDigibank	5	1.6%	3.4%
	AGB_Online	2	0.6%	1.4%
	BDL_Bank	3	0.9%	2.1%
	Boursorama_Banque	3	0.9%	2.1%
	La_Banque_Postale	3	0.9%	2.1%
Total		320	100.0 %	220.7%
a. Dichotomy group tabulated at value 1.				

Statistics

	N	Mean	Std. Deviation
Learnability1	145	5.4207	.68383
Learnability2	145	5.4207	.75156
Learnability3	145	5.2552	.83980
Learnability4	145	5.2897	.84094
Learnability	145	5.3466	.66287
Valid N (listwise)	145		

Appendix

Statistics

	N	Mean	Std. Deviation
Convenience1	145	5.0000	.91287
Convenience2	145	5.1517	.81079
Convenience3	145	5.1034	.87974
Convenience4	145	5.5310	.64609
Convenience	145	5.1966	.58939
Valid N (listwise)	145		

Statistics

	N	Mean	Std. Deviation
Aesthetic1	145	4.8621	.93259
Aesthetic2	145	4.7310	1.11962
Aesthetic3	145	4.6207	1.11224
Aesthetic4	145	4.6414	1.07804
Aesthetic	145	4.7138	.79494
Valid N (listwise)	145		

Statistics

Cognitive1	145	4.2759	1.38184
Cognitive2	145	4.3793	1.28057
Cognitive3	145	4.1655	1.26937
Cognitive4	145	4.4828	1.11868
Cognitive	145	4.3259	.88502
Valid N (listwise)	145		

Statistics

	N	Mean	Std. Deviation
Affective1	145	4.1172	1.31500
Affective2	145	4.6345	1.09172
Affective3	145	4.5172	1.32866
Affective	145	4.4230	1.00251
Valid N (listwise)	145		

Statistics

	N	Mean	Std. Deviation
Behavioral1	145	3.6207	1.48637

Appendix

Behavioral2	145	4.3586	1.20575
Behavioral3	145	4.5379	1.13664
Behavioral	145	4.1724	.98139
Valid N (listwise)	145		

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
mobile app usability	145	-.440	.201	.607	.400
costumer engagement	145	-.152	.201	.281	.400
Valid N (listwise)	145				

Coefficients^a

Model		Collinearity Statistics	
		Tolerance	VIF
1	learnability	.619	1.615
	convenience	.577	1.732
	design/aesthetics	.754	1.326

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	171.75	1	171.75	44.9	.001 ^b
	Residual	546.92	143	3.82		
	Total	718.67	144			

a. Dependent Variable: cognitive

b. Predictors: (Constant), learnability,convenience,aesthetics

Appendix

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation s
		B	Std. Error	Beta			Zero-order
1	(Constant)	3.913	1.533		2.552	.012	
	LEARN	.064	.305	.019	.211	.833	.285
	CONV	.548	.355	.145	1.542	.125	.363
	aest	1.234	.231	.439	5.351	<.001	.515

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533 ^a	.284	.269	1.91034

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.129 ^a	.017	.010	.88072
a. Predictors: (Constant), LEARN				
b. Dependent Variable: CONG				

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.869	1	1.869	2.410	.123 ^b
	Residual	110.921	143	.776		
	Total	112.791	144			

a. Dependent Variable: CONG

b. Predictors: (Constant), LEARN

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.407	.596		5.712	<.001
	LEARN	.172	.111	.129	1.552	.123

a. Dependent Variable: CONG

Appendix

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.273 ^a	.075	.068	.85431
a. Predictors: (Constant), CONV				
b. Dependent Variable: CONG				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.422	1	8.422	11.539	<.001 ^b
	Residual	104.369	143	.730		
	Total	112.791	144			
a. Dependent Variable: CONG						
b. Predictors: (Constant), CONV						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.194	.632		3.473	<.001
	CONV	.410	.121	.273	3.397	<.001
a. Dependent Variable: CONG						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.372 ^a	.138	.132	.82451
a. Predictors: (Constant), aest				
b. Dependent Variable: CONG				

Appendix

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.576	1	15.576	22.912	<.001 ^b
	Residual	97.214	143	.680		
	Total	112.791	144			
a. Dependent Variable: CONG						
b. Predictors: (Constant), aest						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.376	.413		5.750	<.001
	aest	.414	.086	.372	4.787	<.001
a. Dependent Variable: CONG						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.262 ^a	.069	.062	.97085
a. Predictors: (Constant), LEARN				
b. Dependent Variable: AFF				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.940	1	9.940	10.546	.001 ^b
	Residual	134.784	143	.943		
	Total	144.723	144			
a. Dependent Variable: AFF						
b. Predictors: (Constant), LEARN						

Appendix

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.304	.658		3.504	<.001
	LEARN	.396	.122	.262	3.247	.001
a. Dependent Variable: AFF						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.209 ^a	.044	.037	.98380
a. Predictors: (Constant), CONV				
b. Dependent Variable: AFF				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.318	1	6.318	6.528	.012 ^b
	Residual	138.405	143	.968		
	Total	144.723	144			
a. Dependent Variable: AFF						
b. Predictors: (Constant), CONV						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.576	.727		3.541	<.001
	CONV	.355	.139	.209	2.555	.012
a. Dependent Variable: AFF						

Appendix

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.374 ^a	.140	.134	.93282
a. Predictors: (Constant), aest				
b. Dependent Variable: AFF				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.292	1	20.292	23.320	<.001 ^b
	Residual	124.432	143	.870		
	Total	144.723	144			
a. Dependent Variable: AFF						
b. Predictors: (Constant), aest						

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.197	.467		4.700	<.001
	aest	.472	.098	.374	4.829	<.001
a. Dependent Variable: AFF						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.264 ^a	.070	.063	.94981
a. Predictors: (Constant), LEARN				

Appendix

b. Dependent Variable: conat

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.683	1	9.683	10.734	.001 ^b
	Residual	129.006	143	.902		
	Total	138.690	144			
a. Dependent Variable: conat						
b. Predictors: (Constant), LEARN						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.081	.643		3.235	.002
	LEARN	.391	.119	.264	3.276	.001
a. Dependent Variable: conat						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.366 ^a	.134	.128	.91640
a. Predictors: (Constant), CONV				
b. Dependent Variable: conat				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.600	1	18.600	22.148	<.001 ^b
	Residual	120.090	143	.840		
	Total	138.690	144			

Appendix

a. Dependent Variable: conat
b. Predictors: (Constant), CONV

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.004	.678		1.481	.141
	CONV	.610	.130	.366	4.706	<.001
a. Dependent Variable: conat						

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.455 ^a	.207	.201	.87716
a. Predictors: (Constant), aest				
b. Dependent Variable: conat				

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.664	1	28.664	37.254	<.001 ^b
	Residual	110.026	143	.769		
	Total	138.690	144			
a. Dependent Variable: conat						
b. Predictors: (Constant), aest						

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

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1	(Constant)	1.527	.440		3.474	<.001
	aest	.561	.092	.455	6.104	<.001
a. Dependent Variable: conat						

Gender

Group Statistics						
	What is your gender?	N	Mean	Std. Deviation	Std. Error	
x2	MALE	88	12.9678	2.47434	.26377	
	FEMALE	57	12.8494	1.82026	.24110	

Independent Samples Test					
		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
x2	Equal variances assumed	5.126	.025	.311	143
	Equal variances not assumed			.331	140.614

Independent Samples Test					
		t-test for Equality of Means			
		Significance		Mean Difference	Std. Error Difference
		One-Sided p	Two-Sided p		
x2	Equal variances assumed	.378	.756	.11839	.38103
	Equal variances not assumed	.370	.741	.11839	.35735

Independent Samples Test			
		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
x2	Equal variances assumed	-.63479	.87156
	Equal variances not assumed	-.58809	.82487

Appendix

Income level

Tests of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
x2	Based on Mean	.744	5	139	.592
	Based on Median	.596	5	139	.703
	Based on Median and with adjusted df	.596	5	119.711	.703
	Based on trimmed mean	.729	5	139	.603

ANOVA					
x2					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.520	5	4.304	.858	.511
Within Groups	697.158	139	5.016		
Total	718.677	144			

Occupation

Tests of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
x 2	Based on Mean	.872	4	140	.482
	Based on Median	.663	4	140	.619
	Based on Median and with adjusted df	.663	4	135.648	.619
	Based on trimmed mean	.868	4	140	.485

Appendix

ANOVA					
x2					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.572	4	8.643	1.769	.138
Within Groups	684.105	140	4.886		
Total	718.677	144			

Age

Tests of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
x 2	Based on Mean	.629	4	140	.643
	Based on Median	.789	4	140	.534
	Based on Median and with adjusted df	.789	4	137.570	.534
	Based on trimmed mean	.743	4	140	.564

ANOVA					
x2					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	38.838	4	9.710	1.999	.098
Within Groups	679.839	140	4.856		
Total	718.677	144			

Education Level

Appendix

Tests of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
x2	Based on Mean	1.438	3	141	.234
	Based on Median	1.335	3	141	.265
	Based on Median and with adjusted df	1.335	3	136.245	.266
	Based on trimmed mean	1.451	3	141	.231

ANOVA					
x2					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	68.174	3	22.725	4.926	.003
Within Groups	650.504	141	4.614		
Total	718.677	144			

H1

Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.F Change
1	.326 ^a	.106	.100	.83953	.106	17.029	1	143	<.001
a. Predictors: (Constant), x1									
b. Dependent Variable: CONG									

Appendix

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.002	1	12.002	17.029	<.001 ^b
	Residual	100.788	143	.705		
	Total	112.791	144			
a. Dependent Variable: CONG						
b. Predictors: (Constant), x1						

Coefficients ^a									
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	1.674	.646		2.589	.011			
	x1	.174	.042	.326	4.127	<.001	.326	.326	.326
a. Dependent Variable: CONG									

H2

Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.358 ^a	.128	.122	.93935	.128	21.015	1	143	<.001
a. Predictors: (Constant), x1									
b. Dependent Variable: AFF									

Appendix

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.543	1	18.543	21.015	<.001 ^b
	Residual	126.180	143	.882		
	Total	144.723	144			
a. Dependent Variable: AFF						
b. Predictors: (Constant), x1						

Coefficients ^a									
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	1.127	.723		1.558	.122			
	x1	.216	.047	.358	4.584	<.001	.358	.358	.358
a. Dependent Variable: AFF									

H3

Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change

Appendix

1	.453 ^a	.205	.200	.87797	.205	36.921	1	143	<.001
a. Predictors: (Constant), x1									
b. Dependent Variable: conat									

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.460	1	28.460	36.921	<.001 ^b
	Residual	110.230	143	.771		
	Total	138.690	144			
a. Dependent Variable: conat						
b. Predictors: (Constant), x1						

Coefficients ^a									
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	.089	.676		.131	.896			
	x1	.268	.044	.453	6.076	<.001	.453	.453	.453
a. Dependent Variable: conat									

cc

Abstract

Abstract:

This study investigates the impact of mobile banking app usability—focusing on the dimensions of learnability, convenience, and aesthetics—on customer engagement among Algerian users. Adopting a quantitative research design, data were collected through an online questionnaire completed by 145 Algerian mobile banking users. The analysis revealed a statistically significant and positive relationship between usability and customer engagement, underscoring the critical role that user-friendly app design plays in enhancing digital interaction, emotional connection, and continued usage. These findings provide actionable insights for banks and app developers seeking to improve mobile banking adoption, strengthen brand loyalty, and optimize the user experience. The study concludes with strategic recommendations for enhancing app functionality and engagement, contributing both theoretically and practically to the fields of digital banking and user experience design.

Keywords:

Mobile Banking Apps – Usability – Learnability – Convenience – Aesthetics – Customer Engagement.

Abstract

الملخص:

تهدف هذه الدراسة إلى استكشاف تأثير قابلية استخدام تطبيقات الخدمات المصرفية عبر الهاتف المحمول، مع التركيز على أبعاد سهولة الاستعمال، والملاءمة، والتصميم، في تعزيز تفاعل العملاء لدى المستخدمين الجزائريين. وقد تم اعتماد منهجية بحث كمية، من خلال توزيع استبيان إلكتروني على عينة مكونة من 145 مستخدمًا جزائريًا لتطبيقات المصارف عبر الهاتف المحمول. أظهرت نتائج التحليل وجود علاقة إيجابية ذات دلالة إحصائية بين قابلية الاستخدام ومستوى تفاعل العملاء، مما يبرز الأهمية الحاسمة لتصميم التطبيقات سهل الاستخدام في تعزيز التفاعل الرقمي، والارتباط العاطفي، والاستمرارية في الاستخدام. تقدم هذه النتائج رؤى تطبيقية مهمة للبنوك ومطوري التطبيقات الساعين إلى تحسين معدلات التبني الرقمي، وتعزيز الولاء للعلامة التجارية، وتحسين تجربة المستخدم. وتُختتم الدراسة بمجموعة من التوصيات الإستراتيجية لتطوير أداء التطبيقات وزيادة فاعليتها في سياق الخدمات المصرفية الرقمية، مساهمة بذلك في إثراء الجانبين النظري والتطبيقي في هذا المجال.

الكلمات المفتاحية: تطبيقات الخدمات المصرفية عبر الهاتف المحمول – قابلية الاستخدام – سهولة الاستعمال

– الملاءمة – التصميم – تفاعل العملاء.