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DECIPHERING THE FINANCIAL PSYCHODYNAMICS: AN EMPIRICAL STUDY OF CRYPTOCURRENCY INVESTMENT BEHAVIORS IN THE MOROCCAN ECONOMIC CONTEXT[i]

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Abstract:
This study investigates the financial psychology of Moroccan investors in cryptocurrency, focusing on the determinants of perceived investment risk. **Design/methodology/approach**: A quantitative survey was conducted among Moroccan investors, and regression analysis was applied to identify the factors influencing their risk perceptions, including transaction fees, complexity, security, anonymity, fast transactions, volatility, and lack of regulation. **Findings**: The analysis reveals that volatility and lack of regulation significantly heighten perceived risk, whereas fast transactions, reduced complexity, and improved security mitigate it. These results suggest targeted strategies to address volatility and regulatory concerns can decrease perceived risks and attract more investors. **Originality**: This research provides new insights into the interplay of technological, regulatory, and psychological factors influencing investment behavior in a developing country context, specifically Morocco, thereby contributing to the broader literature on financial inclusion and technology adoption. **Research limitations/implications**: The study's limitations include its reliance on self-reported data and the specific focus on Moroccan investors, which may limit the generalizability of the findings. **Practical implications**: By addressing identified risk factors, policymakers and cryptocurrency platforms can develop targeted interventions to reduce perceived risks, thus encouraging broader investment and enhancing financial inclusion. **Social implications**: Improving cryptocurrency literacy and addressing

[i] DÉCHIFFRER LA PSYCHODYNAMIQUE FINANCIÈRE : UNE ÉTUDE EMPIRIQUE DES COMPORTEMENTS D'INVESTISSEMENT EN CRYPTOMONNAIES DANS LE CONTEXTE ÉCONOMIQUE MAROCAIN

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regulatory challenges can promote more inclusive financial participation, fostering economic growth and reducing financial disparities in Morocco.

JEL: D81, D91, E44, G11, G23, G41, O16

Keywords: cryptocurrency investment, financial behavior, Moroccan economy, risk perception, quantitative analysis

Résumé :
Cette étude examine la psychologie financière des investisseurs marocains en cryptomonnaies, en se concentrant sur les déterminants clés de la perception du risque d'investissement. **Conception/méthodologie/approche** : Une enquête quantitative a été menée auprès d'investisseurs marocains, et une analyse de régression a été utilisée pour identifier les facteurs influençant leurs perceptions du risque, notamment les frais de transaction, la complexité, la sécurité, l'anonymat, la rapidité des transactions, la volatilité et les lacunes réglementaires. **Résultats** : La volatilité et l'absence de réglementation augmentent significativement le risque perçu, tandis que la rapidité des transactions, la réduction de la complexité et l'amélioration de la sécurité le réduisent. Ces résultats suggèrent que le traitement des questions de volatilité et des préoccupations réglementaires pourrait atténuer les risques et encourager un investissement plus large. **Originalité/valeur** : Cette recherche apporte de nouvelles perspectives sur l'interaction des facteurs technologiques, réglementaires et psychologiques qui influencent le comportement d'investissement au Maroc, contribuant ainsi à la littérature plus large sur l'inclusion financière et l'adoption des technologies. **Limites de la recherche** : La dépendance aux données auto-déclarées et le focus sur les investisseurs marocains peuvent limiter la généralisation des résultats. **Implications pratiques** : Les décideurs politiques et les plateformes de cryptomonnaies peuvent utiliser ces informations pour développer des interventions ciblées visant à réduire les risques perçus et à promouvoir l'inclusion financière. **Implications sociales** : Améliorer la littératie en cryptomonnaies et relever les défis réglementaires pourrait favoriser une inclusion financière et une croissance économique plus large au Maroc.

Mots-clés : investissement en cryptomonnaies, comportement financier, économie marocaine, perception du risque, analyse quantitative

1. Introduction

The exponential growth of cryptocurrencies has catalyzed profound changes in the global financial ecosystem, underpinned by the revolutionary potential of blockchain technology (Catalini & Gans, 2016; Böhme *et al.*, 2015). As of 2023, the global cryptocurrency market capitalization has surpassed $1 trillion, with over 300 million users worldwide (Chainalysis, 2023). While much of the existing scholarship has

concentrated on the technological and economic dimensions of cryptocurrencies in developed economies (Nakamoto, 2008; Yermack, 2015), the psychological aspects influencing investor behavior, particularly in emerging economies like Morocco, remain insufficiently explored.

Morocco's financial landscape, positioned at the intersection of traditional banking systems and rapidly evolving digital finance, provides a unique backdrop for examining the financial psychology of cryptocurrency investors. Despite a ban on cryptocurrency transactions imposed by the Moroccan central bank in 2017, unofficial estimates suggest that over 2.4% of the country's population owns digital assets (TripleA, 2023). This paradox underscores the need for a nuanced understanding of the factors driving cryptocurrency adoption in this context.

This study aims to identify the factors shaping risk perceptions among Moroccan investors and their subsequent influence on cryptocurrency adoption decisions. Specifically, we address the following research questions:

1) How do financial literacy levels impact risk perception and cryptocurrency investment decisions among Moroccan investors?
2) To what extent do transaction complexity, security concerns, and regulatory issues influence cryptocurrency adoption in Morocco?
3) What role do demographic and socio-economic factors play in shaping attitudes towards cryptocurrency investment in Morocco?

By leveraging behavioral finance theories, particularly Kahneman and Tversky's (1979) Prospect Theory and subsequent works by Barberis and Thaler (2003), this research elucidates the psychological drivers influencing cryptocurrency investment. We hypothesize that higher levels of financial literacy will be associated with more balanced risk perceptions and an increased likelihood of cryptocurrency adoption. Furthermore, we expect that perceived transaction complexity and security concerns will negatively impact adoption rates, while regulatory uncertainty may have mixed effects depending on individual risk preferences.

The study applies a quantitative methodology, employing a survey instrument designed to capture the impact of financial literacy, transaction complexity, security, and regulatory issues on investor behavior. Our sample comprises a diverse group of Moroccan adults, stratified to represent various demographic and socio-economic segments of the population.

This research seeks to address significant gaps in the current literature, particularly the limited focus on developing economies. While the majority of existing studies have concentrated on advanced markets (Fang *et al.*, 2022; Kostika & Laopodis, 2023), socio-economic and cultural factors influencing cryptocurrency adoption in regions such as North Africa remain underexplored. By focusing on Morocco, we offer insights into how emerging economies with unique regulatory and cultural contexts engage with global financial innovations.

The present study contributes to the field in several ways. First, it provides empirical evidence on the role of psychological factors in cryptocurrency adoption within

an emerging market context. Second, it extends the application of behavioral finance theories to the domain of digital assets in a culturally distinct setting. Finally, it offers practical implications for policymakers and financial institutions in Morocco and similar emerging economies, potentially informing more nuanced approaches to regulating and integrating cryptocurrencies into existing financial systems.

By examining the interplay between financial literacy, risk perception, and cryptocurrency adoption in Morocco, this study aims to enhance our understanding of investor behavior in the rapidly evolving landscape of digital finance, with implications for both theory and practice in the field of financial technology.

2. Literature Review

The burgeoning field of cryptocurrency has been the subject of extensive academic inquiry, particularly focusing on its economic and technological aspects. In this literature review, we delve into existing research, highlighting theoretical and population gaps that this study aims to address.

2.1 Economic and Technological Aspects of Cryptocurrencies

A significant body of literature has focused on the economic implications and technological structure of cryptocurrencies, particularly Bitcoin. Böhme *et al.* (2015) offer a detailed analysis of Bitcoin's economic potential and risks, noting its capacity for facilitating micropayments and reducing transaction costs, while also highlighting concerns like price volatility and security vulnerabilities. Their findings suggest that Bitcoin's market capitalization, which peaked at around $13.8 billion in 2013, reflected both speculative interest and growing recognition of its technological innovations.

The interaction between social media, technology acceptance, and investment intentions in cryptocurrencies is highlighted by Robkob and Pankham (2023), emphasizing the role of trust and social media in investment decisions. Recent research has expanded our understanding of cryptocurrency market dynamics. Fang *et al.* (2022) conducted a comprehensive review of cryptocurrency trading, highlighting the evolution from technical aspects to broader economic implications. They note, "*the cryptocurrency market has grown from a niche space to a significant financial sector, with Bitcoin's market capitalization exceeding $1 trillion in 2021*" (Fang *et al.*, 2022, p. 3). Narayanan *et al.* (2016) delves into blockchain technology, underscoring its potential beyond cryptocurrencies. They emphasize blockchain's potential for creating decentralized and tamper-resistant ledgers, which has implications far beyond cryptocurrencies, including in fields like supply chain management and digital identities. This technological innovation has catalyzed a wave of investment and development, with the global blockchain technology market expected to grow from $3 billion in 2020 to $39.7 billion by 2025, according to a report by MarketsandMarkets (2020).

Furthermore, Glaser *et al.* (2014) examine the transactional data of Bitcoin, providing empirical evidence of its use both as an investment vehicle and a medium of

exchange. They note that despite the growing transaction volumes, which exceeded 100,000 daily transactions in 2015, Bitcoin's usage for regular commerce remains limited, primarily due to its volatility and regulatory uncertainties.

2.2 Behavioral Finance Perspectives on Cryptocurrency Investment

In the realm of behavioral finance, the study of cryptocurrencies presents a fascinating convergence of advanced technology and human psychology. Kahneman and Tversky's (1979) Prospect Theory offers a critical lens through which to understand the decision-making processes of cryptocurrency investors. Their theory, which highlights the irrationality of investors driven by cognitive biases rather than pure financial logic, is particularly pertinent given the high volatility and speculative nature of cryptocurrency markets.

Barberis, Shleifer, and Vishny (1998) examine how investor sentiment influences market dynamics, a concept applicable in the cryptocurrency realm, whereas Garcia and Schweitzer (2015) showed how social media affects Bitcoin prices. Shiller (2015) explores speculative bubbles in cryptocurrency markets, attributing them to investor psychology and market narratives.

The generational shift towards digital assets indicates a profound change in investment preferences and behaviors. Lekshmi, *et al.* (2024) delve into the familiarity and preference for cryptocurrency among millennials and Gen Z, revealing that younger generations' investment decisions are influenced by a blend of technological affinity and financial literacy, highlighting the need for a well-informed approach to foster responsible investment in cryptocurrencies. Kostika and Laopodis (2023) applied behavioral finance concepts specifically to cryptocurrency markets. Their study found that cognitive biases such as overconfidence and herding significantly influence trading decisions and market volatility. They conclude, "*investor sentiment plays a crucial role in cryptocurrency price formations, often leading to deviations from fundamental values*" (Kostika & Laopodis, 2023, p. 8).

These behavioral finance theories have yet to be fully integrated into the study of cryptocurrencies in emerging economies. The current literature focuses primarily on developed markets, leaving a gap in understanding how these psychological factors play out in different socio-economic contexts, such as Morocco.

2.3 Financial Literacy and Cryptocurrency Adoption

The connection between financial literacy and cryptocurrency adoption is critical yet underexplored. Lusardi and Mitchell (2014) highlight the importance of financial literacy in navigating complex financial products like cryptocurrencies. Building on this foundation, Jerković *et al.* (2023) conducted a cross-country analysis of the interdependence between cryptocurrency adoption and financial literacy. Their study of 112 countries revealed a positive correlation between financial literacy scores and cryptocurrency adoption rates, with notable variations across different regions.

Studies such as those by Van Rooij, Lusardi, and Alessie (2011) demonstrate a strong correlation between financial literacy and investment decisions in traditional markets, indicating that individuals with higher financial literacy are more likely to participate in the stock market and have diversified portfolios. However, the application of these findings to the cryptocurrency market is not straightforward, as the cryptocurrency market is characterized by high volatility and a lack of regulatory clarity, which could disproportionately impact less financially literate individuals.

The Global Findex Database by Demirgüç-Kunt *et al.* (2018) sheds light on financial literacy disparities and their implications for cryptocurrency adoption in countries like Morocco.

This gap in the literature presents an opportunity for this study to explore how financial literacy influences cryptocurrency investment decisions in Morocco. The research aims to contribute to the understanding of whether higher financial literacy facilitates more informed and rational decisions in the context of the high-risk cryptocurrency market.

2.4 Cross-Cultural and Regional Studies in Cryptocurrency Research

Cryptocurrency research has largely focused on developed economies, overlooking the cultural and regional nuances in emerging markets. Wilson and Yelowitz (2015) found that demographic and economic factors significantly influence cryptocurrency adoption, though their study primarily centers on the US. In emerging economies, factors like remittances, mobile money, and Islamic financial principles play a crucial role in cryptocurrency adoption. Studies by Aker and Mbiti (2010) and El Khamlichi and El Alaoui (2019) highlight the need for research in regions with distinct economic and cultural backgrounds, such as North Africa, like the role of remittances, mobile money penetration, the unbanked population and Islamic financial principles and how they could impact the acceptance and regulation of cryptocurrencies in these regions, highlighting a significant area for further research.

Exploring the investment intentions in the cryptocurrency market, Andraszewicz, Monticelli, and Roberts (2023) investigate the relationships between financial literacy, technological understanding, and the willingness to use cryptocurrencies.

Jerković, Rimac Smiljanić, and Škrabić Perić (2023) take a cross-country perspective to examine the interdependence between cryptocurrency adoption and financial literacy. This study highlights the varied financial literacy levels across countries and their impact on cryptocurrency adoption, underscoring the global nature of digital finance evolution.

Despite the growing global interest in cryptocurrencies, there is a noticeable lack of comprehensive studies focusing on their adoption and implications in specific regions like Morocco.

3. Material and Methods

In our study, we meticulously investigated the financial psychology of Moroccan cryptocurrency investors using quantitative research methods. We distributed our questionnaire online over nearly four months, from December 2023 to March 2024, emphasizing voluntary participation and anonymity. Clear instructions were provided to ensure accurate completion.

3.1 Data Collection

Leveraging a structured questionnaire, we harvested data from a broad spectrum of Moroccan participants. This instrument was meticulously crafted to encapsulate variables such as demographic details, financial literacy, risk tolerance, and cryptocurrency attitudes, ensuring a rich dataset for analysis. The survey did not restrict participants based on their prior experience with cryptocurrencies, thereby allowing for a more inclusive understanding of the general population's perceptions and behaviors.

3.1.1 Sampling Method

A convenience sampling method was utilized, where the questionnaire was distributed via online platforms. These platforms included social media groups, financial forums, and email lists that are frequented by individuals interested in financial topics and technology in Morocco. This method was chosen for its efficiency and ability to reach a diverse group of respondents within a short period.

Stratified sampling was pivotal, guaranteeing representation across diverse demographic strata, including age, gender and profession, to conclude the income range, thus bolstering the study's inclusivity.

3.1.2 Distribution

Capitalizing on the digital age, the questionnaire found its way to participants through social media and financial forums, platforms teeming with cryptocurrency discourse, ensuring a wide-reaching engagement.

3.1.3 Instrumentation

The questionnaire consisted of four main sections:

- **Demographic Information:** Questions in this section sought to gather basic demographic data such as age, gender, education level, and profession.
- **Knowledge and Acceptance of Cryptocurrency:** This section included questions about the respondents' awareness, understanding level, sources of information, and perceptions regarding the risks and benefits of cryptocurrencies.
- **Investment Choices in Cryptocurrency:** This section focused on participants' investment experiences in cryptocurrencies, the types of cryptocurrencies invested in, and their attitudes towards different types of cryptocurrency investment options.

- **Regulatory and Future Outlook, and Personal Experience and Influence:** This comprehensive section covers the regulatory perspectives, future expectations, personal experiences, and the perceived impact of cryptocurrencies on financial inclusion and the demand for education.

The questionnaire was designed in French, considering the linguistic preference of the target population in Morocco.

3.2 Data Analysis Techniques

The analytical journey was rigorous, employing statistical tools to distill insights from the amassed data, offering a window into the psyche of Moroccan cryptocurrency investors. In the initial phase of data collection, the dataset comprised a total of 1,037 entries. Following a rigorous curation process, which involved the application of predefined criteria for data quality and relevance, the dataset was refined to 167 entries. This reduction highlights the importance of data cleansing in ensuring the reliability and validity of the research findings. The curated dataset, now consisting of 167 entries, serves as the basis for the subsequent analyses and interpretations in this study.

3.2.1 Descriptive Statistics

Descriptive Statistics was used to summarize the basic features of the data, providing a simple overview of the respondents' profiles and their general attitudes towards cryptocurrencies.

3.2.2 Inferential Statistics

Various statistical tests, including regression analysis and ANOVA, were employed to examine the relationships between different variables, such as the impact of financial literacy on investment decisions.

3.2.3 Risk Perception and Investment Behavior Analysis

A specific focus was placed on understanding how risk perception influences cryptocurrency investment decisions, utilizing models from behavioral finance literature.

3.3 Ethical Considerations

Adhering to ethical standards, participant consent was paramount, coupled with stringent measures to safeguard data privacy and confidentiality throughout the study.

3.4 Limitations

Acknowledging the study's constraints, the online questionnaire distribution might be biased towards a digitally literate demographic. Moreover, the Moroccan focus narrows the generalizability of findings.

4. Results and Discussion

4.1 Section 1: Demographic Profile of Respondents

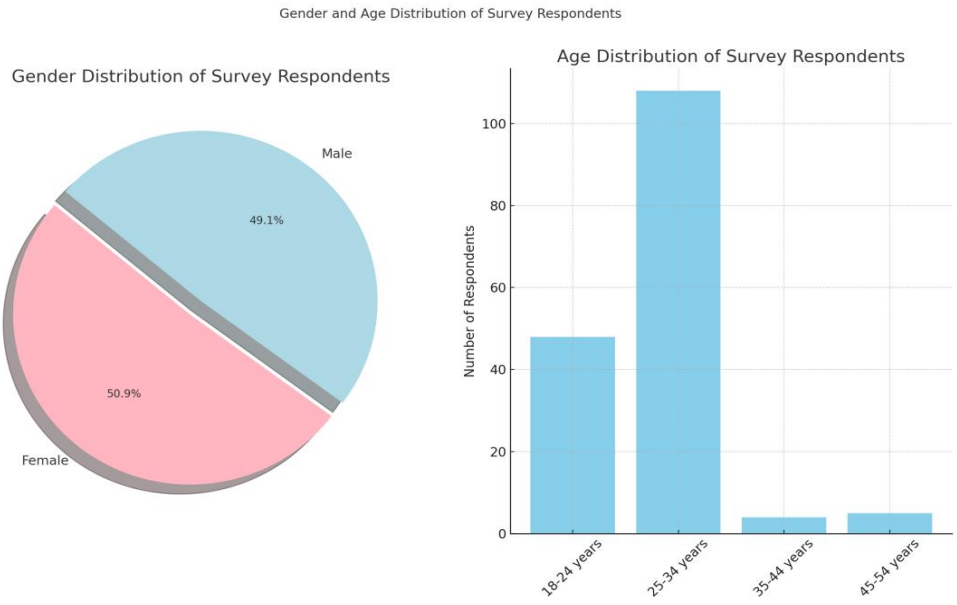
4.1.1 Gender Distribution

The survey participants were nearly evenly split between genders, indicating a balanced interest in cryptocurrencies among males and females in Morocco.

4.1.2 Age Distribution

The age distribution highlights a strong inclination towards younger adults, with the majority of respondents falling into the 25-34 age group, indicating a higher level of interest and engagement with cryptocurrencies among younger Moroccans.

Figure 1: Gender and Age Distribution



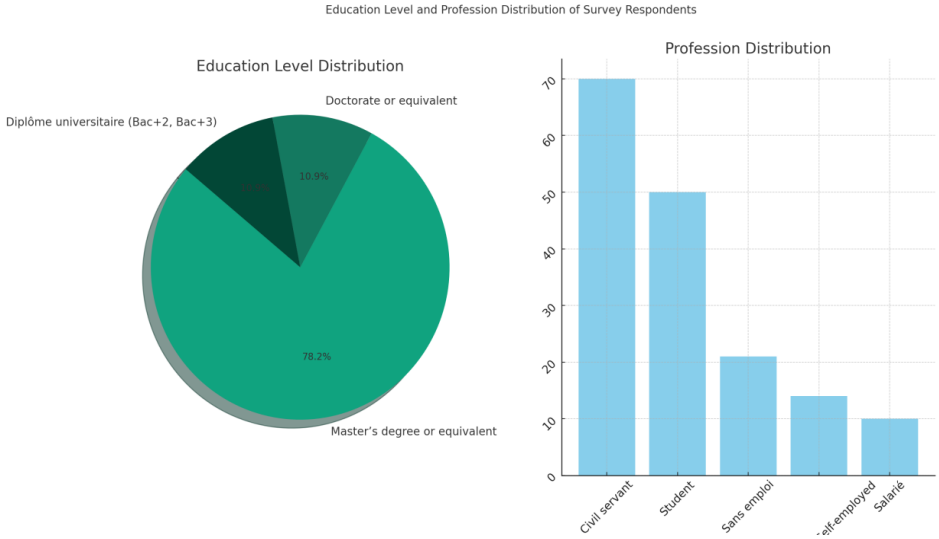
4.1.3 Education Level Distribution

The respondents displayed a high level of education, with a significant majority holding a Master's degree or equivalent. This suggests that educational outreach and advanced cryptocurrency concepts could be well-received within this demographic.

4.1.4 Profession Distribution

The professional backgrounds of respondents varied, with a notable representation of public servants and students. This diversity suggests varying interest levels and potentially different motivations for engaging with cryptocurrencies.

Figure 2: Education Level and Profession Distribution

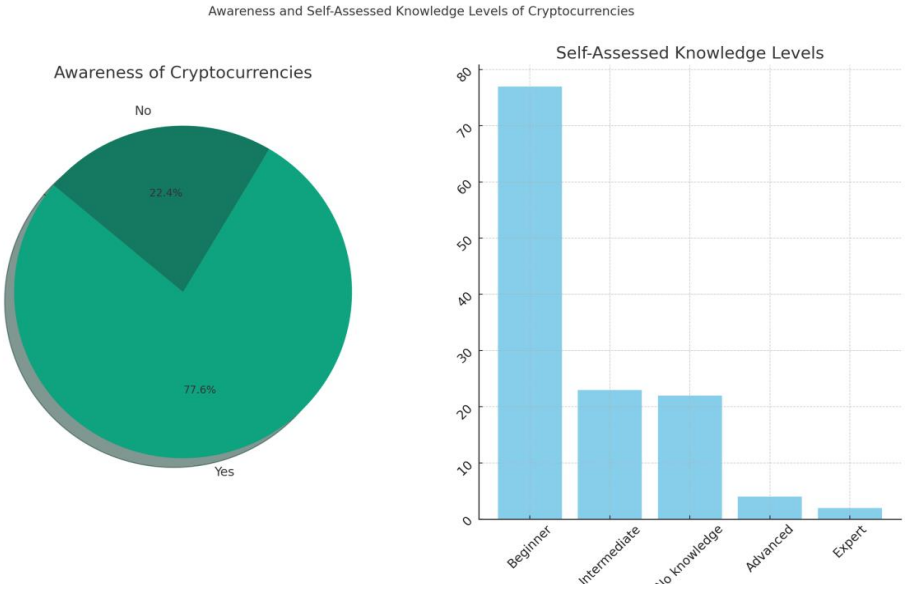


This suggests that cryptocurrency initiatives in Morocco could benefit from targeting educational programs and awareness campaigns in this demographic segment, which shows a significant interest in and knowledge of cryptocurrencies.

4.2 Section 2: Knowledge and Acceptance of Cryptocurrency

4.2.1 Awareness and Knowledge of Cryptocurrencies

Figure 3: Awareness and Knowledge Levels



A substantial portion of the respondents (77.6%) indicated they are aware of cryptocurrencies, showcasing a noteworthy level of general awareness within the surveyed group. This high degree of awareness signifies a robust interest or curiosity about cryptocurrencies among Moroccans, serving as a foundational step towards broader acceptance and understanding.

4.2.1.1 Self-Assessed Knowledge Levels

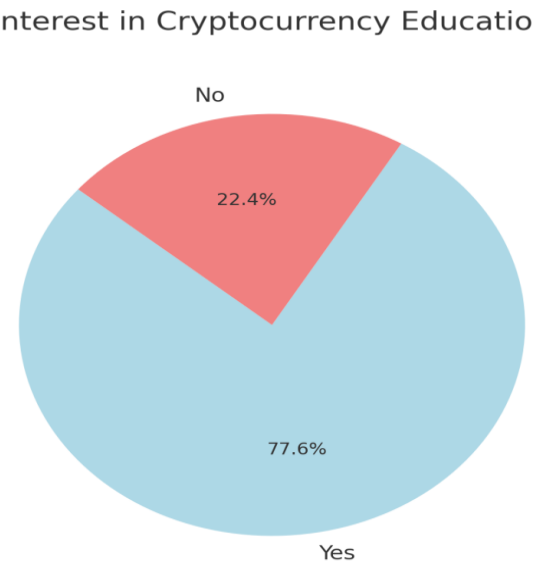
Participants exhibit varied self-assessed knowledge levels. The majority, 60.2%, characterize their understanding as beginner, signifying a basic grasp of cryptocurrencies. A notable 18.0% claim intermediate knowledge, reflecting deeper engagement. Approximately 17.2% admit to having no knowledge, presenting an opportunity for targeted education. A smaller fraction, 3.1% advanced and 1.6% expert, represents a niche but potentially impactful group within the community.

4.2.1.2 Average Knowledge Rating

The average knowledge rating is 1.07, indicating a mostly beginner-level understanding among respondents. Despite high awareness, there is a notable opportunity to enhance cryptocurrency knowledge in Morocco. With widespread awareness and a beginner-level base, stakeholders have a unique chance to implement educational programs, fostering a more informed community in the digital currency landscape.

4.2.1.3 Interest in Cryptocurrency Education

Figure 4: Interest in Cryptocurrency Education



The pie chart shows Moroccan respondents' interest in cryptocurrency education, split between those interested ("Yes") and those not interested ("No"). It suggests a significant interest, indicating a proactive approach to understanding and potentially engaging with cryptocurrencies. The data underscores the need for educational initiatives to empower individuals to navigate the cryptocurrency landscape.

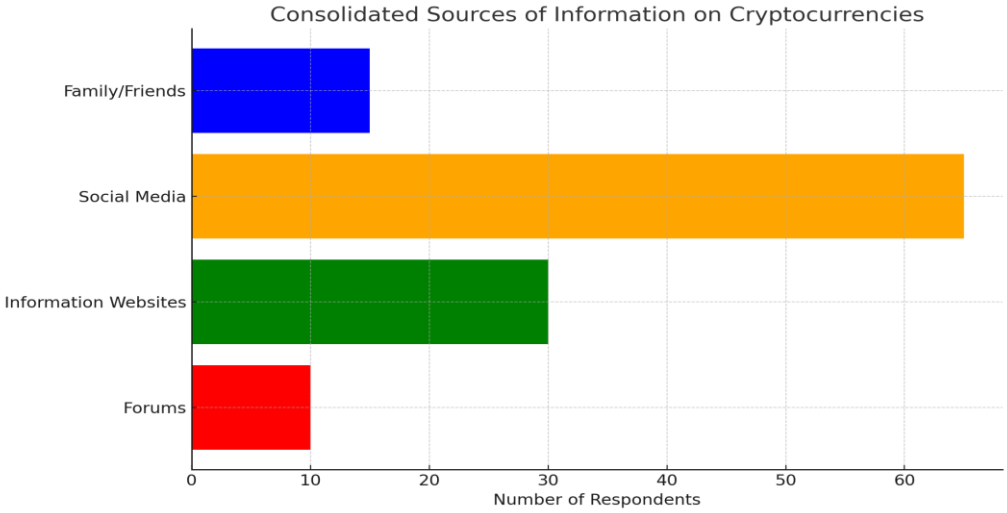
4.2.1.4 Policy and Education

The analysis signals a need for targeted educational programs to address cryptocurrency knowledge gaps. Improving understanding can empower investors, potentially strengthening the cryptocurrency market in Morocco. Varied opinions on

cryptocurrencies' impact on financial stability create an opportunity for policymakers to collaborate with stakeholders. Together, they can explore regulatory frameworks that balance investor protection with fostering innovation and financial inclusiveness.

4.2.1.5 Information Channels

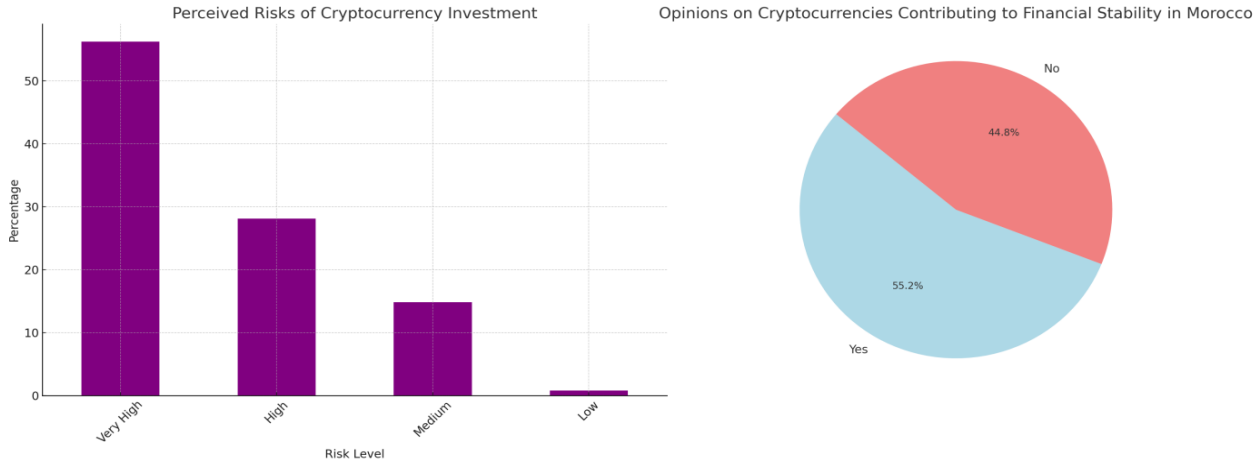
Figure 5: Sources of Information on Cryptocurrencies



Our analysis of cryptocurrency information sources revealed a diverse array of platforms used to stay informed. From traditional news outlets to social media and digital platforms, individuals navigate these sources based on their preferences. Social media platforms like Twitter, Reddit, and YouTube emerge as primary sources, while information websites also play a crucial role. Although the influence of friends and family is less prominent, it highlights the communal aspect of cryptocurrency trading.

4.2.1.6 Risk Perception and Attitudes towards Cryptocurrencies

Figure 6: Risk Perception Levels and Contribution to Financial Stability Opinions



The analysis examines risk perceptions in cryptocurrency investments and assesses attitudes toward the potential role of cryptocurrencies in enhancing financial stability in Morocco. This is crucial for understanding broader sentiments toward cryptocurrencies and their perceived impact on the economic landscape.

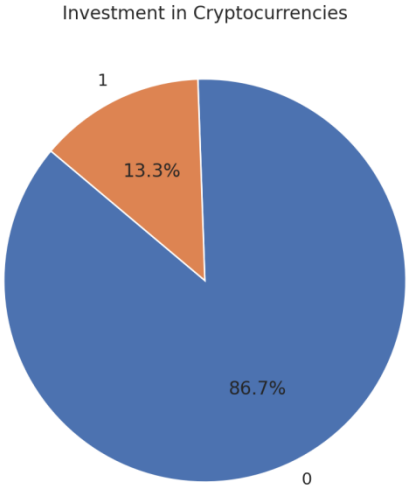
4.2.1.7 Perceived Risks

The bar graph depicts respondents' perceptions of risks in cryptocurrency investment, reflecting diverse comfort levels and concerns. This nuanced understanding highlights the market's inherent volatility. The varied risk perceptions underscore the need for comprehensive education to convey potential risks and rewards more accurately.

4.3 Section 3: Investment Choices in Cryptocurrency

4.3.1 Investment Behaviors

Figure 7: Investment Interest in Cryptocurrencies



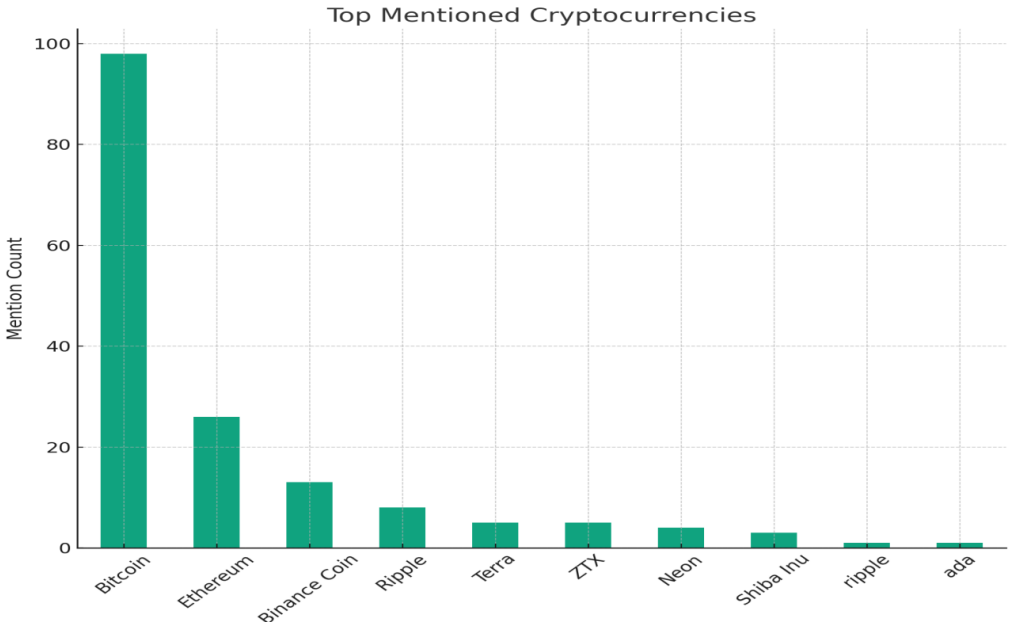
4.3.2 Investment Participation

Our analysis indicates a disparity in investment behaviors, with a minority of respondents (13.3%) coded as 1 (Invested) stating they have invested in cryptocurrencies, whereas a substantial majority (86.7%) coded as 0 (didn't invest) have not engaged in such investments. This pattern suggests that while there is interest and awareness in cryptocurrencies, actual investment participation remains relatively low among the surveyed population.

4.3.3 Top Mentioned Cryptocurrencies

Bitcoin and Ethereum remain prominently at the top, highlighting their foundational roles and widespread acceptance in the cryptocurrency space. Their dominance in mentions not only reflects market capitalization and technological significance but also suggests a general consensus about their importance among the crypto-aware public.

Figure 8: Most Known Cryptocurrencies

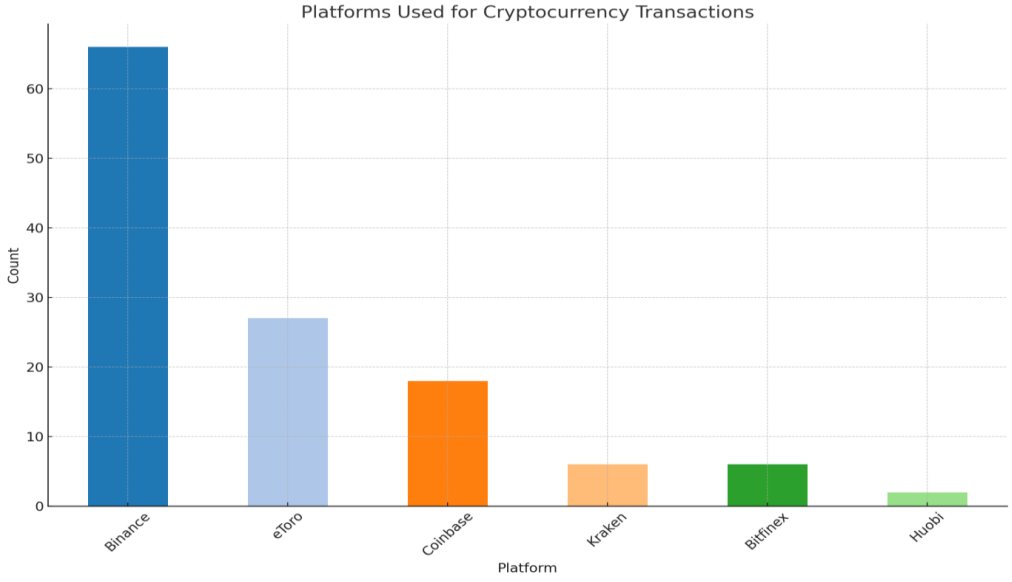


Other cryptocurrencies like Binance Coin, Ripple, and Terra are also mentioned, showcasing a broader awareness beyond the leading names. This diversity reflects respondents' varied interests in utility tokens, platform-specific coins, and tokens with specific use cases or communities.

By excluding non-specific entries, this analysis ensures an accurate representation of active awareness and consideration of cryptocurrencies. It underscores the community's knowledge about market players and the growing interest in a wider range of cryptocurrencies, moving beyond the mainstream focus on Bitcoin and Ethereum.

4.3.4 Platforms Used for Cryptocurrency Transactions

Figure 9: Used Transaction Platforms for Cryptocurrencies



The chart indicates participants' top platforms for cryptocurrency transactions, with Binance as the leader. This suggests its popularity, potentially due to user-friendly features, security, and diverse cryptocurrency support. eToro and Coinbase also show substantial shares, highlighting their presence in cryptocurrency trading. The diverse platform usage underscores varied community preferences, emphasizing factors like ease of use, fees, and security in selection.

4.3.5 Advantages Driving Investment

Investing in cryptocurrencies is driven by perceived advantages, closely linked to individual motivations:

- **Rapid Transactions (35.94%):** Valuing the quick and efficient nature of transactions appeals to those seeking convenience.
- **Investment Opportunity (31.25%):** Cryptocurrencies are seen as a viable investment, reflecting economic motivations.
- **Anonymity (14.06%) and Low Transaction Fees (5.47%):** Indicate a desire for privacy and cost-effectiveness in financial transactions.

These advantages suggest a positive outlook on cryptocurrencies, potentially prompting more individuals to consider them for investment, drawn by their efficiency, investment potential, privacy, and cost-effectiveness.

4.3.6 Concerns Influencing Caution

Conversely, the apprehensions about cryptocurrency usage provide context to the hesitancy observed in investment behaviors:

- **Lack of Regulation (35.16%) and Volatility (28.13%):** These top concerns underscore the perceived risks associated with cryptocurrencies, likely deterring potential investors worried about the unpredictability and the uncertain regulatory landscape.
- **Security (19.53%):** Security concerns, particularly regarding the safety of transactions and investments, further contribute to the cautious stance among respondents.
- **Complexity (9.38%):** The perceived complexity of cryptocurrencies may also hinder broader adoption and investment, suggesting a need for educational efforts to demystify the technology.

The analysis reveals a landscape marked by cautious optimism and significant reservations. At the same time, there is a clear recognition of the benefits cryptocurrencies can offer, such as efficiency, investment potential, and privacy, concerns around volatility, security, and regulation loom large, and influencing investment behaviors.

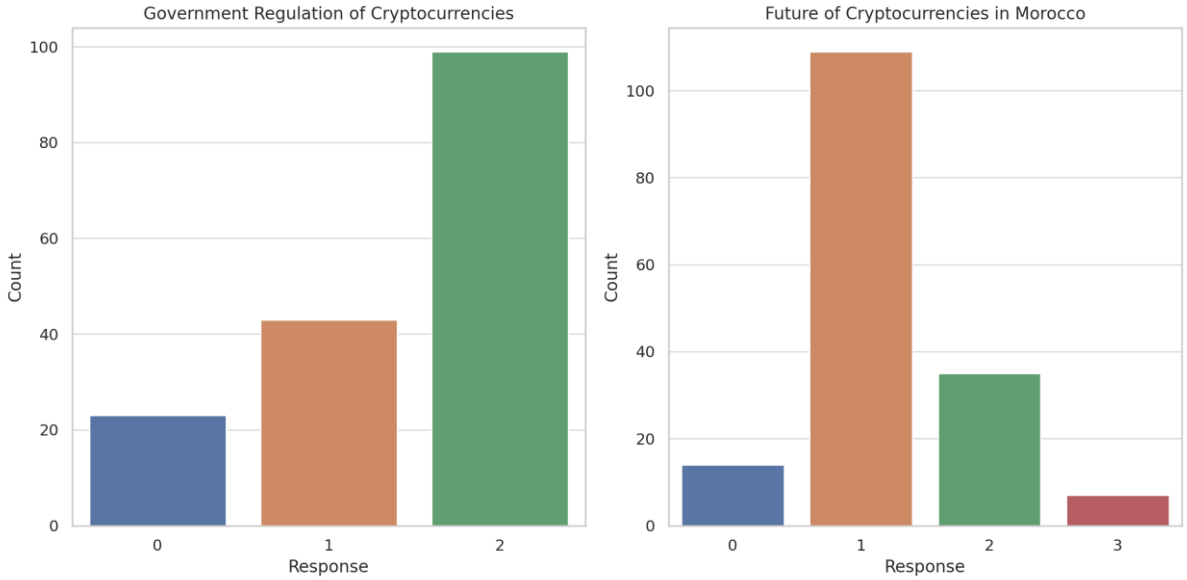
Addressing these concerns, particularly through educational initiatives, regulatory clarity, and enhanced security measures, could be pivotal in shifting perceptions and encouraging more robust participation in cryptocurrency investments among Moroccans. This approach not only supports potential investors in making

informed decisions but also contributes to the development of a stable and secure cryptocurrency ecosystem in Morocco.

4.4 Section 4: Regulatory and Future Outlook, and Personal Experience and Influence

4.4.1 Regulatory and Future Outlook

Figure 10: Regulation and Future of Cryptocurrencies in Morocco



Two main questions have been answered:

- Do you think the Moroccan government should regulate cryptocurrencies?
- In your opinion, what is the future of cryptocurrencies in Morocco?

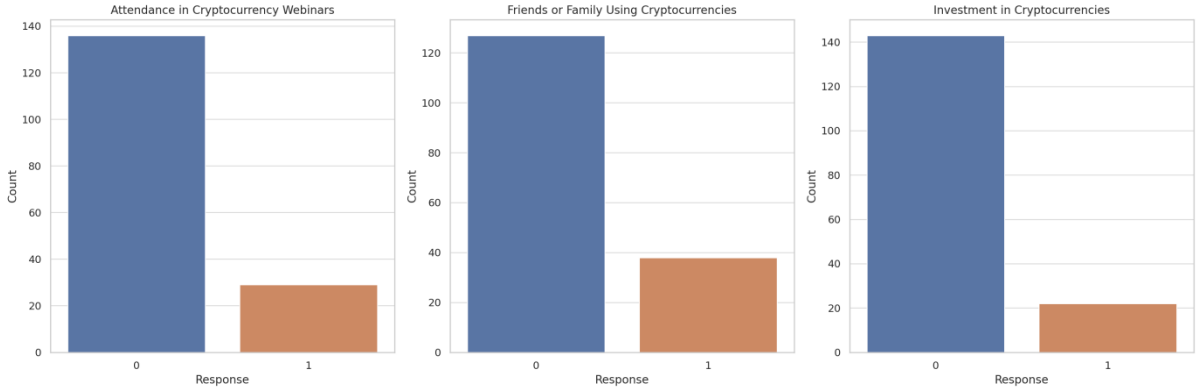
The answers have been coded in the first question to: 0: No, 1: Not sure, 2: Yes, and in the second question concerning the future to 0: Not promising, 1: Uncertain, 2: Promising, 3: Very promising.

When delving into the discussions around whether cryptocurrencies should come under the purview of Moroccan government regulation, the diversity in opinions is striking. Nearly half of the surveyed individuals lean towards some form of governmental oversight, with around 46% of respondents indicating a preference for some level of government regulation, highlighting a complex debate that spans across trust in authority, innovation concerns, and consumer safety. This variety of viewpoints mirrors the broader global conversation on how to balance regulation with fostering innovation.

Looking ahead, the future of cryptocurrencies in Morocco presents a mixed bag of expectations. A notable segment of respondents is cautiously optimistic about cryptocurrencies carving out a space within Morocco's financial landscape, with approximately 21% of respondents optimistic about their integration, suggesting a belief in their potential to bring about significant change. On the flip side, skepticism is not rare, with a good number of individuals unsure about the viability and acceptance of these

digital currencies moving forward. This uncertainty underscores the nascent stage of cryptocurrency adoption and the wide-ranging speculations about its future.

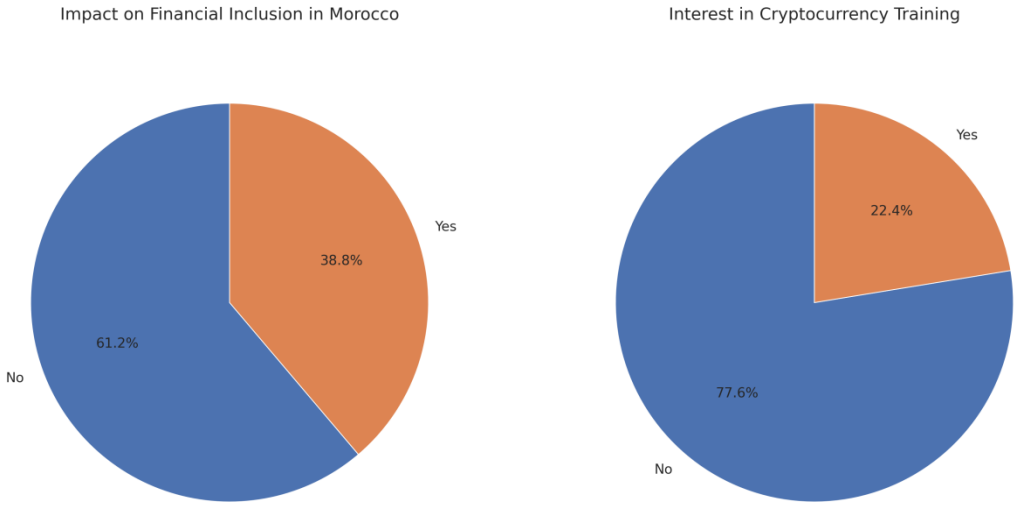
4.4.2 Personal Experience and Influence



The survey highlights a notable lack of engagement with formal cryptocurrency education, such as webinars or training sessions, with only approximately 17.6% of respondents having attended such events. This points to a gap in accessible and engaging learning opportunities, indicating a crucial area for improvement. Enhancing educational avenues could significantly elevate understanding and comfort levels with cryptocurrency technologies. This suggests a need for better educational opportunities. Social networks play a crucial role in cryptocurrency adoption, influencing perceptions and potentially encouraging further exploration or investment.

4.4.3 Specific Opinions on Cryptocurrencies' Impact

Figure 11: Inclusion Impact and Interest in Crypto Training



A substantial portion, approximately 61.2% of those surveyed, expresses a strong belief in the potential of cryptocurrencies to impact financial inclusion in Morocco positively.

This optimism is not just wishful thinking but is grounded in the recognition of the innovative solutions that cryptocurrencies can offer, potentially addressing existing gaps in financial access.

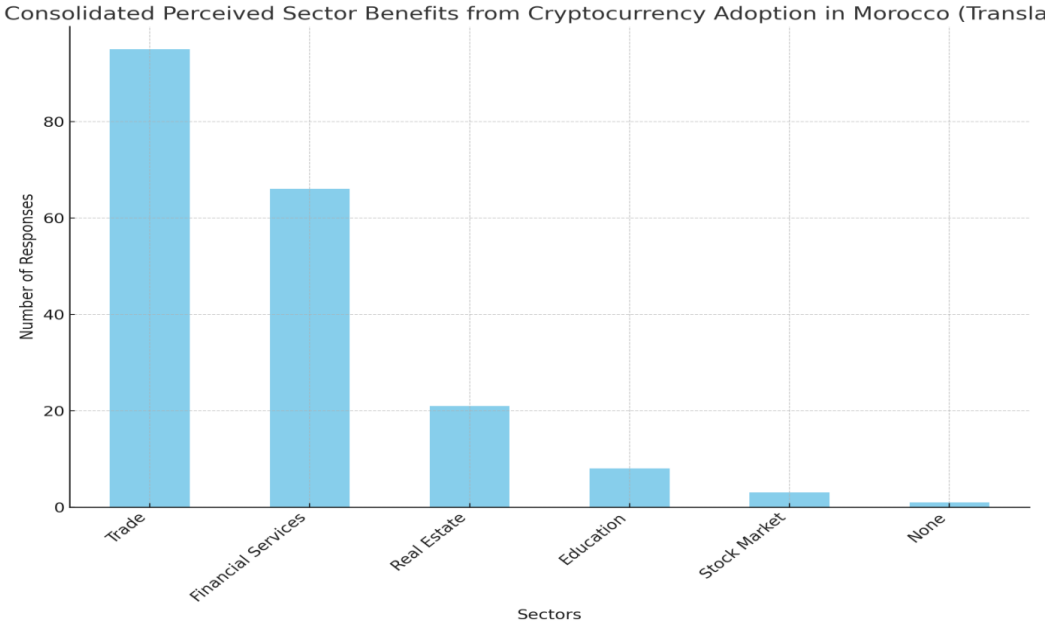
Moreover, 77.6% of respondents expressed interest in cryptocurrency training. The overwhelming interest in cryptocurrency training underscores a widespread acknowledgment of the critical role education plays in the broader adoption and understanding of cryptocurrencies. This enthusiasm for learning signifies a proactive stance towards engaging with new financial technologies and highlights a collective desire for comprehensive and accessible educational programs.

These insights, drawn from the survey, offer a glimpse into the complex tapestry of perspectives, experiences, and expectations surrounding cryptocurrencies in Morocco. They reflect a community at a crossroads, cautiously navigating the promises and uncertainties of a rapidly evolving financial landscape.

4.4.4 Perceived Sector Benefits from Cryptocurrency Adoption

The aim of this analysis is to identify which sectors respondents believe would benefit most from the adoption of cryptocurrencies in Morocco.

Figure 12: Perceived Sector Benefits from Crypto Adoption in Morocco



The bar graph displays respondents' perceptions of sectors benefiting from cryptocurrency adoption in Morocco. It provides insight into the potential impact of cryptocurrencies on various sectors, indicating recognition of transformative possibilities—from efficiency to financial inclusion.

Survey responses highlight varied expectations across sectors, suggesting a nuanced understanding of cryptocurrency advantages. This diversity implies that cryptocurrency adoption could spur innovation and growth in the Moroccan economy, enhancing financial services, trade, real estate transactions, and education.

The responses indicate a strong preference for Commerce and Financial Services as primary sectors for significant cryptocurrency impact, followed by Real Estate.

4.4.5 Cross-Analysis and Chi-Square

This analysis aims to uncover potential significant differences by employing a Chi-Square test. This statistical method allows us to examine relationships concerning cryptocurrencies and discern whether the observed variations in knowledge levels between genders are statistically significant or merely due to chance.

4.4.6 Gender vs Knowledge Level

Table 1: Knowledge Levels

Knowledge Level	Female	Male
0 (No knowledge)	39	21
1 (Beginner)	2	2
2 (Intermediate)	33	44
3 (Intermediate)	0	2
4 (Expert)	11	12

Table 2: Chi-Square Test Results

Test	Result
Chi-Square Statistic	21.993
p-value	0.000525
Degrees of Freedom	5

The p-value of 0.000525 indicates that the association between Gender and Knowledge Level is statistically significant at the 0.05 level. This suggests that there are meaningful differences in self-assessed cryptocurrency knowledge levels between genders among the survey respondents.

Given this significant association, it highlights the importance of considering gender when designing and targeting educational and informational initiatives about cryptocurrencies.

4.4.7 Cryptocurrency Knowledge Level and Type of Investment Made

The chi-square test for the relationship yields the following results:

Table 3: Chi-square Test

Test	Result
Chi-Square Statistic	14.28
p-value	0.0065
Degrees of Freedom	4

Table 4: Expected Frequencies

Knowledge Level	Expected Investment	Expected Trading
No Knowledge	0.14	0.86
Advanced	0.14	0.86
Beginner	0.95	6.05
Expert	0.27	1.73
Intermediate	1.5	9.5

The p-value of 0.0065 signals a statistically significant association between cryptocurrency knowledge levels and the type of investment made. This indicates that respondents' knowledge influences their investment choices, correlating with different preferences for investment types.

This analysis provides insights into how educational background and understanding of cryptocurrencies shape investment behaviors. The significant p-value suggests that as individuals' cryptocurrency knowledge varies, so do their preferences for trading versus traditional investments, showcasing nuanced decision-making based on informational access and understanding.

4.4.8 The Impact of Age or Gender on the Preference for Types of Cryptocurrency Investments

This analysis will help us understand if there are demographic differences in how individuals choose to invest in cryptocurrencies, potentially revealing insights into the preferences and risk tolerances of different age groups and genders.

We will conduct two separate chi-square tests:

4.4.8.1 Age vs. Investment Preference

To examine if different age groups have distinct preferences for types of cryptocurrency investments, the chi-square test for the relationship between shows the following results:

Table 5: Chi-square Test

Test	Result
Chi-Square Statistic	0.30
p-value	0.861
Degrees of Freedom	2

Table 6: Expected Frequencies

Age Group	Expected Investment	Expected Trading
18-24 ans	1.23	7.77
25-34 ans	1.64	10.36
35-44 ans	0.14	0.86

The p-value of 0.861 indicates that there is no statistically significant association between age groups and cryptocurrency investment preferences. This suggests that within the

dataset, age does not significantly influence whether individuals prefer trading or other types of investments in cryptocurrencies.

4.4.8.2 Gender vs. Investment Preference

To determine if there is a significant difference in investment preferences between genders.

Table 7: Chi-square Test

Test	Result
Chi-Square Statistic	0.24
p-value	0.623
Degrees of Freedom	1

Table 8: Expected Frequencies

Gender	Expected Investment	Expected Trading
Woman	0.27	1.73
Man	2.73	17.27

The p-value of 0.623 suggests no statistically significant association between gender and cryptocurrency investment preferences in the dataset. This implies that gender does not significantly influence the preference for trading versus other cryptocurrency investments.

Both analyses—Age vs. Investment Preference and Gender vs. Investment Preference—indicate that neither age nor gender significantly shapes individuals' preferences for various cryptocurrency investments in this dataset.

These findings highlight the limited impact of demographic factors on cryptocurrency investment preferences. The absence of significant differences suggests that other factors, such as individual risk tolerance, access to information, and personal financial goals, may play more crucial roles in shaping investment decisions.

4.4.9 The Correlation between Having Attended Webinars or Training Sessions on Cryptocurrencies and Confidence in the Security of Cryptocurrency Transactions

This relationship will help us explore if educational interventions, like webinars and training sessions, impact individuals' confidence in cryptocurrency transaction security. It aims to understand the role of education in shaping perceptions and confidence in the ever-evolving realm of cryptocurrencies.

For this analysis, we will use a chi-square test to examine the association between:

- Attendance at webinars or training sessions on cryptocurrencies.
- Confidence in the security of cryptocurrency transactions.

Table 9: Chi-Square Test Results

Test	Result
Chi-Square	1.498
p-value	0.473
Degrees of Freedom	2

Table 10: Expected Frequencies for Confidence in Security Based on Webinar Attendance

Webinar Attendance	Expected "Uncertain"	Expected "No"	Expected "Yes"
No	44.86	36.35	17.79
Yes	13.14	10.65	5.21

The chi-square test, with a p-value of 0.473, indicates no statistically significant link between attending webinars or training sessions on cryptocurrencies and confidence in transaction security. This suggests that educational interventions, as measured here, may not significantly impact respondents' confidence levels in cryptocurrency transaction security.

These findings imply that, while education is crucial, it may not directly enhance confidence in transaction security. This highlights the complexity of factors influencing individuals' confidence in cryptocurrency security, including the quality of information, personal experiences, and broader perceptions of the cryptocurrency market.

4.4.10 The Relationship between Cryptocurrency Investment Size and Perception of Investment Risk

This analysis aims to understand if the proportion of one's investment portfolio allocated to cryptocurrencies influences one's perception of the associated risks. This could reveal insights into investor behavior, particularly how investment size correlates with risk tolerance or perception in the cryptocurrency market.

- The size of the investment in cryptocurrencies as a percentage of the overall investment portfolio.
- The perceived risk level associated with investing in cryptocurrencies.

Table 11: Chi-Square Test Results

Test	Result
Chi-Square Statistic	26.85
p-value	0.000154
Degrees of Freedom	6

Table 12: Expected Frequencies for Risk Perception Based on Investment Size

Investment Size	Expected "Low"	Expected "Very High"	Expected "High"
10-25%	0.73	12.36	2.91
26-50%	0.09	1.55	0.36
Less than 10%	0.09	1.55	0.36
More than 75%	0.09	1.55	0.36

The chi-square test results, with a p-value of 0.000154, indicate a statistically significant association between the size of cryptocurrency investments as a percentage of the overall investment portfolio and the perceived risk level associated with investing in cryptocurrencies. This suggests that the proportion of one's investment portfolio allocated to cryptocurrencies significantly influences their perception of the associated risks.

These findings imply that as individuals allocate different portions of their investment portfolios to cryptocurrencies, their perception of the investment risk varies. This could reflect differing levels of risk tolerance, understanding of the cryptocurrency market, or experiences with market volatility among investors with varying investment sizes.

This analysis contributes to understanding how investment size impacts risk perception in the cryptocurrency space, highlighting the importance of considering individual investor profiles and risk tolerance levels when analyzing investment behaviors.

4.4.11 Demographic Influences on Cryptocurrency Perceptions

We will start by examining how demographics (age and gender) influence perceptions of the risks and benefits of cryptocurrencies.

4.4.12 Age and Perceptions of Cryptocurrency Risk

The chi-square test for the relationship between age groups and perceived risk levels associated with investing in cryptocurrencies yielded the following results:

Table 13: Chi-square Test

Test	Result
Chi-Square Statistic	18.41
p-value	0.031
Degrees of Freedom	9

The results highlight a statistically significant link between age groups and perceptions of cryptocurrency investment risks, suggesting notable variations in risk perceptions across different age demographics. The expected frequencies offer insights into how distinct age groups perceive the risk levels associated with cryptocurrency investments.

4.4.13 Analysis of Attitudes Towards Cryptocurrency Risks by Knowledge Levels

The crosstab and chi-square test results for the relationship between knowledge levels and risk perceptions associated with investing in cryptocurrencies reveal:

Table 14: Chi-square Test

Test	Result
Chi-Square Statistic	207.43
p-value	3.8×10^{-33}
Degrees of Freedom	20

Individuals with higher knowledge levels, including those identifying as "Experts," display a nuanced understanding of risk, recognizing both moderate and high levels of risk. This indicates an informed perspective that acknowledges the complexity and volatility inherent in cryptocurrency investments. Conversely, lower knowledge levels may be associated with a tendency to perceive higher risks, likely reflecting a lack of detailed understanding or awareness of the cryptocurrency market dynamics.

Given the statistically significant association, this analysis highlights the importance of educational initiatives in shaping individuals' perceptions of cryptocurrency risks. It suggests that increasing the general public's understanding of cryptocurrencies could potentially moderate perceptions of risk by providing a more balanced view of both the opportunities and challenges presented by cryptocurrency investments.

4.4.14 Analysis of the Correlation between Regulatory Preferences and Investment Risk Perception /Reliance on Social Media for Information and Investment Risk Perception

This analysis aims to shed light on these intricate relationships, offering insights into the broader implications for cryptocurrency adoption and regulation.

Table 15: Correlation Test Result

Variables	Regulatory Preference	Investment Risk Perception	Reliance on Social Media
Regulatory Preference	1.000	0.017	-0.127
Investment Risk Perception	0.017	1.000	-0.138
Reliance on Social Media	-0.127	-0.138	1.000

The updated correlation coefficient of 0.017 indicates a very weak positive relationship between the desire for government regulation of cryptocurrencies and the perception of investment risk. This suggests a minimal correlation between regulatory preferences and perceptions of risk, with the relationship remaining statistically negligible.

The correlation coefficient of -0.127 suggests a weak negative relationship between regulatory preferences and reliance on social media for information. Individuals favoring government regulation are slightly less likely to rely on social media for cryptocurrency information.

The correlation coefficient of -0.138 indicates a weak negative relationship between investment risk perception and reliance on social media. Individuals perceiving higher investment risks are slightly less likely to use social media for cryptocurrency information.

These results maintain weak relationships among the variables, emphasizing that preferences for cryptocurrency regulation, perceptions of investment risk, and reliance on social media are relatively independent among survey respondents. This underscores the complex nature of individuals' engagement with cryptocurrencies.

4.4.15 Analyzing Sector Preferences for Cryptocurrency Adoption in Morocco: A Chi-Square Test Approach

Given the categorical nature of the data, we can conduct a chi-square test to see if the observed distribution of responses significantly differs from what might be expected under a uniform distribution. This test can help determine if there is a significant preference for certain sectors over others.

Table 16: Chi-square test

Test	Result
Chi-Square Statistic	113.262
p-value	8.37×10^{-23}
Degrees of Freedom	5

The remarkably low p-value signifies a significant departure from a uniform distribution across sectors (excluding 'none'), indicating a strong preference among respondents for certain sectors. This suggests distinct preferences regarding which sectors would benefit most from cryptocurrency adoption in Morocco. Notably, Trade and Financial Services stand out as perceived beneficiaries, surpassing others like Education or Bourse. This finding implies the perceived utility and applicability of cryptocurrencies in these sectors, aligning with global trends where commerce and financial services lead in blockchain and cryptocurrency integration.

4.4.15 Point-Biserial Correlation Analysis

The point-biserial correlation analysis reveals a nuanced portrait of how knowledge about cryptocurrencies intersects with perceptions of their impact across various sectors.

- **Variable 1:** Knowledge of Cryptocurrencies (Numeric scale from 0 to 4, where 0 indicates no knowledge and 4 indicates expert knowledge);
- **Variable 2:** Belief in Benefit for Commerce Sector (Binary variable, where 1 indicates the belief that the Commerce sector would benefit the most from cryptocurrencies, and 0 indicates otherwise).

Table 17: Point-Biserial Correlation Analysis Result

Variable	Correlation Coefficient	P-Value
Knowledge of Cryptocurrencies vs Belief in Benefits for the Trade Sector	0.0423	0.590
Knowledge of Cryptocurrencies vs. Belief in Benefits for the Financial Services Sector	0.1623	0.0373
Knowledge of Cryptocurrencies vs. Belief in Benefits for the Real Estate Sector	-0.0241	0.7586

The correlation analysis across the Commerce, Financial Services, and Real Estate sectors in relation to cryptocurrency knowledge reveals varied relationships. For the Commerce sector, a slight and statistically insignificant positive correlation (coefficient: 0.0423, p-value: 0.590) suggests that knowledge of cryptocurrencies does not significantly influence the belief in its benefits. Similarly, for the Real Estate sector, a negligible negative correlation (coefficient: -0.0241, p-value: 0.7586) indicates that increased knowledge slightly decreases the belief in its benefits, though this relationship is also statistically insignificant.

In contrast, the Financial Services sector shows a modest but significant positive correlation (coefficient: 0.1623, p-value: 0.0373), indicating that as individuals' understanding of cryptocurrencies improves, their belief in its positive impact on the Financial Services sector grows. This highlights sector-specific perceptions of cryptocurrency benefits, suggesting that increased knowledge may specifically enhance optimism about cryptocurrencies' potential in the Financial Services industry.

4.4.16 The Influence of Cryptocurrency Investment on Advocacy and Recommendation

In this study, we utilized an Independent Samples T-test to examine the likelihood of recommending cryptocurrency usage based on individuals' investment status. The goal was to determine if those who have invested in cryptocurrencies are more inclined to recommend their use to friends and family compared to those who have not made such investments.

5. Methodological Framework

The analysis was structured around two primary groups: cryptocurrency investors and non-investors, as delineated by the responses to the query, "Have you ever invested in cryptocurrencies?" Satisfaction levels were gauged using the metric, "On a scale of 1 to 10, how likely are you to recommend the use of cryptocurrencies to your friends or family?" thereby providing a quantitative measure of the participants' endorsement propensity.

Table 18: Group Statistics

	Have you ever invested in cryptocurrencies?	N	Mean	Std. Deviation	Std. Error Mean
On a scale of 1 to 10, how likely are you to recommend the use of cryptocurrencies to your friends or family?	0	106	3,89	2,681	,260
	1	22	7,41	1,843	,393

Table 19: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
On a scale of 1 to 10, how likely are you to recommend the use of cryptocurrencies to your friends or family?	Equal variances assumed	20,388	<,001	-5,872	126	<,001	<,001	-3,522	,600	-4,709	-2,335
	Equal variances not assumed			-7,473	41,883	<,001	<,001	-3,522	,471	-4,474	-2,571

Table 20: Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
On a scale of 1 to 10, how likely are you to recommend the use of cryptocurrencies to your friends or family?	Cohen's d	2,560	-1,376	-1,863	-,884
	Hedges' correction	2,576	-1,368	-1,852	-,879
	Glass's delta	1,843	-1,911	-2,637	-1,167

6. Statistical Analysis

Preliminary group statistics highlighted a discernible divergence between the two cohorts, with non-investors (N=106) reporting a mean recommendation likelihood of 3.89 (SD = 2.681), in stark contrast to investors (N=22) who recorded a substantially higher mean of 7.41 (SD = 1.843). This disparity underpins the hypothesis that investment in cryptocurrencies significantly influences one's inclination towards recommending them.

Subsequent to Levene's Test for Equality of Variances, which yielded an F-statistic of 20.388 ($p < .001$), indicating unequal variances between groups, we proceeded with the t-test that does not assume equal variances. The analysis revealed a t-statistic of -7.473 (df = 41.883), with a one-sided p-value and a two-sided p-value both less than .001, firmly

rejecting the null hypothesis in favor of a significant difference in recommendation likelihood between investors and non-investors.

6.1 Independent Samples Effect Sizes

6.1.1 Cohen's d

The Cohen's d value of 2.560 is considerably high, indicating a very large effect size. Cohen's d uses the pooled standard deviation and shows the difference in means between two groups in terms of standard deviation units. The 95% confidence interval ranges from -1.376 to -0.884, suggesting a robust effect size that is significantly different from zero. The negative sign is a convention indicating the direction of the effect; in this case, the group that has invested in cryptocurrencies is more likely to recommend them.

6.1.2 Hedges' g

Hedges' g (here corrected as Hedges' correction) is similar to Cohen's d but includes a correction for small sample sizes. The value of 2.576 is also indicative of a very large effect size, with a 95% confidence interval from -1.368 to -0.879, reinforcing the substantial difference between investors and non-investors in their likelihood to recommend cryptocurrencies.

6.1.3 Glass's Delta

Glass's delta, which is 1.843, uses the standard deviation of the control group (in this case, the non-investors) as the denominator. The measure indicates the difference in means relative to the variability observed in the non-investor group. The confidence interval for Glass's delta ranges from -2.637 to -1.167, further supporting a significant effect.

6.2 Interpretation

The effect size analyses highlight a notable difference in attitudes toward recommending cryptocurrencies between investors and non-investors. The large values of Cohen's d, Hedges' g, and Glass's Delta indicate a substantial effect, suggesting that the experience or perception of cryptocurrencies among investors significantly increases their likelihood of recommending them. Importantly, the confidence intervals for all three effect size measures do not cross zero, reinforcing the statistical significance and the considerable magnitude of the observed differences.

6.3 Implications of Findings

The statistical outcomes underscore a significant and substantial association between cryptocurrency investment and the likelihood of recommending its use to others. The marked effect sizes indicate not only statistical significance but also considerable practical importance. These findings suggest that personal investment in cryptocurrencies may play a pivotal role in shaping individuals' perceptions and advocacy behaviors, with investors potentially becoming key advocates due to positive experiences or a heightened belief in the technology's value. This could serve as a catalyst for broader adoption and

acceptance of digital currencies. This investigation quantifies the impact of personal investment experiences on cryptocurrency advocacy, highlighting investors as key proponents within their social networks. This insight is valuable for marketers, educators, and policymakers interested in understanding the drivers of cryptocurrency adoption and advocacy.

6.3.1 Deciphering the Dynamics of Cryptocurrency Engagement

6.3.1.1 Objective

To examine whether the experience of using cryptocurrencies influences user satisfaction levels.

6.3.1.2 Methodology

Independent Samples T-test to compare satisfaction scores between cryptocurrency users and non-users.

6.3.1.3 Null Hypothesis (H0)

The mean satisfaction score for cryptocurrency investors is equal to the neutral test value of 1. Mathematically, this is represented as: H0: $\mu = 1$.

6.3.1.4 Alternative Hypothesis (H1)

The mean satisfaction score for cryptocurrency investors is different from the neutral test value of 1. Formally, this is: H1: $\mu \neq 1$.

6.4 One-Sample Statistics

Table 21: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Have you ever invested in cryptocurrencies?	22	1,00	,000[a]	,000
How do you evaluate your investment returns in cryptocurrencies?	22	2,59	,796	,170

Table 22: One-Sample Test

	Test Value = 1						
	t	df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Sided p	Two-Sided p		Lower	Upper
How do you evaluate your investment returns in cryptocurrencies?	9,370	21	<,001	<,001	1,591	1,24	1,94

Table 23: One-Sample Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
How do you evaluate your investment returns in cryptocurrencies	Cohen's d	,796	1,998	1,259	2,721
	Hedges' correction	,826	1,925	1,213	2,622

All 22 respondents have invested in cryptocurrencies (mean=1, with a standard deviation of 0). This is likely coded as "1" for yes, and since all respondents are investors, there's no variation.

The mean evaluation of investment returns in cryptocurrencies is 2.59, with a standard deviation of 0.796 and a standard error of the mean of 0.170.

6.5 One-Sample Test

The test value of 1 suggests that you are comparing the mean evaluation of investment returns against a test value (probably a neutral evaluation score of 1 on a given scale).

The t-statistic is 9.370, with 21 degrees of freedom. The one-sided p-value is less than 0.001, which is also the case for the two-sided p-value, indicating that the mean evaluation score is significantly different from the test value of 1.

The mean difference is 1.591, with a 95% confidence interval ranging from 1.24 to 1.94, further showing that the actual mean evaluation of investment returns is higher than the neutral test value of 1.

6.6 One-Sample Effect Sizes

Cohen's d is 1.998, and Hedge's g is 1.925, both indicating a large effect size. These values measure the magnitude of the difference between your sample mean and the test value relative to the standard deviation of the sample.

The confidence intervals for both effect sizes are above 1, suggesting a very strong effect size.

6.6.1 Comments

The t-test and effect size calculations are based on comparing the mean satisfaction score against a hypothetical value (1). The results show that the average satisfaction score is significantly higher than this hypothetical neutral value.

The effect size is large, indicating that the amount by which the satisfaction scores deviate from the neutral value is substantial and not likely to be due to random chance.

Based on the one-sample t-test, we reject the null hypothesis (H0) in favor of the alternative hypothesis (H1), concluding that there is a significant difference between the mean satisfaction score of cryptocurrency investors and the neutral test value of 1. The large effect size confirms that this difference is substantial. The confidence interval for the mean difference does not include the value of 1, providing further evidence against

the null hypothesis. Thus, we conclude that cryptocurrency investors in this sample are, on average, more satisfied with their investment returns than a neutral satisfaction level would suggest.

The analysis indicates that the surveyed group of cryptocurrency investors reports satisfaction levels that are significantly higher than the neutral benchmark. The large effect size and the confidence interval support the conclusion that the satisfaction expressed by investors is a distinct and noteworthy deviation from neutrality. This could reflect positive perceptions of the cryptocurrency market among investors, although it should be noted that this analysis is based on a specific sample, and results may vary with a different cohort or over time.

6.6.1.1 Demographics & Investments

Age and gender do not significantly impact crypto investment preferences, suggesting other factors like risk tolerance are crucial. This aligns with existing literature highlighting the multifaceted nature of individual decisions in the crypto market.

6.6.1.2 Knowledge Gap

Despite high awareness, there's a gap in crypto understanding. Bridging it through financial education is crucial for informed decisions. Lusardi and Mitchell (2014) emphasize the importance of financial literacy in emerging markets, emphasizing the need for comprehensive knowledge.

6.6.1.3 Information Sources

Relying on social media for crypto info raises accuracy concerns. Trustworthy sources are essential to combat misinformation risks. Catalini and Gans (2016) caution against misinformation risks in decentralized platforms, stressing the need for reliable information. The influence of social media on cryptocurrency markets, demonstrated by Garcia and Schweitzer (2015), amplifies the need for reliable and authoritative sources of information.

6.6.1.4 Investment Experiences and Attitudes

Investors in cryptocurrencies are significantly more likely to recommend these digital assets to others, indicating that personal investment experience positively influences advocacy for cryptocurrencies. This distinction underscores the role of personal investment experience in shaping perceptions.

6.6.1.5 Risk Perception

Knowledge influences nuanced investment behaviors, and the perception of crypto as high-risk aligns with market volatility and investor sentiment. The respondents' perception of cryptocurrencies as high-risk investments echoes the inherent volatility of these markets, as discussed by Böhme *et al.* (2015). This is in line with the model proposed by Barberis, Shleifer, and Vishny (1998), which suggests that market narratives and

individual risk tolerance, fueled by investor sentiment, play a crucial role in shaping investment decisions.

6.6.1.6 Regulatory Clarity

The call for government regulation indicates a need for clear frameworks, enhancing market stability and security in the crypto space. This aligns with El Khamlichi and El Alaoui (2019), who argue that well-structured regulatory approaches contribute to market stability and security, particularly in economies like Morocco's.

7. Recommendations

The findings of this study on the financial psychology of Moroccans towards cryptocurrencies lead to several strategic recommendations aimed at enhancing the adoption and integration of digital currencies within the country. These recommendations are intended to address the challenges identified in the research and to leverage the potential opportunities for fostering a more inclusive and informed financial ecosystem.

7.1 Educational Campaigns and Awareness Initiatives

A comprehensive approach to increasing crypto-literacy across Morocco is crucial. Nationwide educational campaigns should be designed to target various demographic segments, with a focus on enhancing understanding of cryptocurrencies and blockchain technology. These initiatives should aim to demystify digital currencies and address common misconceptions, thereby encouraging more informed and confident participation in the digital financial landscape.

7.2 Enhanced Regulatory Framework

The establishment of a clear and supportive regulatory framework is essential for fostering a secure environment for cryptocurrency adoption. The current ambiguity in the legal status of cryptocurrencies in Morocco contributes to uncertainty among potential users. A balanced regulatory approach that protects consumers while encouraging innovation will be pivotal in building trust and attracting investment in the digital finance sector.

7.3 Incorporation of Cultural and Social Norms

Cryptocurrency adoption strategies must align with Moroccan cultural and social values, including religious considerations. Understanding and integrating these cultural factors into promotional and educational efforts will enhance the acceptability of cryptocurrencies. This culturally sensitive approach can bridge the gap between modern financial technologies and traditional practices.

7.4 Development of Local Cryptocurrency Platforms

There is a need to support the development of local cryptocurrency exchanges and platforms that cater specifically to the Moroccan market. Local platforms can offer tailored services that address the unique needs and concerns of Moroccan users, including language preferences and trust issues. This will not only enhance accessibility but also contribute to building a more resilient and user-friendly cryptocurrency ecosystem within the country.

7.5 Focus on Financial Inclusion

Cryptocurrencies present a significant opportunity to promote financial inclusion, particularly in rural and underserved areas where access to traditional banking services is limited. By leveraging digital currencies, Morocco can bridge the financial inclusion gap, providing broader access to financial services and empowering economically marginalized populations.

7.6 Promotion of Gender-Inclusive Strategies

Given the identified gender disparities in financial literacy and access, it is essential to develop gender-specific strategies that promote cryptocurrency adoption among women. Targeted educational programs and outreach efforts can ensure that women are equally informed and capable of participating in the cryptocurrency market. This will contribute to achieving greater financial equity and inclusion within the country.

These recommendations highlight the strategic steps that Morocco can take to harness the potential of cryptocurrencies while addressing the unique challenges posed by the current financial landscape. By focusing on education, regulation, cultural integration, local development, inclusion, and gender equity, Morocco can pave the way for a more secure, inclusive, and innovative financial future.

8. Conclusion

This study meticulously explores Moroccan attitudes toward cryptocurrencies, revealing diverse mindsets from cautious optimism to keen skepticism. Through K-Means cluster analysis, significant population segments have been identified, forming the basis for tailored adoption strategies in tune with the distinct educational needs and risk perceptions of Moroccan investors.

The observed gap between high awareness and limited deep knowledge of cryptocurrencies in Morocco mirrors a broader trend in emerging markets, emphasizing the vital role of structured financial education. Despite the democratization of information through social media, there is a risk of misinformation, highlighting the need for reliable sources to counter speculative investment risks.

Our research highlights a significant perception of high risk linked to cryptocurrency market volatility. This underscores the importance of applying

behavioral finance theories to understand the psychological factors shaping Moroccan investment decisions influenced by individual risk tolerance and market narratives.

A clear demand for regulatory oversight emerges to bring stability and security to financial markets, aligning with a global call for frameworks that balance innovation with investor protection. This is particularly pertinent in markets like Morocco, emphasizing the significance of effective governance in the evolving landscape of digital finance.

However, limitations such as convenience sampling and the potential for response bias, coupled with the digital divide, might have impacted the study's findings. Based on our insights, we recommend the following:

- **Educational Initiatives**: Urgent development of comprehensive cryptocurrency education programs in Morocco is necessary to enhance from basic awareness to detailed understanding, mitigating uninformed investment risks.
- **Reliable Information Sources**: Establishing credible information platforms on cryptocurrencies is vital. Collaboration between financial regulators, academia, and media could be key in providing accurate information.
- **Policy Implications**: Advocacy for a regulatory framework that encourages innovation while protecting investors is crucial, considering Morocco's unique socio-economic landscape.
- **Further Research**: Future studies should aim for more representative sampling methods to capture a broader spectrum of Moroccan views on cryptocurrencies. Longitudinal research could reveal how perceptions and behaviors evolve as the cryptocurrency market develops.

By linking theoretical frameworks with empirical findings, this study contributes to the dialogue on cryptocurrencies, offering a refined perspective on the financial psychology driving digital currency adoption in emerging markets like Morocco.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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