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Original Research

Assessing the Relationship Between Auditor Well-Being and Audit Quality: Insights from the North American Auditing Context

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Abstract

This research examines the relationship between auditors' psychological well-being and the quality of audits they conduct, a subject that has received limited attention in scholarly discourse. Traditional studies in the field have primarily centred on auditors' professional skills, ethical standards, and the pressures inherent in their roles, often overlooking the potential influence of their mental health on audit outcomes. By conducting an empirical investigation among auditors in North America, this study finds a significant and positive link between the well-being of auditors and the quality of their audit work, thereby underscoring the critical role of psychological health in the auditing profession. The findings of this research underscore the necessity for auditing firms to adopt and enhance mental health and well-being programs as part of their strategic initiatives to improve audit quality. By integrating well-being into the organizational culture and operational practices, firms can not only elevate the quality of audit outputs but also contribute to a healthier, more productive, and ethically sound professional environment. This study broadens the scope of audit quality research by integrating psychological well-being into the array of factors that influence audit outcomes, offering a new perspective on achieving excellence in auditing practices. The implications of this research extend beyond the immediate auditing community, suggesting a reevaluation of professional well-being in similar high-stakes, high-pressure fields.

Keywords: Audit Quality, Auditor Well-being, Cultural Nuances, North American Auditing, Organizational Culture, Psychological Well-being.

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Introduction

The relationship between audit quality and the myriad factors influencing it forms a critical discourse within the financial integrity and accountability domains. Much of the current research predominantly hones in on the professional attributes of auditors—such as independence, competence, and workload pressures—as pivotal to audit quality (Himmawan et al., 2019; Ismail et al., 2019). Moreover, aspects like tenure length are posited to enhance quality perceptions, likely due to accrued expertise and familiarity with auditing standards over time (Ghosh & Moon, 2005). Intellectual capital, consisting of the collective knowledge, expertise, and professional rapport within audit firms, also emerges as a vital determinant of audit outcomes (Peprah, 2019). Additionally, the ethical demeanour of auditors and their adeptness at managing comprehensive tasks under stringent deadlines are linked to superior audit results (Calocha & Herwiyanti, 2020; Meidawati & Assidiqi, 2019).

Despite the substantial exploration of these dimensions, the specific impact of auditors' psychological well-being on audit quality remains remarkably under-explored. This oversight is notable given the critical role of cognitive functioning and decision-making, underpinned by psychological well-being, in the meticulous and impartial execution of audit tasks.

As demonstrated by studies such as Fitriani et al. (2022) and Muterera and Brettle (2024), the emerging literature indicates a noteworthy correlation between auditor well-being and audit quality. The body of work underscores the imperative to dig deeper into this potential relationship across diverse regulatory and cultural backdrops, including the North American auditing landscape.

Aiming to fill this gap, the present study investigates the direct and positive correlation between auditor well-being and audit quality within a North American framework. By synthesizing insights from prior investigations and adopting a rigorous methodological approach, this study seeks to explain the influence of auditors' psychological well-being on audit quality. Additionally, it seeks to inform the development of worthwhile strategies aimed at bolstering audit quality by promoting auditor well-being, thereby offering substantial implications for both the scholarly domain and auditing practice.

Literature Review and Theoretical Background

In recent years, the discourse surrounding audit quality has intensified, with scholars investigating various factors influencing it. For example, Alissa et al. (2014) explored the effects of audit characteristics and auditor traits on auditor performance. In another study, Ismail et al. (2019) explored the relationship between auditor independence, competence, and workload with audit quality in the Malaysian public sector. Their findings underscored the critical role of auditor competence as a significant determinant of audit quality, while workload was found to have a negligible impact.

Building upon this, (Himmawan et al., 2019) extended the analysis to include auditor ethics as a moderating variable. Their research revealed that while auditor competence

positively affected audit quality, independence did not significantly impact it. However, when moderated by auditor ethics, independence positively influenced audit quality. This introduced the pivotal role of ethics in enhancing the relationship between independence and audit quality, suggesting that ethical considerations can amplify the positive effects of auditor independence.

Meidawati and Assidiqi (2019) broadened the scope further by examining additional factors such as audit fees and time budget pressure. Their findings indicated that while competence and auditor ethics positively influenced audit quality, audit fees negatively impacted independence, and independence was non-influential. This suggests a complex interplay between financial incentives and professional attributes in determining audit quality.

Peprah (2019) and Calocha and Herwiyanti (2020) contributed to the discussion by providing empirical evidence from different contexts. Peprah (2019) highlighted the influence of regulatory frameworks on audit quality, pointing to the need for robust standards and practices that ensure auditor independence and competence. On the other hand, Calocha and Herwiyanti (2020) emphasized the impact of organizational culture and auditor-client relationships on audit quality, suggesting that these softer factors play a crucial role in shaping audit outcomes.

Ghosh and Moon (2005) provided a historical perspective, tracing audit practices' evolution and impact on audit quality. Their analysis suggested that the development of auditing standards and the increasing emphasis on auditor independence and competence have been central to enhancing audit quality over time.

The research by Truong (2018) investigated the relationship between audit employee job satisfaction and audit quality, employing a dataset from Glassdoor.com and utilizing natural variations in local precipitation as an exogenous factor. The study found that higher job satisfaction among audit employees significantly improved audit quality, evidenced by decreased absolute abnormal accruals and a higher likelihood of detecting significant accounting irregularities. Notably, the aspects of job satisfaction driving these effects are identified as management quality and career opportunities, suggesting specific areas for audit firms to focus on to enhance audit quality.

Collectively, these studies paint a comprehensive picture of the factors influencing audit quality. They underscore the multifaceted nature of audit quality, influenced by a combination of auditor attributes (such as competence and ethics), organizational and client relationships, regulatory frameworks, and financial incentives.

The Emergence of Psychological Well-Being

Although the effects of auditor independence, expertise, and workload pressures are well-established, the direct impact of auditors' psychological well-being on audit quality is less examined. Psychological well-being encompasses life satisfaction, emotional equilibrium, and a sense of purpose, which are vital for cognitive functions and decision-making capabilities. Some researchers, including; Çollaku et al. (2023); Fauzan and Kamaruddin (2022); Yana et al. (2022); Ramadhani et al. (2020); Suwandi et al. (2020);

Salehi et al. (2020); Merawati (2019); Lohapan and Ussahawanitchakit (2016) have begun to address aspects of this issue.

The Fitriani et al. (2022) study investigated the impact of a healthy lifestyle and psychological well-being on auditor performance, with auditor integrity as a moderating variable. The research posited that a healthy lifestyle and psychological well-being could positively influence auditor performance. A healthy lifestyle was conceptualized as practices contributing to physical and mental health, such as regular exercise, a balanced diet, adequate rest, and avoiding harmful substances. Psychological well-being was understood as a state of positive mental health where individuals have a positive attitude towards themselves and others, exhibit self-regulation, and find meaning and purpose in life.

The study's hypotheses were grounded in expectancy theory, which suggests that expected outcomes drive behaviour (Fitriani et al., 2022). The research hypothesized that a healthy lifestyle would directly contribute to better auditor performance by enhancing physical and mental readiness for audit tasks. Similarly, psychological well-being was expected to lead to improved performance by fostering a positive work attitude and reducing stress and job dissatisfaction (Fitriani et al., 2022).

The moderating role of auditor integrity was also examined (Fitriani et al., 2022). Integrity was defined as honesty, transparency, responsibility, courage, and wisdom in the audit process. The study speculated that high levels of integrity could enhance the positive effects of a healthy lifestyle and psychological well-being on performance. This is because auditors with high integrity are likely to be more committed to their professional responsibilities, including maintaining their health and mental well-being, thereby potentially amplifying the benefits of a healthy lifestyle and psychological well-being on their work performance.

Most recently, the research conducted by Muterera and Brettle (2024) investigated the relationship between auditor well-being and audit quality, highlighting the crucial but often overlooked aspect of auditor well-being within the auditing profession. The key findings from this study underscored a significant positive relationship between auditor well-being and audit quality (Muterera & Brettle, 2024). These results indicate that auditors' mental well-being, characterized by aspects such as positive affect, interpersonal satisfaction, and effective functioning, contributes to enhancing the performance and outcomes of audit processes.

Building on the research discussed earlier, this study proposes the theoretical model depicted in Figure 1 and the hypothesis that there is a direct and positive link between the well-being of auditors and the quality of their audit work. This hypothesis is based on the idea that auditors' mental and emotional state plays a crucial role in their capacity to perform detailed and impartial audits. Thus, the hypothesis posited is as follows:

H₁: Auditor Well-being (WB) and Audit Quality (AQ) have a significant positive relationship.

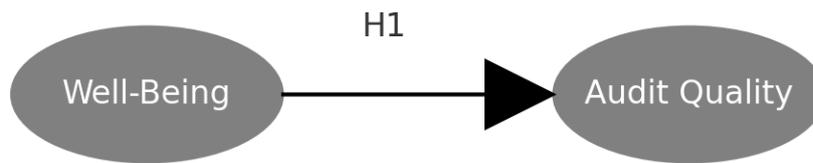


Figure 1: Theoretical Model

Methods

Sampling Strategy and Participants

The study's sample was composed of auditors, strategically selected through a snowball sampling technique, initiated from various professional auditing and accounting membership bodies in the United States and Canada. This approach was particularly effective in reaching a broad and diverse group of practitioners in the field, starting with initial contacts within these organizations and expanding outward through their professional networks. By leveraging the interconnectedness of members within these bodies, the study was able to tap into a rich vein of participants, encompassing a wide range of organizational affiliations. This method ensured the inclusion of a diverse array of auditors, from those in large, multinational firms to individuals in smaller, local practices, thereby providing a comprehensive view of the auditing landscape across these two countries.

The demographic profile of the 593 participants in this study revealed a balanced gender distribution with 54% females ($n=321$) and 46% males ($n=272$). The majority of participants held a Bachelor's degree (60%, $n=355$), followed by those with a Master's degree (33%, $n=197$), and a smaller fraction had obtained a PhD or other doctoral degrees (7%, $n=41$). A significant proportion of the respondents (92%, $n=546$) reported having professional certifications, contrasting with 8% ($n=47$) who did not possess such qualifications. Regarding tenure in their current position, the largest group comprised individuals with 6-10 years of experience (38%, $n=224$), followed by those within the 1–5-year range (27%, $n=162$). Participants with 11-15 years of tenure accounted for 20% ($n=120$), those with 16-20 years constituted 10% ($n=60$), and a minority had been in their position for over 21 years (5%, $n=27$).

Measurement Instruments

Auditor Well-being: For assessing auditor well-being, the study adopted the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), a tool crafted initially to measure the psychological welfare of healthcare professionals (Tennant et al., 2007). This scale comprises 14 positively worded items, offering respondents a five-point scale that ranges from "none of the time" to "all of the time," thereby capturing a broad spectrum of mental well-being dimensions, both emotional and functional. The WEMWBS has been validated through rigorous testing, showing strong construct validity with all items being significant contributors to the scale and exhibiting high levels of reliability, as evidenced by a test-retest reliability score of 0.83 and an internal consistency coefficient (Cronbach's alpha) of 0.89 (Stewart-Brown & Janmohamed, 2008).

Audit Quality: The concept of audit quality is multifaceted, reflecting diverse perspectives and proxies outlined in the literature. Husain (2020) provides a comprehensive review, categorizing the various proxies for audit quality utilized in research, such as auditor firm size, audit fees, and auditor independence. This categorization aids in navigating the complexity of this domain. Considering the complexities and the array of definitions surrounding audit quality, this study employed subjective measures to capture this construct, utilizing a Likert-type scale ranging from 1 to 5, where 1 signifies "Strongly Disagree" and 5 denotes "Strongly Agree."

Audit Quality (AQ) was assessed in the study using a set of seven items developed by the authors. AQ1, "The auditor maintains an objective and unbiased stance throughout the audit process"; AQ2, "The auditor is free from external pressures that could influence audit decisions"; AQ3, "The auditor effectively uses professional judgment in evaluating financial information"; AQ4, "The auditor critically assesses accounting estimates and management representations"; AQ5, "The audit procedures are comprehensive and cover all necessary aspects of the financial statements"; AQ6, "The auditor adequately tests the internal controls of the organization"; and AQ7, "The auditor consistently follows national and international auditing standards." These items were designed to encompass the multifaceted nature of audit quality, capturing aspects of auditor independence, professional judgment, thoroughness of audit procedures, and adherence to auditing standards.

Data Analysis

In this study, we selected several statistical methodologies to thoroughly analyze data from auditors and effectively interpret the relationship between auditor well-being and audit quality. Initially, we thoroughly examined the data and assumptions of multivariate analysis—including normality, linearity, and multicollinearity—confirming that they were within acceptable limits. This ensured the validity of the statistical techniques employed in our study.

We conducted descriptive statistics to provide an overview of sample characteristics, including means, standard deviations, and distributions for key variables. Auditor well-being, assessed through the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), was treated as the independent variable, while perceptions of audit quality served as the dependent variable.

To ensure the reliability of our measurement models for well-being and audit quality, we utilized Confirmatory Factor Analysis (CFA). This statistical technique tested whether our selected observed variables—such as responses from the WEMWBS for well-being and the developed items for audit quality—aligned with their underlying theoretical concepts. By employing CFA, we aimed to validate our measurement scales and establish a strong foundation for analyzing the relationship between auditor well-being and audit quality.

Furthermore, Structural Equation Modeling (SEM) was employed to evaluate the proposed theoretical model. SEM integrates factor analysis and multiple regression elements, making it well-suited for examining relationships between observed and latent

variables. This approach allowed us to explore direct effects within our model, providing a nuanced understanding of the relationship between auditor well-being and audit quality.

Results

Means and Construct Reliability

The descriptive statistics for the constructs of Auditor Well-being and Audit Quality, as presented in Table 1, offer insightful details about the distribution and reliability of the measured variables within our sample.

Table 1. Means and Construct Reliabilities

	Mean	Std. Deviation
Auditor Well-being (Reliability $\alpha = 0.97$)		
WB1	2.99	0.81
WB2	2.97	0.80
WB3	3.06	0.84
WB4	2.93	0.79
WB5	3.04	0.83
WB6	2.97	0.80
WB7	3.00	0.79
WB8	2.99	0.83
WB9	3.02	0.81
WB10	3.00	0.80
WB11	2.93	0.78
WB12	3.02	0.80
WB13	3.04	0.85
WB14	2.93	0.78
Audit Quality (Reliability $\alpha = 0.90$)		
AQ1	3.17	0.67
AQ2	3.02	0.75
AQ3	2.98	0.75
AQ4	2.93	0.70
AQ5	2.81	0.62
AQ6	2.99	0.69
AQ7	2.89	0.65

The construct of Auditor Well-being, with a high-reliability coefficient ($\alpha = 0.97$), indicates excellent internal consistency among its 14 items (WB1-WB14). The means of the Well-being items ranged narrowly from $\bar{x} = 2.93$ (WB4, WB11, and WB14) to $\bar{x} = 3.06$ (WB3), suggesting a relatively uniform perception of Well-being among the auditors in this study. The standard deviations for these items ranged from $sd = 0.78$

(WB 11 and WB14) to $sd = 0.85$ (WB13), indicating a modest spread of responses around the mean values.

Similarly, the Audit Quality construct demonstrated robust reliability ($\alpha = 0.90$), underscoring the consistency of the 7 items (AQ1-AQ7) in capturing the essence of audit quality. The mean scores for audit quality items ranged from $\bar{x} = 2.81$ (AQ5) to $\bar{x} = 3.17$ (AQ1). This range indicates a generally positive assessment of audit quality among the participants. The standard deviations for these items, ranging from $sd = 0.62$ (AQ5) to $sd = 0.75$ (AQ2 and AQ3), indicate consistent responses among participants.

The descriptive statistics discussed above underline a moderate level of perceived well-being among auditors, with relatively consistent responses across the well-being items. Similarly, the audit quality construct demonstrates a slightly broader but moderate range of perceptions, with consistent responses and high internal consistency. These results provide a solid foundation for further analysis of the relationship between auditor well-being and audit quality.

Convergent Validity

In evaluating the constructs of auditor well-being (WB) and audit quality (AQ) within the North American auditing profession sample, confirmatory factor analysis (CFA) served as a tool to ascertain the convergent validity of our measurement model. Convergent validity assesses the extent to which multiple indicators of a single construct converge, reflecting a shared underlying theoretical concept. This section delves into the model fit indices and standardized loadings as evidence of convergent validity in our study.

The Chi-Square test (χ^2) yielded a value of 213.66 with degrees of freedom (df) = 188 and a p -value of .097. According to conventional thresholds, a p -value greater than .05 denotes an acceptable model fit (Kline, 2023). Furthermore, the χ^2/df ratio stood at 1.14, significantly below the widely accepted cutoff of 3 (Carmines et al., 1981), suggesting a good model fit.

The Root Mean Square Error of Approximation (RMSEA) was .02, well below the .05 threshold (Steiger, 1990), indicating a close fit between the model and the observed data. Complementary indices such as the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Incremental Fit Index (IFI) were all .99, surpassing the commonly accepted benchmark of .95, indicating an excellent fit between the hypothesized model and the observed data (Hu & Bentler, 1999). The Standardized Root Mean Square Residual (RMR) was measured at .01, while the Goodness of Fit Index (GFI) was .97. A GFI close to 1 is generally desired, and an RMR approaching 0 indicates minimal residual variance, both of which suggest a good fit of the model (Jöreskog & Sörbom, 1982). Overall, these indices collectively affirm the model's strong fit, providing a solid foundation for assessing the constructs' convergent validity.

Table 2. Measurement Model Fit Indices and Convergent Validity

Construct	Indicator	Standardized Loading	R ² Value
Auditor Well-being (WB)	WB1	0.83*	0.69
Auditor Well-being (WB)	WB2	0.87*	0.75
Auditor Well-being (WB)	WB3	0.80*	0.64
Auditor Well-being (WB)	WB4	0.85*	0.72
Auditor Well-being (WB)	WB5	0.80*	0.64
Auditor Well-being (WB)	WB6	0.86*	0.74
Auditor Well-being (WB)	WB7	0.82*	0.67
Auditor Well-being (WB)	WB8	0.84*	0.71
Auditor Well-being (WB)	WB9	0.82*	0.68
Auditor Well-being (WB)	WB10	0.85*	0.72
Auditor Well-being (WB)	WB11	0.86*	0.74
Auditor Well-being (WB)	WB12	0.80*	0.64
Auditor Well-being (WB)	WB13	0.83*	0.69
Auditor Well-being (WB)	WB14	0.70*	0.49
Audit Quality (AQ)	AQ1	0.77*	0.59
Audit Quality (AQ)	AQ2	0.77*	0.59
Audit Quality (AQ)	AQ3	0.78*	0.61
Audit Quality (AQ)	AQ4	0.73*	0.53
Audit Quality (AQ)	AQ5	0.74*	0.55
Audit Quality (AQ)	AQ6	0.70*	0.49
Audit Quality (AQ)	AQ7	0.76*	0.57
All coefficients were significant $p < 0.01$			

For the Auditor Well-being construct, all indicators (WB1 to WB14) demonstrated substantial standardized loadings, ranging from $lx = 0.80$ to $lx = 0.87$, indicating strong associations with the latent construct. These loadings are above the recommended threshold of 0.7, suggesting a high level of convergent validity (Hair et al., 2010). Correspondingly, the R^2 values for these indicators varied between $R^2 = 0.64$ and $R^2 = 0.75$, implying that the underlying Auditor Well-being construct can explain between 64% and 75% of the variance in each well-being indicator. These high R^2 values further affirm the indicators' substantial shared variance with the latent construct, reinforcing the convergent validity of the Auditor Well-being construct.

Similarly, the Audit Quality construct indicators (AQ1 to AQ7) exhibited strong standardized loadings, with values ranging from $lx = 0.70$ to $lx = 0.78$. These loadings, consistent with the Auditor's Well-being indicators, exceed the 0.7 benchmark, indicative of satisfactory convergent validity (Hair et al., 2010). The R^2 values for these indicators ranged from $R^2 = 0.50$ to $R^2 = 0.61$, suggesting that the latent Audit Quality construct accounts for 50% to 61% of the variance in each Audit Quality indicator. These findings provide empirical support for the indicators' substantial shared variance with the Audit Quality construct, further validating its convergent validity.

Discriminant Validity

In assessing discriminant validity within the constructs of Auditor Well-being (WB) and Audit Quality (AQ), we utilized the Heterotrait-Monotrait (HTMT) ratio of correlations as an indicator. The HTMT ratio is a relatively new criterion for assessing discriminant validity and is considered a superior approach relative to traditional methods, such as the Fornell-Larcker criterion (Henseler et al., 2015).

The HTMT ratio is calculated as the mean of the heterotrait-heteromethod correlations (correlations between items measuring different constructs) divided by the mean of the monotrait-heteromethod correlations (correlations among items measuring the same construct). For our analysis, the heterotrait-heteromethod (HT) correlations averaged 0.212, and the monotrait-heteromethod (MT) correlations averaged 0.268 for the AQ scale and 0.452 for the WB scale. This yielded an HTMT ratio of 0.61.

According to Henseler et al. (2015), an HTMT value below 0.85 is indicative of sufficient discriminant validity, although a more conservative threshold of 0.90 is sometimes employed. With an HTMT ratio of 0.61 in our analysis, we are well below both thresholds, indicating a clear discriminant validity between Auditor Well-being and Audit Quality constructs. This suggests that the constructs are distinct and that the indicators used to measure them do not reflect an excessive overlap in what they are purported to measure.

Hypothesis Testing in SEM Analysis of Auditor Well-being and Audit Quality

We posited that Auditor Well-being (WB) significantly impacts Audit Quality (AQ). This hypothesis was grounded in the theoretical framework suggesting that auditors' psychological and emotional state, reflected in their Well-being, influences their ability to conduct thorough and accurate audits, thereby affecting the overall quality of audits.

As shown in Figure 2, our SEM analysis revealed that the direct path from Auditor Well-being to Audit Quality was significant, with a standardized regression weight of $\gamma_1 = .61$. This finding substantiates our hypothesis that Auditor Well-being has a positive and meaningful impact on Audit Quality. The positive weight indicates that improvements in auditor well-being are associated with enhancements in audit quality, which aligns with our theoretical expectations.

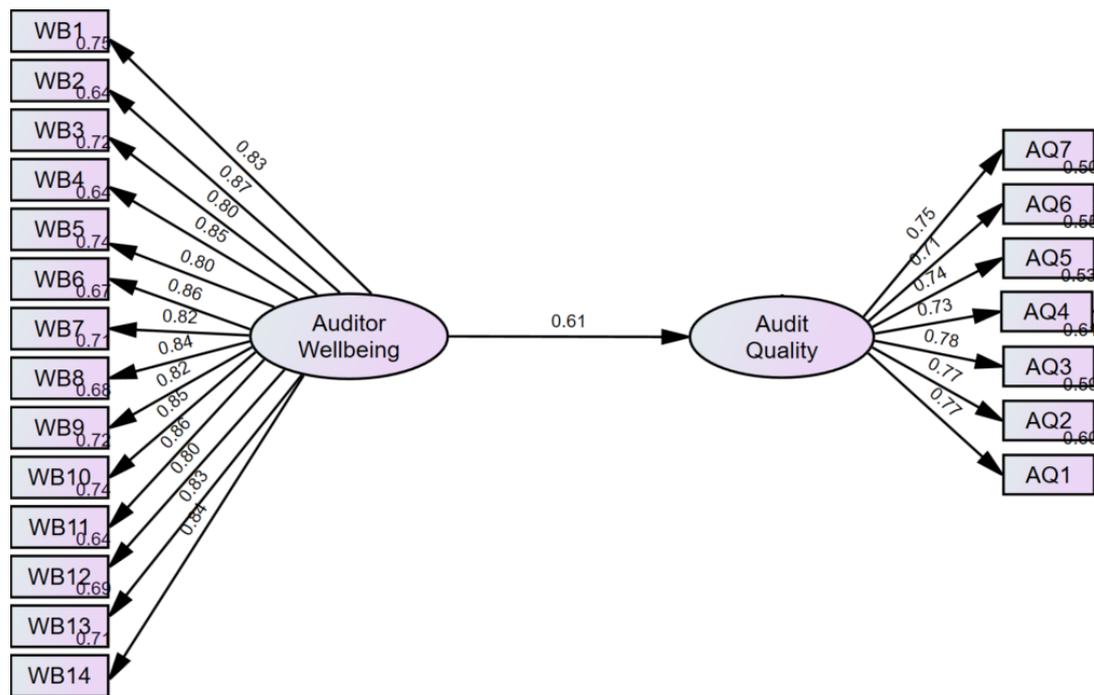


Figure 2. Results from the Structural Model Analysis

Discussion

Our study's results resonate with the findings of Muterera and Brettle (2024), yet extend the discourse by situating it within the North American context. Both studies affirm a significant positive correlation between auditor well-being and audit quality, underscoring the pivotal role of psychological well-being in the auditing profession. The current research also aligns with Fitriani et al. (2022) in underscoring the significance of psychological well-being and a healthy lifestyle in enhancing auditor performance. Fitriani et al. revealed that a healthy lifestyle and psychological well-being positively and significantly influence auditor performance. This finding is particularly resonant with our study, which also identifies a positive correlation between auditor well-being and audit quality. The convergence of these findings underscores the broader applicability of the relationship across diverse contexts and highlights the universal importance of auditor well-being in promoting high-quality audit outcomes.

Our research, leveraging a sample of 593 auditors from the United States and Canada, demonstrated through structural equation modelling (SEM) that auditor well-being significantly impacts audit quality (standardized γ_1 coefficient = 0.61). This indicates that as auditor well-being increases, so does the quality of audit work. This positive association echoes Muterera & Brettle's (2024) findings, which, through a survey of 360 auditors in southern African countries, revealed a similar positive relationship. However, the current study distinguishes itself by delving into the North American auditing environment, characterized by its unique regulatory, cultural, and professional landscapes.

The convergence of findings across different geographical regions highlights the universality of the well-being-audit quality link, suggesting that irrespective of locale, auditors' well-being is a crucial determinant of audit quality. This universality reinforces the imperative for auditing firms globally to invest in supportive work environments that foster auditor well-being.

Moreover, the current study enriches the dialogue initiated by Muterera and Brettle (2024) by shedding light on the specific aspects of well-being that are most salient in the North American context. The nuanced understanding of well-being in our study, measured through the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), provides a comprehensive view of well-being that encompasses both emotional and functional dimensions. This holistic approach to assessing well-being offers a deeper insight into how various facets of psychological health influence auditors' performance and, by extension, audit quality.

Additionally, our research contributes to a broader conceptualization of audit quality within the auditing profession. By employing subjective measures developed by the authors to capture the multifaceted nature of audit quality, our study acknowledges the complexity of defining and measuring audit quality. This approach contrasts with traditional proxies such as auditor firm size or audit fees, encouraging a more nuanced exploration of what constitutes quality in audit work.

Overall, the current study not only corroborates the findings of Muterera and Brettle (2024) regarding the positive impact of auditor well-being on audit quality but also advances the discourse by contextualizing it within the North American auditing environment. The consistency of findings across different regions underscores the global relevance of auditor well-being as a key determinant of audit quality.

Limitations and Opportunities for Future Research

While providing valuable insights into the relationship between auditor well-being and audit quality, our study is subject to several limitations. Firstly, the foundational reliance on self-reported data stands as a primary limitation. While self-assessment instruments provide a window into the auditors' perceptions of their well-being and their appraisal of audit quality, they inherently carry the risk of response bias. Such bias might manifest in various forms—social desirability bias could lead auditors to portray an overly positive view of their well-being or the quality of audits they conduct, or, conversely, a tendency towards self-criticism might skew results in the opposite direction. While valuable for capturing personal experiences and perceptions, this subjective nature of data collection necessitates cautious interpretation and underscores the need for triangulation with more objective measures in future research endeavours. Future studies could employ a mixed-methods approach, incorporating both qualitative and quantitative measures to triangulate data and mitigate the risks of response bias. For instance, integrating objective performance metrics or third-party evaluations of audit quality with self-reported measures could offer a more comprehensive and balanced view. Additionally, qualitative interviews could provide deeper insights into the personal experiences and perceptions of auditors, enriching the understanding of the well-being-audit quality relationship.

Second, the cross-sectional design of our study, capturing a single snapshot in time, constrains our ability to ascertain causal relationships. While we identify a notable association between auditor well-being and audit quality, the directional intricacies of this relationship remain speculative. Does enhanced well-being lead to improved audit quality, or do successful audit outcomes contribute to an auditor's sense of well-being? Or perhaps a reciprocal relationship exists between the two? These questions point towards the complexity of causality that a cross-sectional approach cannot unravel, highlighting the potential value of longitudinal studies that can track these variables over time and offer a clearer view of their interaction and causal pathways. Longitudinal research designs present a significant opportunity to explore the temporal dynamics and causality within the well-being-audit quality relationship. Future research could track auditors over time, examining how changes in well-being impact audit quality and vice versa. Such studies could also explore the potential reciprocal nature of this relationship, providing insights into how auditors' well-being and audit outcomes influence each other over time.

Third, the methodology employed in sample recruitment, though strategic, introduces another layer of limitation. While effective in reaching a wide network of auditors across various firms and practice settings, the snowball sampling technique may inadvertently lead to a sample with inherent biases. Given its reliance on professional networks and contacts, this approach might skew the sample towards auditors within certain circles or with specific shared characteristics, potentially overlooking the diversity present in the broader auditor population. This limitation points to the possibility that our findings, though indicative, may not fully encapsulate the varied experiences and perceptions of auditors across the entire North American auditing landscape. Future studies might explore alternative sampling strategies to ensure a more representative and diverse participant pool. Stratified random sampling, for instance, could ensure the inclusion of auditors from a wide range of firm sizes, specialties, and geographic locations, providing a more comprehensive view of the auditing landscape. Additionally, the research could investigate potential differences in well-being and audit quality across different segments of the auditor population, such as those working in different types of audit firms (Big 4 vs. non-Big 4), industries, or regions, to discern any variances attributable to these factors.

The fourth limitation of our study is its focus on the North American context, which may constrain the generalizability of our findings to regions with different cultural and organizational norms. While our research provides valuable insights into the relationship between auditor well-being and audit quality within the North American auditing landscape, the applicability of our findings to other cultural contexts warrants careful consideration. Future research endeavours could address this limitation by conducting cross-cultural studies that examine the relationship between well-being and audit quality across diverse cultural and organizational settings. Additionally, comparative analyses between regions could help identify similarities and differences in this relationship, offering insights into the influence of cultural and organizational factors. By acknowledging and addressing these contextual differences, researchers can enhance the breadth and applicability of knowledge in auditing and well-being.

Finally, one of the most significant limitations of our study is the simplicity of the conceptual model that primarily focuses on the direct relationship between auditor well-

being and audit quality. While this approach provides valuable initial insights into the potential impact of well-being on audit outcomes, it overlooks the complexity of the auditing environment and the myriad factors that can influence this relationship. The audit process is multifaceted, with numerous individual and organizational variables that can mediate or moderate the well-being-audit quality link. For instance, factors such as job stress, organizational support, work-life balance, and the ethical climate of the workplace can significantly affect this relationship but were not accounted for in our simplistic model. This limitation opens several avenues for future research to develop a more comprehensive and nuanced understanding of the dynamics at play. Future studies could adopt a more complex model that includes potential mediators and moderators in the well-being-audit quality relationship. For example, research could explore how job stress mediates the relationship between well-being and audit quality or how organizational support and ethical climate might moderate this relationship, enhancing or diminishing the impact of well-being on audit outcomes.

Incorporating these additional variables into the model could provide a deeper, more nuanced understanding of the conditions under which auditor well-being most strongly influences audit quality. Moreover, investigating these mediators and moderators could offer actionable insights for audit firms looking to design interventions to enhance audit quality by fostering auditor well-being.

Additionally, future research could employ advanced statistical techniques, such as structural equation modelling (SEM) with mediation and moderation analysis, to test these more complex models. This approach would allow for a more detailed examination of well-being's direct and indirect effects on audit quality, accounting for the interplay of various individual and organizational factors.

Therefore, while our study lays the groundwork by highlighting the importance of auditor well-being for audit quality, acknowledging and addressing its model's simplicity paves the way for more sophisticated research endeavours. By embracing the complexity of the auditing profession, future studies could significantly advance our understanding of how to enhance audit quality through the well-being of auditors.

Practical Implications

The findings from this study carry significant implications for auditing firms and the broader accounting profession. Firstly, we call for a paradigm shift in how firms approach auditor well-being. Creating a supportive work environment that balances the demanding nature of auditing with adequate job resources can mitigate burnout and stress, enhancing audit quality. Firms are encouraged to adopt flexible work arrangements, provide opportunities for remote work, and introduce well-being initiatives such as sabbaticals or mental health days.

Secondly, fostering a corporate culture that prioritizes well-being can lead to a more engaged, motivated, and resilient workforce. This cultural shift should include regular well-being assessments and confidential counselling services to address well-being issues proactively. Integrating well-being metrics into performance evaluations and recognizing practices that enhance well-being can further solidify this culture.

Lastly, investing in auditor well-being should be considered a strategic imperative for improving audit quality. This could involve leveraging advanced technological tools to streamline audit processes, reducing manual workload and stress. Continuous professional development programs that equip auditors with the latest skills and knowledge can bolster their confidence and job satisfaction.

By reorienting their strategies towards enhancing auditor well-being, firms can elevate the quality of their audit outputs and forge a reputation for ethical and professional integrity. This, in turn, can strengthen client trust and satisfaction, securing a competitive edge in the market. As the auditing profession evolves, emphasizing auditor well-being will likely become a hallmark of forward-thinking, responsible, and successful auditing practices.

Conclusions

The current study, conducted within the North American context, provides valuable insights into the interplay between auditor well-being and audit quality, offering significant implications for both research and practice in auditing. By employing a quantitative approach and utilizing established psychological scales such as the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), this research sheds light on the crucial role of auditor well-being in enhancing audit performance and ethical decision-making.

The study's findings reveal that auditors' well-being is positively associated with the quality of audit work. This suggests that auditors who experience higher levels of well-being are more likely to approach their tasks with greater precision, commitment, and ethical consideration, thereby contributing to the overall integrity and effectiveness of the audit process.

Furthermore, the research highlights the importance of creating supportive work environments that balance the rigorous demands of the auditing profession with adequate job resources. Such environments mitigate the risk of job burnout and stress and foster a culture that values well-being, ultimately leading to improved audit quality. This underscores the need for auditing firms to prioritize initiatives aimed at enhancing auditor well-being as a strategic approach to achieving excellence in audit quality.

In conclusion, our study, in conjunction with the insights from Fitriani et al. (2022) and Muterera & Brettle (2024), collectively advocate for reorientating auditing firms' policies toward fostering auditor well-being. This strategic focus on well-being is posited as a moral imperative and a foundational pillar in the pursuit of excellence in audit quality. As the profession continues to evolve, the well-being of auditors will undoubtedly remain a critical factor in shaping the landscape of audit quality and integrity.

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Original Research

Exploring the Sense of Overconfidence Bias on Investment Decisions: Insight from The Retail Investors of Bangladesh

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Abstract

Investment decisions are influenced by several rational and irrational factors. The most common irrational phenomena are behavioral biases, such as overconfidence or herding bias. This paper intends to examine the impact of overconfidence bias on investment decisions from the perspective of Bangladeshi retail investors. The current study is based on primary data collected from general investors through a survey of a self-developed questionnaire. For surveying the questionnaire, investors were selected following the convenience sampling technique. Collected data were analyzed using Correlation, OLS Regression, One-way ANOVA, and One sample t-test in SPSS software. The study found that the investment decision is significantly influenced by the overconfidence bias. They think they can outperform the market and rely on their capability to analyze an investment opportunity. Such behavior could be very harmful to themselves as well as the market stability. The study also found that male investors tend to be more overconfident in their investment decisions than females. The empirical model concludes that there exists significant overconfidence bias among retail investors. This research could be helpful for stakeholders of the capital market to understand the tendency of Bangladeshi investors towards overconfidence bias.

Keywords: Behavioral Bias, Investment Decision; Investor; Outperform; Overconfidence.

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Introduction

The traditional finance theory focuses only on how the investors should behave and how to make rational decisions. These theories assume that investors or individuals are “Rational Economic Men”. But in reality, the individuals or investors don’t behave like they should have. Behavioral finance tries to understand why people make irrational decisions and which types of biases are causing this (Grežo, 2021). Many researchers have found that overconfidence bias is one of the most important common biases that can be observed among investors (Costa et al., 2017). There is a lot of research which are conducted in Bangladesh in the field of behavioral finance but none of them were done to analyze the effect of overconfidence bias of Bangladeshi investors (Yasmin & Ferdaous, 2023). In this paper, the researcher will try to analyze the effect of overconfidence bias on investment decisions of investors in Bangladesh.

The thought process of investors is essential in determining the market outcome, especially in the stock market (Baker & Wurgler, 2007). Market vulnerability is so frequent that sometimes it is taken for granted as caused by the behavioral cognitive (Detert & Edmondson, 2011). It is perceived that only investor psychology is being considered under behavioral finance but the domain considers the bias of financial analysts too. It is the combination of investors, analysts, traders, and brokers who act directly in the purchase and sale of a stock (Shefrin, 2002). There are several important biases possessed by the investor that influence their buying-selling decision. Overconfidence, an illusion of control, self-attribution, hindsight bias, confirmation, and representative bias are the main areas where investors get trapped in their minds in decision-making (Shah et al., 2018). Among them, overconfidence bias is most simple to understand but irresistible for the investor (Kahneman & Riepe, 1998).

Overconfidence bias is a tendency to perceive a false and misleading assumption about an individual skill set, intellect, and analytical ability (Merkle & Weber, 2011). In behavioral finance, it can be termed as the high belief about their stock analysis and investment decision. They have egoistic confidence in their market understanding as well as their prediction ability about the stock price movement. It is very common for analysts, fund managers, and portfolio managers to pretend that they are better than others in terms of managing investment. To understand the market, it is essential to know the behavior of the market. A market is nothing but a combined output of individual investor behavior (Grinblatt & Keloharju, 2000). So, a rigorous study of the behavior patterns of investors can make it easier to understand a market more effectively. The degree and diversification of the overconfidence bias of each investor is needed to understand to evaluate a market more efficiently. The reason why overconfidence bias needs attention and development.

The primary objective of this paper is to evaluate how investment decisions, such as purchasing stock, holding the investments, or selling the stocks are affected by the overconfidence bias of Bangladeshi investors. The study also intends to measure the extent of the investors’ confidence level and find the reasons behind making their irrational decisions.

Moreover, the paper is designed to understand the irrationality of investor's decisions regarding portfolio construction. There are many reasons and biases which influence the rational behavior of investors. The study aims to find the degree and direction of biases caused only by the overconfidence of individual investors.

Literature Review

Behavioral finance began based on prospect theory which was developed by Daniel Kahneman and Amos Tversky where both scholars proved that people generally make decisions as opposed to simply relying on the utility decision-making strategies (Lawa, 2017). In the field of the financial market, the application of behavioral finance should ensure the explanation of inefficiencies and mispricing of assets (Qashim et al., 2019). According to Antti Seppälä (2009), overconfidence bias is one of the most important psychological characteristics of investors which are observed among them and he categorized the appearance into three basic forms which are 'better than average', 'optimism biases, and 'setting narrow confidence limits. Different types of studies examined overconfidence and these prove that people are suffering from overconfidence during decision-making (Haliassos, 2015). Overconfidence can lead to serious financial problems and increase the risk of financial wellbeing (Seppälä, 2009). According to Lewellen et al (1977), overconfident investors trade a lot and believe that their capabilities to predict the returns are highly accurate which will lead them to earn more than anyone else in the market. They will get higher returns than the less confident investors (Lewellen, 1977). Another researcher Odean (1998) found that the investors suffering from overconfidence overestimate the value of their private information and they ignore the information that is gathered by others, causing them to trade actively. However, it is not true that only active trading will lead to better performance. Indeed, according to Barber and Odean (2000), household trading frequently has earned much lower net annualized returns than traders who trade infrequently. So, the overconfidence bias can be disastrous to the individual's wealth.

Hoffman has shown in his research that overconfident investors tend to show few characteristics in general like thinking of themselves as superior to others, capable of predicting the market movement, and able to earn higher returns than others (Hoffmann, 2014). On the other hand, Lawa stated that overconfident investors tend to underestimate the downside risks of their chosen investments. However, these characteristics can be compiled to get a clearer view of overconfident investors. Some major characteristics of overconfident investors are-

- Prediction of market movement: Hoffman found that overconfident investors think they can predict the market movement more appropriately than others (Hoffmann, 2014). They think their analytical power and capability are much higher than other people. They think they are superiors.
- Underestimating the market and downside risk: Lawa found in his paper that overconfident investors tend to underestimate the market risks and stock risks. They don't consider all the available information and when they have made up their mind regarding an investment opportunity, they underestimate other risk factors.

- **Earning higher return:** According to Daniel and Hirshleifer, (2015) Overconfident people think of themselves as better than others and they can earn more return than others. They act more confidently based on their analysis and they are very confident to earn higher returns in any situation.
- **Outperforming the market:** Oehler has stated that, overconfident investors think that can outperform the market because they have the superior capability to analyze the market and other things (Oehler, 2000). They tend to have more confidence in choosing stocks, and investment opportunities and make investment decisions.

In reality, investors don't behave rationally because their actions, thinking, and strategies are affected by different types of biases. Behavioral finance mixes psychological theories with finance theories to analyze the actions of investors. Professor (Brad Barber, 2001) studied 35000 households who are holding accounts in large brokerage firms and their study showed the relationship between the overconfidence of both men and women and the effect of overconfidence on portfolio performance. They have found that overconfident investors overestimate the precision of their information (Brad Barber, 2001). Besides that, Brad Barber found that overconfident people may even trade when the true expected gains are negative. At the end of their studies, Barber and Odean concluded overconfidence is a factor that is hazardous to the wealth of investors. According to these researches, overconfident investors have a few characteristics identified which are the ability to predict the future, higher confidence of their own to earn more than any other investors in the market, the ability to outperform the market, and underestimating the downside risks. The behavioral analysis of the investors of Bangladesh has not been yet done by many researchers. In Bangladesh, plenty of retail investors are investing in the stock market. Though they hold a smaller portion of the volume of stock than institutional investors, they still are an important part of the financial market. The psychology of the investors in Bangladesh is quite different from that of other countries and most of the retail investors here are less rational than other countries (Khan et al., 2015). So, it is important to apply behavioral financial theories here to analyze the impact of it on investment decisions. In this paper, only the impact of overconfidence bias will be evaluated and it is the most common psychology which has been found among the investors by Barber and Odean in their research. But other biases like representative bias, cognitive dissonance bias, availability bias, self-attribution bias, the illusion of control bias, etc. also need to be focused too.

There are several research analyses conducted to analyze the effect of overconfidence bias and how they are changing the thinking patterns of human beings. However, how it will specifically influence the investment decision is not analyzed in those research papers. The impact of overconfidence bias on investors is very general in Bangladesh as most investors are financially illiterate and do not have enough understanding of market parameters (Sochi, 2018). They act based on rumors, emotion, suggestion, and their self-estimation (Gupta & Banik, 2013). Generally, the retail investors of Bangladesh are more emotional and unrealistic than any other investors of developed countries and this was shown in many events. Their actions were ridiculed in past years when the stock market crashed (Van Agtmael, 2007). So, how behavioral finance is working, needs to be measured. In this paper, the impact of overconfidence bias will be evaluated which will

help us to understand how it is affecting their investment decisions. This could help the investors themselves, market analysts, financial advisors, and other parties.

Material and Methods

In this research, the null hypothesis is that overconfidence bias has no impact on investment decisions. On the other hand, there are a few alternative hypotheses which are:

H₀: The overconfidence bias has no impact on the investment decisions of retail investors in Bangladesh

H₁: Future prediction capabilities of overconfident investors influence investment decisions.

H₂: Higher confidence level of earning more return on average than the market of overconfident investors influences investment decisions.

H₃: Ability to outperform the market of overconfident investors influences investment decisions.

H₄: Underestimating the downside risks of overconfident investors influences investment decisions.

This paper will use the primary data collected by surveys using a questionnaire. Here the null hypothesis is that the overconfidence bias has no impact on the investment decisions of retail investors in Bangladesh. To test the hypothesis, one sample t-test will be used here. A regression model will also be established to present how much the independent variables will have explained the dependent variables. A correlation matrix will be also presented to show the linearity between different variables used in this paper (Zou et al., 2003). In this paper, the dependent variable is the investment decisions of investors and the independent variable is overconfidence bias. To test the overconfidence bias, here different types of questions will be prepared, and based on the answers of respondents the effects of overconfidence on investment decisions will be evaluated. The conceptual framework is given below:

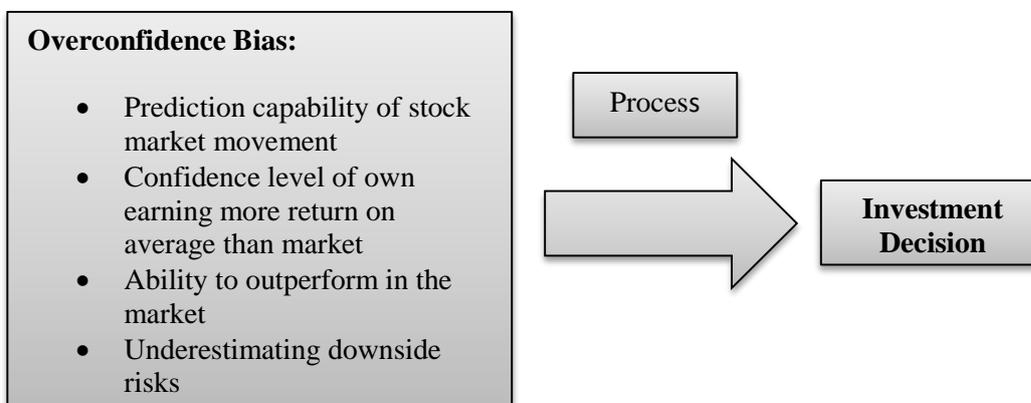


Figure 1: Research Model

Here, the overconfidence bias is considered the independent variable that affects investment decisions. Several researchers have found that overconfidence bias has a significant impact on investment decisions and it increases the number of trading of investors in the market who are overconfident (Bodied, Kane, and Marcus, 2014). They are thinking that they are making the right decisions and they can predict the market movement. So, they believe that they earn more returns than any other investors in the market. But probably they are not right; their returns may be higher because of excessive trades or simply just luck (Czaja and Röder, 2020). When an investor is overconfident, he may make three types of decisions regarding a stock or portfolio. He may sell it, buy more, or hold it for the future to increase the price (Dittrich et al., 2005). Overconfidence bias can be harmful to investors because it can make them underestimate the downside risks associated with their investments (Pikulina et al., 2017).

The data have been collected from the investors of Bangladesh who are holding portfolios in DSE or CSE with a brokerage firm. They were selected by convenience sample technique and a questionnaire was provided to them to answer the questions. The different professional was also tested in this research to know how their investment decisions could be affected by overconfidence. Based on their answers the analysis was done. Here the Ordinary Least Square (OLS) Regression was used to measure how the independent variables were expressing the dependent variable. One sample t-test was also used in this paper to test the hypothesis.

The data collection method has great importance in any research where primary data is used. Due to the nature of the research, this paper will use the primary data collected from respondents. Here primary data will be collected by questionnaire. To ensure the data quality and prevent biases, the researcher explained the necessity of this research analysis to the respondents properly.

The researcher has made a questionnaire where some questions were asked to get the responses of respondents. Besides the research-related questions, a few demographic questions were also asked. The questionnaire was sent to the respondents through e-mail and hard copy. The respondents were requested to complete the questionnaire and submit it to the researcher. Here the researcher used Google Forms to collect and store their responses.

The sampling method is very important for data analysis. In this paper, the t-test was used which takes the sample for the population in a convenient way. The data collection was produced using a convenient sampling method. The convenient sampling technique is used as investors are difficult to reach and communicate. Moreover, it is also required that investors have minimum financial knowledge and understanding about biases. However, it is ensured by the researcher that the data is collected from a well-diversified sampling group who are of different ages, professions, genders, income levels, and educational backgrounds. As a result, it is assumed that the samples are well representative of the population.

The data which are collected from the primary sources are analyzed by using different types of statistical tools here. To test the hypothesis t-test was used in this research paper. The data was collected by using a Likert chart and the values were distributed from 1 to

5. Then the responses were analyzed through statistical tools. In this research paper, SPSS and MS Excel were used for the analysis purpose. The one-sample t-test, Pearson correlation, and OLS regression were run by the SPSS, and the descriptive statistics were produced.

Analysis

The data was collected from the primary sources by using the Likert scale. Then the responses were coded into numerical data. Here, the responses were collected from 45 respondents.

Descriptive statistics

Descriptive statistics presents the mean, median, mode, range, standard deviation, and other statistical results of different variables. It shows the overall picture of all the variables and responses which are collected from the respondents. In this part, the descriptive statistics of all the independent variables and dependent variables are given below:

Table 1. Descriptive Analysis

Particular	Gender	Prediction of market	Earning Higher return	Underestimating downside risk	Ability to outperform the market	Investment decision
Mean	1.5778	3.3556	3.1333	2.8666	3.3777	2.2888
Standard Error	0.0744	0.1716	0.1758	0.1639	0.1566	0.1173
Median	2	3	3	3	3	2
Mode	2	4	4	3	3	3
Standard Deviation	0.4994	1.1511	1.1793	1.0995	1.0507	0.78688
Sample Variance	0.2494	1.3252	1.3909	1.2091	1.104	0.6191
Kurtosis	-1.9841	-0.8957	-0.8923	-0.6123	-0.6901	-1.1395
Skewness	-0.3259	-0.1905	0.07849	0.06059	0.03114	-0.5709
Range	1	4	4	4	4	2
Minimum	1	1	1	1	1	1
Maximum	2	5	5	5	5	3
Sum	71	151	141	129	152	103
Count	45	45	45	45	45	45

In this survey, both male and female respondents were given the questionnaire. A total of 60 questionnaires were distributed and 45 respondents filled up the form properly. A few questionnaires were not fulfilled properly. The data of the independent variable was coded based on a Likert chart. There were three options in the dependent variable which are coded from 1 to 3.

Most of the respondents were male which can be found from the mode, median, and mean. According to data coding, 1 is for females and 2 is for males. The responses of independent variables were collected by using a Likert chart which is coded 1 to 5. The prediction capability of the market is an independent variable of this paper. Here, the

mean is 3.35 which represents that the average responses were more than 3. Most of them think they have good prediction capability of market movement. The mode is 4 which shows the highest number of responses were 4 which agrees with the given statement.

In the case of “earning more return than the average market return”, the mean, median, and mode also indicate the same thing. Most of the responses agreed with the statements but the mean value is less than the previous. That means there is more variation of answers than in previous questions. The standard deviation is also higher here.

In “underestimating the downside risks”, the responses of respondents are slightly different from the previous two. Because the mean and mode both are decreased here. Most of the responses were 3 which means most of them are neutral to that statement and they take the downside risks into their consideration sometimes.

The “ability to outperform the market” is one of the important characteristics of overconfident investors which were found by Barber and Oden in their research. It has the highest mean value among all four independent variables which is 3.37. The mode and median are also here 3 but the standard deviation is 1.05 which is relatively lower than other variables. Though numerous responses were neutral, a lot of responses also came from other sections like agreeing or strongly agreeing with the statement.

The dependent variable is the responses of investors on how frequently overestimation is influencing their investment decisions. Here 3 options were given which are never, rarely, and most of the time. The mean is 2.28 which represents their investment decision is influenced a lot by their overconfidence bias. Here mode is 3 which means most of the respondents think overconfidence is affecting their investment decisions most of the time.

Correlation

The correlation matrix is a table where the relationships between different variables are provided to understand the relationship between them. In this part, the correlation between all independent variables and dependent variables of this paper will be shown. Several studies exhibit a correlation matrix of variables to present the relationship because they declare that the correlation will help to understand the strengths of the relationship between variables (Muhammad Qasim, 2018). The Pearson correlation matrix of this research is presented below with the significance level.

From the table 2, it can be understood that all the variables have a positive correlation with each other and all the relationships are statistically significant. The highest correlation is 0.737 which is between the Prediction of the market and Investment decision. On the other hand, the lowest correlation is 0.438 which is between Underestimating downside risks and Ability to outperform the market. As a result, it can be said that these variables don't have a very strong or weak correlation between them but rather a moderate correlation which is near 0.5.

Table 2. Correlations

Correlations		Investment Decision	Ability to outperform the market	Underestimating Downside risk	Earning Higher return than average	Prediction of market movement
Investment Decision	Pearson Correlation	1	.662**	.650**	.692**	.737**
	Sig. (2-tailed)		0	0	0	0
Ability to outperform the market	Pearson Correlation	.662**	1	.438**	.509**	.600**
	Sig. (2-tailed)	0		0.003	0	0
Underestimating Downside risk	Pearson Correlation	.650**	.438**	1	.505**	.505**
	Sig. (2-tailed)	0	0.003		0	0
	N	45	45	45	45	45
Earning Higher return than average	Pearson Correlation	.692**	.509**	.505**	1	.617**
	Sig. (2-tailed)	0	0	0		0
Prediction of market movement	Pearson Correlation	.737**	.600**	.505**	.617**	1
	Sig. (2-tailed)	0	0	0	0	

OLS Regression

To test the hypothesis, OLS regression will be used in this paper because it can analyze and present the relationship between dependent and independent variables. In their research on measuring the impact of herding behavior and overconfident bias on investors' decisions, several researchers used regression and correlation (Muhammad Qasim, 2018). The regression analysis will present the adjusted R square value and level of significance of the intercept of independent variables which will help to understand the impact of independent variables on dependent variables according to Table 3.

Table 3. OLS Regression

Regression Statistics	
Multiple R	0.852800981
R Square	0.727269513
Adjusted R Square	0.699996464
Standard Error	0.430998568
Observations	45

Here, the regression statistics table represents the R square value of the analysis. The adjusted R square is 0.699 which means that; the independent variables were able to explain 69.9% of the dependent variable. As a result, the dependent variable which is investors' decisions is explained 69% by the overconfidence bias characteristics

In this table of regression analysis, the coefficient of every independent variable and their significance level are provided. The coefficients of every independent variable present how much the dependent variable will change if one unit of change occurs in the independent variable. As the range of the dependent variable was 1 to 3, a little fractional coefficient will have a great impact on the dependent variable.

According to Table 4, the prediction capability of the market has a coefficient of 0.211 which is positive and has a p-value of 0.01 which is less than the significance level of 0.05. So, it has a positive and significant impact on the investment decisions. The coefficient of earning a higher return is 0.165 and the p-value < 0.05. So, this variable also has a positive and significant impact on the dependent variable. Underestimating the downside risks of the market has a higher coefficient than the previous variable which is 0.19 and the p-value is also significant as 0.011 < 0.05. So, it also has a positive and statistically significant impact on the dependent variable. The coefficient of ability to outperform the market is 0.175 and the p-value indicates that this is also statistically significant. It is also positive in value and statistically significant for the dependent variable.

Table 4. Coefficients

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.0761	0.24312	-0.3127	0.756	-0.5675	0.4154	-0.5675	0.4154
Prediction of market	0.21133	0.08091	2.6118	0.0126	0.0478	0.3748	0.0478	0.3748
Earning Higher return	0.16574	0.07416	2.2348	0.0311	0.0158	0.3156	0.0158	0.3156
Underestimating downside risk	0.19014	0.07214	2.6357	0.0118	0.0443	0.3359	0.0443	0.3359
Ability to outperform the market	0.17507	0.08007	2.1865	0.0346	0.0132	0.3369	0.0132	0.3369

So, all the independent variables have a positive coefficient and a statistically significant p-value. That represents the integration of independent variables with dependent variables. It can be understood from here that, the investment decisions of the investors are influenced by the overconfidence bias.

One sample t-test

One sample t-test is a statistical tool that is widely used to test the hypothesis where the sample mean is compared with a given or population mean (Mishra et al.,2019). In the test, the sample mean is calculated and a given mean is compared with it to find out whether there is a significant difference between them or not. The sample mean is compared in the t-test and is run against the known value to find out the significant difference between them which leads the researcher to prove the hypothesis (Mishra et al.,2019). In the case of testing the behavior patterns of human beings, the test is used by Aspara in their research (Aspara, 2011). They used population mean to find out the behavioral decisions their sample made. Besides that, to evaluate the impact of behavioral bias on households Chiang used one sample t-test (Chiang, 2013). For this reason, the researcher has decided to use the test for this comparison.

The objective of this t-test is to know whether the investment decision is influenced by the overconfidence of investors. By using the data collected from the sample will be used to conduct the test here. The respondents were asked how frequently their investment decision would be affected by their overestimation of a stock. Three options were used here which were never, rarely, and most of the time which are categorized 1 to 3. If their investment decision is not influenced by overconfidence, their average or mean response would be “1” or “Never”. So, in this t-test, the sample mean will be compared with the given mean “1” to see if there is any difference. The hypothesis of this test is-

H₀: There is no mean difference between the sample mean and the given mean

H₁: There is a significant difference between the sample mean and the given mean

So, here the test value of this two-tailed t-test is 1 and the confidence level is 95%. As a result, the significance level is 0.05 which will be used to prove the hypothesis. The level of significance of the t-test will be compared with the p-value to accept or reject the null hypothesis. If the significance level of the test is less than 0.05, the null hypothesis will be rejected or it will be proved that there is a significant difference between the sample and the given mean. Otherwise, the null hypothesis will fail to be rejected.

In Table 5., the mean of the Investment decision can be seen along with the standard deviation. Here, the mean value is 2.29 which is higher than the given mean of 1.

Table 5. One-sample t-test of Investment Decision

One-Sample Statistics						
	N	Mean	Std. Deviation	Std. Error Mean		
Investment decision	45	2.29	.787	.117		
One-Sample Test						
	Test Value = 1					
	t	f	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Investment decision	0.988	4	.000	1.289	1.05	1.53

Here, the mean difference and significance level are presented along with the t value of the statistics. The mean difference is quite higher which is 1.289 and it can be said that the difference is much higher. The significance level is 0.000 which is less than 0.05 and it indicates that there is a significant difference between the sample mean and given mean. So, the null hypothesis would be rejected and the alternative hypothesis would be accepted.

One sample t-test to measure the overconfidence bias

One sample t-test can be used to measure whether the respondents have an overconfidence bias or not. In the questionnaire, there were four major questions to measure their overconfidence which can be used here to identify their overconfidence (Park, 2010). Those questions had five options which were prepared by using a Likert scale from 1 to 5 representing strongly disagree, disagree, neutral, agree, and strongly agree consequently. If the respondents are suffering from overconfidence, they will disagree with the statement which will be the basement of this t-test. Those variables or sample means will be tested against the given mean of 2. If there is a mean difference and the significance level is less than 0.05, it would be proved that there is a significant difference between the sample mean and the given mean. As shown in Table 6., this will prove that the respondents are overconfident.

Table 6. One sample t-test of independent variables

One-Sample Test						
	Test Value = 2					
	t	f	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Prediction of market movement	7.899	4	.000	1.35556	1.0097	1.7014
Earning Higher return than average	6.446	4	.000	1.13333	.7790	1.4877
Underestimating Downside risk	5.287	4	.000	.86667	.5363	1.1970
Control over outperforming the market	8.796	4	.000	1.37778	1.0621	1.6935

Here, all the t-values, mean differences, and significance levels of these variables are given. From the table of the t-test, the mean differences of all variables are positive and greater than zero. On the other hand, all the significance level is also less than 0.05 which indicates that there is a significant difference between the sample mean and the given mean. It indicates that the average respondents were overconfident as there is less or little evidence of disagreeing with the statement which is asked of them through the questionnaire.

ANOVA test

Barber and Odean analyzed 35000 households for testing the overconfident bias and they have shown that gender has an impact on the overconfidence bias (Brad Barber, 2001). According to their research, male respondents had more overconfidence than the female. Through the ANOVA test, the tendency of male and female respondents to the overconfident will be measured here. In the ANOVA test, the mean between groups is compared with each other to find out if there is any difference (Oehler, 2000). Here the hypothesis is, that the male and female have no different mean. That means gender has no impact on making the investment decision. If there is a mean difference between these two groups, it will be proved that gender also has an impact on investment decision-making by overestimating it. Here the hypotheses are-

- H0: There is no significant mean difference between males and females in investment decision
- H1: There is a significant mean difference between males and females in investment decision

Table 7. ANOVA

Descriptive								
Investment Decision								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Female	17	1.8824	0.85749	0.20797	1.4415	2.3232	1	3
Male	28	2.5357	0.63725	0.12043	2.2886	2.7828	1	3
Total	45	2.2889	0.78689	0.1173	2.0525	2.5253	1	3

From the Table 7., the number of observations of each group can be seen. Here 17 female and 28 male respondents have participated and there is no missing dependent variable as the total is 45. The mean of the female group is 1.88 which is close to the value of 2 and 2 indicates that the female respondents were rarely overconfident with their investment decisions. On the other hand, the mean value of the male group is 2.535 which is more than 2 and close to 3 and 3 indicating that most of the time the investors are overconfident with their investment decisions. So, here it can be seen that the means of both groups are not the same or close. It is important to find out more evidence from the Table 8.

Table 8. Significance level

ANOVA					
Investment Decision					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.515	1	4.515	8.543	0.006
Within Groups	22.729	43	0.529		
Total	27.244	44			

From the table 8, the significance level can be found which 0.006 is and it is less than 0.05. As the p-value is less than 0.05, it is proved that there is a significant mean difference between those two groups. From the ANOVA analysis, it can be concluded that gender has an impact on investment decision-making and male people are more overconfident than females as Barber and Odean found in their article.

Conclusion and Findings

The aims and objectives of this paper were to evaluate the retail investors of Bangladesh and identify their overconfidence bias. This research was designed to evaluate the impact of overconfidence bias on investment decisions of overconfident investors. The data was collected from primary sources and analyzed by using statistical tools to test the hypothesis. Throughout this paper the attained aims and objectives are presented below:

Four types of common characteristics of overconfident investors were identified by other researchers, psychologists, scholars, and articles. Those traits have a vital impact on the investors' behaviors and characteristics (Demirer, 2006). Although there are few traits identified by other researchers, these are the most common and major impacts that were found among overconfident investors.

How the investment decisions are biased by overconfidence and overestimation is also measured by this paper. The impact of demography like gender on the investment decision is also evaluated here.

The four traits of overconfident investors are also analyzed here to understand how much these traits influence an investor. From the t-test of these characteristics, it can be understood that all of these have a great impact on the investors' decision-making.

The regression analysis showed the relationship between dependent and independent variables. The R square value was 0.69 which represents that independent variables explained 69% of dependent variables (Hoffmann, 2014). Besides that, the coefficient of all of these independent variables is positive. So, they have a positive and strong relationship. It proved that the overconfidence bias influences the investment decisions of retail investors.

This paper was done based on primary data. The data was collected through convenient sampling. A total of 60 questionnaires were distributed and 45 respondents completed it

properly. Based on the data of 45 respondents, those are approached based on a convenient sampling method to ensure the data validity and reliability on the subject matter. From the analysis, it is found that the overconfidence bias has a significant influence on the investment decisions of retail investors in Bangladesh. From the regression analysis and correlation matrix, this is proved. The R square value is .69 and the regression table has shown the coefficient of independent variables along with their p-value. The independent variables that are used in this analysis are the ability to outperform the market, prediction capability of market movement, underestimating the downside risks of investment, and earning a higher return than the average market return. All the variables have a significant p-value which is less than 0.05 and a positive coefficient. So, these variables have a positive relationship with the dependent variable which is an investment decision. On the other hand, the correlation matrix has shown a strong relationship between different variables which was ranging from 0.43 to 0.73 and there is no negative or inverse relationship. It proves that all the variables are correlated with each other and the investors' investment decision-making has a strong relationship with the overconfidence bias.

This paper also evaluated the extent of the overconfidence bias of investors. The descriptive analysis and one sample t-test have shown that most of the investors are suffering from the overconfidence bias. The mean value of the ability to outperform the market is 3.37 which is the highest. It indicates that there is the highest number of respondents who have this particular characteristic of overconfidence. Besides the mean value, the mode also indicates that most of the investors have the traits of overconfidence bias. But all of them are not suffering from this and few investors are free from overconfident bias and their investment decision is not affected by it.

Another important finding is the influence of demographic factors on investment decisions. From the analysis of variance (ANOVA) it is found that male investors are likely more overconfident than female investors. Barber and Odean found this in their research in 2000 and it is also found in the case of the investors of Bangladesh.

Behavioral finance has a wide range of implications in the financial market. This type of research will be helpful for the convenient sampling consultants, financial professionals, fund managers, and investors themselves. This paper will help to understand how investors are making their decisions and what factors are influencing their decision-making. The overconfidence bias has a great influence on overall decision-making as well as the actions of investors. It could be a good thing for investors a few times but it will bring plenty of problems at the end of the day. The investors will not be able to focus on the market or available information properly and they will make mistakes that will bring them financial losses. This will be bad for the financial market also. If most investors are biased, the market won't work efficiently or the market will be more bullish (Baker & Nofsinger, 2002). So, it is important to understand the behavioral patterns of investors and take action to reduce this bias for the greater good.

Limitations

The study only focuses on the investors who have portfolios on the Dhaka Stock Exchange. The research area may limit the generalizability of the findings only to the

investors of Bangladesh, more specifically to the investors of DSE. It may not prevail a conclusive finding to other populations. Moreover, the sample size is very limited which also may not outline the impact of overconfidence bias very precisely. All the respondents are in the age group of 35 to 50 and all of them are graduates who have minimum financial literacy. The respondent group has an average income of 500 USD. So, the demography of the respondent also confined the generalizability of the result as different results may come when there is a change in respondent demography. The researcher uses common statistical measures to draw conclusions and findings. The use of sophisticated statistical tools may portray a shred of better evidence in case of overconfidence bias among investors.

Recommendation to Address Overconfidence Bias

It is difficult to overcome the overconfidence bias which is cognitive in nature. The investor needs to adjust room for the opinion from their close one. Diverse opinion is a key to minimizing the overconfidence of investors to outperform the market (Asaad, 2020). Another key strategy will be to set realistic investment goals that will eradicate the tendency to underestimate the downside risk (Kahneman & Riepe, 1998). As part of self-awareness, investors may keep a record book about each investment decision, the reason behind the decision, and the outcome of the decision which will help to be realistic in making investment decisions. It is also necessary to raise questions about self-instinct and belief, assumptions about the market, and evaluate past performance will be required to prevent overconfidence bias in decision-making. Proper risk management asks to assess the potential possibility of loss and gains, prepare a worst-case scenario, create a diversified investment portfolio, proper risk-return analysis as well, and measure certainty. So, Proper risk management and self-education on the market movement need to be emphasized by the investor as they keep the investor aware of the market trend and updated about the relevant market information.

Another strategy to address the overconfidence bias can be “premortem”, suggested by Daniel Kahneman, a Nobel Prize winner in economics and psychology (Port, 2019). It is suggested to imagine the success of the investment decision and list the potential reasons for this success. Also, imagine the failure of an investment decision and list the potential reasons for failing an investment decision. This process reduces the degree and nature of overconfidence bias for investors as well as financial professionals.

Future Research

There are several overconfidence biases exist among investors. The illusion of control, timing optimism, and over-ranking can be studied as those biases are not addressed in this paper. Moreover, there are biases such as confirmation bias, hindsight bias, familiarity bias as well as loss aversion can also be tested to understand the behavioral pattern more accurately in the context of Bangladesh. The behavior patterns of Bangladeshi investors are different from other countries which is the reason for doing a specific study on them. Also, a comparative study on the overconfidence bias will be more effective in understanding the investment dynamics among the different countries and stock markets. Lastly, by changing the demographic dynamics, used in this paper, numerous studies can

be designed to illustrate the behavioral psychology of investors of certain groups or populations.

Author Contributions

The corresponding author designs and collects the data, produces the analysis, and writes the methodology. The second author wrote the introduction and literature review and accumulated all the sources used in this article.

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<p>HOW TO CITE THIS ARTICLE</p> <p>Ahammed, M. Y., & Tazminur, S. (2024). Exploring the Sense of Overconfidence Bias on Investment Decisions: Insight from The Retail Investors of Bangladesh. <i>International Journal of Management, Accounting and Economics</i>, 11(4), 350-369.</p> <p>DOI: https://doi.org/10.5281/zenodo.11096482</p> <p>URL: https://www.ijmae.com/article_194948.html</p>	 A square QR code located in the bottom right corner of the 'HOW TO CITE THIS ARTICLE' section, which likely links to the article's online version.

Original Research

Do Personality Traits Matter in Auditors' Compliance with Professional Ethics?

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Abstract

The purpose of this research is to investigate the factors that influence auditors' compliance with professional ethics. This study is a quantitative and post-event and descriptive-correlational research. The statistical population of this research is all certified accountants working in the audit institutions of Tehran, and based on Cochran's sampling formula, 336 auditors were selected as a sample. However, 243 completed questionnaires were received by the researcher. Cronbach's alpha was used to test the reliability of the questionnaire, and the value was 0.787. In this research, structural equation modelling and PLS software were used to test the research hypotheses. The results indicate that there is no significant relationship between the trait of neuroticism and auditors' compliance with professional ethics. However, there is a significant relationship between the trait of extraversion and auditors' compliance with professional ethics. Additionally, the results showed that there are significant relationships between the trait of openness to experience, the trait of agreeableness and the trait of conscientiousness with auditors' compliance with professional ethics. Based on this result, it can be mentioned that auditors who feel a greater sense of responsibility, utilize appropriate techniques and methods for their job, and have the necessary readiness to review social, political, and religious values and possess a broad mind and enjoy challenges and puzzles. In addition, auditors who are cooperative, empathetic, and eager to help others demonstrate better ethical behaviour compared to self-centred auditors who are suspicious of others and engage in more competition than cooperation.

Keywords: Auditors' Ethics, Compliance with Professional, Ethics Personality Traits.

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Introduction

Compliance with professional ethics is considered necessary for audit profession due to gain the community and financial information users' trust based on their ethical behavior and adherence to principles. For example, regarding the financial scandal of Enron and its auditor (Arthur Andersen), more investigations showed that the reason of scandal was not only insufficient accounting and auditing standards, but the lack of professional ethics was the main factor. Therefore, like other professions, the accounting profession is also needs to compliance professional ethics in order to maintain its survival. Martinson (1994) mentioned that ethical behavior is not just a right, but a necessity. Therefore, if the accounting profession and especially audit profession tend to improve, there Not in the reference must be a dominant and comprehensive model of behavior based on ethical and responsible principles. In fact, unethical behavior of accountants and auditors not only damages public trust, but also disrupts the efficiency of capital markets. Moreover, Williams and Elson (2010) believed that educating individuals solely from a scientific perspective without considering ethical dimensions poses a threat to society and having different laws to prevent cooking the book and fraud is necessary, but not sufficient.

Professional ethics in accounting and auditing have been brought up since 1494 when Luca Pacioli mentioned ethical matters in his first book. In 1996 the International Federation of Accountants (IFAC) published professional ethics at the international level and formulated the "International Ethics Committee" to develop a code of conduct for professional accountants, which serves as a guideline for associations and professional communities members of the federation (Namazi & Rajabdoory, 2018). In Iran, the Institute of Certified Public Accountants was the first organization to develop a code of professional ethics. In general, ethical principles can be defined as a set of moral values. All individuals possess such a set of values, but they may be ignorant of them. The main duty of the audit profession is to provide credibility improvement to financial reporting and financial information. Without ethical behavior, the position of this profession is undermined. In fact, auditing is a profession which heavily reliant on trust and performing credit responsibilities (Noushadi, Mohammadi, Nourosh, & Amini, 2019).

The Institute of Certified Public Accountant regarding the code of ethics and professional conduct mentioned that one of the prominent features of accounting profession is the acceptance of responsibility for safeguarding public interests. Therefore, the responsibility of a certified public accountant is not only limited to the satisfaction of the client, but a certified public accountant must act in accordance with code of ethics (professional code of conduct) in order to protect public interests. However, if regulations prevent a certified public accountant from complying with a part of this code of conduct, the accountant must adhere to the remaining parts of this code. In fact, the code of ethic is a tool to ensure that professionals are familiar with ethical principles and compliance these professional standards. Therefore, code of ethics serves as a reference for determining the professional and social responsibilities of an accountant and is considered as a guide for suitable behavior in audit profession.

Due to this fact that personality traits and individual characteristics are among the topics discussed in every profession. Personality can be considered as the most fundamental issue in the field of psychology, as it revolves subjects such as motivation, perception, thinking, emotions, and feelings. Although, perception is an important factor in decision-making, personality traits are also involved in this process. Considering the undeniable impact of ethics on individual behavior, and the existence of different personality traits among auditors, it can be expected that there are relationships between personality traits and auditors' compliance with professional ethics. Personality can be defined as a set of psychological traits that can be used to classify individuals. These personality traits have a stable impact on professional behavior, and based on them, the specific values of individuals in various job situations can be determined. The role of personality traits in individual behavior and cognition is sometimes direct and immediate, and sometimes it leads to behavioral and cognitive consequences by influencing mediating factors. Considering individuals' personality dimensions in organizations allows employees to engage in activities that coordinated their abilities and personality traits, leading to improved individual performance and organizational effectiveness (Azizian, Moharramzadeh, Rouhnavaz, & Toosi, 2020). Some researchers also have found personal characteristics as influential factors on professional ethics. Sultana et al (2014), Marcus and Roy (2019), Bashlideh et al. (2011), and Bleidorn et al (2021) concluded that personality traits have effect on professional behaviors (Azizian et al., 2020).

Ethics and ethical code of conduct are essential for the effective social life. Many behaviors and actions of people are influenced by ethical values and stem from ethics. Therefore, ignoring ethics in life and the lack of ethical principles can create numerous problems. The accounting profession and, more importantly, the audit profession, as a requirement for public satisfaction and its own survival, require compliance with ethics. Today, the accounting profession, like many other important professions, has adopted its own approved ethical principles. This issue confirms the compelling need for the profession to compliance with ethics, but these principles must be followed by accountants and auditors. Therefore, the role of an auditor for compliance with ethics appears to be highly significant (Oteiza et al., 2017).

Based on previous studies, auditors face various problems and tensions in their profession, and the ineffective resolution of these issues leads to a decrease in job satisfaction. Considering the irreversible effects and damages that ignoring professional ethics has on organizations and individuals.

Personality traits affect the performance of managers, auditors and accountants. This is because the development of professional ethics is not a single concept, but a multiple concept, and several factors directly and indirectly affect this improvement. The unethical decisions of accountants in recent years have questioned society's trust in accountants. Developing ethical behavior improves professional behavior. Therefore, the intellectual concern of the researcher was to deal with the effect of personality traits on compliance with professional ethics of auditors in Tehran. The studies conducted show that most of the studies that have been conducted in this field are either independent or a combination of two or three variables, but there has not been any research that has conducted this title among auditors, which indicates the theoretical gap and Experience is important in this

field. Therefore, this research aims to answer this question: What effect do the five personality traits of auditors in Tehran have on their compliance with professional ethics? Therefore, the main contribution of this research can be summarized in the following five points:

- 1- The effect of neuroticism of auditors with professional ethics
- 2- The effect of extraversion of auditors with professional ethics
- 3- The impact of auditors' compatibility with professional ethics
- 4- The effect of experience characteristic of auditors with professional ethics
- 5- The effect of being conscientious with professional ethics

The continuation of the article is provided as specified. In the next section, the literature review and the background of the research will be discussed, then the research method and the implementation steps of the research will be explained. After that, the results of using the proposed method will be presented in a case study. Finally, a general conclusion will be presented along with suggestions for future research.

Literature Review

Personality characteristics

One of the main concerns of managers and company owners is how to create suitable platforms for human factors employed in all professions. A suitable platform in companies makes individuals responsible and commitment to their responsibilities and compliance with ethical principles governing their job. Professional ethics defined as a branch of ethical knowledge that focuses on the examination of individuals' work-related relationships (La Ode, Wahyuniati, Angela, & Oktri, 2020). In a definition of professional ethics, it is considered a type of ethical commitment and conscientiousness towards any type of work, duty, and responsibility (Zarefar & Zarefar, 2016). Ethical conducts in a profession is the result of individuals' knowledge, willingness, ability, and attitude. Professional ethics is a rational thinking process that encompasses a set of accepted ethical actions and reactions. Organizations and professional associations establish professional ethics to provide the most desirable social relationships for their members regarding the performance of their professional duties (Zarefar & Zarefar, 2016).

Personality traits are collection of an individual's insights, beliefs, and convictions which accompanied by relatively stable behavioral traits. There are two important perspectives regarding personality traits. The situationist perspective which attributes the formation of personality to situational factors, while the trait perspective considers human personality as internal and hereditary. Personality can be expressed as a set of characteristics that explain relatively stable patterns of human responses to situations by combining these two perspectives (Sulhan & Choiruddin, 2021). One of the most effective and comprehensive theories proposed about personality and characteristics is the Five-Factor Model by McCrae and Costa (1992). According to this perspective,

personality structure has a hierarchical nature with five main dimensions at the highest level, which are further divided into lower-level components or traits. The five personality factors include neuroticism, extraversion, agreeableness, openness, and conscientiousness. Neuroticism trait refers to have intention for experiencing tension, anxiety, self-consciousness, impulsivity, hostility, introversion, depression, illogical thinking, and low self-esteem. Extraversion trait represents the tendency for positivity, empathy, decisiveness, and sociability. Openness to experience trait refers to an individual's inclination for curiosity, artistic tendencies, love of art, and intellectual curiosity. Agreeableness trait refers to the willingness to forgive, empathy, kindness and loyalty (Sulhan & Choiruddin, 2021). Conscientiousness trait refers to the desire to organize, trustworthiness, efficiency and meditation. It also describes the ability to control impulses in a way that society considers desirable and facilitates task-oriented and goal-oriented behavior. Conscientiousness includes characteristics such as reliable, goal-oriented and responsible. The main indicator of conscientiousness is internal order (discipline). Another feature of these people is good performance (caution in decision-making) and giving answers in an effective way instead of reacting impulsively or out of habit (Obeid, Salleh, & Nor, 2017).

Since the twentieth century, scholars and researchers have increasingly dedicated themselves to studying this topic, given the importance assumed by personality in the psychological panorama. One of the most famous and relevant approaches to the study of character is the five-factor model (FFM) of personality traits (often referred to as the “Big Five”) proposed by McCrae & Costa (1992). As a multidimensional set, personality traits include individuals’ emotions, cognition, and behavior patterns (Goldberg, 2013). Furthermore, the FFM is the most robust and parsimonious model adopted to understand personality traits and behavior reciprocal relationships (Angelini, 2023). due to two main reasons: its reliability across ages and cultures (McCrae & Costa, 1997) and its stability over the years (Stahlmann et al, 2024). According to several scholars, the FFM consists of five personality traits: agreeableness, conscientiousness, extraversion, neuroticism, and (Mammadov, 2022). Agreeableness refers to being cooperative, sympathetic, tolerant, and forgiving towards others, avoiding competition, conflict, pressuring, and using force (Jirásek & Sudzina, 2020). Conscientiousness is reflected in being precise, organized, disciplined, abiding by principles and rules, and working hard to achieve success (Baruth & Cohen, 2023). Extraversion is related to the quantity and intensity of individual social interaction characteristics. It is displayed through higher degrees of sociability, assertiveness, talkativeness, and self-confidence (Plessen et al, 2020). Neuroticism reflects people’s loss of emotional balance and impulse control. It is characterized by a prevalence of negative feelings and anxiety that are attempted to cope with through maladaptive coping strategies, such as delay or denial (Luo et al, 2023). Openness is reflected in intellectual curiosity, open-mindedness, untraditionality and creativity, the preference for independence, novelty, and differences (Chakraborty et al, 2023). In the last thirty years, the Big Five model has been recognized as a primary representation of salient and non-pathological aspects of personality, the alteration of which contributes to the development of personality disorders, such as antisocial, borderline, and narcissistic personality disorders (Atherton et al, 2024).

Professional ethics

The concept of ethics and compliance with professional ethics is a serious issue in the field of accounting and audit, directly affecting the independence, impartiality, competence and honesty of auditors in gaining public trust. Possessing an independent mindset is essential to be free from the pressures of any group in a way that fraud can be easily detected (Putria & Mardijuwonob, 2020). According to the third paragraph of ethical principles in the Code of Conduct of the American Institute of Certified Public Accountants, in order to maintain and enhance public trust, auditors must perform all their professional responsibilities with the highest degree of honesty and integrity. Honesty, as one of the core values, plays a central role in professional ethics and formulated basis for audit opinions. Integrity is a fundamental principle which is based on public trust and serves as the ultimate criterion by which each member of the profession should assess their decisions (Luksanaphokin, 2018). Without gaining the trust of financial statements' users, the provision of services by accountants and auditors would be futile. Trust in audit services is contingent upon trust in service providers (accountants and auditors), and that is contingent upon integrity, impartiality, and compliance with professional ethics. Considering the important and fundamental role of accounting and auditing in the economic, political, and social progress of societies, as well as the importance of accurate information for users, investors, and stakeholders, ethics in audit profession becomes a central factor. The two-way relationship between the community and the professions, where on one side professionals provide their services to the community and on the other side service providers utilize those services, must necessarily be governed by precise regulations that familiarize both parties with each other's rights and responsibilities. Ethical and behavioral regulations of each profession form its most important policies (Schinkel & de Ruyter, 2017).

Ethical principles

Audit profession has been developed based on several specific rules and ethical principles which serves the criteria for auditors' behaviors in the profession. After recent financial scandals that have occurred in reputable and large companies, the audit profession has established some rules that go beyond simple compliance with law (DPS, 2011). These complex rules and regulations are equivalent to the necessary ethical rules of organization. However, it should be noted that laws, regulations, and fear of scandals can never definitively prevent fraudulent financial reporting. While ethical principles such as honesty, integrity, truthfulness, courage, and righteousness penetrate the depths of an auditor's being and begin from childhood within the family, they are influenced by factors such as environment, friends, religion, and cultural and public institutions. Therefore, the likelihood of auditor's compliance with ethical principles may be higher in some special conditions and it may influence by some factors like personality traits (Namazi & Rajabdoory, 2018).

Experimental investigation and hypothesis development

(Ogoun & Zuode, 2020) investigated the relationship between professional doubt and professional judgment of external auditors. The population was all Iranian external auditors and 150 auditors were selected randomly as a research sample. The data for this

survey study collected by questionnaire and the results showed that there is a positive and significant relationship between auditors' professional doubt and their professional judgment. (Kalbers & Gross-Schaefer, 2018) examined the differences between auditors' mentality (beliefs and ethics) and their action based on foko perspective. The research sample was 214 auditor and audit students as a control sample. The results indicated that there is a significant difference between auditors' mentality to ethical issues and their actions. (Ogoun & Zuode, 2020; Royae, Yaghoobnezhad, & Azinfar, 2014) also investigated the compliance of professional code of conduct by auditors working in audit firms that are members of the Institute of Public Accountants. They divided the auditors working in audit firms into five categories of senior supervisors, supervisors, senior auditors, auditors, and assistant auditors. The results of this research showed that the rate of compliance with the regulations by individuals who have the rank of auditor is less than other auditors; this means that auditors at the beginning of entering this profession more consider the code of professional conduct. Moreover, Hogianto and Sebastian (2019) focused on the implementation of professional and emotionally intelligent ethics in decision-making of auditors. The results of this study indicated that professional ethic is affected by independence, integrity, objectivity, general standards and accounting principles, responsibility towards clients. The results also indicated that responsibility towards colleagues and others has no significant impact on auditors' decision-making but emotional intelligence, as a measure of self-regulation, motivation and social skills, has a significant effect on auditors' decision-making.

Regarding personality traits, (Cahyono & Sudaryati, 2023) examined the relationship between the personality types of auditors and their intention to behave accordance to the code of professional auditing conduct. In this research, the five-factor model of personality traits was used to investigate the personality type (NEOs) and for professional code of conduct section, the data was collected through a researcher-made questionnaire. The results showed that the agreeableness personality trait is most closely related to auditors' intention to behave accordance to the code of professional conduct. (Drozd, Pysmenna, & Volkov, 2020) proposed effective tools for internal controls at audit firms to improve professional performance and ethical behavior of auditors. It was a survey study and 150 auditors and accountants were selected as a sample but 96 full answered questionnaires were analyzed. As a research result, the authors proposed the auditors compliance with ethical standards and ethical values compliance as a tool for assessing ethical behavior of auditors. (Chulpanovna, Botiraliyevna, & Turgunovich, 2021) indicated the increasing responsibility of accounting professionals towards society, substantiating the necessity and importance of fundamental principles set by the code of ethics for professional accountants, and highlighting the essence of professional behavior for auditors. (Pourbahrami, Yaghobnejad, Tavangar, & Rohy, 2021) examined the effect of personality traits and thinking style on compliance with professional ethics among certified accountants. The results showed that individuals with flexible personality trait and those with a holistic and free-thinking style were less likely to comply with ethical principles and professional behavior. Conversely, individuals with detail-oriented, agreeable, and cautious traits had the highest positive and significant effect on compliance with professional ethics and behavior among certified accountants.

Due to the importance of training ethical behavior to auditors, Kim (2022) proposed a new conceptual framework for professional ethics education, highlighting the emotional

aspects of ethical behavior. (Alizadegan, Samadi Largani, & Imeni, 2023) investigated the auditors' ability to detect fraud using the theory of planned behavior and the effect of personality traits and professional ethics on detecting fraud. The statistical population of the research, including auditors working in the audit organization and audit firms and 302 auditors were selected as the research sample. The results showed that auditors' personality types and professional ethics have positive and significant effects on the detection of fraud. Also, personality and moral type have a positive and significant effect on the detection of fraud in the financial statements. Moreover, (Samagaio & Felício, 2022) examined the impact of auditor's personality traits on audit quality. The results indicated that agreeableness, conscientiousness, and openness traits are positively related to professional skepticism of auditors, while extraversion and neuroticism have negative influences on audit quality. Recently, (Arifudin, Maharani, & Sidharta, 2023) investigated the relationship between auditor's perception and factors that influence the ethical behavior of auditors in the college environment. This study was a qualitative research and research data was collected using interviews with auditors in the financial section of the Internal Supervisory Unit of State Universities. The results showed that an auditor's ethical reasoning, the professional commitment of an auditor, environmental conditions related to the influence of superiors, and also ethical, moral support, as well as the spirituality of the auditor have influence on the ethical behavior of auditors. Based on literature review and also prior studies the research hypotheses are as follows:

H₁: There is a significant relationship between neuroticism and auditors' compliance with professional ethics.

H₂: There is a significant relationship between extraversion and auditors' compliance with professional ethics.

H₃: There is a significant relationship between openness and auditors' compliance with professional ethics.

H₄: There is a significant relationship between agreeableness and auditors' compliance with professional ethics.

H₅: There is a significant relationship between conscientiousness and auditors' compliance with professional ethics.

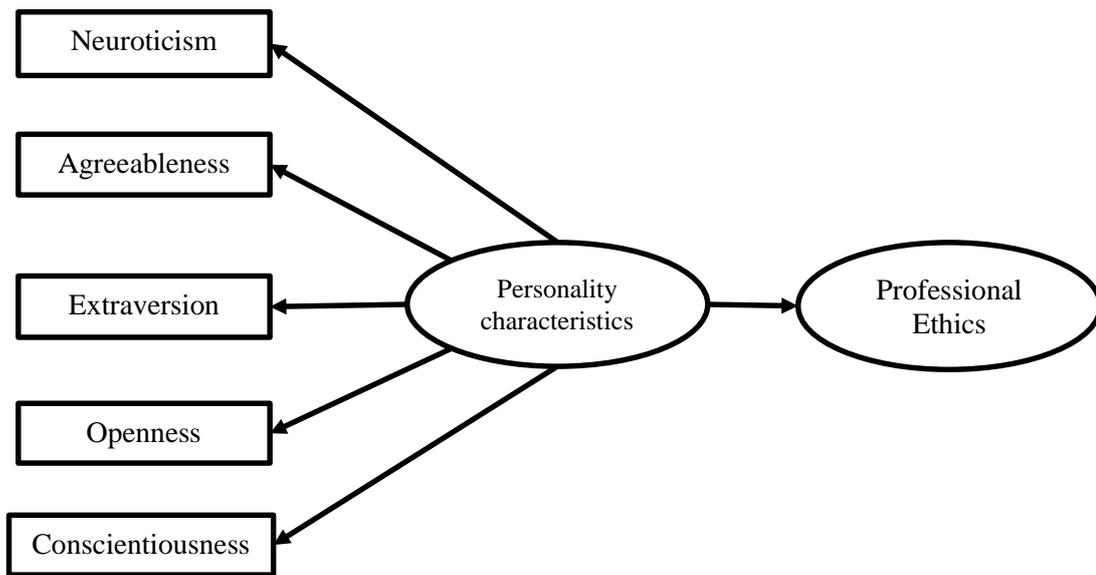


Figure 1. Research conceptual model (by the researcher)

Methodology

This study is descriptive-correlational research based on data analysis method and applied research based on objective. The statistical population includes all official accountants working in auditing institutions in Tehran and also audit organization, with a total of 2,710 members according to the latest comprehensive statistics of Institute of Certified Public Accountants. Using the Cochran sampling formula, a sample of 336 auditors was selected, and research instrument was distributed among samples. Finally, 243 completed questionnaires were collected for analysis. The questionnaire consists of three parts. The first part related to demographic information of auditors. The second part related to compliance with professional ethics of auditors, which included 36 questions from Salehi's research (Salehi, 2016). The questionnaire measured the professional behavior components of auditors, including honesty and integrity, professional performance, independence and impartiality, and auditor's confidentiality. The third part related to personality traits questionnaire with five factors, which included 60 questions. The traits of this questionnaire include neuroticism, extraversion, agreeableness, openness, and conscientiousness. The validity of the questionnaire was confirmed through formal validity and the opinions of experts in this field and the reliability of the questionnaire based on Cronbach's alpha coefficient was 0.787. For testing research hypotheses, structural equation modeling (SEM) and confirmatory factor analysis (CFA) and PLS software were used to examine the relationships between the research variables.

Results and discussion

A brief description of demographic data of the respondents is provided in Table 1 for descriptive analysis.

Table 1. Descriptive statistics of demographic information.

Row	Factor	Variable	Numbers	Percent
1	Gender	Male	185	0.77
		Female	55	0.23
2	Level of Education	Diploma	0	0
		Bachelor	120	0.5
		Master	116	0.48
		Ph.D.	4	0.02
3	Work experience	Less than 5 years	88	0.36
		Between 5 and 10 years	93	0.38
		Between 10 and 15 years	15	0.06
		More than 15 years	44	0.2
4	Position	Auditor's assistant	70	0.30
		auditor	64	0.26
		Senior auditor	51	0.21
		Audit supervisor	21	0.08
		Audit manager	30	0.12
		Audit partner	4	0.03
5	Audit Firm Type	Trusted auditing institute of the stock exchange and audit organization	173	0.72
		Private auditing institute	67	0.28

The Kolmogorov-Smirnov test was used to test the normality of the data. If the data distribution is normal, inferential statistical tests can be used. This test is examined at the 5% error level (Table 2). For the normality test, the statistical assumptions are as follows:

H_0 : The data distribution of the variables is normal

H_1 : The data distribution of the variables is not normal

Table 2. Kolmogorov Smirnoff.

Statistical Indicators Scale	Statistic	Significance level
Neuroticism	0.159	0.001
Extraversion	0.188	0.001
Openness	0.157	0.001
Agreeableness	0.152	0.001
Conscientiousness	0.111	0.001
Professional Ethics	0.147	0.001

To assess the validity of the research model and the goodness of fit measures, the communality variance index and the residual variance index were used. The Q^2 index (Stone-Geisser), with positive values, indicates acceptable and satisfactory quality of measurement and structure for the model. Although the available PLS algorithms do not report fit statistics such as standardized Bentler-Bonett indices, they are based on the assumption that the estimated model parameters reduce the differences between the observed and reproduced covariance matrices. The goodness of fit criterion can be measured by calculating the geometric mean of the average communality variance and R^2 the average residual variance. For this index, values of 0.10, 0.20, and 0.36 are considered as weak, moderate and strong respectively.

Table 3. Communality values and R^2 of the personality traits impact on professional ethics.

Variables	Communality values	R^2
Professional ethics	0.254	0.755
Conscientiousness	0.264	0.704
Extraversion	0.339	0.589
Openness	0.260	0.663
Agreeableness	0.306	0.739
Neuroticism	0.264	0.617

Based on the results in Table 3, only endogenous variables have R^2 values. After calculations, the value of the GOF index for personality traits and professional ethics is obtained as 0.436488, which is a good indicator and shows good overall model quality.

For testing research hypotheses, the structural equation modeling method with the PLS software was used. In Figure 2 t-values are shown for the measurement model (t-values for the questions and variables related to them) and the structural model (t-values for the paths between variables).

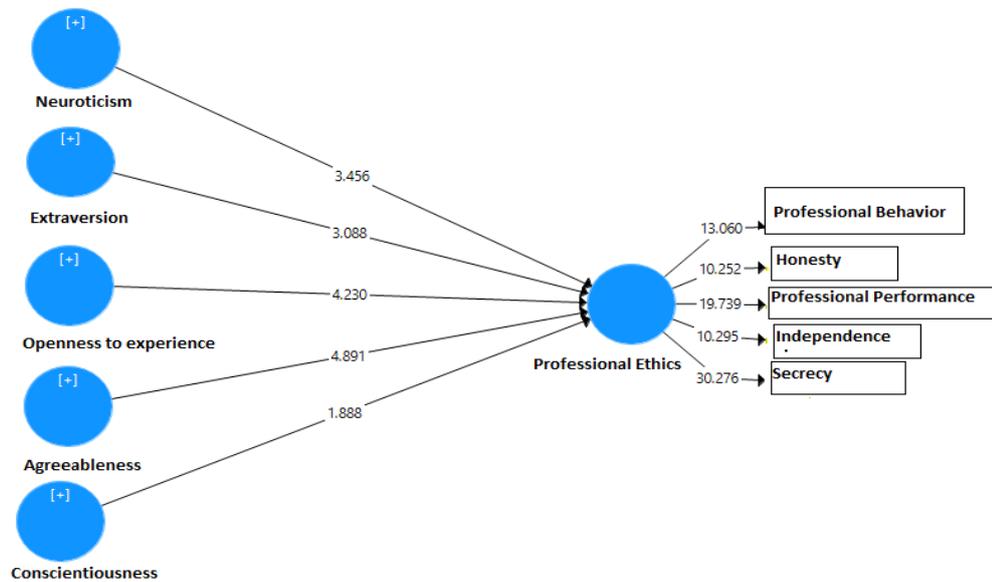


Figure 2. Meaningful model of research

Research model indicates significant relationships between variables if the calculated t coefficient at a 0.05 error does not fall within the insignificant interval (+1.96 and -1.96). Figure 3 shows the standardized coefficients for the measurement model (standardized coefficients for the questions and variables related to them) and the structural model (path coefficients for the paths mentioned in the model between the variables).

The significance of the relationship between the latent factor (hidden variable) and the observable variable is demonstrated through factor loading. The factor loading is shown in this figure, which ranges from zero to one. If the factor loading is less than 0.3, a weak relationship is considered and a factor loading between 0.3 and 0.6 is acceptable, and if it exceeds 0.6, it is highly desirable. The results indicate that the influence of neuroticism trait on compliance with professional ethics is not significant. This means that neuroticism personality trait has not effect on professional ethics ($\beta = -0.042$). Therefore, the first hypothesis is not accepted. Moreover, the results indicate that extraversion trait significantly affects compliance with professional ethics. This means that extraversion personality trait has an impact on professional ethics ($\beta = 0.069$). Therefore, the second hypothesis is accepted.

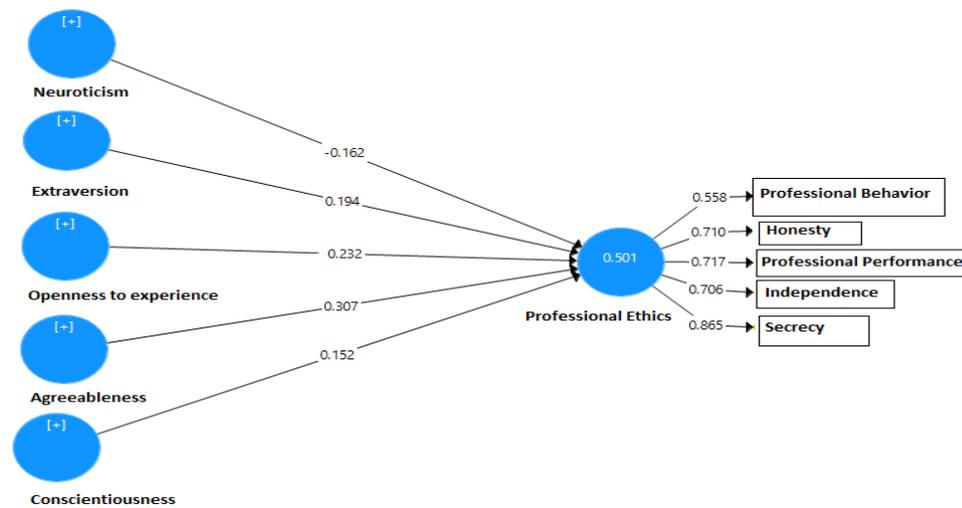


Figure 3. Standard research model

Also, the results indicate that the influence of openness trait on compliance with professional ethics is significant. This means that the openness personality trait affect professional ethics ($\beta = 0.197$) and the third hypothesis is accepted. Besides that, based on the results, agreeableness trait significantly affects compliance with professional ethics. It means that agreeableness trait has impact on professional ethics ($\beta = 0.399$) and the fourth hypothesis is accepted. Finally, the results of testing the last hypothesis show that conscientiousness trait significantly affects professional ethics. It means that conscientiousness personality trait has effect on professional ethics ($\beta = 0.166$) and the fifth hypothesis is accepted. Overall results of the research hypotheses testing are presented in Table 4.

Table 4. Results of hypotheses.

	Hypotheses	T Coefficient	Standard Coefficient	Result
H ₁	There is a significant relationship between neuroticism and auditors' compliance with professional ethics.	0.624	0.533	Rejected
H ₂	There is a significant relationship between extraversion and auditors' compliance with professional ethics.	2.871	0.435	Accepted
H ₃	There is a significant relationship between openness and auditors' compliance with professional ethics.	2.437	0.015	Accepted
H ₄	There is a significant relationship between agreeableness and auditors' compliance with professional ethics.	4.826	0.001	Accepted
H ₅	There is a significant relationship between conscientiousness and auditors' compliance with professional ethics.	2.541	0.017	Accepted

Discussion

The main objective of this research was to investigate the impact of personality traits on auditors' compliance with professional ethics. Five hypotheses were formulated regarding the five factor personality traits. 243 auditors were participated in this survey and the research data were collected using questionnaire. Based on the results, the influence of neuroticism personality trait on compliance with professional ethics was not confirmed. According to this result, there is no significant relationship between neuroticism as a personality trait and the professional ethics principles among auditors. It means that auditors who experience nervousness and negative emotions such as fear, sorrow, and agitation are less likely to comply with professional ethics compared to their colleagues. Emotional instability and introversion are two important personality traits that expose individuals to illness, and auditors with these traits lack social skills.

According to the results of testing the second hypothesis, the extraversion personality trait has a significant impact on compliance with professional ethics and the second hypothesis was accepted. Auditors with extraversion traits are sociable individuals who are decisive, active, and inclined towards conversation. They enjoy excitement and mobility, and have hopes for future success. The extraversion scale reflects individuals' interest in developing their professional careers and their tendency to behave in accordance with ethical principles. It can be interpreted that extraverted auditors, due to their optimistic or positive-thinking nature, have a greater inclination to behave in line with ethical principles. Moreover, based on the result of testing third hypothesis, agreeableness personality trait has a significant influence on compliance with professional ethics. It means that auditors who have narrower perspectives and limited interests, socially conservative, and politically cautious, perform at a lower level of professional ethics compliance compared to auditors who are pleasure-seekers and have experiences regarding positive and negative emotions in their lives. Based on these results, it can be mentioned that auditors who feel a greater sense of responsibility, utilize appropriate techniques and methods for their job, and have the necessary readiness to review social, political, and religious values and possess a broad mind and enjoy challenges and puzzles.

The results also show that agreeableness trait has a significant impact on compliance with professional ethics. Based on this result, auditors who are cooperative, empathetic, and eager to help others demonstrate better ethical behavior compared to self-centered auditors who are suspicious of others and engage in more competition than cooperation. An agreeable auditor is essentially friendly, empathetic towards others, and willing to assist, believing in mutual assistance. Therefore, it can be mentioned that agreeable auditors easily collaborate with their clients and feel obligated to behave in accordance with ethical principles, due to their cooperative nature. They are more inclined to adhere to ethical principles even when faced with unethical practices under pressure. The results also show that conscientiousness trait has a significant impact on compliance with professional ethics. Based on this result, auditors who are responsible, goal-oriented, and strive to achieve organizational objectives exhibit better ethical behavior within the organization. Conscientious auditors, when faced with unethical conduct, are more inclined to act in accordance with ethical principles. These results are consistent with the

findings of the research conducted by (Samagaio & Felício, 2022), (Alizadegan et al., 2023), (Pourbahrami et al., 2021), and (Cahyono & Sudaryati, 2023).

Conclusion

Based on the research results, the following suggestions are proposed:

- Auditors in organizations should work as a team towards common goals to improve firm performance. Auditors should feel accountable for their responsibilities at work and commit to continuous improvement through new working methods.
- Considering the significant role of personality traits in auditors' ethical behavior, it is suggested that audit firms, professional accounting societies, and auditing institutions take into account auditors' personality traits in addition to their familiarity with accounting and auditing standards and ethical conducts.
- Audit firms are recommended to mitigate the negative impact of auditors' mental problems on their performance by providing appropriate training on ethical behaviors and conducts.
- For future studies, it is recommended to examine other factors such as social factors, environmental factors and audit firms characteristics on auditors' compliance with professional ethics.

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<p>HOW TO CITE THIS ARTICLE</p> <p>Rahimi, F., Ebrahimi Kahrizsangi, K., & Aghaei Chadegani, A. (2024). Do Personality Traits Matter in Auditors' Compliance with Professional Ethics?. <i>International Journal of Management, Accounting and Economics</i>, 11(4), 370-388.</p> <p>DOI: https://doi.org/10.5281/zenodo.11097031</p> <p>URL: https://www.ijmae.com/article_195346.html</p>	 A square QR code located in the bottom right corner of the 'HOW TO CITE THIS ARTICLE' section.

Original Research

The Impact of Financial Knowledge on Household Wealth Accumulation in Dodoma City Council

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Abstract

This study aimed to assess the impact of financial knowledge on household wealth accumulation in Dodoma City. The research design employed for this study was cross-sectional, and a sample of 304 household heads participants was selected using simple random sampling. Data collection was conducted through the use of questionnaires. The quantitative data obtained were analyzed using descriptive statistics and a multiple linear regression model. The findings of the study revealed that financial knowledge in terms of personal level of education, financial trainings and financial management skills were positive and significant related to household wealth accumulation. The study concludes that, financial knowledge was important component in in financial literacy influence the accumulation of wealth among households in Dodoma City Council. Consequently, the study recommends that the local government and relevant organizations should implement comprehensive financial education programs that specifically target the residents of Dodoma City Council. These programs should focus on improving financial attitudes and behaviors, as well as providing knowledge on effective budgeting, saving, investing, and debt management.

Keywords: Financial knowledge, financial literacy, Financial management skills, financial training, Personal level of education, Dodoma City.

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Introduction and Problem statement

Each person needs to be prudent and knowledgeable when making financial decisions to help offset the rising cost of living as the global economy struggles. For households, investment is fascinating because it allows them to exercise agency and witness the results of their choices (Agarwalla et al., 2015). Although not everyone engages in traditional investment activities like the buying and selling of stocks, bonds, and other financial instruments, most people do invest in some capacity, be it through a 401(k), an employee savings plan, the purchase of life insurance, the purchase of real estate, or some other means (Berry et al., 2018). However, you need a solid grasp of personal finance if you plan to invest in anything at all (Kadoya & Khan, 2020).

It has been determined that higher levels of financial literacy are associated with greater asset accumulation among households (Lusardi, 2019), which in turn contributes to higher levels of future income and, ultimately, economic growth (Asongu & Efobi, 2018). Lusardi (2019) argues that financially literate households have greater access to financial services, which could help the economy grow by funding new initiatives in areas like education and healthcare, launching new businesses, increasing the size of existing investments, and boosting the number of households with assets (Garang, 2016). Goal number four of the United Nations' Sustainable Development Goals (SDGs) emphasizes providing access to high-quality education for all and expanding opportunities for lifelong learning (Aguiar-Díaz & Zagalaz-Jiménez, 2022). This objective aims to inspire countries to incorporate financial education into their local curriculum by the end of 2020, with the ultimate result of raising financial literacy levels among both users and providers of financial services (Gustman et al., 2012).

Acquiring assets and preparing for retirement are two areas where higher levels of financial knowledge are linked in Africa. Financial literacy was linked to household spending, financial inclusion, and other welfare indices (Agarwalla et al., 2015). Low levels of financial literacy have been shown to have negative effects on individuals and their investment behavior (Lusardi et al., 2020). Individuals with low financial literacy are more likely to incur difficulties when trying to repay debt, to avoid using formal financial institutions like the stock market (Lusardi et al., 2020), to avoid saving for retirement, to be less adept at managing and amassing wealth efficiently (Frémeaux & Leturcq, 2022), to borrow credit at high interest rates (Millimet et al., 2015), and to be less likely to save for the future.

In Tanzania, financial literacy is viewed as a tool for empowering households and to complements their protection, however literacy levels are particularly low in the country as evidenced by a global financial literacy survey report of 2021 where only 21% of people in Tanzania are reported to be financially literate compared to 32% in Sub Saharan African and 65% in high income economies OECD. Many Tanzanians benefited from increased financial awareness and literacy because it led to more contented and prosperous citizens, new business opportunities, and the development of a stronger economy (Minani, 2021). It also helped alleviate poverty, crime, and the burden on social welfare programs.

Koomson et al. (2022) assessed the role of financial literacy in household assets accumulation and found it plays a significant role in the accumulation of both financial and durable assets, but it has more impact in the accumulation of productive durable assets (Millimet et al., 2015), reported lack of financial literacy as a potential barrier to wealth accumulation. University students in Ghana have a moderate understanding of saving and borrowing but a low understanding of other financial concerns that have far-reaching consequences (Millimet et al., 2015). Those with a strong grasp of financial concepts are more likely to exercise good judgment when it comes to money matters, select the most suitable option from a variety of available ones, and maintain healthy financial routines (Gomes et al., 2021).

The literature suggests that most researchers disregarded the role that financial literacy plays in the success of households in building wealth. By asking about the effect of financial knowledge on wealth accumulation in the Dodoma City Council in the Dodoma Region, this study provided strong evidence in this regard. So the study objective is to assess the impact of Financial Knowledge on Household Wealth accumulation in Dodoma City Council

Literature Review

Theoretical Framework

Decision theory

The principles of Warner's 1968 Decision theory serve as the basis for this investigation. According to the principles of decision theory, people should always choose the option that will make them the happiest. Moreover, the theory states that people who do not take measures to increase their utility will never be able to amass riches. The research also showed that investment choices are made by many parties with diverse goals. According to Roberts and Henneberry (2007).

Financial information availability is a key component that influences household investment decisions, asset acquisition, and saving behaviors, according to the idea. Investors make choices about which assets to purchase based on the level of detail they are able to access. Information, expected returns, and investment choices were found to be significantly related by Easley et al. (2010). Interviews with company executives and yearly reports have been identified by Gentry and Fernandez (2008) as very valuable information gathering tools. Whether or not an individual chooses to invest in shares is largely dependent on the information they have at their disposal, as demonstrated by the research of Kiplangat et al. (2020). This theory is relevant to the present investigation because it suggests that better access to financial data could improve families' investment decisions, asset purchase, and savings behaviors.

Empirical Studies

The effects of financial education on household asset accumulation were investigated by in Ghana (Koomson & Ibrahim, 2018). Account balances, long-lasting assets, and broken-down constituents were used to calculate the value of the financial assets. The

study indicated that the accumulation of productive durable assets reflected the positive and strong link between financial and durable assets. The research also found that women who received financial education increased their savings and checking account balances, and that male beneficiaries benefited more from this type of instruction. These findings are different from the current study because of the study's focus on a specific demographic (women) and location (a different region).

The effects of financial literacy on the development of personal wealth were investigated by Chinese researchers (Lu et al., 2021). Research was conducted on the topic of household finances in China during 2017-2019. The study found that financially literate households owned significantly more assets than their financially illiterate counterparts. This is likely because financially literate households are more likely to seek advice from professional investors and pay closer attention to economic opportunities. The analysis of the study also reveals that the optimizing effect of financial literacy on Families Assets Accumulation is larger among wealthy, highly educated households located in areas with superior regional financial development.

In a similar (Rahadi et al., 2019) analyzed the connection between financial literacy and the distribution of family wealth in Indonesian brands. A survey was employed to gather information for the study. The majority of households have savings accounts, and the survey found that these accounts were actively used for saving. This suggests that financial literacy and family wealth distribution in branding are positively correlated. According to the research, households often have a large net worth of shares/stocks. Surprisingly, most Indonesian share-holders lack the financial literacy to properly manage their wealth, and as a result, their retirement savings may be insufficient.

In addition, Uddin (2020) investigated the results of financial education on personal savings in Oman. The researchers used a survey technique and 200 participants in an exploratory study design. Using logistic regression, researchers revealed that knowing more about personal finances improves people's chances of putting money away. The influence of participants' demographics on their financial literacy was also examined. Results showed that the more schooling a respondent had, the more money they put away. Both the location (his study was done in Oman, while our one will be done in Tanzania) and the topic (family saving, household investment, and household asset accumulation) are key ways in which the two studies diverge. Unlike the present study, which adhered to a more controlled methodology, this one opted for an experimental approach.

In the country of Sri Lanka the effect of students' financial literacy on their investment choices was studied in the Western Province among undergraduates (D.A.T, 2020). Two hundred students from four different public universities were used in the study. Financial products, financial management, financial product accessibility, and financial investment knowledge and aptitude were the primary research factors. Students' financial positions, actions, and behaviors were also analyzed in light of the level of financial literacy the students possessed. The data showed that students who had a basic understanding of personal finance were more likely to make wise investments. The study differs from the current study in methodology because the respondents were students rather than households, and also because the factors and the setting in which the study was conducted are different.

Garang (2016) in South Sudan the impact of financial literacy on the investment choices made by financial institution workers was investigated in a study done in Juba City. Data was collected from 28 banks, 86 Forex Bureaus, and 10 microfinance institutions using a semi-structured questionnaire in a descriptivist research methodology. Secondary information was also supplemented with source data. Frequencies, percentages, analysis of variance, and multiple linear regression were some of the inferential statistics used to examine the data. An individual's investment decision was the dependent variable, while one's propensity to save, manage debt, prepare for retirement, and file tax returns were the independent factors. The findings indicate that an entrepreneur's ability to understand complex financial ideas like risk and diversification, and consequently make sound investment decisions, is influenced by their level of financial literacy. In contrast to the last study, which surveyed bank personnel, the present investigation will limit its attention to normal people living in their own homes.

Kristanto and Gusaptono (2020) conducted research in Yogyakarta, Indonesia, on the effect of financial literacy on the choice between saving and credit made by customers of Sharia banks. Data were gathered via questionnaire and analyzed via multiple linear regression in this probability-based survey. Investment decisions were found to be influenced by several factors: financial knowledge, financial conduct, awareness of financial matters, and financial attitude. The new study will employ household investment, asset accumulation, and saving as its factors, as opposed to the previous study's focus on financial knowledge, financial awareness, behavior, and attitude.

Additionally, Kristanto and Gusaptono (2020) in Indonesia assessed the impact of financial literacy on investment decision between saving and credit on Sharia Bank Customers. While that study's variables were financial knowledge, financial awareness, financial behavior, and financial attitude, the current studies will be household investment, asset accumulation, and household saving. As an additional point, Oman did a study on the effect of financial literacy on personal savings, but they only looked at one variable (households) and employed an exploratory study design, none of which are included in the present investigation (Uddin, 2020). However, it is unclear from the available literature how much of an impact financial literacy has on these three aspects of household decision-making and wealth building. Therefore, the purpose of this research is to examine how financial knowledge can affect household wealth accumulation with a focus on the Dodoma City Council.

Methods

Research Design

This study employed an explanatory research methodology to investigate potential causal links between financial literacy and wealth accumulation. These findings have explanatory value since they detail the chain of events that led to the observed correlations. The explanatory design is used because it is helpful in describing the connections among the buildup of financial attitude, financial behaviour and financial knowledge. An explanatory study design aims to evaluate causation and effect links between variables (Saunders et al., 2007).

Population of the study

A study's population is the entire set of subjects or objects that its results can be extrapolated (Jawabreh et al., 2022). In this study, the targeted population is all households of the selected wards in Dodoma City Council (namely Chang'ombe 6061, Chigongwe 10,146, Chinangali 2,995 and Chahwa 7,202) which makes a total of 26,404.

Sampling procedure

The study employed a simple random sampling to household's members from Dodoma city, because using a simple random sampling technique in this study helped to ensure that the sample of participants is representative of the population of interest, reduces sampling error, and is easy to implement.

Sample size

The term "sampling design" refers to the methodical approach taken to select a subset of a larger population. It is the strategy or method the researcher would use to pick objects for the sample (Krejcie & Morgan, 1970). Given the quantitative nature of the research, a mixed probability and non-probability sampling methodology was used to choose representative samples from the larger population (Pace, 2021). This study will use a probability and random sample of 378 houses to get at the quantitative data, given that the total population is 26,402. According to the method proposed by Hair et al., this data set has sufficient quality for correlation analysis (2006).

Table 1. Determining sample size from a given population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375

N	S	N	S	N	S	N	S	N	S
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Source: Krejcie and Morgan, (1970)

The calculation of sample size per ward was preceded by the establishment of a general sample size that constitutes households from sampled wards .

$$S_i = (BS_i / BS_t) * G_s$$

Where:

S_i = sample per ward (i.e. number of households sampled per wards)

BS_i = number of household in the ward that was used to prepare the sampling frame

BS_t = total number of households in all sampled wards =26,404.

G_s = General sample size obtained using a formula developed by Kothari, 2004 (see section 3.4.4) = 378 households: Basing on the proportion to size ratio, the sample per ward is shown in table 3.2 below

Table 2:Sample size as per ward

Name of ward	Population	Sample representation
Chang'ombe	6061	87
Chigongwe	10416	146
Chinangali	2,995	42
Chahwa	7,202	103
TOTAL	26,404	378

Data Collection Methods

The primary data was acquired by administering questionnaires to Dodoma City Council household heads. Utilizing questionnaires, the collected data on the influence of financial literacy on household wealth accumulation. It is planned to disseminate both open-ended and closed questions to the required 378 responders in the four designated wards. The impact of financial literacy on household wealth creation was elicited from Dodoma City Council households through the use of an open-ended questionnaire.

Data Analysis Technique

The used quantitative data analysis methods, where by descriptive statistics and multiple linear regressions analysis method was employed. The descriptive statistics methods were used to summarize data by using mean score and standard deviations. Multiple linear regression analysis was used to predict the value of a variable based on two or more other variables. This analysis was applied to establish the significant association between independent and dependent variables for each specific objective, specifically in the context of financial knowledge components and wealth accumulation. To assess effect of financial knowledge on wealth accumulation. The regression equation presented as follow:

$$Y = \beta_0 + \beta_1 \text{Personal level of education} + \beta_2 \text{Financial trainings} + \beta_3 \text{Financial management skills} + \varepsilon \quad \text{..... (i)}$$

Where;

Y= Wealth accumulation (measured by index score of wealth accumulation).

β_0 = Constant

$\beta_1 - \beta_3$ = regression coefficients

ε = error term.

Results and Discussion

Descriptive Statistics Results for Financial Knowledge

Respondents were asked to rate their level of agreement for each variable that measured financial knowledge. The responses were collected using a five-point Likert scale questionnaire, where 5 indicated a strong agreement and 1 indicated a strong disagreement. The mean scores were calculated using SPSS and presented in Table 4.1 to provide a summary of the average responses for each item.

Table 3. Descriptive statistics of Financial Knowledge

Variables	Mean	Std. deviation
Personal level of education	4.137	0.605
Financial trainings	4.034	0.664
Financial management skills	3.741	0.869

Personal level of education

Results in Table 3 revealed that, the mean response for personal level of education was 4.137, above the mean score of 3.5. This indicates that the respondents, who participated in the study, agree that personal level of education is important in wealth accumulation, due to its correlation with increased earning potential, expanded career opportunities, entrepreneurial success, financial literacy, adaptability in a changing job market, and access to valuable social networks. These factors collectively contribute to an individual's ability to accumulate wealth over time.

The findings correspond with those of Lusard et al., (2020) higher levels of education often lead to better employment opportunities and higher income potential. By acquiring specialized knowledge and skills through education, individuals can qualify for higher-paying jobs or advance in their careers, ultimately increasing their earning capacity.

Financial trainings

Results in Table 4 revealed that, the mean response for financial training was 4.034, above the mean score of 3.5. This implies that, respondents agree with statement that, attending regular financial trainings can enhance personal in wealth accumulation. The findings suggested that, financial trainings provide valuable knowledge and skills to households that can help individuals make informed decisions about managing their money. They can learn about budgeting, saving, investing, tax planning, debt management, and other important financial concepts. With a better understanding of these topics, individuals can make wiser financial choices that contribute to wealth accumulation (Arshad & Chee, 2023).

Financial management skills

Results in Table 4 revealed that, the mean response for financial management skills was 3.741, above the mean score of 3.5. This implies that, respondents agree with statements that, financial management skills are vital in wealth accumulation. The findings imply that, financial management skills provide the knowledge and tools necessary to make sound financial decisions, control spending, save money, manage debt and invest wisely. By honing these skills, households can increase their wealth accumulation potential and work towards achieving their financial goals (Morgan & Long, 2020).

Inferential Statistics Results for Financial Knowledge

This section presents the inferential statistics results regarding to effect of financial knowledge on household wealth accumulation. Therefore, the multiple linear regression analysis was applied to test the significant relationship between independent variables (Personal level of education, financial trainings and financial management skills) and dependent variable (Household wealth accumulations).

The results presented in Table 4 demonstrate a favorable effect of financial behavior on the accumulation of household wealth. The adjusted R² value of 0.62 indicates that factors related to financial knowledge, such as personal level of education, financial trainings and financial management skills, account for 62% of the variability observed in household wealth accumulation. Furthermore, the F-value reveals that the independent variables, namely personal level of education, financial trainings and financial management skills, predict the dependent variable (household wealth accumulation) with statistical significance, as indicated by a p-value of less than 0.05.

Table 4. Summary of Regression Coefficients of Financial Knowledge and Wealth Accumulation

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	0.101	1.351		1.271	0.012
Personal level of education	0.172	0.136	0.143	1.210	0.017
Financial trainings	0.151	0.140	0.130	1.259	0.012
Financial management skills	0.118	0.106	0.101	2.344	0.046
Dependent Variable: Wealth accumulation		F-value =20.2,			
Adjusted R squared = 0.627		p-value= 0.003			

Moreover, the results presented in Table 4 demonstrate that personal level education has a positive and significant relationship with household wealth accumulation ($\beta=0.172$, $p\text{-value} < 0.05$). These findings suggest that a one-unit increase in personal level of education within households can lead to a 17.2% increase in their wealth accumulations. This indicates that personal level of education is a financial knowledge attribute that influences the accumulation of wealth among households in Dodoma City Council.

The findings concur with those of Gustman et al (2012) who found that, level of education is often associated with higher income levels. Individuals with higher levels of education tend to have access to better job opportunities, higher-paying jobs, and promotions, leading to increased earning potential over time. Higher income levels provide individuals with more resources to save and invest, contributing to wealth accumulation

Furthermore, according to the results presented in Table 4, there is a significant and positive relationship between financial trainings and household wealth accumulation ($\beta=0.151$ and $p\text{-value} < 0.05$). These findings suggest that a one-unit increase in financial trainings among households can lead to a 15.1% increase in their wealth accumulation. Therefore, it can be inferred that financial trainings is an important financial knowledge attribute that impacts the household wealth accumulation in Dodoma City Council.

The findings concur with those of (Sekita et al., 2022) who found that financial trainings provide individuals with a better understanding of key financial concepts, such as budgeting, saving, investing, and debt management. With increased financial literacy, individuals are more likely to make wealth accumulation.

Additionally, the results presented in Table 4. indicated that, that financial management skills has a positive and significant effect on household wealth accumulation ($\beta=0.118$, $p\text{-value} < 0.05$). These findings suggest that a one-unit increase in financial management skills among households can lead to 11.8% increase in their wealth accumulation. These results indicate that financial management plays a crucial role as a financial knowledge attribute affecting household wealth accumulation in Dodoma City Council.

The findings also supported by Sekita et al. (2022) who found that, there is a strong relationship between financial management skills and household wealth accumulation. Effective financial management skills enable individuals and households to make better financial decisions, optimize their resources, and build wealth”

Conclusions, Recommendation and the Area for Further Research

Conclusion

The study concludes that, financial knowledge in terms of personal level of education, financial trainings and financial management skills were positive and significant related to household wealth accumulation. The study concludes that, financial knowledge was important component in in financial literacy influence the accumulation of wealth among households in Dodoma City Council.

Recommendation

The study found that, financial education was important component in financial literacy influence the accumulation of wealth among households in Dodoma City Council. Therefore, it recommended that, the local authorities in Dodoma City Council prioritize and promote financial education initiatives. This can be achieved through collaborations with educational institutions, community organizations, and financial institutions to develop and implement comprehensive financial literacy programs

Area for Further Research

Further research can focus on evaluating the impact of different financial education programs on household wealth accumulation in Dodoma City Council. This research can analyze the effectiveness of various educational initiatives, such as workshops, seminars, and community outreach programs, in improving financial knowledge, skills, and behaviors among residents. It can explore the long-term outcomes of these programs, such as savings behavior, investment decisions, and overall wealth accumulation.

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Original Research

Consequences of Carbon Disclosure in Indonesian Company: Requires Adequate Regulations

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Abstract

Previous research found that companies that fail to mitigate carbon emissions will make higher carbon disclosures than companies that successfully mitigate carbon emissions, and companies will also make decisions that are relevant to applicable regulations and policies. This research will explore the stakeholder perspective in assessing the company. This stakeholder perspective will determine whether more adequate regulations are needed to address the problem of greenwashing and stakeholder protection. This research will also explore whether the transparency of carbon information carried out by companies is directly proportional to the accountability for mitigating carbon emissions and whether current environmental regulations are able to motivate companies to mitigate environmental pollution. The results of the study found carbon emission disclosures have a positive effect on financial performance. Carbon emission disclosure has a positive effect on green innovation. Carbon emission disclosure has a negative effect on the cost of debt. The period of ratification of Presidential Regulation No.98 can strengthen the relationship between carbon emission disclosure and financial performance as measured by return on equity (ROE), but not with financial performance as measured by Tobin's Q. The period of ratification of Presidential Regulation No.98 can strengthen the relationship between carbon emission disclosure and green innovation. The period of ratification of Presidential Regulation No.98 has no effect on the relationship between carbon emission disclosure and the cost of debt.

Keywords: Environmental Accounting, Firm Performance, Government, Green Innovation, Policy and Regulation.

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Introduction

In 2016, the Indonesian government signed the Paris Agreement in which there is a nationally determined contribution (NDC) commitment. This commitment was later confirmed to be part of the national development planning document for the 2020–2024 period and made climate change management one of the national priority agendas. In 2021, the president ratified Presidential Regulation (Perpres) No. 98 regarding the implementation of the economic value of carbon for achieving nationally determined contribution targets and controlling greenhouse gas emissions in national development. This makes Indonesia one of the drivers of market-based climate change mitigation at the global level towards a sustainable economic recovery.

Presidential Regulation No. 98 is a replacement for the old regulations relating to carbon emission mitigation, namely Presidential Regulation No.71 of 2011 concerning the implementation of a national greenhouse gas inventory. The following are the differences between the two rules stated in table 1.

Table 1. Comparison of Presidential Regulation No. 98 and Presidential Regulation No. 71

No	Presidential Regulation No.98	Presidential Regulation No.71
1	This regulation concerns the implementation of the economic value of carbon to achieve nationally determined contribution targets and control of greenhouse gas emissions in national development	This regulation concerns the implementation of a national greenhouse gas inventory
2	Regulate carbon trading procedures. This regulation states that carbon trading is carried out through emission trading mechanisms and greenhouse gas emission offsets	Regulates the national greenhouse gas inventory, as well as monitoring, reporting, verification of greenhouse gases
3	Invite all parties to carry out carbon mitigation and be involved in carbon trading, especially for business entity	Appoint the active participation of sub-national governments namely provinces, districts and cities to prepare a national greenhouse gas inventory. Meanwhile, the development of greenhouse gas inventories only involves central ministries/agencies

Source: Presidential Regulation No.98 dan No.71

Based on table 1 it shows that Presidential Regulation no.71 focuses on conducting a national greenhouse gas inventory. In this case the government focuses on mitigating carbon emissions at the national level. Then, Presidential Regulation No.71 was replaced with Presidential Regulation No.98 which is oriented towards implementing carbon economic values to achieve contribution targets set nationally and controlling greenhouse gas emissions. This presidential regulation on the value of the carbon economy is intended

for both domestic and international markets. Through this regulation it is also hoped that it will open up opportunities for Indonesia to receive wider funding in climate change control.

All parties, especially business entities, are expected to contribute to the implementation of the Presidential Regulation No.98. Presidential Regulation No.98 should be able to reach all parties to contribute to controlling carbon emissions. However, there are still deficiencies, namely that there is no specific mention of the obligations of all parties, especially business entities, to carry out carbon mitigation and carbon disclosure. Then, there are no specific standards and rules that can be used as the basis for implementing carbon mitigation and carbon disclosure for business entities. Thus, the success or failure of business entities in mitigating carbon emissions is difficult to compare, because there is no uniformity in the standards and rules that bind business entities in carrying out carbon mitigation and carbon disclosure.

The government needs to reconsider the continuation of regulations related to carbon emission mitigation, because Indonesia has an NDC target that must be achieved. Indonesia has set a target of reducing greenhouse gas emissions by 29% on its own and 41% with international support by 2030. It is not without reason that Indonesia plays a role in achieving this carbon emission reduction target, because Indonesia is included in the top 10 countries emitting the most carbon in the world. World (Ministry of Environment and Forestry, 2021).

Previous research found that companies that fail to mitigate carbon emissions will adopt actions that are considered relevant in maintaining the company's good name, one of which is carrying out higher carbon disclosure and promotion as a green company through the media than companies that successfully mitigate carbon emissions.. The study also succeeded in proving that companies will make decisions that are relevant to the applicable regulations (Silvia & Guo, 2023).

Companies with adequate environmental disclosure should be able to demonstrate that companies can carry out environmental damage mitigation. Accountability and transparency in environmental aspects should encourage companies to mitigate environmental damage through green innovation. Green innovation is a plan used to achieve the company's strategic targets by using new or changed techniques, systems, practices and production processes to reduce the impact of environmental damage.

Research by Xiang et al., (2020) found that environmental disclosure can encourage corporate green innovation. Green innovation is a tool that companies can use to fulfill their responsibilities to stakeholders and the environment. It is interesting to examine the relationship between disclosure of carbon emissions and green innovation in Indonesian companies. Environmental disclosure, especially carbon disclosure in Indonesia is still voluntary. Adequate voluntary disclosure does not guarantee that companies are truly motivated to carry out green innovation. So it is necessary to do an analysis of this problem. The author also has not found research that investigates this problem in Indonesia.

In addition, this study is also interested in re-examining the relationship between voluntary carbon disclosure, financial performance, and market performance of companies. The instrumental perspective of stakeholder theory shows that business entities that carry out stakeholder management will perform better in terms of profitability, growth, and stability (Laplume, 2021). This theory shows that there is a relationship between the behavior adopted by the company and the results to be obtained.

Companies that carry out stakeholder management properly are likely to succeed in terms of conventional performance (Egels-zanden, 2004). This theoretical perspective also shows the interest of consumers and investors to judge companies based on voluntary disclosure which actually has 2 different consequences. First, it can have an impact on reducing information asymmetry. Second, it allows greenwashing practices behind voluntary disclosure. This situation is feared to mislead stakeholders and lead to inappropriate decision making. It is necessary to know the perspectives of consumers and investors in assessing Indonesian companies through this study. This study will examine the relationship between carbon emission disclosure and financial performance.

This research will also look at the creditor's perspective in assessing the company. Creditors are parties who provide credit or loans to companies. In this case there is an interest rate given as a condition from the creditor for the return of the company's debt. Companies with high environmental risk will have an impact on the high interest rates given by creditors. Is carbon emission disclosure an important matter for creditors to determine the company's interest rate. It is interesting to analyze the relationship between voluntary carbon disclosure and cost of debt in Indonesian companies. This is because most companies in Indonesia are very dependent on external financing from creditors. Research on the relationship between disclosure of carbon emissions and the cost of debt is very limited. The author also has not found research that uses data from Indonesian companies for this problem. Thus, the government's role is very important to overcome these weaknesses through adequate regulation and supervision.

This research will explore the relationship between voluntary carbon disclosure and financial performance, market performance, green innovation, and the cost of debt in companies in Indonesia using views from several different theories. Through this research, it will be proven how the stakeholder perspective is in assessing the company. This stakeholder perspective will determine whether more adequate regulations are needed to overcome the problem of greenwashing. So that in the future the protection of stakeholders will be more guaranteed, especially guarantees in decision making. Similar to previous research, this research also involves the ratification period of Presidential Regulation No. 98 of 2021 to determine its contribution to the relationship between the variables analyzed. It is necessary to study the role and ability of regulators in intervening in Indonesian companies and what stakeholders' perspectives are regarding these regulations.

Literature Review

Consequences of Carbon Emission Disclosure

Research on the consequences of carbon disclosure has been carried out by previous researchers, such as research analyzing the impact of carbon disclosure on company performance, ecological environment, investor decision making, earnings management, and others (Zhang & Liu, 2020). In the aspect of financial performance, research by Griffin & Sun (2013); Matsumura et al., (2014); Saka & Oshika (2014) found carbon disclosure has a positive effect on firm value. Research by Borghei et al., (2018); Ganda (2018) found carbon disclosure has a positive effect on company financial performance. Research by Blanco et al., (2017); Zhou et al., (2018) found carbon disclosure has a positive effect on agency costs and various other benefits. Another study by Lee et al., (2015); Griffin et al., (2017) found the high cost of disclosure causes carbon disclosure to not provide adequate economic benefits for companies, and can even reduce profitability. Lee et al., (2015) found voluntary carbon disclosure has a negative impact on shareholder value in South Korean companies. Another study by Kim & Lyon (2011); Bimha & Nhamo (2017) found carbon disclosure has no effect on firm value.

In terms of ecological environment, research by Akpalu et al., (2017); Qian et al., (2018) found the carbon disclosure has a impact on reducing carbon emissions and improving the ecological environment. Qian et al., (2018) found carbon disclosure has a positive effect on carbon performance. Another study by Matisoff (2013); Liesen et al., (2015); Tang & Demeritt (2018) found carbon disclosure has no effect on ecological improvement and carbon reduction. Research by Knox-Hayes & Levy (2011); Liesen et al., (2017) found carbon disclosure has a small impact on improving the ecological environment.

In terms of investor decision making, research by Motoshita et al., (2015); Griffin et al., (2017); Liesen et al., (2017) found carbon disclosure has a positive effect on investor decision making. In contrast to research by Lee et al., (2015) found carbon disclosure has a negative effect on investor decision making. Haigh & Shapiro (2011) found carbon disclosure can play a role in investors' assessment of corporate governance. Motoshita et al., (2015) found carbon disclosure can encourage consumers to show low-carbon preferences in shopping activities. Another study by Lee et al., (2015) found investors see disclosure of carbon emissions as bad news. Research by Harmes (2011); Sullivan & Gouldson (2012) found the voluntary carbon disclosure cannot meet the needs of investors. Research by Liu et al., (2016) found the carbon labeling can provide positive and negative pressures for producers, investors, and other stakeholders. Sorensen (2009) found consumers do not pay attention to carbon labels, while research by Upham et al., (2011) found carbon labels can help consumers make more reasonable choices.

In another aspect, research by Matisoff (2013) found carbon disclosure has a positive impact on the transparency of Japanese companies. Schiemann & Sakhel (2019) found companies in Europe that voluntarily disclose carbon information were able to reduce information asymmetry between investors and companies, and vice versa. Research by Lemma et al., (2019); Li & Long (2019) found carbon disclosure has a negative effect on the cost of equity. Li & Long (2019) found the level of marketing can positively moderate

the negative relationship between disclosure of carbon emissions and the cost of capital in Chinese companies. Another study by Krishnamurti & Velayutham (2018) found carbon disclosure has a positive impact on stock market liquidity. Research by Knox-Hayes & Levy (2011); Pellegrino & Lodhia (2012) found carbon disclosure has a positive impact on company reputation and can increase company legitimacy. Research by Goss & Roberts (2011); Ge & Liu (2015); Eliwa et al., (2019); Fonseka et al., (2019); Yang et al., (2021) found disclosure of environmental information has a negative effect on the cost of debt. Kleimeier & Viehs (2018); Palea & Drogo (2020); Wang et al., (2022) found that disclosure of climate and carbon information has a negative effect on the cost of debt. Talbi & Omri (2014); Guidara et al., (2014) found voluntary disclosure has a negative effect on the cost of debt.

There is another aspect that may be a consequence of disclosing carbon emissions, namely green innovation. Several studies have analyzed the impact of environmental disclosure and corporate green innovation. As research by Xiang et al., (2020) found environmental disclosure can encourage corporate green innovation in China. Research by Hong et al., (2020) found disclosure of corporate social responsibility has a significant impact on corporate green innovation in China. The research also succeeded in proving that there is a positive role from environmental regulation by the government. Research that examines the relationship between environmental disclosure and corporate green innovation is very limited, especially for corporate carbon disclosure. Research using Indonesian company data has also not been found.

All of these research results show that disclosure of carbon emissions has impact on several aspects, such as company performance, investor decision making, ecological environment, information asymmetry, cost of capital, cost of debt, and other aspects. However, there is still controversy regarding the consequences of disclosing carbon emissions, especially for aspects of financial performance, green innovation, and cost of debt. In the aspect of financial performance there are inconsistent research results. In addition, research that examines this issue using data from Indonesian companies is very limited and based on certain company sectors, and the research results also vary.

In the green innovation aspect, previous research has proven that environmental disclosure and CSR disclosure has a impact on green innovation. However, has no previous research that focused on carbon disclosure as a factor can influence green innovation, especially in Indonesian companies. Indonesia is one of the countries does not have adequate regulations to protect stakeholders from providing wrong information. Carbon disclosure in Indonesia is still voluntary and there is a risk of greenwashing by companies. It remains controversial whether companies with adequate voluntary disclosure are truly motivated to engage in green innovation. On the aspect of the cost of debt, no research has been found that uses data from Indonesian companies to analyze the relationship between carbon disclosure and the cost of debt. This is important because the cost of debt is one of the main sources of external financing for companies. Therefore, it is very interesting to analyze this problem in Indonesia because most Indonesian companies depend on external financing from creditors.

Carbon Emission Disclosure and Financial Performance

Research on the relationship between carbon disclosure and corporate financial performance raises various controversies. Although disclosure of carbon emissions is considered an important factor in determining company performance, it still raises various views regarding the findings obtained by previous researchers. Griffin & Sun (2013); Matsumura et al., (2014); Saka & Oshika (2014) found carbon disclosure has a positive effect on firm value. Borghei et al., (2018); Ganda (2018) found carbon disclosure has a positive effect on company financial performance. Zhou et al., (2018) found high-quality carbon disclosure led to lower corporate agency costs. Research by Borghei et al., (2018) found the companies disclose carbon information in the current period can increase the return on assets in the future.

In contrast to research by Griffin et al., (2017); Lee et al., (2015) found carbon disclosure does not provide economic benefits and reduces company profitability, due to the high disclosure costs incurred by companies. Other studies found voluntary carbon disclosure has a negative effect on shareholder value (Lee et al., 2015). Bimha & Nhamo (2017); Kim & Lyon (2011) found disclosure of carbon emissions is not significantly correlated with firm value. There is no evidence that disclosure of corporate carbon emissions can increase shareholder value. Another study by Liu et al., (2016) investigated how carbon disclosure can mediate the relationship between carbon performance and financial performance. The findings provide evidence that carbon performance and the level of carbon disclosure has a positive effect on the company's financial performance. Rohani et al., (2021) investigated the relationship between performance and disclosure of carbon emissions on economic performance by proxy for ROE (return on equity), the results showed has no relationship. Lu et al., (2021) found carbon disclosure has no effect on financial performance in carbon-intensive industries.

In Indonesia, research related to the relationship between disclosure of carbon emissions and financial performance has been examined by Soewarno et al., (2018) found carbon disclosure has a positive effect on the financial performance of Indonesian companies participating in PROPER. Hardiyansah et al., (2020) conducted research on companies that won the ISRA (Indonesian Sustainability Reporting Award), the results of the study found carbon disclosure has a positive effect on the company's financial performance. Research by Kurnia et al., (2020) found carbon disclosure has no effect on the financial performance of mining, agro and manufacturing companies.

Carbon Emission Disclosure and Green Innovation

Corporate green innovation is a plan used to achieve the company's strategic targets by using new or transformed production techniques, systems, practices and processes to reduce the impact of environmental damage. Fischer & Newell (2008); Marzucchi & Montresor (2017) found effective environmental policies and regulations can encourage more green innovation in companies. Through analysis of German public survey data, research by Horbach et al., (2012) found government regulations can encourage ecological innovation in German companies.

Another study by Calel & Dechezlepretre (2016); Zhu et al., (2019) found carbon trading schemes to have a significant impact on low-carbon technology innovation in companies. Another study by Xiang et al., (2020) found environmental disclosure can encourage corporate green innovation in China. Research by Hong et al., (2020) found disclosure of corporate social responsibility has an impact on corporate green innovation in China. The research also succeeded in proving there is a positive role from environmental regulation by the government.

The relationship between environmental disclosure and green innovation can be explained by stakeholder theory. Donaldson & Preston (1995) explained that stakeholder theory can be seen, presented and used in several different aspects, namely descriptive aspects, instrumental aspects, and normative aspects. In the descriptive aspect, stakeholder theory is used to describe and explain the characteristics or behavior of entities and stakeholders, such as the nature of the company, how managers and stakeholders behave, and how they perceive the behavior and roles of each.

The instrumental aspect, stakeholder theory is used to identify the relationship between management, stakeholders and entity objectives. How should managers act in the interest of the entity to achieve adequate performance and ensure long-term business continuity. Thus, the entity will pay close attention to the people who have an interest in its business.

The normative aspect, stakeholder theory is used to identify the entity's functions based on norms, ethics, and rules. How managers must act and make decisions to achieve goals based on the principles of norms, ethics and rules. Thus, the company will carry out accountability and transparency in environmental aspects to fulfill its responsibilities to stakeholders and the environment. Companies with adequate environmental disclosure should be able to demonstrate that the company is capable of mitigating environmental damage through green innovation.

Research that examines the relationship between environmental disclosure and corporate green innovation is very limited, especially for corporate carbon disclosure. Research using Indonesian company data has not been found. Thus, this study will analyze the relationship between carbon emissions disclosure and green innovation in Indonesian companies.

Carbon Emission Disclosure and Cost of Debt

The cost of debt is one of the main sources of external financing for companies. Based on the pecking order theory, when a company needs external financing, the company must prioritize debt financing, then equity financing. This is because equity financing often sends overvaluation signals to outside investors which can have a negative impact on financial performance. In addition, compared to equity financing, debt financing is relatively low and the interest costs of debt capital are itemized before tax, which can act as a tax deduction (Wu et al., 2020).

In making loan decisions, lending institutions face several environmental risks, one of which is credit risk. Bad environmental behavior by the company will lead to loss of reputation and managers must detect the company's environmental factors to reduce the

risk. Thus, credit risk is a way to influence creditors' decisions. Company environmental disclosure can help creditors make an assessment of the company's environmental investment, environmental risk, and environmental management performance. Environmental disclosure indicators on a regular basis can also motivate companies to protect the environment adequately.

Signaling theory suggests that corporate environmental disclosures can contribute to lowering financing costs by reducing information asymmetry. Companies that actively disclose carbon information will gain several advantages. Such disclosure of corporate carbon information can show the public that the company is in good condition thereby increasing investor confidence. Then, companies can demonstrate to the government their social responsibility and contribution to protecting the environment, including mitigating carbon emissions.

With increasing company transparency, the company's risk is assessed by creditors will be lower. Then, the creditor will charge a lower interest rate, because the rate of return requested by the creditor is the company's risk. This is evidenced by research by Francis et al., (2005) found companies that are sensitive to external funding will have a high level of disclosure, due to the need to have their own capital and low cost of debt. Franco et al., (2016) found bonds issued by companies with high disclosure quality have low debt costs. Goss & Roberts (2011); Ge & Liu (2015); Eliwa et al., (2019); Fonseca et al., (2019); Yang et al., (2021) found environmental information disclosure has a negative effect on the cost of debt. Kleimeier & Viehs (2018); Palea & Drogo (2020); Wang et al., (2022) found carbon disclosure and climate information has a negative effect on the cost of debt. Talbi & Omri (2014); Guidara et al., (2014) found voluntary disclosures has a negative effect on the cost of debt.

Hypothesis Development

Carbon Emission Disclosure and Financial Performance

Referring to the instrumental stakeholder theory perspective, it indicates that there is a relationship between the behavior adopted by the company and the results to be obtained. Companies that carry out stakeholder management appropriately, are likely to succeed in terms of conventional performance. Stakeholder management carried out by the company is usually related to important things for stakeholders. Disclosure of environmental information, especially carbon disclosure is one of the important things for stakeholders. There is interest from stakeholders to assess the company based on the environmental information presented in the company report.

In the current era, environmental issues become an important focus for stakeholders in making decisions. Companies are expected to contribute to the goals of sustainable development. As it is known that the company is an important party that damages the environment through its business activities. Thus, corporate responsibility on social and environmental aspects is indispensable.

In addition to implementing environmental and social accountability, companies are also expected to be transparent in presenting environmental information. However,

carbon disclosure in Indonesia is still voluntary. Many companies do not carry out adequate carbon disclosures because there are no mandatory rules and standards that can be used as references.

Thus, the instrumental stakeholder theory perspective also indicates the interest of consumers and investors to assess companies based on voluntary environmental disclosures which actually have 2 different consequences. First, it can have an impact on reducing information asymmetry. Second, it allows the practice of greenwashing behind the voluntary environmental disclosure. This situation is feared to mislead stakeholders and lead to inappropriate decision making. The role of the government is very important to overcome this weakness through adequate regulation and supervision. It is necessary to analyze this problem, especially for Indonesian companies.

All of these studies obtained different results regarding the strength and direction of the relationship between carbon emission disclosures and corporate financial performance, especially for Indonesia. Several studies in Indonesia are also limited to mining, agro, manufacturing companies and companies with certain achievements, so the results of the research cannot be generalized to all Indonesian companies. By doing this research it is possible to narrow the gap in research results and add new literature studies, especially for Indonesia. This study does not limit the research sample to specific sectors or award criteria. All companies from various sectors are possible to be the research sample. The following is the hypothesis that the author proposes:

H₁: Carbon emission disclosure has a positive impact on the financial performance.

Carbon Emission Disclosure and Green Innovation

Referring to stakeholder theory shows that stakeholders have a role in determining the success of the entity in achieving its goals, so that the entity will try to adjust all activities carried out to meet the expectations of its stakeholders. Stakeholder expectations (investors, government and the general public) are also considered not static which in turn requires entities to be more responsive in making decisions. An entity must manage good relations and meet the expectations of its stakeholders to gain support.

In the current era, the focus of stakeholders is not only on the company's ability to achieve financial performance. However, how can companies contribute to mitigating environmental damage and act transparently in providing environmental information. The Indonesian government invites all people, especially business entities to contribute to achieving the national NDC target. Companies have a responsibility to mitigate carbon emissions and disclose the necessary information transparently.

Thus, the company will carry out accountability and transparency in environmental aspects, especially carbon information to fulfill its responsibilities to stakeholders and the environment. Companies with adequate environmental disclosure should be able to mitigate environmental damage through green innovation. Green innovation is a plan used to achieve the company's strategic targets by using new or changed techniques, systems, practices and production processes to reduce the impact of environmental damage.

Green innovation is a tool that companies can use to fulfill their responsibilities to stakeholders and the environment. Environmental disclosure in Indonesia, especially carbon disclosure is still voluntary. It is still controversial whether adequate voluntary disclosure can guarantee that companies are genuinely motivated to engage in green innovation. So it is necessary to do an analysis of this problem. The author also has not found research that investigates this problem in Indonesia.

Research that examines the relationship of environmental disclosure to green innovation is very limited. In addition, no research has been found that focuses on carbon disclosure and green innovation, especially in Indonesia. The following is the hypothesis that the author proposes:

H₂: Carbon emissions disclosure has a positive effect on green innovation.

Carbon Emission Disclosure and Cost of Debt

Signal theory indicates that disclosure of the company's environment can contribute to lowering the cost of financing by reducing information asymmetry. Environmental information is important information that stakeholders want. The company is expected to fulfill its environmental and social accountability. Companies also need to contribute to achieving sustainable development goals. All business activities carried out by the company have a significant impact on the issue of carbon emissions. Companies that actively implement carbon emission mitigation and disclose carbon information will get several benefits. For example, disclosure of company carbon information can show the public that the company is in good condition, thereby increasing stakeholder trust. Then, companies can show the government about their social responsibilities and contributions to protecting the environment, including reducing carbon emissions.

In addition, the company also gets benefits related to aspects of external financing and the company's rate of return. Cost of debt is the interest rate given as a requirement from creditors for the rate of return on debt made by a company. Based on the pecking order theory, when a company needs external financing, the company must prioritize debt financing, then equity financing. This is because equity financing often sends signals of overvaluation to outside investors which can have a negative impact on financial performance. In addition, compared to equity financing, the cost of debt financing is relatively low. With increased transparency of the company, the risk of the company assessed by creditors will be lower. Then, the creditor will charge a lower interest rate, because the rate of return required by the creditor represents the risk of the company. It is interesting to analyze the relationship between voluntary carbon disclosure and the cost of debt in Indonesian companies. This is because most companies in Indonesia are very dependent on external financing from creditors.

Research on the relationship between disclosure of carbon emissions and the cost of debt is very limited. The author also has not found any research that uses data from Indonesian companies to deal with this problem. The following is the hypothesis that the author proposes:

H₃: Carbon emission disclosure has a negative effect on the cost of debt.

Research Methods

The majority of previous research, especially research using Indonesian company data, used a carbon disclosure checklist adopted from Choi et al., (2013) which totaled 18 disclosure items. Previous studies have only focused on the quantitative aspects of carbon disclosure. Unlike previous research, this study will evaluate the carbon disclosure of Indonesian companies based on a quantitative and qualitative perspective using a checklist and measurement method adopted from Tang et al., (2019).

The financial performance in this study will be proxied by ROE (Return on Equity) and Tobin's Q. ROE is a measure of financial performance in a economic aspect, and Tobin's Q is a measure of financial performance in a market aspect. Green innovation in this study will use disclosure indicators developed by Li et al., (2022). The cost of debt is measured using the interest payment rate, which is defined as the company's interest expense during year t divided by the company's short-term and long-term debt at the beginning of year t (Guidara et al., 2014).

Population of this study is all companies listed on the Indonesian stock exchange (excluding financial companies) with sustainability reports from 2017–2023, total 170 companies. This population was chosen because most of the carbon information can be found in sustainability reports, so it is relevant to this study. The period from 2017 to 2023 is the time after Indonesia signed the Paris agreement in 2016. The sample data for this study is all of the population, totaling 170 companies, so the total sample data is 1190 (company-year).

A random effect model is employed in this study to examine the correlation between the variables. This research also uses the Difference in Difference (DID) method in analyzing the relevance of research variables by involving the ratification of Presidential Regulation No.98. 2023 is the baseline period for ratification of Presidential Regulation No.98. These periods will be compared one by one with other periods in this research. So we will know the impact of this regulation on the relationship between variables.

Results and Discussions

Results

The analysis results for carbon emissions disclosure, financial performance, green innovation, cost of debt and control variable are presented in table 2.

Table 2. analysis Results of Carbon Emission Disclosure, Financial Performance, Green Innovation, Cost of Debt and Control Variable

Variable	ROE	TOBSQ	GI	COD
Carbon Emissions Disclosure	3.451**	2.265**	3.115**	-2.255**
Firm Size	0.988	0.871	2.762**	-0.996

Variable	ROE	TOBSQ	GI	COD
Firm Leverage	-1.752	-3.335**	-0.887	3.002**
Media Exposure	2.662**	2.437**	-1.334	-2.875**
Industry	1.028	1.774	2.661**	2.646**
Intensity of Capital	3.102**	3.107**	2.373**	1.101
Growth of Company	2.151**	2.874**	1.454	-3.151**
Adjusted R ²	0.441	0.522	0.411	0.524
F Value	7.637	10.762	5.019	11.210

The analysis results show carbon disclosure has a positive effect on financial performance and green innovation. Carbon disclosure also has a negative effect on the cost of debt. Companies with adequate capital intensity and company growth are able to achieve adequate financial performance. Companies with adequate capital intensity also have the opportunity to carry out green innovation adequately. Company growth also has an impact on the cost of debt. Media exposure also has a significant impact on financial performance and cost of debt.

Discussion of Results

Carbon Emission Disclosure and Financial Performance

The empirical results show that carbon emission disclosure has a positive effect on financial performance as measured by return on equity (ROE) and Tobin's q. These results are relevant to the perspective of instrumental stakeholder theory which indicates that there is a relationship between the behavior adopted by the company and the results to be obtained.

Companies that carry out stakeholder management properly tend to be successful in terms of conventional performance. Stakeholder management carried out by companies is usually related to important matters for stakeholders. Disclosure of environmental information, especially carbon disclosure is one of the important things for stakeholders. There is an interest from stakeholders to assess the company based on the environmental information presented in the company's report.

In the current era, environmental issues are an important focus for stakeholders in decision making. Companies are expected to contribute to the goals of sustainable development. As it is known that the company is an important party that damages the environment through its business activities. Thus, corporate responsibility towards social and environmental aspects is indispensable. In addition to implementing environmental and social accountability, companies are also expected to be transparent in presenting environmental information to reduce the risk of information asymmetry.

Information on voluntary carbon disclosure has received a positive response from the market, because the market believes that carbon emission information is one of their considerations in predicting company sustainability. Furthermore, efforts to mitigate carbon emissions and present carbon information adequately can be a marketing tool for companies to improve company performance, such as achieving maximum profitability because consumers will only be interested in using products and services from green companies.

The results of this study are relevant to research by Griffin & Sun (2013); Matsumura et al., (2014); Saka & Oshika (2014) found carbon disclosure has a positive effect on firm value. Borghei et al., (2018); Ganda (2018) found carbon disclosure has a positive effect on the company's financial performance. After disclosing carbon emissions in a certain year, the return on company assets also increases (Borghei et al., 2018).

Soewarno et al., (2018) found carbon emission disclosures have a positive effect on the financial performance of Indonesian companies participating in PROPER. Hardiyansah et al., (2020) conducted research on companies that received ISRA (Indonesian Sustainability Reporting Award), the results of the study found carbon emission disclosures has a positive effect on the company's financial performance.

Carbon Emission Disclosure and Green Innovation

The empirical results show that carbon emissions disclosure has a positive effect on green innovation. These results are relevant to stakeholder theory which indicates that when a company considers stakeholders as an important part of its business, the company will carry out business activities and decision making that are relevant to stakeholder expectations.

One of the expectations of the company's stakeholders is accountability and transparency in environmental aspects. Companies that prioritize environmental damage mitigation in their business activities are considered as companies with low risk. The company is also considered to have contributed to achieving sustainable development goals.

Referring to stakeholder theory shows that stakeholders have a role in determining the success of the entity in achieving its goals, so that the entity will try to adjust all activities carried out to meet the expectations of its stakeholders. Stakeholder (investors, government and the general public) expectations are also considered not static which in turn requires entities to be more responsive in making decisions. An entity must manage good relations and meet the expectations of its stakeholders to gain support.

In the current era, the focus of stakeholders is not only on the company's ability to achieve financial performance. However, how can companies contribute to mitigating environmental damage and act transparently in providing environmental information. The Indonesian government invites all people, especially business entities to contribute to achieving the national NDC target. Companies have a responsibility to mitigate carbon emissions and disclose the necessary information transparently.

Thus, the company will carry out accountability and transparency in environmental aspects, especially carbon information to fulfill its responsibilities to stakeholders and the environment. Companies with adequate environmental disclosure should be able to mitigate environmental damage through green innovation. Green innovation is a plan used to achieve the company's strategic targets by using new or changed techniques, systems, practices and production processes to reduce the impact of environmental damage.

Green innovation is a tool that companies can use to fulfill their responsibilities to stakeholders and the environment. Empirical results show Indonesian companies that have implemented adequate carbon information disclosure techniques in the current year are likely to make efforts to mitigate carbon emissions through green innovations in the following year. This shows that most Indonesian companies has the awareness to contribute to achieving national NDC targets and meeting stakeholder expectations. This company awareness needs to be supported by adequate standards and regulations from the Indonesian government, so that the national NDC target is actually achieved.

The results of this study are relevant to research by Xiang et al., (2020) found environmental disclosure can encourage corporate green innovation in China. Research by Hong et al., (2020) found that disclosure of corporate social responsibility has a impact on corporate green innovation in China. The research also succeeded in proving that there is a positive role from environmental regulation by the government.

Carbon Emission Disclosure and Cost of Debt

The empirical results show that voluntary carbon disclosure has a negative effect on the cost of debt. This finding is relevant to signal theory which indicates that corporate environmental disclosures can contribute to lowering financing costs by reducing information asymmetry. Environmental information is important information desired by stakeholders. Companies are expected to fulfill their environmental and social accountability. Companies also need to contribute to achieving sustainable development goals. All business activities carried out by the company has a significant impact on the issue of carbon emissions.

Companies that actively implement carbon emission mitigation and disclose carbon information will get several benefits. For example, disclosure of company carbon information can show the public that the company is in good condition there by increasing stakeholder trust. Then, companies can demonstrate to the government their social responsibility and contribution to protecting the environment, including reducing carbon emissions. In addition, the company also gets benefits related to aspects of external financing and the company's rate of return.

The cost of debt is the interest rate given as a requirement from creditors for the rate of return on debt made by the company. Based on the pecking order theory, when a company needs external financing, the company must prioritize debt financing, then equity financing. This is because equity financing often sends overvaluation signals to outside investors which can have a negative impact on financial performance. In addition, compared to equity financing, debt financing costs are relatively low.

With increasing company transparency, the company's risk is assessed by creditors will be lower. Then, the creditor will charge a lower interest rate, because the rate of return requested by the creditor is the company's risk. The results of this study are relevant to research by Goss & Roberts (2011); Ge & Liu (2015); Hasan et al., (2017); Eliwa et al., (2019); Fonseka et al., (2019); Yang et al., (2021) found the disclosure of environmental information has a negative effect on the cost of debt.

Kleimeier & Viehs (2018); Palea & Drogo (2020); Wang et al., (2022) found the disclosure of corporate climate and carbon information has a negative effect on the cost of debt. Talbi & Omri (2014); Guidara et al., (2014) found the company's voluntary disclosure has a negative effect on the cost of debt.

Robustness Test

Carbon Emission Disclosure and Financial Performance (ROE) Period of Ratification Presidential Regulation No.98

The results of the robustness test for carbon emission disclosure and ROE period of ratification Presidential Regulations No.98 are stated in table 3.

Table 3. Analysis Results of Carbon Emission Disclosure and ROE Period of Ratification Presidential Regulation No. 98

Variable	ROE					
	2017	2018	2019	2020	2021	2022
Regulation Period	0.987	1.112	0.886	0.764	1.710	1.633
Carbon Emission Disclosure (CDV)	2.330**	2.412**	2.004**	2.157**	2.110**	2.178**
Interaction of Regulation Period and CDV	3.217**	3.101**	2.455**	2.312**	2.065**	2.322**
Firm Size	1.874	2.103**	2.266**	1.150	2.151**	2.371**
Firm Leverage	-0.917	-0.985	-1.123	-2.313**	-2.122**	-2.453**
Media Exposure	0.717	0.840	0.935	-0.861	-0.771	-0.821
Industry	1.671	1.556	1.431	1.652	0.912	1.033
Intensity of Capital	3.122**	2.643**	2.786**	2.713**	3.106**	2.919**
Growth of Company	2.447**	2.569**	2.078**	2.012**	2.856**	2.667**

The robustness results with 2023 as the baseline period show quite consistent results. Especially for carbon emission disclosure, interaction of regulation period and CDV, intensity of capital, and growth of company variables. These results indicate that the ratification of Presidential Regulation No.98 played a role in influencing the relationship between carbon emissions disclosure and return on equity (ROE) in Indonesian companies. Ratification of Presidential Regulation No. 98 can strengthen the relationship between carbon emissions disclosure and return on equity (ROE).

Carbon Emission Disclosure and Financial Performance (Tob's Q) Period of Ratification Presidential Regulation No.98

The results of the robustness test for carbon emission disclosure and Tobin's Q period of ratification Presidential Regulations No.98 are stated in table 4.

Table 4. Empirical Results of Carbon Emission Disclosure and Tob's Q Period of Ratification Presidential Regulation No.98

Variable	Tob's Q					
	2017	2018	2019	2020	2021	2022
Regulation Period	1.032	0.848	1.337	0.951	1.175	0.821
Carbon Emission Disclosure (CDV)	2.671**	2.355**	2.422**	2.540**	2.177**	2.458**
Interaction of Regulation Period and CDV	1.431	1.547	1.330	1.251	1.556	1.471
Firm Size	0.677	0.923	1.104	0.905	1.574	1.233
Firm Leverage	-3.103**	-3.006**	-2.763**	-2.458**	-2.557**	-2.461**
Media Exposure	0.938	0.962	1.212	1.102	1.633	1.402
Industry	-2.221**	-2.217**	-2.341**	-2.550**	-3.114**	-2.761**
Intensity of Capital	0.882	0.655	0.425	0.564	0.772	1.108
Growth of Company	1.202	0.746	0.884	0.958	1.104	0.845

The robustness results with 2023 as the baseline period show quite consistent results. Especially for carbon emission disclosure, firm leverage, and industry variables. These results indicate that the ratification of Presidential Regulation No.98 has no impact on the relationship between carbon disclosure emissions and Tobin's Q in Indonesian companies.

Carbon Emission Disclosure and Green Innovation (GI) Period of Ratification Presidential Regulation No.98

The results of the robustness test for carbon emission disclosure and green innovation period of ratification Presidential Regulations No.98 are stated in table 5.

The robustness results with 2023 as the baseline period show quite consistent results. Especially for carbon emission disclosure, regulation period, interaction of regulation period and CDV, industry, and intensity of capital variables. These results indicate that the ratification of Presidential Regulation No.98 played a role in influencing the relationship between carbon emissions disclosure and green innovation in Indonesian companies. Ratification of Presidential Regulation No. 98 can strengthen the relationship between carbon emissions disclosure and green innovation.

Table 5. Analysis Results of Carbon Emission Disclosure and GI Period of Ratification Presidential Regulation No. 98

Variable	GI					
	2017	2018	2019	2020	2021	2022
Regulation Period	2.207**	2.116**	2.341**	2.008**	2.146**	2.477**
Carbon Emission Disclosure (CDV)	2.871**	2.921**	3.217**	2.662**	3.165**	2.865**
Interaction of Regulation Period and CDV	3.544**	3.127**	2.717**	2.931**	3.125**	2.711**
Firm Size	1.126	1.871	1.776	1.901	0.848	1.005
Firm Leverage	-1.632	-1.883	-1.267	-1.326	-1.447	-1.211
Media Exposure	-0.771	-0.912	-0.977	-0.898	-1.885	-1.753
Industry	2.723**	2.781**	2.665**	2.460**	2.202**	2.662**
Intensity of Capital	3.110**	3.651**	2.718**	2.880**	2.600**	2.203**
Growth of Company	0.716	0.737	0.678	0.515	0.785	1.109

Carbon Emission Disclosure and Cost of Debt (COD) Period of Ratification Presidential Regulation No.98

The results of the robustness test for carbon emission disclosure and cost of debt period of ratification Presidential Regulations No.98 are stated in table 6.

Table 6. Empirical Results of Carbon Emission Disclosure and COD Period of Ratification Presidential Regulation No.98

Variable	COD					
	2017	2018	2019	2020	2021	2022
Regulation Period	0.818	0.952	0.933	0.896	1.230	0.906
Carbon Emission Disclosure (CDV)	-2.467**	-2.616**	-2.320**	-2.718**	-3.252**	-2.775**
Interaction of Regulation Period and CDV	1.873	1.765	1.620	1.434	1.515	1.113
Firm Size	-1.257	-1.212	-0.733	-0.810	-0.719	-1.207
Firm Leverage	2.545**	2.818**	2.829**	3.121**	3.210**	2.517**
Media Exposure	-2.101**	-2.156**	-2.414**	-2.192**	-2.010**	-2.336**
Industry	3.157**	3.010**	2.210**	2.314**	2.211**	2.515**
Intensity of Capital	0.650	0.357	0.477	-0.833	-0.795	-1.011
Growth of Company	-2.311**	-2.006**	-2.128**	-2.054**	-1.998**	-2.103**

The robustness results with 2023 as the baseline period show quite consistent results. Especially for carbon emission disclosure, firm leverage, media exposure, industry, and growth of company variables. These results indicate that the ratification of Presidential Regulation No.98 has no impact on the relationship between carbon disclosure emissions and cost of debt in Indonesian companies.

Further Analysis

The results of the robustness test show period of ratification Presidential Regulation No.98 can strengthen the relationship between voluntary carbon disclosure and financial performance as measured by return on equity (ROE). These findings prove that the regulations and standards set by the government can affect the activities of company management and the perspective of company stakeholders. Efforts to mitigate carbon emissions and provide adequate carbon information can be a marketing tool for companies to improve company performance, such as achieving maximum economic performance because consumers will only be interested in using products and services from an green company.

The ratification of Presidential Regulation No.98 has proven to have a significant impact on the relationship between voluntary carbon disclosure and short-term financial performance as measured by return on equity (ROE). However, it has no a significant impact on the relationship between voluntary carbon disclosure and long-term financial performance as measured by Tobin's q. This is due to the implementation of Presidential Regulation No. 98 is still new and only regulates the application of carbon economic values to achieve contribution NDC targets nationally and control greenhouse gas emissions in national development.

The regulation does not regulate the company's obligation to disclose carbon according to certain rules and standards. Thus, regulations made by the Indonesian government are not sufficient to strengthen the relationship between disclosure of carbon emissions and financial performance in the long term.

Then, robustness test results show the period of ratification of Presidential Regulation No.98 can strengthen the relationship between carbon emissions disclosure and green innovation. This finding indicates that Indonesian companies also consider the rules made by the government in making decisions and carrying out business activities. The government through its regulations can intervene business entities in carrying out activities and making decisions. Thus, it is very necessary to have adequate regulations and standards to control business entities.

The findings in this study prove that Indonesian companies actually have the awareness to mitigate carbon emissions, but current regulations in Indonesia are not sufficient to support companies to carry out their responsibilities in environmental aspects. Further regulations are needed to ensure companies can carry out carbon emission mitigation and achieve national NDC targets.

The robustness test results also show the period of ratification of Presidential Regulation No. 98 has no impact on the relationship between voluntary carbon disclosure

and the cost of debt. This indicates that any circumstances and situations during the observation period did not change creditor's perceptions in assessing company risk.

Companies that actively implement carbon emission mitigation and disclose carbon information can increase stakeholder confidence, especially creditors because they are considered green companies with a low level of risk. Green companies are also considered as companies that prioritize sustainability. Thus, the company's risk assessed by creditors will be lower. Then, the creditor will charge a lower interest rate, because the rate of return requested by the creditor is the company's risk.

Conclusion

Empirical evidence shows that carbon emissions disclosure has a significant effect on the company's financial performance and cost of debt. This indicates that stakeholders are interested in green companies, because they are considered companies that prioritize sustainability. The government must pay attention to this situation and need to consider adequate regulations to protect stakeholders. This study also finds that carbon emission disclosure has a positive effect on green innovation. Indonesian companies that have implemented adequate carbon information disclosure techniques this year will most likely make efforts to mitigate carbon emissions through green innovation in the following year. This shows that the majority of Indonesian companies have the awareness to contribute to improving the quality of the environment. This company awareness needs to be supported by adequate standards and regulations from the Indonesian government. Relevant to previous research, this research also supports the need for further and adequate regulations regarding environmental damage to overcome the problem of greenwashing and provide guarantees for stakeholder protection, especially in decision making. It is hoped that future research can improve the limitations of this research which only focuses on companies in Indonesia, thereby limiting the generalizability of these findings to other countries or regions. This research also has the potential to have weaknesses in the research method and can cause bias, so future research can look for alternative methods to overcome this. This research only examines the relationship between carbon disclosure and financial performance, without considering other potential factors that can influence company performance. Future research needs to consider these potential factors. The consequences of carbon disclosure can have an impact on other variables not analyzed in this research, so further analysis is needed regarding the consequences of carbon disclosure involving other variables.

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Original Research

Investigating Various Levels of Financial Literacy with Behavioral Trends of Investors

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Abstract

Understanding the factors that contribute to decreased financial literacy and increased behavioral biases can suggest solutions for risk management and improving decision-making processes. On the other hand, investors make financial decisions based on their levels of financial literacy and behavioral biases. The main goal of this research is to examine the various levels of financial literacy with investors' behavioral biases, and understanding this relationship can help us recommend the best strategies to encourage investors to make better-informed decisions. The research population includes all investors in the Tehran Stock Exchange. A sample, calculated using Cochran's formula, ultimately collected 390 questionnaires manually and online, and necessary pretests were conducted to confirm the validity and reliability. Descriptive statistics, including the demographic characteristics of respondents and the frequency of responses to each question, were performed in this study. Then, structural equation modeling was used to test hypotheses. The results of hypothesis testing showed that professional financial literacy has an inverse effect on overconfidence behavioral bias. It was also found that professional financial literacy has a significantly positive effect on risk tolerance. Finally, it was determined that there is a significant negative relationship between professional financial literacy and self-documentary and risk aversion biases. On the other hand, it was revealed that investors with low levels of financial literacy have a positive relationship with the mentioned behavioral biases. Based on the research results, it can be claimed that as the level of financial literacy decreases among investors, they will become more involved in behavioral biases.

Keywords: Behavioral biases, financial literacy, investors.

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Introduction

Investors, in their financial decision-making, are influenced by behavioral factors. These factors include behavioral biases such as overconfidence, emotional fluctuations, high self-confidence, a tendency to gather information from unknown sources, etc. For example, for investors with overconfidence, positive news may intensify their overconfidence and result in financial decision-making errors. Therefore, in financial decision-making, it is necessary for investors to be aware of their behavioral factors and try to control their impact. The term "bias" refers to deviation from correct and optimal decision-making. In summary, behavioral biases are defined as systematic errors in judgment (Xiao et al., 2022). To provide a proper analysis of investor behavior, analysts need to identify all influential factors. Identifying these factors helps analysts make more accurate efforts to attract investors in the stock market and, in addition to paying attention to other financial and economic individual variables, consider occupational and educational factors as important and influential variables on investors' decisions. Financial planners can also use the findings of this research in developing solutions and allocating financial resources. Today, it is globally accepted that financial literacy is a crucial component of financial stability and economic development. Considering this importance, many institutions (such as the Jump\$tart Coalition for Personal Financial Literacy and the Center for Financial Literacy Global Financial Literacy Excellence Center) study financial literacy on a national and global scale. Most of these studies aim to enhance individuals' financial knowledge (Arianti, 2018).

Some researchers have conducted studies in search of a meaningful framework for classifying behavioral biases. Some authors refer to behavioral tendencies as heuristics, while others label them as beliefs and preferences. Some researchers classify biases into cognitive and emotional categories, and it seems that this classification could be useful. So far, a cohesive theory regarding the causes of behavioral biases has not been presented. However, financial research relies on a broad set of evidence confirming the suboptimal financial decisions of individuals in various conditions (Ghalmegh et al., 2019).

Although classifying biases seems useful, its practical applications in real-life situations may not be as important as it appears. Behavioral biases include overconfidence, representativeness, reliance, adjustment, conservatism, familiarity, self-documentary, hindsight, ambiguity aversion, over-optimism, myopia, optimism, mental accounting, belief perseverance, event framing, loss aversion, novelty-seeking, regret aversion, shape preference, reversal aversion, and many more (Ndou, 2023).

Financial illiteracy among participants in all markets, especially financial markets, violates the first condition of a free market according to its theoretical definition (equal access to information) and can impact the performance of these markets. Therefore, one of the main issues in the efficiency of financial markets is the financial literacy of current or potential participants. Policymakers who seek to develop financial markets based on economic market theories must be aware of the minimum level of financial literacy required for participants in financial markets to achieve their goals. Additionally, the evaluation of the financial literacy level of participants at different time intervals must be conducted accurately. Financial literacy is the ability of an individual to use their

knowledge and skills to manage their financial resources effectively for financial security throughout their lifetime (Arianti, 2018).

Given the lack of consensus in defining financial literacy, it is not surprising that various methods exist for assessing it. This is because the assessment of any subject is fundamentally tied to its definition, meaning that the boundaries and scope of the definition determine the dimensions and content of the assessment. Examining the research conducted in the field of financial literacy reveals differences in both the content and methods of assessment (Ghalmegh et al., 2019).

An important feature of this research is its focus on financial literacy and decision-making. While controlling for other wealth-determining factors such as income and education, the study also considers the influence of several variables proposed by behavioral economics, such as overconfidence, conservatism, self-documentary, and risk tolerance.

Theoretical Foundations of the Research

Concept and Importance of Financial Literacy

Based on theoretical concepts of financial literacy, the ultimate goal of the accounting process is to provide useful information to a wide range of users to assist in decision-making. Users of financial statements, especially investors, evaluate the information provided by companies to meet their informational needs and make informed decisions. For this information to be useful in decision-making, users must be able to understand it. Some have referred to this as a bridge between users and informed decision-making. In other words, as long as the information is not understood, the ability to use it in the future will be limited. Achieving understandable information is crucial, and in recent theoretical foundations, it is referred to as financial literacy (Bhushan & Medury, 2013). The results of previous research directly and indirectly indicate that financial literacy of financial reports is one of the influential factors on investors' decisions (Bhushan & Medury, 2013). In recent years, literacy in financial information and accounting text has gained significant attention from market observers. Since achieving the qualitative property of understandability is largely dependent on the concept of literacy, understanding the extent to which literacy affects various decisions of stakeholders, especially investors, seems essential. However, so far, few empirical studies have examined the consequences of financial information literacy (Nurjannah et al., 2023). The aim of this research is to investigate the relationship between financial statement literacy and investors' sensitivity to the use of accounting information. This research is important for several reasons. Firstly, it leads to a more comprehensive theoretical framework in the linguistic field and is expected to be useful for a wide range of stakeholders in this area. Secondly, the study aims to explore the extent to which the concept of literacy can play a role in investors' judgments and sensitivity to the use of accounting information (Nurjannah et al., 2023).

Factors Affecting Financial Literacy

Financial literacy is considered one of the most important sources of information for legislators, shareholders, financial report analysts, and other stakeholders. These reports

will be useful to users if they are easily understandable. Therefore, literacy in financial reporting is of particular importance. One of the main goals of financial reporting is to provide the necessary information for decision-making to stakeholders or market analysts (Shusha, 2017).

Several factors can impact financial reporting literacy. One of these factors is the organization's success in observing and performing its relevant social responsibilities. Social responsibility, as a strategic tool for increasing the value and long-term sustainability of a company, involves creating positive relationships with the community, adhering to laws and regulations, and implementing ethical procedures. The simultaneous consideration of social environment, social performance, and social responsibility, along with the advancement of societies and attention to human rights, has highlighted the concept of corporate social responsibility in recent decades. Companies are now expected to be responsive to the environment and stakeholders. In addition to the traditional responsibilities of companies, such as profitability, companies are responsible for society and the environment. Their responsibilities extend beyond shareholders to include citizens, who have gained increased attention. Companies are now expected to be accountable not only for their profitability but also for their impact on society and the environment (Sajadi et al., 2014). Another factor that can significantly impact financial reporting literacy is adherence to professional ethics (Sajadi et al., 2014).

Another factor that seems to have a close relationship with financial reporting literacy is the management of the tone of financial reporting. The type of writing in financial reports and the tone during presentations can influence how users perceive the information. Overall, the tone, whether positive or negative, is a tool that managers use in non-numerical, explanatory, and even oral reports. Like reading, the tone can impact the decision-making of annual report users (Sajadi et al., 2014).

Financial reporting literacy, defined as the transparency of the text and success in making financial information understandable, is crucial. Investors, analysts, and other stakeholders widely rely on the information presented in company reports. Clarity, transparency, and understanding of these reports are of great importance to auditors and investors. Recent changes in laws and financial reporting have increased the required disclosures in annual reports. According to the assumption of managerial ambiguity, managers' motivations can lead to ambiguity and hiding information by reducing transparency in disclosures. Managers may hide information they do not want to disclose, making financial reporting difficult for investors to understand (Sajadi et al., 2014).

The Effects of Financial Literacy on Investor Decision-Making

This study examines how disclosures with lower literacy levels affect the sensitivity of investors' evaluative judgments toward external sources of information. Using a controlled experiment, it was determined that when a company provides less literate disclosures, participants feel less comfortable evaluating the company, and their judgments about the company are more sensitive to the content of external information sources. Additionally, if investors' behavior is more stringent, less literate disclosures may increase the likelihood that investors, not only in recent periods but also in future periods, direct their attention towards external information. This suggests a worsening of

managers' ability to effectively communicate private information to investors (Tega et al, 2023).

In general, our results particularly indicate that an increase in disclosure literacy reduces investors' inclination to rely on external information, suggesting that investors may rely more on well-literate disclosures. From an economic theory perspective, if financial statements provided by companies have low literacy, investors may find it challenging to evaluate them, leading them to seek and rely on other information. Consequently, it is expected that their sensitivity to the use of company accounting information will decrease, as accounting information is limited compared to extensive and varied other information. Therefore, investors may become confused, making their decision-making process more complex. As a result, investors' judgments about non-accounting information become more sensitive in these conditions, signifying that the impact of other information on their judgments becomes more pronounced compared to company accounting information, which fades into the background (Arianti, 2018).

Based on the obtained results, it can be stated that investors feel more discomfort in evaluating a company based on less literate disclosures. This result indicates that providing less literate disclosures may reduce managers' ability to convey information to investors, making investors rely on external information instead of company disclosures. More literate disclosures may lead investors to rely more on company disclosures, reducing their inclination to incorporate external information into their evaluations. In other words, when investors feel they cannot rely on current company disclosures and, therefore, find it challenging to evaluate the company's future performance, they are more likely to seek external information and rely on it as a tool for evaluating the company (Slovic et al., 1977).

These findings suggest that individuals who feel more comfortable making decisions based on the current set of information may expect less benefit from conducting additional information searches, and therefore, they are more likely to end their information search with a higher probability. Similarly, investors who feel less comfortable evaluating the company based on company disclosures may expect greater benefits (profits) from searching for external information (Arianti, 2018).

(Arianti, 2018) From the overall findings, it can be concluded that investors, after receiving reports with less literacy, will have less comfort in evaluating the company. Additionally, studies emphasizing the fluidity of processing indicate that a fluent text can bring about a more favorable evaluation of information, showing that more literate disclosures may have limitations in investors' understanding. These limitations provide opportunities for future research. The constraints include:

- First, in implementing this scenario, the researcher only had access to a limited set of information for participants to maintain task management capabilities, while in the real world, investors have access to a variety of information resources.
- Second, some participants may want to have good external information access due to certain experiential needs. This potential increase in information search criteria may

reduce the ability to detect the relationship between disclosure literacy and information search.

- Third, all participants in the study observed company disclosure before external information. Investors can practically choose the timing or accessibility of company disclosures. While the potential impact of this choice is not directly tested in the design, even if external information is available before company disclosures, the literacy of company disclosures can still influence investors' relative reliance on company disclosures versus external information.

In conclusion, future research can explore how disclosure literacy affects information search and reliance on external information for disclosures that include positive, forward-looking, and historical information.

Strategies for Improving Financial Literacy

Most companies, in pursuit of their goals, opt for a set of interconnected strategies designed at various levels within the organization, rather than adopting a comprehensive and unitary approach. In larger companies with multiple products, these levels are categorized as follows: 1. Corporate Strategy, 2. Business Commercial Strategy, and 3. Functional Operational Strategy. It should be noted that in smaller companies, the first and second levels are often merged into one, creating a single level (Tega, 2023). At the Corporate Strategy level, decisions are made regarding overall objectives and businesses in which the company intends to invest. This level primarily includes board members, CEOs, and administrative managers. Business Commercial Strategy encompasses a section of the company, a product line, or other profitable centers that can operate independently of other units. At the Business Commercial Strategy level, the focus is more on creating sustainable competitive advantages for products. The third level is the Functional Operational Strategy, mainly involving managers responsible for products, geography, and functional areas. At this level, the responsibility includes formulating annual goals and short-term strategies in areas such as production, operations, research and development, finance and accounting, marketing, and human relations. Nevertheless, larger responsibilities are related to the execution of the company's strategic plans (Tega, 2023). Managers at the Corporate Strategy level and Business Commercial Strategy level focus on executing the right actions, while managers at the Functional Operational Strategy level concentrate on performing the right tasks. There is a close relationship among these three strategy levels (Sajadi et al., 2014).

There are two prevalent and dominant frameworks for business strategies: 1. Porter's Framework, 2. Miles and Snow Framework, and 3. Porter's Framework, which focuses on customers and competitors. According to Porter, the overall strategy for businesses includes cost leadership, differentiation, and focus, which can be employed at the business unit level and contribute to creating added value for the business. The Miles and Snow framework concentrates on the willingness to change products and market focus. It is usually implemented at the product level, emphasizing improving the competitive position of the company's products and services in a specific market segment. Through research on various types of companies, it has been concluded that companies, to reduce the negative impact of the environment and benefit from opportunities while adapting to

conditions, primarily employ one of four types of strategies: aggressive, defensive, analytical, and reactive (Oppong et al., 2023). A summary of the characteristics of these four strategies is provided. The research results indicate that the business strategy, considering the company's structure and processes, technology, market and product scope, capacity, and knowledge domain, affects how the company achieves its goals and the desired performance. The complexity of operations and environmental uncertainty, incorrect reporting, aggressive tax behavior, the risk of stock price decline, internal control and audit quality, audit reports, investment levels, and manager rewards are among the factors studied in the informational environment (Sajadi et al., 2014).

Research conducted on financial literacy in financial reports indicates that financial reporting literacy is associated with messages from audit reports, reactions exceeding or falling short of investor expectations, coverage, dispersion, and accuracy of analysts' profit predictions, transparency of the company's financial position and performance, institutional ownership debt costs, analysts' ability, and transaction volume, voluntary disclosure, earnings management, credit rating, and debt costs, management ability, audit fee, and business strategy (Barber & Odean, 1998).

Literacy is easily defined as the ability to read and comprehend a text by the reader. In accounting and financial literature, financial reporting literacy of companies has also received attention, and various research has been conducted to examine the factors affecting it. One of the influential factors in the level of financial reporting literacy is the business strategy of the company, which can determine the articulation and clarity of the disclosed information for users of financial reports. In this regard, the present study investigates the impact of business strategy on the financial reporting literacy of companies. For this purpose, the business strategy of companies was divided into defensive and aggressive strategies using the scoring system, and the FOG index was utilized to measure the level of financial reporting literacy of companies. The results of the research indicate a significant and positive relationship between the business strategy and the FOG index. In other words, if a company has an aggressive business strategy, it tends to have lower financial reporting literacy (Bucher-Koenen et al., 2021).

Companies with aggressive strategies strive to produce new products and discover market opportunities. Therefore, they significantly modify their technologies. As these companies operate in a highly competitive environment, predicting the outcomes of new products is challenging. Moreover, because aggressive companies expect any bad news to be accompanied by significant failure, they disclose more complex and technical information. Consequently, companies with aggressive strategies, due to operating in an uncertain and competitive environment, attempt to provide ambiguous and complex information about processes and new products. The findings of the current research align with the results of previous studies. Furthermore, the present research results are consistent with financial research, indicating that the complexity of operations and environmental uncertainty leads to a reduction in the clarity of disclosed information (Bucher-Koenen et al., 2021).

In addition to the types of investors, their ownership structure in companies also varies. In other words, part of the ownership belongs to major investors, and another part belongs to minor shareholders. Major investors, given their significant ownership stake in

companies, wield considerable power. When major shareholders hold a substantial percentage of a company's shares, they can impose their policies on the company and attract private interests that others may not be able to attain. Major investors often play a significant role in the process of selecting the board of directors and can have direct access to valuable confidential information that is not easily accessible to the public (Bucher-Koenen et al., 2021).

Conversely, minor investors rely on publicly available information, such as financial statements, for monitoring management performance and decision-making. Based on these foundations, it is inferred that the mentioned sensitivity in the main hypothesis is higher for companies with minor investors.

Why is there a significant statistical relationship between financial literacy and behavioral biases of investors in the Tehran Stock Exchange? To test this hypothesis, the Pearson correlation coefficient has been employed. From an objective perspective, this research is both fundamental and applied. Its fundamental goal is to explain the relationship between personality behavioral biases and the level of financial literacy of investors. On the other hand, this study is considered applied research conducted to develop applied knowledge in the fields of behavioral finance and empirical accounting theory. In terms of data collection, this study can be considered a descriptive survey research, used to examine the distribution of characteristics in the statistical population under study (Droms, 2009).

Is there a significant relationship between occupational and educational factors with financial literacy or not? To answer this question, monthly income, education level, field of study, employment status, and occupational field are considered as occupational and educational factors. In short, the research results show that investors with higher monthly incomes also have higher levels of financial literacy, which seems logical and is consistent with other studies conducted in this field. For example, similar results were obtained among Iranian students in another study. The level of education does not affect financial literacy, as this research only focuses on the general financial literacy of investors. Unfortunately, most university academic curricula currently lack these topics in the majority of academic disciplines. The research results indicate that the financial literacy of students with higher education levels is higher than that of other students (Barber & Odean, 1998).

Overconfidence in Investors

Overconfidence, or excessive trust, can be defined as a baseless belief in one's cognitive abilities, judgments, and intuitive reasoning. The concept of overconfidence arises from a wide range of psychological tests and examinations in which individuals overestimate both their predictive abilities and the accuracy of the information provided to them. Investors, in particular, tend to have excessive confidence in their investment abilities. The confidence they allocate to their investment predictions is often very high. This type of overconfidence is referred to as over-precision in forecasting (Barber & Odean, 1998). Some investors are also frequently very confident in their judgments, termed over-certainty. For instance, after identifying a suitable company for investment, individuals often overlook the prospect of loss. If such investments result in poor

performance, investors may be surprised or disappointed. This behavior leads to investors' inclination to identify "the next hot stocks," resulting in excessive trading and potentially having inadequately diversified portfolios. These investors often refrain from diversifying their portfolios, claiming access to confidential information about the companies or having an emotionally unbreakable connection to them. Consequently, they are unwilling to accept the reality that such investments may pose risks, and this overconfidence in forecasting can lead to significant losses (Roshangarzadeh et al., 2023) Individuals tend to exaggerate their abilities, including predictive power, perceptual information, and knowledge. In other words, they have excessive trust in their abilities and knowledge, meaning that information available to investors may not be perceived accurately. Nevertheless, they consider themselves competent in interpreting information and make decisions based on it. Overconfidence manifests in various ways, with individuals exposed to this bias often failing to use diversification in their investments. Instead, they typically invest in companies they are familiar with, showing a preference for local stocks or those associated with their workplace (Roshangarzadeh et al., 2023).

Self-Serving Bias in Investors

Self-serving bias is a crucial concept in psychology, referring to the tendency of individuals to attribute their successes to internal factors, such as talent or insight, while attributing failures to external factors beyond their control (Miller & Ross, 1975). The inclination of individuals to attribute their successes to intrinsic qualities like abilities or foresight and attribute failures to external factors, such as bad luck (Mohammadi et al., 2017), is contingent on this bias. In other words, this bias aligns with the theory of self-serving bias. Individuals prefer to attribute their successes to internal and intrinsic factors like their capabilities, while considering their failures as insignificant and attributing them to external factors like the shortcomings of others (Droms, 2009).

Investors' Risk Appetite

Risk appetite, as one of the topics in behavioral finance, is the extent to which individuals are encouraged to take initiative and engage in risky activities. In essence, risk appetite is an individual's inclination to enter decision-making scenarios (LariSemnani, 2018). Risk is a significant factor influencing the decision-making process for investors. It is evident that desirable investment aligns with economic and social development (Sajadi et al, 2013). The level of risk and the factors affecting risk are crucial considerations for investors in planning their investments to achieve favorable outcomes.

Many scholars in the field of risk believe that individuals' financial literacy enhances their risk-taking ability. Various theories exist regarding the factors influencing investors' risk appetite. Some researchers consider demographic variables, such as gender (men being more risk-tolerant) and age (younger individuals being more risk-tolerant), as influential factors in their risk tolerance. Others emphasize the personality traits of individuals and assert that, regardless of demographic characteristics, psychological traits significantly affect individuals' willingness to take risks. According to this group of scholars, characteristics such as risk tolerance are part of individuals' personalities and may even be considered hereditary (Einabadi & Khoshfetrat, 2023).

While some argue that personality traits alone do not determine an individual's risk tolerance, others believe that an individual's ability to recognize, understand, and analyze factors affecting stock markets, such as industry-related factors, environmental factors, and internal factors of stock-supplying companies, can influence investors' risk tolerance. This approach, while accepting some aspects of the mentioned theories, overall contends that risk and risk appetite are primarily acquired and dependent on the individual's surrounding environment. One of the most important factors considered by these scholars is individuals' financial literacy. In this context, individuals with higher financial literacy, due to better understanding and mastery of conditions, tend to take less risk in their financial decisions. Even if they do take risks, these are calculated risks based on careful planning (Einabadi & Khoshfetrat, 2023).

Investors' Cognitive Dissonance

Cognitive dissonance adaptation is essentially an effort to overcome mental discomfort resulting from conflicts and cognitions. Cognition refers to attitudes, emotions, beliefs, and values. Individuals typically experience a form of mental discomfort when confronted with new information that contradicts their previous perceptions. Cognitive dissonance adaptation is a form of imbalance that involves a response in the form of confrontation and efforts to harmonize conflicts and overcome mental discomfort (Arefinejad & Shahrestani, 2023).

The Relationship Between Financial Literacy and Overconfidence in Investors

Overconfidence or excessive self-confidence can be summarized as a groundless belief in one's cognitive abilities, judgments, and intuitive reasoning. The concept of overconfidence has been extensively examined in a broad range of cognitive psychological studies, revealing that individuals tend to overestimate both their predictive abilities and the accuracy of the information available to them. Furthermore, in assessing probabilities, they exhibit poor performance, often assigning much lower probabilities to events they consider certain. In essence, people often perceive themselves as more intelligent instance, upon hearing confidential news from a financial advisor or reading an article on the than they truly are and believe they possess better information. For internet, individuals immediately feel prepared to act based on their perceived informational advantage. This readiness to make quick decisions, especially regarding investments, is a common characteristic of overconfidence. (Badri & Kouchi, 2013)

In the field of economics, researchers typically categorize overconfidence into two broader subsets:

1. Belief that individuals know more than they actually do.
2. Belief that individuals are superior to others and know more than others.

The Relationship Between Financial Literacy and Investor Adaptability

Adaptability in individuals with higher financial literacy refers to their ability to align with various situations, environments, and different conditions. Generally, adaptable individuals possess the capacity to adjust to changes and pressures easily, allowing them

to adapt to new circumstances. They often demonstrate a higher ability to cope with stress, life challenges, or positive and negative changes. Therefore, enhancing financial literacy skills and understanding financial concepts can contribute to better management of conditions (Adil et al., 2022).

The Relationship Between Financial Literacy and Self-Attribution Bias in Investors

Self-attribution bias refers to the tendency of individuals to attribute their successes to intrinsic qualities such as talent or insight, while often attributing their failures to external factors like bad luck. For example, students who succeed in an exam may praise their intelligence or diligence, but when they perform poorly, they frequently complain about unfair grading. Similarly, athletes who win a competition often argue that they have enhanced their superior sports skills, but when they lose, they claim to be victims of unfair refereeing. Self-attribution bias is a cognitive phenomenon that leads individuals to relate their failures to external factors and their successes to their intrinsic qualities (Miller & Ross, 1975).

The Relationship Between Financial Literacy and Investor Risk-Taking

The connection between financial literacy and investor risk-taking pertains to uncertainty and awareness of the outcome of an action, which is referred to as risk. It involves undertaking an action without knowing its outcome. Therefore, for risk-seeking investors, it is necessary to embark on paths where the results may not be entirely clear, or one might not have full knowledge of the path taken. While there are methods for achieving success with lower risk, it is known that influential individuals in the world have consistently been part of groups with high risk-taking tendencies. Hence, unless we step into the unknown, we cannot achieve specific and unique success (Ndou, 2023).

Research Background

(Wijayanto et al., 2023) conducted a research titled "Financial Literacy and Behavioral Bias of Individual Investors: Empirical Research in Indonesia". Financial literacy and behavioural biases are critical factors that influence investment-decision making individual investors. This study aims to identify financial literacy relationships and behavioural biases (overconfidence, representativeness, and illusion of control) which can lead to irrational behaviour in investment decision making. The population in this research data is individual investors who are on Java. Based on the purposive sampling method, the sample was 83 respondents through a questionnaire. The data obtained, passed the validity test, reliability test, classical assumption test, and multiple regression analysis to test the hypothesis. Hypothesis testing concludes that financial literacy has a negative effect on behavioural biases, meaning increasing financial literacy, so individual investors are increasingly objective in making investment decisions, and will reduce behavioural biases.

(Weixiang et al., 2022) conducted a study titled "An Empirical Assessment of Financial Literacy and Behavioral Biases in Investment Decision: Fresh Evidence From Small Investor Perception." This research specifically explores the impact of behavioral biases and financial literacy on investment choices, particularly in stock market

investments. The study assessed a representative sample of 450 individual investors. A structured questionnaire using Likert scales was designed to extract research variables, and the data obtained underwent analysis using SEM (Structural Equation Modeling) methods. The findings reveal a significant statistical relationship between exploratory bias and the development of behavioral biases in decision-making. However, cognitive illusions, herd mentality, and framing effects all have detrimental effects on behavioral biases. Moreover, investors often adhere to exploratory biases rather than other non-rational strategies when judging investments. Therefore, the level of financial literacy strongly influences the investment choices made in the stock market.

(Adil et al., 2021) conducted a study titled "How Financial Literacy Moderate the Association Between Behavioral Biases and Investment Decisions?" The aim of this study is to examine the impact of behavioral biases (such as overconfidence, risk aversion, herding, and disposition) on investment decisions across genders. The authors predominantly investigate the moderating effect of financial literacy on the relationship between behavioral biases and investment decisions among genders.

(Lebdaoui et al., 2021) conducted a study titled "The Impact of Behavioral Biases on Investment Performance: Does Financial Literacy Matter?" This article aims to examine the impact of behavioral biases and financial literacy on investment performance in the emerging stock market. Based on data collected from a sample of 196 Moroccan investors active in the Casablanca Stock Exchange, the research hypotheses were examined using structural equation modeling, focusing on four biases within our proposed conceptual framework (i.e., overconfidence, representativeness, anchoring, and herding). The results show that only overconfidence and representativeness have a significant positive impact on financial performance. The study also demonstrates a significant positive impact of financial literacy on representativeness, while a negative association with overconfidence was found. This research is the first of its kind to examine the existence of behavioral biases in emerging African and Arab markets, representing an initial attempt to investigate the relationship between behavioral biases and investor performance.

(Hsu et al., 2021) conducted a study titled "Does Financial Literacy Reduce Gender Differences in Behavioral Biases in Investment?" This research investigates gender differences in certain behavioral biases using an online survey of individual investors aged eighteen and above, each with at least one year of stock trading experience in Taiwan. The results indicate that women are significantly more risk-averse than men, while men exhibit higher levels of overconfidence, illusion of control, and confirmation bias compared to women. However, among individuals with a high level of financial literacy, the prevalence of behavioral biases is similar for both genders. This suggests that financial literacy reduces gender differences in behavioral biases.

(Madaan & Singh, 2019) conducted a study titled "An Analysis of Behavioral Biases in Investment Decision-Making." In this study, four behavioral biases named overconfidence, anchoring, herding, and confirmation bias were examined. The results show that overconfidence and herding behavior have a positive and significant impact on investment decisions. The overall findings suggest that individual investors with limited knowledge are more susceptible to psychological errors. The research findings also indicate the existence of these four behavioral biases in investment decision-making. This

study will be beneficial for financial intermediaries to provide guidance to their clients. Additionally, it can serve as a basis for further exploration of other behavioral biases in investment decision-making.

(Baker et al., 2018) In the study conducted by Guer titled "How financial literacy and demographic variables relate to behavioral biases," the objective was to investigate how financial literacy and demographic variables (gender, age, income level, education, occupation, marital status, and investment experience) relate to behavioral biases. Unfortunately, the specific findings and details of the study's results were not provided in your input. If you have specific questions or if there's a particular aspect you would like more information on from this study, please let me know.

(Abdeldayem, 2016) conducted a study titled "Is There a Relationship Between Financial Literacy and Investment Decisions in the Kingdom of Bahrain?" The results show that the financial literacy level of Bahraini investors is low (6.38%). When analyzing financial literacy based on demographic variables, it was found that women generally have lower financial literacy than men. Respondents aged 41 to 50 are more aware across all age groups, and financial literacy correlates highly with education. Furthermore, participants in the High Financial Literacy Group (HFLG) have higher awareness levels of all financial products except for deposit certificates and postal savings. In conclusion, those in the Low Financial Literacy Group (LFLG) mostly prefer traditional and secure financial products, while they do not invest significantly in complex financial products that are relatively risky and could yield higher returns.

Research Hypotheses

H₁: Financial literacy has a significant effect on behavioral biases of investors.

- Sub-Hypothesis 1: Professional financial literacy has a significant effect on investor overconfidence.

- Sub-Hypothesis 2: Professional financial literacy has a significant effect on investor conservatism.

- Sub-Hypothesis 3: Professional financial literacy has a significant effect on investor self-attribution.

- Sub-Hypothesis 4: Professional financial literacy has a significant effect on investor risk tolerance.

H₂: Moderate financial literacy has a significant effect on behavioral biases of investors.

- Sub-Hypothesis 5: Moderate financial literacy has a significant effect on investor overconfidence.

- Sub-Hypothesis 6: Moderate financial literacy has a significant effect on investor conservatism.

- Sub-Hypothesis 7: Moderate financial literacy has a significant effect on investor self-attribution.

- Sub-Hypothesis 8: Moderate financial literacy has a significant effect on investor risk tolerance.

H₃: Low financial literacy has a significant effect on behavioral biases of investors.

- Sub-Hypothesis 9: Low financial literacy has a significant effect on investor overconfidence.

- Sub-Hypothesis 10: Low financial literacy has a significant effect on investor conservatism.

- Sub-Hypothesis 11: Low financial literacy has a significant effect on investor self-attribution.

- Sub-Hypothesis 12: Low financial literacy has a significant effect on investor risk tolerance.

Research Methodology

The primary objective of this research is to investigate the relationship between different levels of financial literacy (basic, advanced, and advanced considering other factors) and behavioral biases of investors. The statistical population of the study includes investors in the Tehran Stock Exchange in the year 1402 (Solar Hijri calendar). The sample size under investigation in this study consists of 384 individuals, distributed among them using the available sampling method over a specific time period.

Given the uncertainty in the number of investors in the stock market, the Cochran formula is employed to calculate the sample size for unknown populations:

$$n = \frac{\left(Z_{\alpha/2}^2 \times S^2 \right)}{d^2} = 384$$

In the above formula $Z_{\alpha/2}$ is calculated at a 5% error level and assumed to be 1.96. The error rate (d) is considered as 5%.

The questionnaire consists of questions presented in Table (1).

Table 1. Research Questionnaire Questions

Overconfidence	Description of the question
F1	During my decision-making, I don't allow false confidence to dominate me.
F2	I acknowledge that some of my successful investments in the stock market are due to my good luck.
F3	When my stock investments become profitable, I don't let pride take over.
F4	I never accept a risk greater than what I have the capacity and tolerance for.
F5	I have more confidence in my predictions than necessary.
Adaptability	Description of the question
S1	I often try to avoid unfavorable situations.
S2	Challenging situations are not attractive to me.
S3	If I feel that there are unfavorable conditions in my investments, I refrain from engaging in them.
S4	I become satisfied with an investment only when there is minimal doubt about its compatibility with acceptable conditions.
S5	I choose investment opportunities that align with my goals and are in harmony with the conditions.
Self-documentation	Description of the question
K1	Usually, when I encounter failures in an investment, I search for the cause among external environmental factors.
K2	It is less likely that the financial failures of the company are due to my wrong decisions.
K3	I believe that most of the investment successes of the company result from my experiences.
K4	When faced with a failure in an investment, I believe that part of the problem has been on my part.
K5	In the financial failures and investments I have faced, other individuals have also been involved.
Risk taking	Description of the question
R1	I am willing to accept a high level of risk for a predicted level of return in my investments.
R2	Even if the cash flow in my investments is unpredictable, I am still willing to invest.
R3	I have the ability to tolerate failure in my investments.
R4	In uncertain environmental conditions, I have a high ability to make investment decisions.
R5	I am risk-tolerant in my investments because I expect a high return from them.

To examine the reliability of the questionnaire items, Cronbach's alpha coefficients were used. The results of this test are presented in Table 2.

Table 2. Cronbach's Alpha Coefficients

No	variable	Number of questions	Cronbach's alpha	Cronbach's alpha of all questions
1	overconfidence	5	0.787	0.845
2	adaptability	5	0.785	
3	Self-documentation	5	0.786	
4	risk taking	5	0.811	

The results in Table 2 indicate that the Cronbach's alpha coefficient for the research questions is greater than 0.70; therefore, the reliability of the questionnaire is at an acceptable level.

Research Findings

To measure the levels of financial literacy, the questions in the demographic section of the questionnaire are used. In this section, questions about the history of activity in the stock market, the level of education, and the field of study are addressed.

Table 3. Classifications Related to Levels of Financial Literacy

Professional reading	Postgraduate education (Master's or Ph.D.) in relevant fields such as accounting, financial management, financial engineering, or economics is required, or more than 5 years of professional experience in the stock market.
Average readability	A bachelor's degree in related fields such as accounting, financial management, financial engineering, or economics is required, or between 2 to 5 years of professional experience in the stock market.
Poor readability	Without academic qualifications in related fields such as accounting, financial management, financial engineering, or economics, or less than one year of professional experience in the stock market.

Descriptive statistics for each of the items are presented in Table 4. These statistics include the minimum, maximum, mean, and standard deviation of the research items.

Table 4. Descriptive Statistics of Research Items

Symbol	Number	Min	max	average	standard deviation
F1	390	1	5	3.93	0.784
F2	390	1	5	4.11	0.812
F3	390	1	5	4.13	0.787
F4	390	1	5	3.59	1.194
F5	390	1	5	3.98	0.943
S1	390	1	5	3.96	1.044
S2	390	1	5	3.76	1.093
S3	390	1	5	4.21	0.778

Symbol	Number	Min	max	average	standard deviation
S4	390	1	5	4.22	0.866
S5	390	1	5	3.57	1.136
K1	390	1	5	3.84	0.982
K2	390	1	5	4.08	0.901
K3	390	1	5	3.06	1.010
K4	390	1	5	4.15	0.850
K5	390	1	5	3.75	1.030
R1	390	1	5	3.51	1.151
R2	390	1	5	3.41	0.989
R3	390	1	5	4.06	0.761
R4	390	1	5	4.13	0.892
R5	390	1	5	4.28	0.707

Table (4) indicates that the highest mean is related to item S4, and the lowest mean is related to K3. Most items have a minimum value of 1, and all items have a maximum value of 5. An important point is the standard deviation of the research items. Considering that the standard deviation of the research items is around ± 2 , it can be concluded that the research variables are normally distributed.

To determine whether the research data are suitable for factor analysis in terms of sample size and the relationship between variables, the Kaiser-Meyer-Olkin (KMO) index and the Bartlett's test were used. The results of these tests are presented in Table (5).

Table 5. Results of Model Adequacy and KMO Test

Variable	Number of questions	d.f	Bartlett's test Sig	KMO
overconfidence	5-1	10	0.0000	0.739
adaptability	10-6	10	0.0000	0.748
Self-documentation	15-11	10	0.0000	0.795
risk taking	20-16	10	0.0000	0.790
Total questions	20	190	0.0000	0.737

As seen in the table above, considering that the KMO index is greater than 0.7, the model adequacy is confirmed, and the data are suitable for factor analysis.

Table 6 indicates the communalities of each variable, expressing the proportion of variance in each variable accounted for by the common factors. According to this table, since the communalities are mostly above 0.40, they remain in the model. Table (6) indicates the communalities of each variable, expressing the proportion of variance in each variable accounted for by the common factors. According to this table, since the communalities are mostly above 0.40, they remain in the model.

Table 6. Communalities of Questionnaire Items

Questionnaire questions	Shared value before factorization	Shared value after factorization
F1	1	0.421
F2	1	0.565
F3	1	0.614
F4	1	0.554
F5	1	0.572
S1	1	0.684
S2	1	0.525
S3	1	0.553
S4	1	0.720
S5	1	0.658
K1	1	0.523
K2	1	0.743
K3	1	0.790
K4	1	0.622
K5	1	0.624
R1	1	0.753
R2	1	0.661
R3	1	0.782
R4	1	0.610
R5	1	0.499

Once it was determined that all the items have the capability to enter the model, the structural equation model was implemented. In Figures (1) and (2), standardized coefficients and t-values are provided.

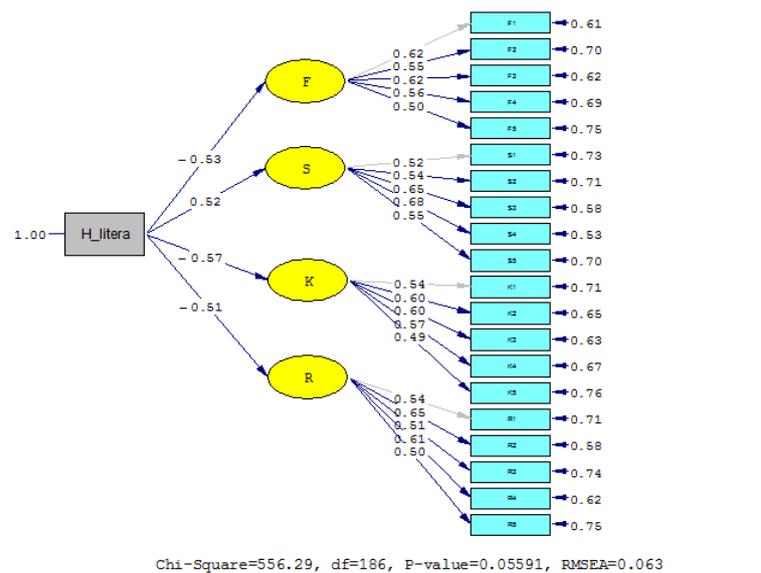


Figure 1. Standardized Coefficients of the First Hypothesis in the Research

Figure 1. illustrates the standardized coefficients of the variable 'professional financial literacy.' The coefficients indicate that professional financial literacy has a 53% negative impact on investor overconfidence. Moreover, the positive impact of professional financial literacy on investor consistency is 52%, on self-confidence is 57% with a negative direction, and ultimately, it has an inverse impact of 51% on risk tolerance.

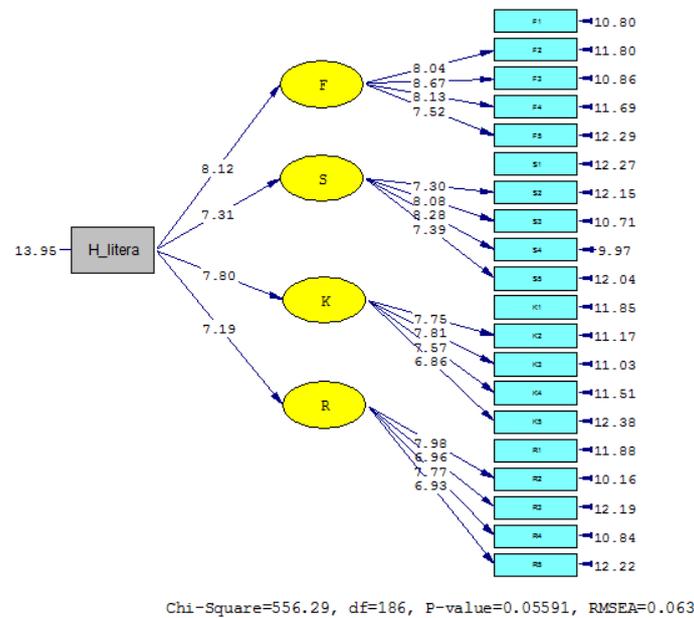


Figure 2. t-values for the first hypothesis of the research

Figure 2. presents the t-values for the research. Considering that the t-values for all paths in the above figure exceed the standard value of 1.96, the first hypothesis of the research is confirmed.

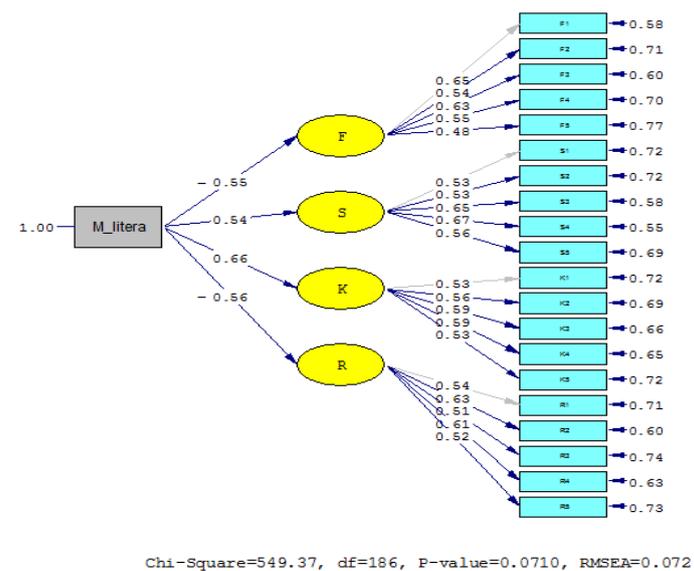


Figure 3. standardized coefficients of the second hypothesis.

Figure 3. displays the standardized coefficients of the variable 'average financial literacy' for the second hypothesis. The coefficients indicate that average financial literacy has a negative impact of 55% on investors' overconfidence. Furthermore, the influence of average financial literacy on investors' consistency is 54% in a positive direction, on self-confidence is 66% in a positive direction, and ultimately on risk aversion, it has a reversed effect of 56%.

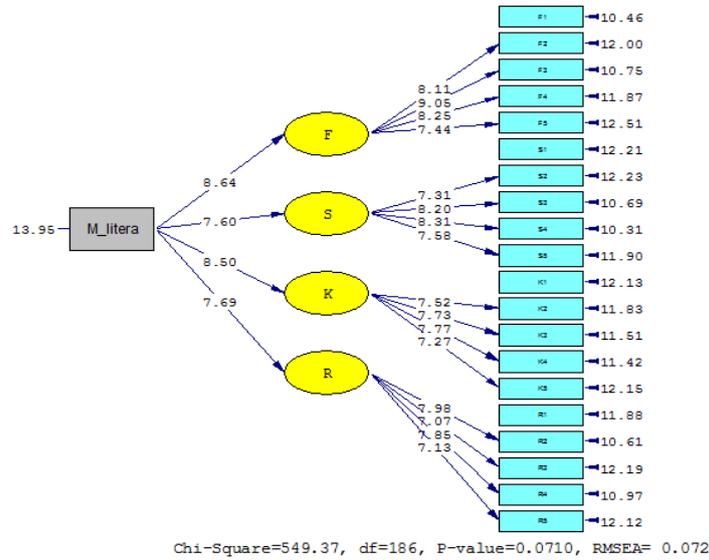


Figure 4. t-value for the second hypothesis of the research.

Figure 4. illustrates the t-value values for the research. Considering that the t-value values for all paths in the above figure are greater than the standard value of 1.96, the second hypothesis of the research is confirmed.

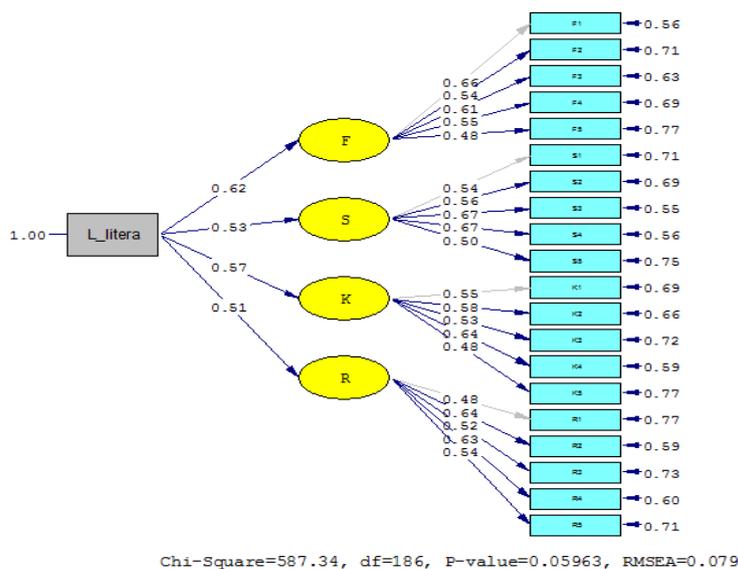


Figure 5. standardized coefficients for the third hypothesis of the research.

Figure 5. illustrates the standardized coefficients for the variable 'financial literacy - weak.' The coefficients indicate that weak financial literacy has a positive impact of 62% on investors' overconfidence. Additionally, the effect of weak financial literacy on investors' adaptability is 53% in a positive direction, 57% in a positive direction for self-documentation, and finally, an inverse impact of 51% on risk-taking.

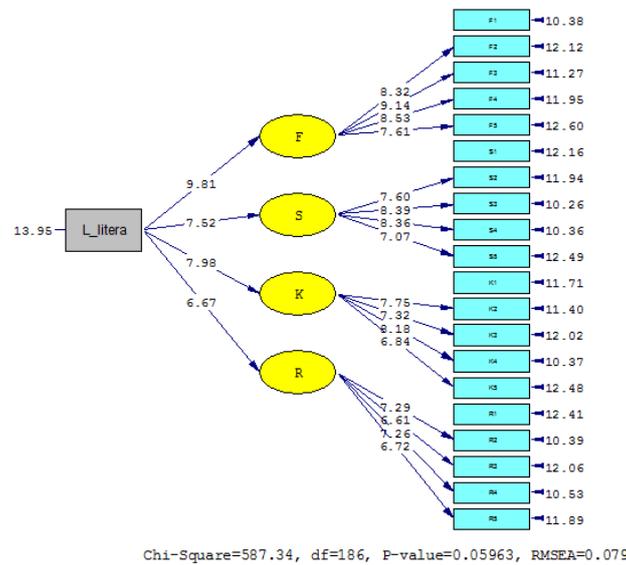


Figure 6. t-value for the third hypothesis of the study.

The values of t-value for the research are shown in Figure 6. Considering that the t-value values for all paths in the above figure are greater than the standard value of 1.96, the third hypothesis of the research is confirmed.

Conclusion

Hypothesis one suggests that professional financial literacy has a significant and inverse effect on investor overconfidence. The results of testing this hypothesis indicate a meaningful and inverse impact between these two variables. In other words, improving financial literacy leads to a reduction in overconfident behavior. Stated differently, when financial information is clear and understandable to investors, it can prevent the emergence of overconfidence. This finding is supported by the theory of supportive thinking.

According to this theory, analysts and investors prefer decisions that can be supported from an informational and conceptual perspective. Decision-makers and investors seek to reduce uncertainty and increase confidence. Based on the assumption that financial literacy influences overconfidence, it can be argued that presenting financial information in a way that provides the maximum cognitive support can reduce overconfident behavior. In essence, professional financial literacy can act as a form of supportive thinking for decision-makers, contributing to the improvement of trust in investor decisions.

Hypothesis two states that there is a significant relationship between financial literacy and adaptability. After testing, it was determined that there is a positive and meaningful relationship between professional financial literacy and adaptability. The results of this hypothesis indicate that individuals with greater skills in reading and understanding financial issues have a higher ability to adapt to different situations, environments, and conditions. Adaptable individuals usually have the capacity to adjust to various changes and pressures, easily adapting to new situations.

Adaptable individuals generally possess the ability to cope with stress, life challenges, and positive or negative changes in their lives. Therefore, enhancing financial skills and the ability to understand financial concepts can help individuals better manage their conditions and contribute to better coping with stress, life challenges, and positive or negative changes in their lives.

Hypothesis three suggests that there is a significant relationship between financial literacy and self-serving bias. Self-serving bias refers to individuals attributing their successes to inherent qualities such as talent, while often attributing their failures to external factors such as bad luck. For example, investors who successfully profit from a stock investment may attribute it to their own vigilance or diligence, but when the market and the situation of those stocks turn unfavorable, they often complain about political issues and unfair interventions.

Self-serving bias is a cognitive phenomenon that leads individuals to attribute their failures to external factors and their successes to their inherent qualities. It can be analyzed in two dimensions:

1- Self-enhancement bias: Reflects individuals praising their own skills and intelligence when successful, but often blaming political issues and unfair interventions when their stock investments do not yield profits.

2- Self-protection bias: Represents the message of an action, indicating the irrational denial and non-acceptance of the responsibilities of failure consequences.

Self-serving bias leads investors to overestimate themselves. If they believe that their successful investments are solely due to skill rather than luck and popularity, they may incur losses. This behavior is detrimental.

In self-serving bias, investors are inclined to 'hear what they want to hear.' This means that when information is presented to them, they tend to attribute sharp intelligence and cleverness to themselves. This behavior can lead to buying or holding onto a stock that should be avoided.

Individuals in self-serving bias may come to the conclusion that some investors, especially those who perceive the company's success as a result of their contribution in selecting executive management, board members, and the like, are special. A non-diversified investment portfolio can result from self-serving bias, where investors believe they should take credit for the success of the company due to their involvement in selecting executive management, board members, and the like. Non-diversified investment can lead to self-serving bias, and precautions should be taken to prevent it.

The fourth hypothesis of the research asserts that there is a significant relationship between financial literacy and risk tolerance. The reasoning behind this claim is that one of the key features in organizational performance is how its managers make decisions. In other words, decision-making is a prepared task for managers as they need to evaluate all options and accept the risk that future outcomes may vary. Many decision-making processes in the real world, such as stock portfolio selection, budgeting, and funding new projects, involve a series of interrelated decisions influenced by economic, social conditions, and personal characteristics of the manager. For example, loss aversion may lead us to avoid many profitable opportunities and be unwilling to take on the associated risks. In other words, risk-averse individuals have a conservative personality and want to be certain of a return. They will not engage in a matter involving chance and luck when it is brought up. In other words, another factor that can be constant in the performance of managers and plays a very important role in the efficiency and effectiveness of managers and organizations is the risk of a probability of 78.

Results can be either profitable or detrimental. Companies that have a higher risk tolerance gain more opportunities for advancement. Recognizing the fundamental determinants for decision-making in companies is challenging because risk is neither tangible nor universally interpreted, and individuals' tolerance levels vary. Identifying the factors affecting individuals' and companies' risk tolerance can be influential in making informed choices and selecting individuals at various levels of the organization. Based on the research findings, it is recommended that individuals enhance their financial skills. This improvement can be achieved by participating in training courses, workshops, and similar educational programs. Additionally, it is suggested that individuals, given the importance of financial awareness for market participants, actively monitor financial news, financial crises, and other financial developments. Finally, individuals with weak to moderate levels of financial literacy are advised to utilize modern financial instruments and capital markets, including analytical applications and online programs offered by institutions for fundamental and technical analysis. Some suggestions for future research include conduct longitudinal studies to examine the long-term effects of financial literacy interventions on investor behavior. Explore how cultural differences influence the relationship between financial literacy and investor behavior. Develop and test innovative interventions aimed at enhancing financial literacy among investors.

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<p>HOW TO CITE THIS ARTICLE</p> <p>Azarberahman, A., Lalbar, A., Tohidinia, M., & Ghorbanpoor, Z. (2024). Investigating Various Levels of Financial Literacy with Behavioral Trends of Investors. <i>International Journal of Management, Accounting and Economics</i>, 11(4), 428-453.</p> <p>DOI: https://doi.org/10.5281/zenodo.11111236</p> <p>URL: https://www.ijmae.com/article_195093.html</p>	 A square QR code located in the bottom right corner of the table, which likely links to the article's online version.

Original Research

The Nexus Between National Culture and Cryptocurrency Adoption: the Moderating Role of Financial Literacy

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Abstract

Cryptocurrencies are increasingly becoming more popular as cheaper, faster and more secure means of transferring money across the globe while offering diversification benefits to investors. This current study explores the effects of national culture on cryptocurrency adoption across 118 countries. We test how each cultural dimension from the Hofstede model affects cryptocurrency adoption. These are power distance, long-term orientation, uncertainty avoidance, individualism and masculinity. We subsequently assess the moderation effects of financial literacy on the linkage between national culture and cryptocurrency adoption. We employ analysis of variance (ANOVA) and stepwise regression estimations to probe into the magnitudes and significance of postulated relationships. Our results firstly indicate significant disparities in cryptocurrency adoption, but only between countries with high and low uncertainty avoidance. The stepwise regression results revealed a strong negative relationship between uncertainty avoidance and cryptocurrency adoption, with other cultural dimensions exhibiting insignificant effects. Moreover, countries with high uncertainty avoidance but whose adults are highly financially literate were seen to be less vulnerable to fears of uncertainties and risks when deciding to adopt cryptocurrencies. Our findings lay a foundation for further theory development and provide practical implications to cryptocurrency entrepreneurs, governments, users and businesses that accept payments in Bitcoin and other cryptocurrencies.

Keywords: Bitcoin, Cryptocurrency, Hofstede, financial literacy, National culture; Technology adoption.

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Introduction

During the last decade, cryptocurrencies have experienced a dramatic increase in usage, thus gaining the attention of households, organizations, policymakers and scholars. Since the introduction of Bitcoin in 2008, cryptocurrencies have skyrocketed, with more than 2,000 traded in global financial markets (Sousa et al., 2022). Cryptocurrencies have grown increasingly important to households and organizations due to their secure nature, which is made possible by using a distributed ledger system facilitated by blockchain technology (Giudici et al., 2020). In addition, cryptocurrencies have gained popularity among asset managers for risk diversification because their returns are not highly correlated with those of traditional financial assets, e.g., stocks and bonds. Despite the novelty of cryptocurrencies as a cheaper and faster means of carrying out financial transactions, their overall adoption rates remain low, which calls for more research to understand the factors driving adoption (Dabbous et al., 2022).

The effects of technological innovations have been observed to be unparalleled among households, organizations and countries (Wang et al., 2020). Cryptocurrencies are no exception, as attributed to the fact that different countries have experienced varying adoption rates. National culture is one of the crucial factors that can explain cryptocurrency adoption dynamics across countries. This is due to cross-country disparities in cultural values such as social relations, risk attitudes, ethics, and power dynamics, all of which have been well documented (Hofstede, 1999; Hofstede, 2001a; Hofstede, 2001b; Hofstede, 2008). National culture has a powerful sway on the propensity of households and organizations to adopt technologies because it influences their levels of trust in emerging technologies (Lee et al., 2013). Özbilen (2017) stresses that technology acceptance depends on how well it interacts with its social context. To this end, we employ the Hofstede model to evaluate how national culture affects cryptocurrency adoption. We scrutinize how each of the five cultural dimensions, namely, long-term orientation (LTO), masculinity (MAS), individualism (IND), uncertainty avoidance (UA) and power distance (PD), influence cryptocurrency adoption. Hofstede (2001b) postulates that cultural dimensions, especially UA and IND, can be used to predict the ease and speed of technology adoption. Other studies have also employed the Hofstede model to investigate a similar phenomenon in different technologies (Metallo et al., 2022; Özbilen, 2017; Lee et al., 2013).

In addition, we probe into the potential of financial literacy to moderate the relationship between each cultural dimension and crypt

ocurrency adoption. Hermansson and Jonsson (2021) stress that financial literacy enhances individuals' risk tolerance, which fosters investment decision-making. Empirical evidence points towards the positive role of financial literacy on cryptocurrency adoption (Fujiki, 2020; Zhao & Zhang, 2020). To that end, we seek to empirically answer the following question (s): How does national culture influence cryptocurrency adoption? And what role does financial literacy play in moderating this relationship? We provide findings with theoretical and practical implications to cryptocurrency issuing firms, governments/regulators, retail customers (users) and other businesses.

Our article extends the existing knowledge of cryptocurrency adoption in two (2) ways. Firstly, there is scant literature concerning the influence of national culture on cryptocurrency adoption. Extant literature on the subject pertains to national culture's role in adopting other technologies such as ICT and mobile phones (Özbilen, 2017; Lee et al., 2013). Similar studies in the cryptocurrency context have investigated how aspects such as perceptions on ease of use, trust and cost, economic and regulatory factors influence cryptocurrency adoption (Sukumaran et al., 2022; Dabbous et al., 2022; Soomro et al., 2021; Zhao & Zhang, 2021; Fujiki 2020; Nadeem et al., 2021). Secondly, we introduce financial literacy to moderate the relationship between Hofstede's cultural dimensions and cryptocurrency adoption.

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The rest of this article is organized as follows; section 2 reviews the literature on culture and technology/cryptocurrency adoption. Section 3 highlights data and methods, while Section 4 presents the results of analyses. Section 5 discusses the results and Section 6 covers conclusions, implications and areas for further studies.

Literature review

Hofstede model

Culture refers to collective programming that separates members of one society from members of other societies (Hofstede, 1999). Cultural values are inherent to groups of individuals, not individuals within society. The famous Hofstede model puts forward five distinct values that define a particular society's culture: uncertainty avoidance, long-term orientation, individualism-collectivism, power distance and masculinity-femininity (Hofstede, 1991). The complete definitions of these cultural dimensions are summarized in Table 1.

National culture might influence adoption when technology cuts across international borders, such as cryptocurrency and blockchain. Garfield & Watson (1998) stressed the need for countries to align their technology infrastructure with their national cultures. This can be attributed to the fact that national culture may influence technology diffusion through users' trust. Hofstede's cultural dimensions may be applied to describe technology adoption in a particular society due to uncertainty and risks associated with emerging technologies (Lee et al., 2013). Cultural dimensions such as individualism and uncertainty avoidance may be instrumental in predicting technology adoption because

they are associated with ease of use and speed of technology adoption (G. J. Hofstede, 2001). In the interest of brevity, we discuss how each of Hofstede’s cultural dimensions influences cryptocurrency adoption in the following sub-section.

Table 1. Definitions of cultural dimensions based on Hofstede’s model

Cultural Dimension	Meaning
Power distance (PD)	“The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally”
Long-Term Orientation (LTO)	“The extent to which a society exhibits a pragmatic, future oriented perspective rather than a conventional historic or short-term perspective”
Uncertainty Avoidance (UA)	“The extent to which people feel threatened by ambiguous situations and create beliefs and institutions in an attempt to avoid them, such as that people with high uncertainty avoidance seek stability, predictability and low risk rather than change and new experiences”.
Individualism (IND)	“The degree to which individuals are integrated into groups, such as that individualistic societies show loose ties between individuals and seek forms of society that are more independent”.
Masculinity (MAS)	“The degree to which a society is characterized by either assertiveness or nurturance, such as that more masculine countries place greater emphasis on wealth, success, ambition, whereas more feminine countries place greater value on people and helping others”

Source: Hofstede (2001a)

Hypotheses development

This sub-section provides the theoretical underpinnings of how national culture may potentially affect cryptocurrency adoption. We discuss how each of the five cultural dimensions from Hofstede’s model influences the adoption of cryptocurrency across countries.

Power distance

The power distance cultural dimension has the potential to influence cryptocurrency adoption. Firstly, in high PD societies, technologies may threaten governing authorities because they diminish their ability to exert control on society members (Zheng et al., 2021). Cryptocurrencies are highly unregulated, decentralized and backed by neither real assets nor governmental claims. These unique features of cryptocurrency have been a significant source of backlash from governments that have banned or restricted their use, e.g., China, Egypt and Bangladesh. Their concerns have been mainly about the anonymity of cryptocurrency transactions which may cause people to engage in activities deemed undesirable by society (Giudici et al., 2020). To date, central banks across the globe are still designing proper mechanisms to control cryptocurrency transactions. Secondly,

resources are unequally distributed in high PD societies, creating a considerable gap between privileged and less fortunate (poor) individuals (Matusitz & Musambira, 2013). Therefore, privileged individuals may be more likely to use new technologies. So in high PD societies, cryptocurrencies may be viewed as a luxury for a privileged few with the ability to purchase them and internet access to conduct transactions. We, therefore, hypothesize that;

H₁: Power distance has a significant negative relationship with cryptocurrency adoption.

Long-Term Orientation

High LTO societies may experience different cryptocurrency adoption rates than those with low LTO. High LTO societies accentuate values such as building relationships, persistence, loyalty and trustworthiness (G. Hofstede, 2008). High LTO societies are pragmatic in nature because they can adapt their norms and values to changing environmental conditions. These societies believe in learning to build knowledge and expertise to deal with complex situations (G. Hofstede et al., 2010). When a change, i.e., new technology, emerges, high LTO societies do not quickly accept it because their values are geared towards learning and comprehending the difference before rushing to adopt it. But once the society accepts the change, it is usually adopted at a very high rate as opposed to low LTO societies (Lee et al., 2013). It has been more than a decade since the genesis of cryptocurrency following the introduction of Bitcoin in 2008 (Nakamoto, 2008). Henceforth, we expect high LTO societies to have learned and understood the technology. We, therefore, hypothesize that;

H₂: Long-term orientation has a significant positive effect on cryptocurrency adoption.

Uncertainty Avoidance

Societies with high UA tend to shun highly risky situations, and they strive to seek ways to control uncertainties. This is by designing mechanisms to control future events to minimize uncertainty and risks (Hofstede et al., 2010). This contrasts with low UA societies, whose members are socialized to accept risk and uncertain situations (Lee et al., 2013). This also applies to new technologies; high UA societies may be highly skeptical of adopting a particular technology unless their perceived risks disappear (G. Hofstede, 2008). This argument can be used to theorize the linkage between UA and cryptocurrency adoption. Cryptocurrencies are different from traditional financial assets because they are unregulated, decentralized and have no real assets or governmental claims to secure them (Nadeem et al., 2021). They are highly volatile and may be used by criminals to further their illegal activities. Therefore, high UA societies may perceive cryptocurrency as risky in the light of the controversies and uncertainties surrounding it. In light of these uncertainties, we hypothesize that;

H₃: Uncertainty avoidance has a significant negative impact on cryptocurrency adoption.

Individualism

In societies that exhibit individualistic traits, members are usually self-oriented and tend to gather information on their own rather than collectively from direct and formal sources. They consider themselves independent decision-makers by separating themselves from societal influences (Lee et al., 2013). On the other hand, collectivistic societies emphasize collective decision-making through inter-linkages between societies members bound together by group norms (Hofstede, 2008). This cultural trait can also be used to explain cryptocurrency adoption (Lee et al., 2013). As previously mentioned, cryptocurrency has been associated with many uncertainties and controversies that have led to bans in various countries. In individualistic societies, members may seek their own information by doing the risk-benefit analysis of cryptocurrency to determine if they are worth owning. These members may not be influenced by the overall societal views on cryptocurrency and would make their own decisions about holding it despite their societies' opposition to the technology. This is because members of highly individualistic cultures are not usually influenced by neither others' opinions or society's subjective norms (Srite & Karahanna, 2006). We, therefore, hypothesize that;

H4: Individualism has a significant positive effect on cryptocurrency adoption.

Masculinity

Individuals in highly masculine societies are driven by pursuing material goods and attaining higher social status. This trait is usually embedded in organizations' and individual societies' education systems. Masculine individuals tend to focus on competitive results, which influences the use of technology (Bollinger & Hofstede, 1987). Highly masculine countries gravitate towards new technology to be competitive by exhausting resources to seek innovative solutions (Özbilen, 2017). This is especially true for "status-providing technologies" that give users an image of status in their respective societies (Hofstede, 2001). This can be evident by looking at Bitcoin, which is the largest cryptocurrency in market capitalization. Experts acknowledge Bitcoin as a new status symbol for social and economic power despite being in virtual form. Bitcoin trades at an average of USD 40,000 per coin, putting it on the list of expensive assets. We, therefore, hypothesize that;

H5: Masculinity has a significant positive effect on cryptocurrency adoption.

Empirical review of literature

To support our hypothesis, we conducted a thorough review of the empirical literature on how different cultural dimensions of Hofstede's model drive cryptocurrency adoption, as summarized in Table 2.

Table 2. Summary of empirical review

Author(s) and year	Technology	Methodology	Findings
Metallo et al. (2022)	Healthcare	A single country study conducted in the healthcare/hospital sector using a survey strategy. The study used Partial Least Squares (PLS) to analyze significance of postulated relationships.	Their findings showed that UA, MAS and LTO to be the only cultural values that affect technology acceptance in hospitals
Özbilen (2017)	ICT	One way Analysis of Variance (ANOVA) and regression analysis was used to examine the phenomenon in a longitudinal study covering 148 countries.	All five dimensions with the exception MAS exhibited significant relationship with adoption of ICT
Alhirz et al. (2014)	Enterprise Resource Planning (ERP)	A cross sectional study conducted in Saudi Arabia using a Survey strategy to collect data from 230 ERP users. Structural equation modelling was used to test postulated relationships	The results presented evidence to show a significant role of UA on users' acceptance of ERP. On the other hand, PD and IND exhibited weak relationships with the dependent variable.
Lee et al. (2013)	Mobile phone	A Cross country study comparing US and South Korea using a cross-sectional data analyzed using non-linear Bass diffusion model.	UA, LTO and IND were observed to significantly influence mobile phone adoption.
Matusitz and Musambira (2013)	ICT	The study covered only two dimensions namely; UA and PD in a longitudinal study covering 53 countries. Regression analysis was used to assess the postulated relationships	Negative relationship between UA, PD and adoption of ICT was observed.
Bagchi et al. (2004)	ICT	A cross sectional study following data smoothing by averaging four years. The study utilized ordinary least Squares (OLS) regression estimations for analytics	The results showed significant roles of IND, PD and MAS on adoption of ICT with UA weakly affecting the dependent variable
Hofstede (2001b)	ICT	The study covered 56 countries from across the globe using regression analysis in different years	UA and IND were found to influence adoption of ICT

Different studies have been carried out over the years to assess the influence of culture on technology adoption, with ICT being the predominant context (Özbilen 2017; Matusitz and Musambira, 2013; Bagchi et al., 2004; Hofstede, 2001b). Metallo et al., 2022; Lee et al., 2013; Alhirz et al., 2014) conducted a similar analysis in other technologies, including

healthcare, ERP, and mobile phones. Extant research on cryptocurrency adoption has focused on the influences of technological, social, economic, and regulatory factors in country-specific contexts, including the USA, China, Lebanon, Pakistan, and Malaysia. Specific factors covered include "risk and value perceptions" (Sukumaran et al., 2022; Dabbous et al., 2022); "perceived trust" (Soomro et al., 2022) "financial literacy" (Zhao & Zhang, 2021; Fujiki 2020); "usefulness and ease of use perceptions" (Nadeem et al., 2021); and "regulatory and social influences" (Saiedi et al., 2021).

To the best of our knowledge, this study is among the very first to examine the influences of culture on cryptocurrency adoption. This may be attributed to the fact that, unlike other technologies discussed, cryptocurrency technology is still manifesting following its first ever introduction in 2008 (Nakamoto, 2008). Since cultural values differ from one country to another (G. Hofstede, 2008), we investigate the phenomenon in a cross-country study that allows for contrasts and comparisons across different countries. We supplement the findings of other cross-country studies that have assessed how different country factors, e.g., economic growth, development level, and education, affect cryptocurrency adoption (Bhimani et al., 2022).

The moderation role of financial literacy

Financial literacy refers to knowledge and comprehension of basic economic and financial concepts required for proper management of financial resources (Carton et al., 2022). It is a crucial ingredient needed when an individual seeks to make well-informed investment decisions. Financial literacy equips individuals with the skills to make well-informed financial decisions in the short and long term due to their knowledge of basic financial concepts, financial products, and services (Mutlu & Ozer, 2021). Individuals possessing high financial literacy tend to invest in riskier assets as opposed to individuals with low financial literacy (Bannier & Neubert, 2016). This can be attributed to the fact that financial literacy improves an individual's comprehension of risk management strategies, making them more risk tolerant (Hermansson & Jonsson, 2021). Adil et al. (2022) show a strong negative relationship between risk aversion and investment decision-making. Surprisingly, financial literacy was observed to positively and significantly moderate the relationship between risk aversion and investment decisions.

This postulation can be well used to explain the cryptocurrency adoption phenomenon. Cryptocurrencies have had their fair share of controversies and uncertainties, which may deter investors. Cryptocurrencies are highly volatile, and they are seen as a speculative bubble with no fundamental value (Giudici et al., 2020). These fears were heightened by the 2018 Cryptocurrency Crash, which saw Bitcoin and other coins plummet to all-time lows. The decision by some countries to totally ban them, as previously mentioned, may add to the uncertain nature of cryptocurrencies. However, financial literacy has been observed to positively influence cryptocurrency adoption amid these risks and uncertainties. A good example can be sourced from Japan, where empirical evidence points to the fact that the majority of cryptocurrency owners in the country are those with high financial literacy (Fujiki, 2020). These individuals were observed to have knowledge and experience about financial management, financial troubles, and credit cards. Zhao & Zhang (2020) support these findings by showing the tremendous role of financial literacy

in fostering cryptocurrency adoption in China, where coins such as Bitcoin have been banned.

It is our belief that since financial literacy plays a major role in improving investing decisions through a better comprehension of risks, it can potentially alter the strength or even direction of the relationship between cultural dimensions and cryptocurrency adoption. We posit that financial literacy may have moderation effects on the relationship between each cultural dimension and cryptocurrency adoption. For instance, our prior postulations hypothesized a negative relationship between UA and cryptocurrency adoption. However, negative effects in a high-UA country with low FL may be dissimilar from those in other high UA countries with high FL. The same may apply to high-IND countries with low FL and high FL, with the latter possibly experiencing higher adoption rates. We therefore hypothesize that;

H₆: Financial literacy positively moderates the relationship between national culture and cryptocurrency adoption.

Data and methods

Data

We use a dataset with 14 major variables, including the Crypto Adoption Index (CAI), Uncertainty Avoidance (UA), Power Distance (PD), Masculinity (MAS), Individualism (IND), Uncertainty Avoidance (UA), Long-Term Orientation (LTO), Financial Literacy (FL), Human Development Index (HDI), GINI Coefficient (GINI), Financial Freedom Index (FFI), GDP per capita (GDPCC), Network Readiness Index (NRI), Control of Corruption (CC), and Regulatory Quality (RQ). The dataset involves a total of 118 countries, which were conveniently selected based on the availability of complete data for all 14 variables. The reason behind convenience sampling was that Hofstede's cultural dimensions and Standard & Poor's financial literacy scores are limited to no more than 120 countries across the globe. To avoid distorting statistical inferences, we preferred not to use the average scores of neighboring countries as an approximation criterion to fill in the missing data for the remaining countries. We discarded countries with no scores for the financial literacy and cultural dimensions using the complete-case analysis (list-wise deletion) method. This was after ensuring that the remaining sample was still representative of the population and not biased towards a particular sub-group/continent (Salgado et al., 2016). Our sample size represents 61% of the population and contains countries from all major world regions, namely Africa, North America, South America, Europe, Asia, and Oceania.

Data for all variables in question were retrieved from different sources that are indicated in Table 3. All the data sources utilized originate from reputable organizations whose databases have been employed by other studies. These include the World Bank, Hofstede, Standard & Poor's, United Nations Development Programme (UNDP), and Heritage Foundation, all of which are trusted organizations (Lee et al., 2013). For the case of cryptocurrency adoption, we employed data compiled (Liu et al., 2022), which is among the leading cryptocurrency firms in the world whose data have been employed in similar recent studies (Bhimani et al., 2022). The study is cross-sectional in nature, and

we employed it using data compiled or prevailing in 2021. This design was deemed appropriate due to the characteristics of the data relating to Hofstede’s cultural dimensions and financial literacy. Unlike other variables whose data are compiled on an annual/regular basis, the data for the aforementioned variables do not have a pre-defined frequency of publication. For instance, the global financial literacy scores that are prevailing to date were compiled by Standard & Poor’s in 2015, while Hofstede’s recent scores for cultural dimensions were provided in 2020. Until these two organizations conduct other surveys in the future to update their data, the current scores prevailed in 2021. This was done similar to other studies that have employed Hofstede’s model to explain technology adoption (Özbilen, 2017; Matusitz & Musambira, 2013).

Table 3. Data sources

No.	Variable	Year	Database source
1	Crypto Adoption Index (CAI)	2021	https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/
2	Power Distance (PD)	2020	https://www.hofstede-insights.com/product/compare-countries
3	Masculinity (MAS)	2020	https://www.hofstede-insights.com/product/compare-countries
4	Individualism (IND)	2020	https://www.hofstede-insights.com/product/compare-countries
5	Uncertainty Avoidance (UA)	2020	https://www.hofstede-insights.com/product/compare-countries
6	Long-Term Orientation (LTO)	2020	https://www.hofstede-insights.com/product/compare-countries
7	Financial Literacy (FL)	2015	https://gflec.org/initiatives/sp-global-finlit-survey/
8	Human Development Index (HDI)	2021	https://hdr.undp.org/data-center/human-development-index
9	GINI Index	2021	https://data.worldbank.org/indicator/SI.POV.GINI
10	Financial Freedom Index (FFI)	2021	https://www.heritage.org/index/download
11	GDP per Capita	2021	https://www.heritage.org/index/download
12	Network Readiness Index (NRI)	2021	https://networkreadinessindex.org/countries/
13	Control of Corruption (CC)	2021	http://info.worldbank.org/governance/WGI/
14	Regulatory Quality (RQ)	2021	http://info.worldbank.org/governance/WGI/

Methods

Sensitivity analysis

We performed sensitivity analysis to measure how sensitive the outcome variable (cryptocurrency adoption) is to variations in the predictor variables (Hofstede's cultural dimensions) as well as the moderating variable (financial literacy). Sensitivity analysis is appropriate to the setting of this study because it helps to estimate the effects of omitted variables/confounders in the relationship between the main predictors and outcome variables, thus reducing omitted variable bias (Cinelli & Hazlett, 2020). As documented by Bhimani et al. (2022), cryptocurrency adoption can be influenced by a wide range of factors. Therefore, sensitivity diagnostics are vital in estimating the power of these factors in explaining cryptocurrency adoption in the presence of hypothetical confounding variables that may also have effects on the main dependent variables.

Analysis of Variance (ANOVA)

We utilized a one-way ANOVA to examine the differences in cryptocurrency adoption between countries with low and high magnitudes of Hofstede's cultural dimensions as well as financial literacy (Özbilen, 2017). This test is vital to setting the stage for further analyses by showing the extent to which significant differences exist in cryptocurrency adoption between countries belonging to two different extremes of cultural traits and financial literacy. We classified a particular country as having high levels of individual cultural dimensions and financial literacy if it scored at least 50 percent. Countries with scores below this figure were classified as having low levels of the individual cultural dimension and financial literacy (Hofstede et al., 2010).

Stepwise regression estimations

Our study utilized stepwise regression to estimate the best-fit model to explain the relationship between the predictors and the outcome variable. The regression model employed has a total of 12 explanatory variables, five of which are predictor variables, i.e., individual Hofstede's cultural dimensions, and the remaining seven (7) are control variables. In the presence of multiple predictor and control variables, it is appropriate to use stepwise regression (Khatibi Bardsiri et al., 2014). This method helps to maximize the estimation power by utilizing the minimum number of independent variables. It involves back-and-forth iterations that involve an automatic process for selecting predictor variables (Silhavy et al., 2017). We followed an iterative process that started with regressing the main predictors, i.e., Hofstede's cultural dimensions, by excluding the control variables. Then the process continued with the addition of control variables and checking whether it improved the goodness of fit of the regression model. The process was repeated until all the control variables were added to the model. To avoid multicollinearity problems in our analyses, we carried out the variance inflation factor (VIF) test with the cut-off point of 5. We also conducted heteroskedasticity diagnostics using the Breusch-Pagan test to ensure model robustness.

We repeated the stepwise regression procedures for each cultural dimension to test for moderation effects of financial literacy. The moderating variable (FL) was presented as a

binary variable, with 0 denoting low financial literacy and 1 translating to high financial literacy (*see sub-section 3.2.2*). Each of Hofstede's cultural dimensions was isolated, and stepwise regression was conducted for the moderation effects of FL. The seven remaining variables, namely, HDI, GINI, FFI, GDPCC, NRI, CC, and RQ, were incorporated into the study as control variables (Bhimani et al., 2022). These were introduced to eliminate parameter estimation bias, which occurs as a result of the exclusion of other variables that affect cryptocurrency adoption.

We specify the following model with moderation effects;

$$Y_c = \alpha_c + \beta_1((PDC/MASc/UAc/LTOc/INDc) \times FLc) + \beta_2(PDC/MASc/UAc/LTOc/INDc) + \beta_3(FLc) + \sum_{k=0}^k \beta_k X_c^k + \epsilon_c, \quad (i)$$

Whereby;

Y = The dependent variable (CAI); c = Country; α_c = A constant term; β = Coefficient of independent/moderating variables; PDC/MASc/UAc/LTOc/INDc = Uncertainty avoidance index for a given country; $UAI_c \times FLc$ = the first interaction term which means the effects of country's individual cultural dimensions on adoption of cryptocurrencies is contingent upon financial literacy; X_c^k = a set of country level control variables that include income inequality (GINI); financial freedom (FFI); control of corruption (CC); regulatory quality (RQ); individual income levels (GDPCC); network readiness (NRI) and standards of living (HDI); ϵ_c, d = Error term.

Results

Descriptive statistics

The descriptive statistics results reveal some interesting details relating to the main variables of interest (*Table 4*). Firstly, the outcome variable (CAI) has a mean value of 7.06 out of 100, which indicates low overall adoption of cryptocurrencies across the globe (Dabbous et al., 2022). The variations between countries are nonetheless very high, as some of them, such as Vietnam, Turkey, and Ukraine, experience very high adoption rates as opposed to the likes of Angola, Burkina Faso, and Iraq. Overall, global UA and PD are high, with the remaining cultural dimensions having low scores, i.e., below the threshold of 50. The variations between countries in all five cultural dimensions appear to be high, presenting evidence of disparities in cultural values between different countries across the globe. The overall FL is low, i.e., below the threshold of 50, with visible disparities between countries. While countries like Sweden, Denmark, and Australia boast a higher percentage of adults with financial literacy, Afghanistan, Nepal, and Albania have otherwise the least financially literate adults.

Table 4. Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
CAI	178	7.42	11.22	0.00	100.00
PD	178	66.09	20.73	11.00	104.00
IND	178	37.47	20.98	6.00	91.00
GRO	178	46.75	17.54	5.00	110.00
UA	178	66.36	21.71	8.00	112.00
LTO	178	41.93	23.66	0.00	100.00
FL	178	0.39	0.14	0.14	0.71
HDI	178	0.78	0.13	0.45	0.96
GINI	178	37.32	8.18	23.20	63.00
FFI	178	55.07	17.48	10.00	90.00
GDPPC	178	4.24	0.44	3.00	5.07
NRI	178	54.93	14.27	24.90	82.06
RQ	178	58.10	27.13	1.44	100.00
CC	178	55.26	27.67	0.48	100.00

Correlation analysis

We used pairwise correlation analysis to get a sense of how our variables of interest are related to one another (Table 5). Out of all five cultural dimensions, only UA revealed a significant correlation with CAI, i.e., a negative correlation. This seems to indicate that countries whose people have a higher UA tend to be more reluctant to adopt cryptocurrencies. Nonetheless, these findings are not conclusive, as more rigorous tests that followed assessed the relationship between cultural dimensions and cryptocurrency adoption. The results further indicate significant correlations between FL and cryptocurrency adoption, which may provide early evidence of the power of FL to change the relationship between each cultural dimension and CAI.

Table 5. Correlations matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CAI (1)	1.0													
PD (2)	0.1	1.0												
IND (3)	-0.1	-0.6*	1.0											
GRO (4)	0.1	0.1	0.1	1.0										
UA (5)	-0.2*	0.2*	-0.2	0.0	1.0									
LO (6)	0.1	0.0	0.2*	0.1	0.2	1.0								
FL (7)	0.2*	-0.6*	0.7*	-0.1	-0.2*	0.3*	1.0							
HDI (8)	-0.2	-0.4*	0.6*	0.1	0.2	0.4*	0.6*	1.0						
GINI (9)	0.1	0.12	-0.3*	0.1	-0.2*	-0.5*	-0.3*	-0.4*	1.0					
FFI (10)	-0.1	-0.4*	0.4*	0.1	-0.1	0.2*	0.6*	0.6*	-0.2	1.0				
GDPPC (11)	-0.2	-0.4*	0.5*	0.1	0.1	0.4*	0.6*	0.9*	-0.3*	0.6*	1.0			
NRI (12)	-0.1	-0.5*	0.7*	0.0	-0.0	0.5*	0.7*	0.9*	-0.4*	0.6*	0.9*	1.0		
RQ (13)	-0.2	-0.5*	0.6*	0.0	-0.1	0.4*	0.7*	0.8*	-0.3*	0.8*	0.8*	0.8*	1.0	
CC (14)	-0.2*	-0.6*	0.6*	-0.1	-0.2*	0.3*	0.7*	0.7*	-0.2*	0.6*	0.7*	0.8*	0.9*	1.0

*Significant at 0.05 level

Sensitivity analysis

The sensitivity analysis results are presented for each individual cultural dimension, FL against CAI (*Figure 1a, 1b, 1c, 1d, 1e and 1f*). The results first reveal the tremendous power of UA to influence cryptocurrency as opposed to other cultural dimensions. Even when the confounding variables are 2–3 times as strong as the predictor (UA), the predictor still has the power to negatively impact cryptocurrency adoption. This can be shown by the three values that lie in the contours below the dotted threshold line and that all indicate negative coefficients of CAI, as highlighted by variations in UA. CAI was also observed to be sensitive to PD, but at a magnitude below UA. For the case of FL, when confounders are over two (2) times stronger than the predictor (FL), then FL cannot be powerful enough to explain cryptocurrency adoption. Therefore, sensitivity analysis results indicate that cryptocurrency adoption in any country is highly sensitive to the degree of its people's comfort with uncertainties and risk.

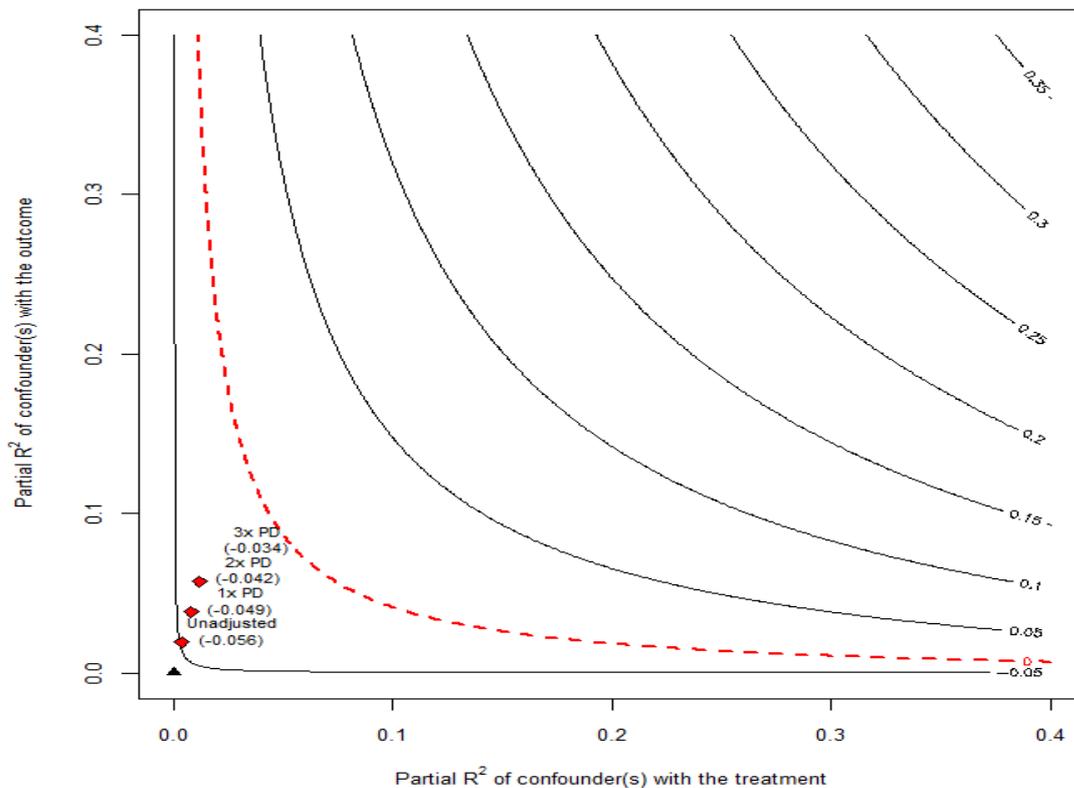


Figure 1a: Sensitivity analysis PD vs. CAI

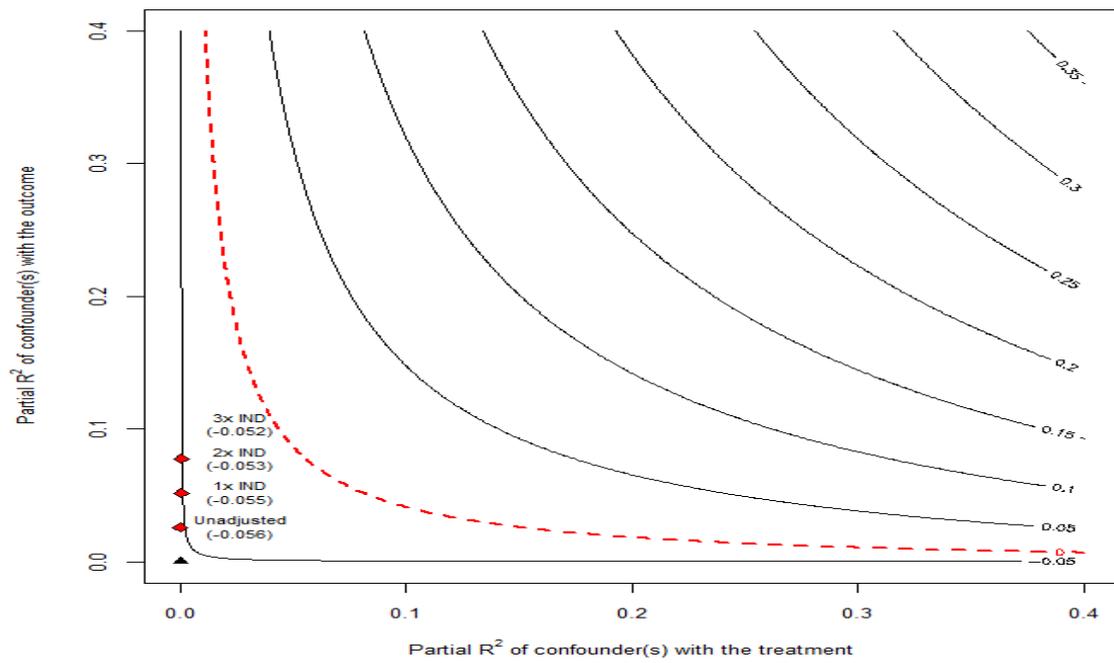


Figure 1b: Sensitivity analysis IND vs. CAI

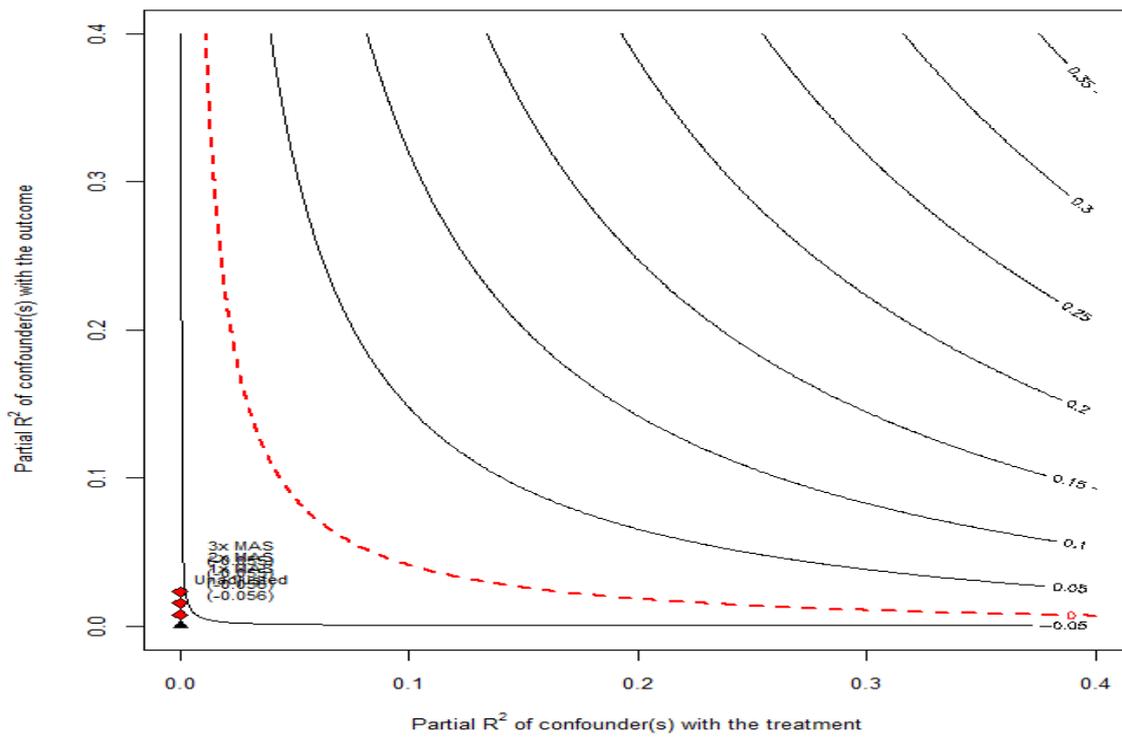


Figure 1c: Sensitivity analysis MAS vs. CAI

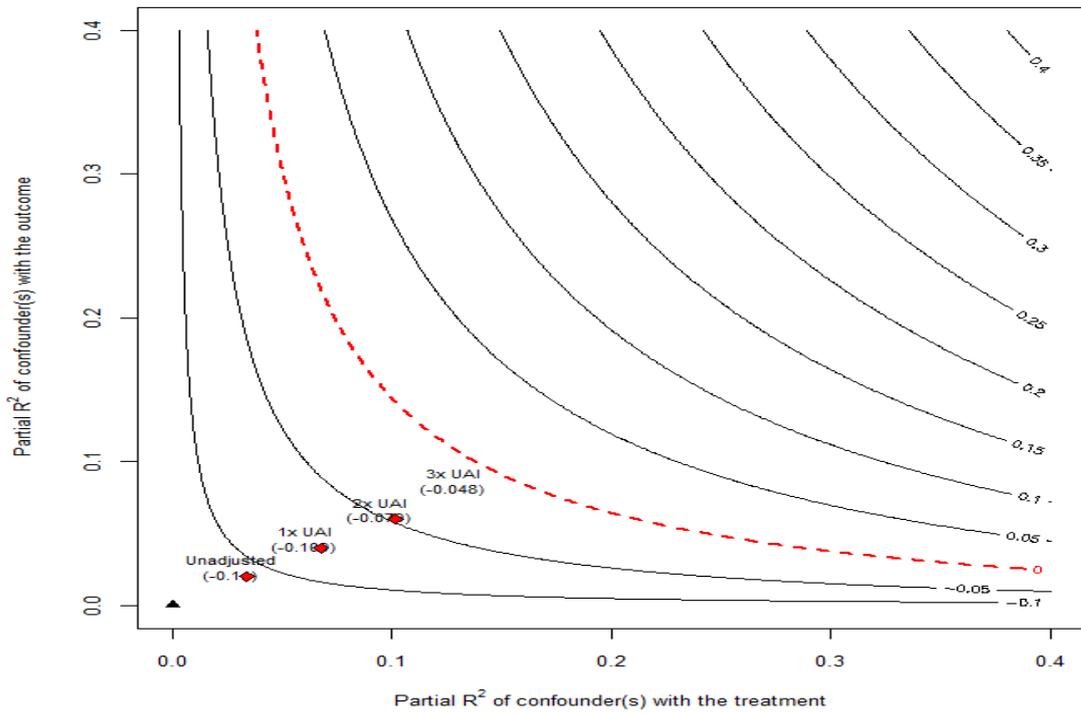


Figure 1d: Sensitivity analysis UA vs. CAI

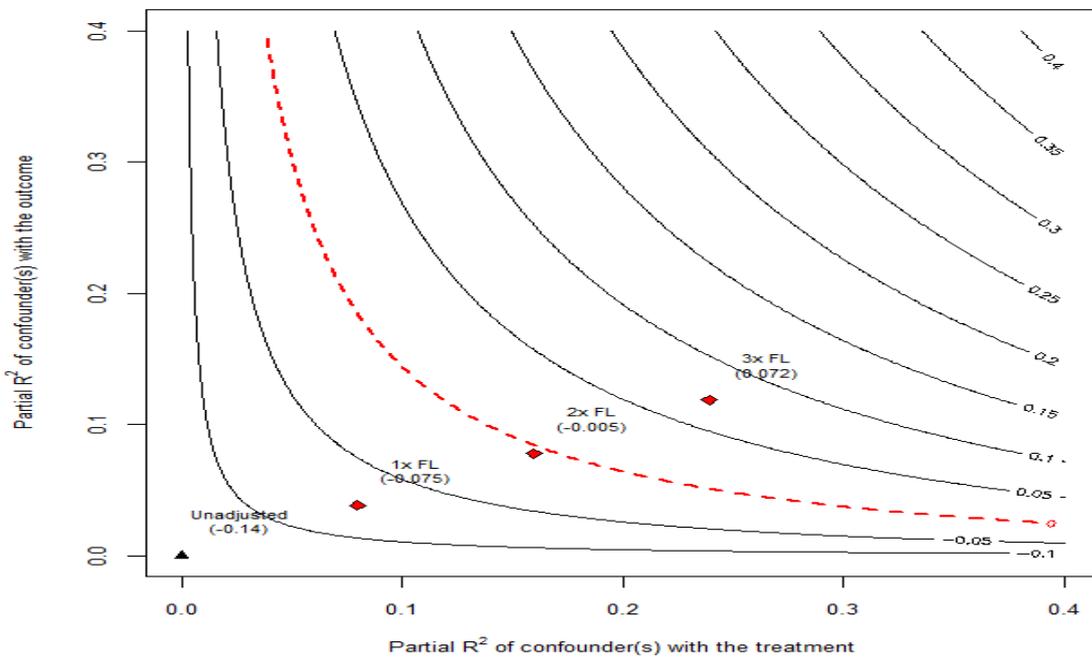


Figure 1e: Sensitivity analysis LTO vs. CAI

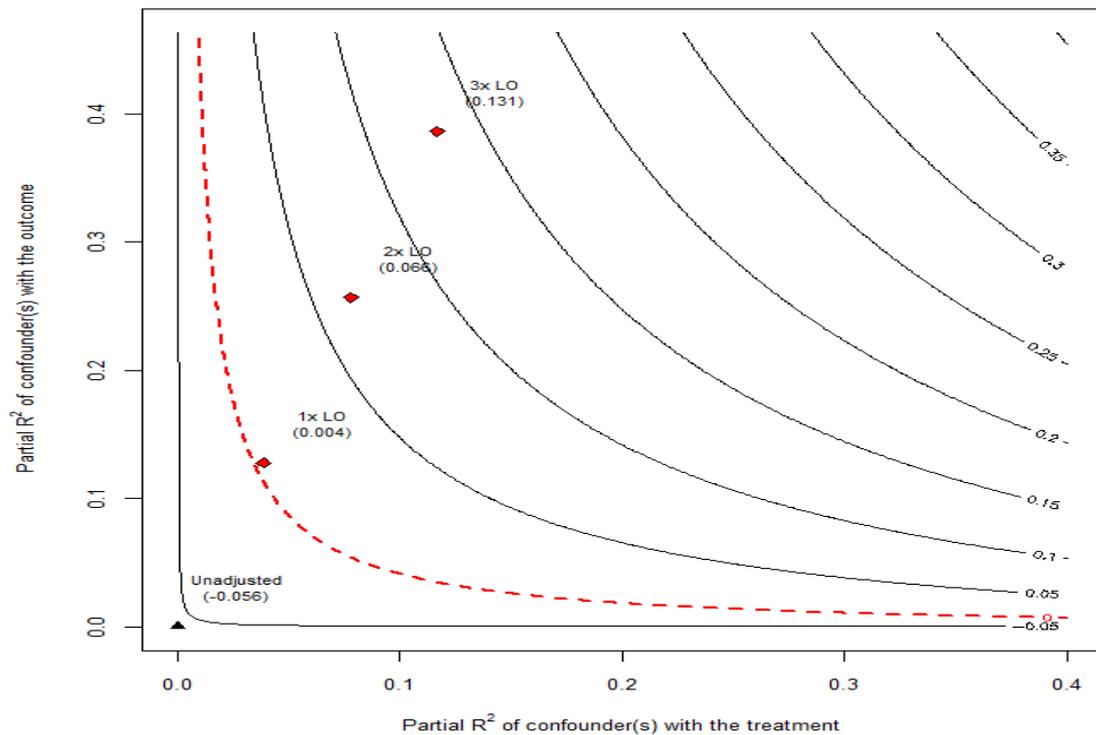


Figure 1f: Sensitivity analysis FL vs. CAI

One way ANOVA results

The results from ANOVA indicate that there are no significant differences in cryptocurrency adoption between countries with high and low PD, MAS, IND, and LTO (Table 6). However, the results reveal significant disparities in cryptocurrency adoption between high-UA and low-UA countries. This provides preliminary evidence of the power of the UA cultural dimension to explain cryptocurrency adoption. In addition, strong disparities were observed in cryptocurrency adoption between countries with high and low FL.

Table 6. One-way ANOVA results

CAI	Sum Sq	Mean Sq	Df	F-Value	Pr(>F)
PD	146	146.5	1	1.164	0.283
IND	214	213.8	1	1.707	0.194
MAS	0	0.16	1	0.001	0.972
UA	666	666	1	5.489	0.0208*
LO	316	316.2	1	2.543	0.114
FL	498	498.1	1	4.056	0.0463*

*Significant at 0.05 level

Stepwise regression estimations

Main effects

Stepwise regression procedures were carried out to examine the relationship between Hofstede’s cultural dimensions and cryptocurrency adoption. The first iteration involved the examination of these relationships in the absence of control variables. The process continued with the addition of individual control variables until the best-fit model was obtained. For the sake of brevity, only the final, best-fit model (with control variables) was presented (*Table 7*). The results for *Model 1* (with no control variables) indicated that only UA has a significant relationship with CAI. Similar results were shown by *Model 2*, which was best-fit to explain the main effects since its coefficient of determination (r squared) was double that of *Model 1*, i.e., 0.36, and Prob>F was well below the 0.05 level. We therefore accept *H3* and reject *H1*, *H2*, *H4*, and *H5*. To overcome the multicollinearity problem, all control variables that registered VIF values greater than 5 were eliminated from the model.

Table 7: Regression estimations results for the relationship between cultural dimensions and cryptocurrency adoption

Variables	Model 1 (Without control variables)		Model 2 (With control variables)	
	Coef.	p-value	Coef.	p-value
CAI				
PD	-0.001	0.988	-0.058	0.399
IND	-0.100	0.135	-0.073	0.328
MAS	0.027	0.654	-0.007	0.906
UA	-0.123	0.014*	-0.155	0.002*
LO	0.070	0.125	0.087	0.113
GINI			0.055	0.71
FFI			-0.043	0.572
CC			-0.208	0.003*
NRI			0.266	0.025*
Cons	15.197	0.028	18.172	0.11
Prob > F	0.112		0.0209	
R-squared	0.178		0.3609	
F-test	1.83		2.3	
Root MSE	11.03		10.702	
B-Pagan	34.12	0.234*	28.12	0.419*
VIF	< 5.000		< 5.000	
No of Obs	178		178	

*Significant at 0.05 level

Moderation effects of financial literacy

We then proceeded to assess whether financial literacy changes the relationships between each cultural dimension and cryptocurrency adoption. Each cultural dimension was isolated, and the moderation effects of financial literacy were tested without control variables (sub-model 1) and with control variables (sub-model 2). Stepwise regression procedures were followed, and the best-fit model (with control variables) was presented for brevity reasons (*Tables 8a, 8b, 8c, 8d, and 8e*). For the case of individualism (*Table 8b*), sub-model 1 (with no control variables) was best fitted. The results revealed that financial literacy has no power to change the significance or direction of relationships

between four cultural dimensions, namely power distance, masculinity, individualism, and long-term orientation. However, when moderating effects were assessed on the relationship between UA and cryptocurrency adoption, the results revealed a significant positive moderation role for financial literacy. Financial literacy was observed to have the power to reduce the negative effects of uncertainty avoidance on cryptocurrency adoption.

Table 8a: Stepwise regression estimation results with moderation effects of financial literacy on the relationship between PD and cryptocurrency adoption

Variables	Model 1 (with no control variables)			Model 2 (with control variables)		
	Coef	Coef	Coef	Coef	Coef	Coef
CAI	0.033	-0.049	-0.085	-0.013	-0.052	-0.209
PD		20.894*	25.669		24.265*	44.467
FL			0.081			0.343
FL*PD				-0.181*	-0.148	-0.164*
CC				0.572*	0.674*	0.700*
NRI				-48.169*	-48.739*	-49.496*
HDI				0.022	0.016	0.022
RQ						
Cons	5.219	18.845*	21.187	23.091	28.435*	38.187*
Prob > F	0.508	0.074	0.157	0.009	0.0037	0.005
R-squared	0.04	0.044	0.044	0.126	0.1571	0.164
F-test	0.44	2.65	1.77	3.21	3.45	3.07
Root MSE	11.252	11.07	11.116	10.728	10.58	10.587
B-Pagan	12.45*	32.34*	22.34*	19.34*	27.45*	34.32*
VIF	<5.000	<5.000	<5.000	<5.000	<5.000	<5.000
No of Obs	178	178	178	178	178	178

*Significant at 0.05 level

Table 8b: Stepwise regression estimation results with moderation effects of financial literacy on the relationship between IND and cryptocurrency adoption

Variables	Model 1 (with no control variables)			Model 2 (with control variables)		
	Coef	Coef	Coef	Coef	Coef	Coef
CAI	-0.058	-0.043	-0.251	-0.058	-0.043	-0.251
IND		21.341	48.380*		21.341	48.380*
FL			0.635			0.635
FL*IND						
Cons	9.593*	14.152*	25.139*	9.593*	14.152*	25.139*
Prob > F	0.242	0.086	0.059	0.242	0.086	0.059
R-squared	0.012	0.042	0.063	0.012	0.042	0.063
F-test	1.38	2.51	2.54	1.38	2.51	2.54
Root MSE	11.207	11.082	11.009	11.207	11.082	11.009
B-Pagan	34.56*	34.12*	38.54*	34.56*	34.12*	38.54*
VIF	<5.000	<5.000	<5.000	<5.000	<5.000	<5.000
No of Obs	178	178	178	178	178	178

*Significant at 0.05 level

Table 8c: Stepwise regression estimation results with moderation effects of financial literacy on the relationship between LTO and cryptocurrency adoption

Variables	Model 1 (with no control variables)			Model 2 (with control variables)		
	Coef	Coef	Coef	Coef	Coef	Coef
CAI						
LTO	0.034	0.062	0.232	0.053	0.043	0.272
FL		-19.136*	0.542*		19.982	7.065
FL*LTO			-0.446			-0.601
CC				-0.167*	-0.133	-0.136
NRI				0.527*	0.634*	0.659*
HDI				-48.759*	-50.308*	-52.992*
RQ				0.021	0.021	0.017
Cons	5.974*	12.305*	5.138	22.240*	23.926*	15.109
Prob > F	0.434	0.039	0.050	0.005	0.004	0.002
R-squared	0.005	0.05	0.066	0.135	0.158	0.178
F-test	0.62	3.35	2.68	3.49	3.47	3.39
Root MSE	11.243	11.006	10.99	10.672	10.575	10.498
B-Pagan	34.56*	12.56*	34.45*	31.34*	31.56*	12.45*
VIF	<5.000	<5.000	<5.000	<5.000	<5.000	<5.000
No of Obs	178	178	178	178	178	178

*Significant at 0.05 level

Table 8d: Stepwise regression estimation results with moderation effects of financial literacy on the relationship between UA and cryptocurrency adoption

Variables	Model 1 (with no control variables)			Model 2 (with control variables)		
	Coef	Coef	Coef	Coef	Coef	Coef
CAI						
UA	-0.094*	-0.117*	-0.319*	-0.444*	-0.258*	-0.125*
FL		19.83*	49.171*		24.93*	66.775*
FL*UA			0.504			0.663*
CC				-0.206*	-0.159	-0.155
NRI				0.289*	0.405*	0.449*
FFI				-0.063	-0.027	0.013
RQ				0.011	-0.015	-0.043
Cons	13.683*	22.967*	35.039*	15.357*	16.67*	30.612*
Prob > F	0.048	0.0049	0.005	0.007	0.002	0.001
R-squared	0.133	0.188	0.225	0.131	0.366	0.393
F-test	4.000	5.58	4.47	3.390	3.69	3.76
Root MSE	11.084	10.809	10.757	10.693	10.523	10.39*
B-Pagan	63.710*	117.12*	161.94*	96.680*	149.27*	95.31
VIF	<5.000	<5.000		<5.000	<5.000	<5.000
No of Obs	178	178	178	178	178	178

*Significant at 0.05 level

Table 8e: Stepwise regression estimation results with moderation effects of financial literacy on the relationship between MAS and cryptocurrency adoption

Variables	Model 1 (with no control variables)			Model 2 (with control variables)		
	Coef	Coef	Coef	Coef	Coef	Coef
CAI						
MAS	0.021	0.009	-0.002	0.025	0.006	-0.044
FL		16.249*	17.276		26.311*	31.293
FL*MAS			0.023			0.108
NRI				0.408*	0.588*	0.593*
RQ				-0.107	-0.071	-0.072
GDPPC				2.560	0.298	0.172
HDI				-44.674	-43.566	-43.276
Cons	6.435*	13.364*	13.851	13.952	21.888	24.343
Prob > F	0.723	0.101	0.207	0.072	0.017	0.031
R-squared	0.08	0.09	0.09	0.085	0.128	0.138
F-test	0.13	2.34	1.55	2.09	2.71	2.31
Root MSE	11.267	11.099	11.147	10.972	10.763	10.808
B-Pagan	34.211*	28.341*	22.341*	13.452*	26.452*	23.231*
VIF	<5.000	<5.000	<5.000	<5.000	<5.000	<5.000
No of Obs	178	178	178	178	178	178

*Significant at 0.05 level

Discussions

The current study makes an inquiry into the influence of national culture on cryptocurrency adoption, drawing evidence from 118 countries. The fundamental hypothesis of this study is our postulation that different cultural dimensions of Hofstede's model, i.e., PD, UA, LTO, MAS, and IND, have the potential to explain the cryptocurrency adoption phenomenon. Unlike previously discussed technologies such as ICT, ERP, and healthcare, cryptocurrencies are unique because they belong to the group of financial technologies (Fintech) and carry financial risks inherent in financial assets. To this end, we scrutinize the role that financial literacy plays in changing the strength of the linkage between individual cultural dimensions and cryptocurrency adoption.

The results from sensitivity analysis, ANOVA, and stepwise regression estimations partially support this hypothesis. UA was observed to be the only cultural dimension with a significant influence on cryptocurrency adoption. Moreover, significant disparities in cryptocurrency adoption between high- and low-UA countries were evident. These findings resonate well with Hofstede's postulation that UA plays a more powerful role compared to other cultural dimensions in technology adoption. In comparison to other technologies, the findings of this study resemble those of (Alhirz & Sajeev, 2015) which also revealed UA to be the only cultural dimension strong enough to influence ERP use. Though studies covering other technologies such as ICT, mobile phones, and healthcare have also found other cultural dimensions to influence the process, UA was predominant in each of these studies (Bagchi et al., 2004). Unlike other technologies, the degree of risk and uncertainty surrounding them is immense (Metallo et al., 2022). Being financial assets, cryptocurrencies are subjected to market risks similar to stocks and bonds. Adding

to the fact that they are not backed by any security, their prices have been extremely volatile when compared to other assets. Moreover, they have been embroiled in controversy around the world following the Great Crypto Crash of 2018 and government bans in some countries (Giudici et al., 2020). The documented risks and uncertainties revolving around cryptocurrencies may provide a plausible explanation for why high-UA countries have low adoption rates.

By taking a pragmatic view, our findings spotlight the power of UA to explain cryptocurrency adoption. However, FL may have the potential to alter the relationship between the remaining cultural dimensions and cryptocurrency adoption. Therefore, our study further examined the moderation effect of financial literacy on the relationship between each cultural dimension and cryptocurrency adoption. Preliminary findings highlight significant differences in cryptocurrency adoption between high- and low-FL countries. This corroborates findings from earlier research that observed elevated levels of cryptocurrency adoption in highly financially literate countries (Zhao & Zhang, 2021). The regression results reveal a strong positive moderation role of FL on UA cultural dimension alone thus partially accepting H6. FL was found to have an insignificant power to change the nature of the insignificant relationship between the remaining cultural dimensions and cryptocurrency adoption. These findings indicate that countries with a high level of financial literacy are less likely to be concerned about uncertainties and risks when deciding whether or not to use cryptocurrencies. Financial literacy has the potential to change or reduce the negative effects of high UA on cryptocurrency adoption. This is due to the fact that high UA has been associated with risk-aversion behavior, but FL has the potential to neutralize this behavior by improving investment decision making (Adil et al., 2022). Scrutinizing the linkage between Hofstede's cultural dimensions and cryptocurrency adoption offers fresh insights for theory and managerial practice.

Conclusions, implications and limitations

Conclusions

The proliferating popularity of cryptocurrencies has aroused the interests of researchers, investors, governments, and the general public. The advantages of cryptocurrencies such as Bitcoin have been well documented, to the point that they have been regarded as the future of global commerce. The acceptance of Bitcoin and other cryptocurrencies as a payment option by companies such as Microsoft, Starbucks, and AT&T further solidifies their benefits. There has been a growing scholarly focus on the examination of behavioral influences such as attitudes, perceptions, and trust on cryptocurrency adoption. However, literature on the effects of culture on cryptocurrency adoption has received limited attention. Borrowing from studies in other technologies, our article spotlights the influence of national culture on cryptocurrency adoption based on the Hofstede model. It further investigates the moderating role of financial literacy in the linkage between each cultural dimension and cryptocurrency adoption. The findings suggest that cryptocurrency adoption is highly sensitive to an individual country's UA alone. Moreover, UA was found to have a significant negative impact on cryptocurrency adoption, while the remaining dimensions exhibited insignificant effects. Nevertheless, our findings indicate that FL positively moderates the linkage between UA and cryptocurrency adoption.

Theoretical contributions and implications

The findings of our study create a more nuanced understanding of the cryptocurrency adoption phenomenon, and several theoretical implications emerge from them. The findings from our inquiry speak volumes because little is known about the influence of culture on technology adoption decisions (Teo & Huang, 2018). Our work supplements previous studies relating to the humanistic view of cryptocurrency adoption from the perspective of decision systems (Sukumaran et al., 2023). We generate crucial insights for further decision-system theorizing by spotlighting how cultural values affect decisions to adopt cryptocurrencies. For many years, dominant technology adoption theories such as the Technology Acceptance Model (TAM) have served as the theoretical foundations for empirical studies on technology adoption and human behavior (Albastaki, 2024). These theories have unfortunately neglected cultural values and their influences on technology adoption.

Our article provides evidence of why cultural considerations are vital in comprehending the technology adoption phenomenon. This provides a good foundation for further theory development, especially in the context of cryptocurrency, since its technology and inner workings stand apart from others. There is a strong need to extend existing theories to incorporate cultural aspects in describing behavioral aspects of technology adoption. Furthermore, the findings reveal that financial literacy has positive and significant moderation effects on the linkage between UA and cryptocurrency adoption. As such, there is a need for theories that can help solidify the theoretical underpinnings of the linkage between culture, financial literacy, and cryptocurrency adoption. Financial technology (Fintech) includes cryptocurrency, and mobile banking, which are highly influenced by financial literacy, unlike other technologies. By linking these three constructs in the same model, our findings lay the groundwork for future Fintech theorizing.

Practical implications

The study's findings attest to the importance of carefully considering specific cultural dimensions when developing strategies to encourage the use of cryptocurrencies. Our findings offer various managerial implications by providing vital information to cryptocurrency entrepreneurs/issuing firms, businesses (using cryptocurrency as a payment alternative), investors (asset managers), households (users and payees), as well as governments/regulators. We provide evidence to show how UA is the single most important cultural dimension that influences cryptocurrency adoption. Henceforth, managerial implications emanating from the findings are inclined towards addressing the "*uncertainty and risk*" aspects of cryptocurrencies. To boost usage in high-UA societies, governments should invest in designing appropriate regulatory and legal frameworks aimed at promoting a positive image of cryptocurrencies. For instance, aspects such as security, economy, and usefulness should be at the forefront of the frameworks that may be instrumental in diminishing the perceived risk of cryptocurrencies (Almajali et al., 2022). Cryptocurrencies offer a cheap, fast, and secure mechanism to make payments. This has led to the inclusion of Bitcoin, Ethereum, and others among payment options by giant companies such as Wikipedia, Microsoft, and AT&T. So cryptocurrency issuers and

businesses that accept payments in cryptocurrency can also benefit from increasing usage by promoting the positive image of these coins in their promotional materials.

One of the matters of concern relating to cryptocurrencies is the aspect of coin losses through online theft, which may deter potential users in high-UA countries from owning these coins. So regulators and cryptocurrency entrepreneurs should design mechanisms to minimize this risk, e.g., through insurance. This has been implemented by firms such as Coinbase and BitGO, but this should be a sector wide effort that can be enforced by regulators (Kethineni & Cao, 2020). On the other hand, cryptocurrencies such as Bitcoin are stored in an e-wallet, with sole access provided to the owner through a password. This may pose challenges to the beneficiaries, especially when they don't have the owner's password. Cryptocurrency regulators are urged to address this uncertainty through mechanisms such as electronic-will/e-will that will be stored electronically through blockchain technology (Nadeem *et al.*, 2021). The findings of this study are also relevant to households/individual users of cryptocurrencies. Cryptocurrency adoption was observed to be low in societies with high-UA, however, FL was found to reverse this relationship. FL has been found to improve an individual's tolerance to risk (Banner & Neubert, 2016). This is crucial since cryptocurrencies are deemed to be risky assets. Potential investors and users are urged to seek professional financial advice to better understand the risks and rewards associated with these assets. This has been shown to help investors perform better as opposed to those who are driven by social influences (Hermansson & Jonsson, 2021).

Research limitations & avenues for future research.

Despite providing novel insights into the culture and cryptocurrency adoption phenomena, our study has limitations. First and foremost, we used cross-sectional data to look into the phenomenon at one point in time (Dhiyf *et al.*, 2024). Therefore, we couldn't possibly analyze the studied relationships over a period of time. Cryptocurrency adoptions may vary from one year to another, as such a longitudinal study would have helped to explain the adoption behavior across time (Almajali *et al.*, 2022). Secondly, we couldn't study the entire population and settled for a sample size of 118 countries because Hofstede's cultural values survey data do not cover all countries. Future researchers can extend our study by examining the channels by which culture affects cryptocurrency adoption. User behaviors, e.g., attitudes, perceptions, and trust, have been found to influence cryptocurrency adoption (Almajali *et al.*, 2022; Sukumaran *et al.*, 2022). In the light of these mixed views, one can delve into exploring whether user behaviors can mediate/bridge the effects of culture on cryptocurrency adoption in specific contexts.

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Original Research

Mining Stock Price Reactions Before and After the Russia - Ukraine Conflict Events

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Abstract

This research aims to observe how the Indonesian capital market reacts, especially in the mining sector, to the export ban resulting from the Russian invasion of Ukraine, particularly on coal exports. This study uses the event study method by collecting closing stock price data 5 days before and 5 days after the Russian invasion of Ukraine which occurred on February 24, 2022. This research indicates that the Russian invasion of Ukraine had a significant impact on the market, as evidenced by the disparities in average abnormal returns before and after the events, as well as the fluctuations in stock prices and substantial abnormal returns when comparing the days surrounding the events. The theories employed in this study include the Efficient Market Hypothesis and Signal Theory. This study only uses mining company as a sample and abnormal returns and stock prices as variables. This research does not only look at the average difference before and after the Russian invasion of Ukraine. But also compare the difference in stock prices and abnormal returns between each day before and after the event. The results of the research conducted are in line with previous research conducted by Theiri et al., (2022).

Keywords: Abnormal return, Russian invasion of Ukraine, Stock Prices.

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Introduction

This study meticulously dissects the multifaceted impact of the Russian invasion by closely examining abnormal market returns. On February 24, Russia launched its invasion of Ukraine, citing two main reasons: a plea for aid from the People's Republic of Donbas and the need to protect Donbas citizens, who had endured "harassment to genocide" orchestrated by the Ukrainian government over the past eight years (Isa, 2022). The global consequences of Russia's invasion reverberated deeply. Numerous nations condemned the action, imposing strict restrictions on access to gas, oil, and commodities. This, in turn, led to a sharp increase in energy, commodity, and food prices. Based on World Economic Outlook (2022), The International Monetary Fund projections signaled a decline in aggregate economic activity for both Russia and Ukraine, triggering a surge in commodity prices worldwide. These outcomes were extensive, heightening price pressures and compounding significant policy challenges. In 2022, International Energy Agency (IEA) data Russia's role as the world's third-largest producer of oil and natural gas accentuated the impact. Predictably, coal prices were poised to rise due to increased demand and limited stock availability, further complicating the global energy landscape (Abdul Malik, 2022).

The Russia-Ukraine conflict significantly shook Indonesia's economic landscape, particularly affecting its trade and energy sectors. Non-oil and gas exports faced a sharp decline, and disruptions in wheat imports raised concerns about food price hikes (Permana, 2022). Simultaneously, the global energy market witnessed a surge in prices, benefiting Indonesia as the world's leading thermal coal exporter (Nugroho, 2022). On February 24, as news of the conflict spread, Indonesia's financial markets reacted strongly. The Jakarta Composite Index (JCI) dropped by 2.04 percent, hitting IDR 6,776. According RTI Infokom data, foreign investors displayed confidence, making substantial net purchases, totaling Rp. 761.14 billion. The following day, JCI showed signs of recovery, strengthening by 0.58 percent to IDR 6,681 (CNN, 2022). Amid the conflict, PT Adaro Energy Tbk, a major mining company, secured coal supplies from European Union countries, bypassing the Russian coal ban. The more constrained the coal supply, the greater the surge in coal prices (Setiawan, 2022). On March 7, 2022, coal stocks surged: ADRO rose by 6.58 percent to IDR 3,240, HRUM by 9.13 percent to IDR 13,750, and PTBA by 2.26 percent to IDR 3,260. This upward trend also benefitted mutual funds. Manulife Andalan fund achieved a one-year return of 21.37 percent, Earth Spring Investments Value Discovery fund yielded 9.38 percent, and Sucorinvest Equity Fund recorded 10.79 percent returns within a year (Abdul Malik, 2022).

This study offers a comprehensive analysis, not only examining the variance in average abnormal returns before and after the Russian invasion of Ukraine but also scrutinizing stock prices and abnormal returns in the days surrounding this significant event. Employing the event study methodology, this research delves into the information content of the Russian invasion by assessing how the market reacted. The same method was also used by Theiri et al., (2022), have probed the repercussions of the Russia-Ukraine conflict on financial markets. This study focused on the response of Bitcoin and Ethereum liquidity. Their findings revealed a significant yet temporary surge in Bitcoin and Ethereum liquidity levels during the initial two days post-event, returning to pre-

event levels subsequently. Considering the presence of abnormal returns indicates that the Russian invasion of Ukraine contains information that significantly influences market dynamics. Conversely, the absence of abnormal returns suggests a lack of substantial information impact on the market.

Theoretical Foundations

Efficient Market Theory

The Efficient Market Hypothesis (EMH), as posited by Jensen & Jones, (2019), asserts that stock prices promptly adjust to assimilate all relevant information, thereby upholding fairness among investors. However, real-world scenarios often involve complexities that challenge this theory. Putri et al., (2022) explores information asymmetry, where specific individuals possess undisclosed information, disrupting market efficiency and occasionally leading to abnormal returns. This imbalance prompts investors to strategically adjust their portfolios, seeking to maximize profits by capitalizing on these unincorporated insights. Comprehending and navigating these theories not only enriches financial knowledge but also empowers investors with essential insights. Armed with this understanding, investors can confidently navigate the intricate landscape of the stock market, making informed decisions in the face of evolving information disparities. The implementation of this theory in Russian Invasion of Ukraine is when the information regarding the Russian invasion of Ukraine is rapidly integrated into changes in stock prices and other financial assets, it indicates the efficiency of the market. This implies that markets adeptly assimilate newly emerging information, and prices promptly and accurately reflect the swift assessments made by market participants regarding the impact of the invasion.

According to Fama theory (2020), there are three levels of market efficiency, namely:

a. Weak Form Efficient Market

Market efficiency is said to be weak because in making stock buying and selling decisions investors use past price and volume data combined with various technical analyses to determine the direction of stock movement whether to go up or down. The drawback is that the analysis ignores other variables that may affect the stock price in the future, so errors in estimating prices may occur (Handini & Astawinetu, 2020).

b. Semi-Strong Form Efficient Market

Market efficiency is said to be half strong because in making buying and selling decisions, investors use historical data and published information such as financial reports, annual reports, social and political events, international financial information, and others that can affect the national economy. This means that investors use technical analysis and fundamental analysis in determining the position of the buying price and selling price of shares by Handini & Astawinetu, (2020).

c. Strong Form Efficient Market

Strong market efficiency occurs because investors use more complete data such as historical data, published information, and private information that is not published in general. Examples of private information are the results of research produced by the company itself or purchased from other research institutions (Handini & Astawinetu, 2020).

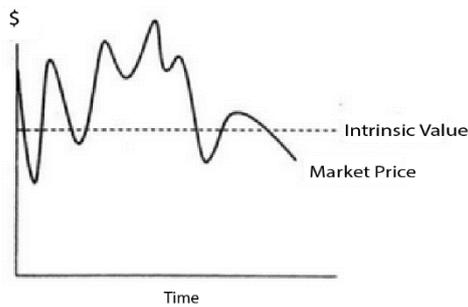


Figure 1. Weak Efficient Market

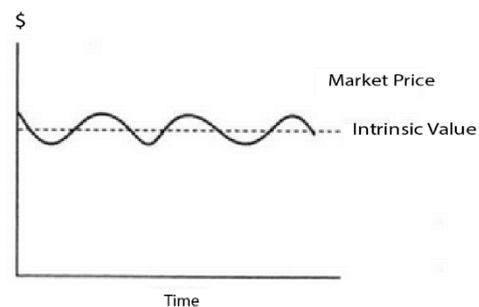


Figure 2. Strong Efficient Market

Sumber: Handini & Astawinetu, (2020)

In a strongly efficient market, where investors share similar information, the gap between market price and intrinsic value remains minimal. Bid and ask prices show slight differences, reflecting the market's rationality. Conversely, in a weakly efficient market influenced by emotional decision-making and limited information, the disparity between price and intrinsic value widens significantly. Investors tend to speculate without considering vital indicators, emphasizing the need for informed decision-making (Handini & Astawinetu, 2020).

Signal Theory

In the realm of investment decision-making, information published as announcements plays a pivotal role. Investors evaluate this information to gauge a company's prospects. If the data suggests positive outcomes and garners a favorable response from investors, a swift and accurate market reaction indicates market efficiency by Hartono, (2022). Signaling theory is instrumental in comprehending management decisions, where conveyed information can influence investors' choices based on the company's circumstances. During events like the Russian and Ukrainian invasions, information owners relay company-related updates to recipients. These recipients analyze the actions taken to mitigate the impact of the invasion. Their responses manifest as signals, either bad news or good news. A positive reception, deemed as good news, can lead to a company's increased value, reflected in stock price fluctuations. Stock returns rise in tandem with the ascending stock prices (Welley et al., 2020). This dynamic interplay underscores the significance of signaling theory in understanding market reactions during crucial events.

Abnormal Return

Abnormal returns signify the variance between the actual return and the anticipated return, with investors making predictions about market performance (Hartono, 2022). Abnormal returns can be positive or negative. Positive abnormal returns occur when the actual return significantly exceeds the expected return, indicating favorable market conditions. Conversely, negative abnormal returns arise when the expected return surpasses the actual return, reflecting less favorable market conditions (Safitri, 2021). In the context of the Russian invasion of Ukraine, the capital market is inevitably influenced, potentially leading to fluctuations in stock prices. Positive signals received can cause an upsurge in stock prices, while negative signals may lead to a decline. Analyzing abnormal returns before and after the invasion can illuminate market reactions, highlighting the impact of significant events on stock performance. Understanding abnormal returns is essential as it provides valuable insights into market responses, shedding light on investors' reactions to critical events and their subsequent effects on stock prices.

Expected Return

$$E(Rit) = \alpha + \beta * Rmt \text{ (IHSG return period } t\text{)}. \quad (1)$$

Abnormal Return

$$AR = Rit \text{ (Stock Return } I \text{ period } t\text{)} - E(Rit) \quad (2)$$

Stock Prices

The stock price in the stock market represents a consensus among investors, and the price of a stock can fluctuate multiple times within a single day, with a wide range between the lowest and highest market prices (Handini & Astawinetu, 2020). A higher stock price indicates a greater company value and can fluctuate based on supply and demand dynamics (Prasasti, 2022). Events like the Russian invasion of Ukraine can trigger immediate reactions among investors. Major events often lead to panic selling, causing a decline in stock prices due to increased selling pressure. Conversely, if events provide positive signals, investors respond favorably, leading to stock price increases. The analysis involves tracking changes in closing stock prices five days before and after the event to understand these fluctuations.

Research Methodology

This study involved a quantitative analysis of financial data from mining companies listed on the stock exchange. The sample used in this research consists of 24 mining companies. The data collected consists of closing stock prices for five days before and after the Russian invasion of Ukraine, specifically five days before and five days after February 24. In addition, closing price data for 30 days before the event was gathered, which was then analyzed from five days before the event to determine Expected Stock price returns. The collection technique utilized documentation and data analysis through an event study. The variables used in this study include abnormal returns and stock prices.

Results and Discussion

Table 1 displays the observed variations in stock prices before and after the Russian invasion of Ukraine, examining days prior to the event, the event day itself, and subsequent days. Noteworthy differences were found, particularly in the stock prices from (t-5, t+5) to (t-1, t+1), indicating substantial changes spanning five days before and after the event. This trend continued when analyzing closing prices one day before and after the event, emphasizing consistent shifts. A significant stock price shift occurred from (t-5, 0) to (t-1, 0), signifying substantial changes in the five days leading up to the event. Similar patterns were observed when comparing other days before the event with the day of the event. Moreover, significant changes persisted on days (0, t+4) and (0, t+5), indicating notable alterations in stock prices four to five days after the event. Preceding days did not witness significant price changes.

This analysis delves into the nuanced dynamics of abnormal returns concerning the Russian invasion of Ukraine, shedding light on the market's responsiveness during pivotal events. Examining abnormal returns before and after the event revealed significant disparities at specific time intervals. Notably, there were significant differences in returns five days before to five days after the event day (t-5, t+5), four days before to four days after the event day (t-4, t+4), and one day before to one day after the event day (t-1, t+1), all significant at a 99% confidence level. Similarly, (t-4, t+4) and (t-1, t+1) exhibited significance at certain levels, emphasizing the consistent pattern. Contrastingly, abnormal returns on (t-3, t+3) and (t-2, t+2) did not display significance, indicating that differences in abnormal returns on these days were not substantial. A notable distinction emerged between abnormal returns on the day before and the day of the event, especially at specific time intervals. Significant differences were observed in abnormal returns five and four days before the event compared to the event day. However, there was no significant difference between abnormal returns on the event day and days (t-3, 0), (t-2, 0), and (t-1, 0). Additionally, abnormal returns displayed significance at the 10 percent level on the day (0, t+1), signifying a difference one day after the event. This analysis underscores the nuanced nature of abnormal returns, emphasizing specific time intervals' significance in capturing market responses to critical events. Similar to the research conducted by Theiri et al., (2022), the resulting findings indicated that liquidity levels increased in the first two days around the event and then returned to pre-event levels thereafter. Another study conducted by Gavalas et al., (2022) uses abnormal returns to measure the unexpected impact of an event.

The analysis indicates a notable abnormal return on the day of the incident, with subsequent days displaying no significant abnormal returns. Referencing Table 1, it is apparent that significant price changes occurred in nearly every comparison, especially noticeable in the contrast between the event day and the subsequent day. Significance is only noted on days (0, t+4) and (0, t+5). The invasion of Ukraine by Russia substantially impacted stock prices, leading to significant fluctuations before, during, and after the event. Notable price changes were observed in the days preceding the event, as well as on the event day. Post-event, fluctuations persisted on the fourth and fifth days. However, abnormal returns were significant only in specific instances within each comparison.

Table 1. The Results of Comparative Variables Before, During, and After the Event

Event Window	Stock Price	Abnormal Return
(t-5, t+5)	0,006***	0,003***
(t-4, t+4)	0,006***	0,002***
(t-3, t+3)	0,011**	0,278
(t-2, t+2)	0,007***	0,544
(t-1, t+1)	0,086*	0,013**
BEFORE AND EVENT DAYS		
(t-5, 0)	0,012**	0,043**
(t-4, 0)	0,006***	0,046**
(t-3, 0)	0,006***	0,125
(t-2, 0)	0,003***	0,143
(t-1, 0)	0,033**	0,317
AFTER AND EVENT DAYS		
(0, t+1)	0,149	0,075*
(0, t+2)	0,277	0,455
(0, t+3)	0,196	0,391
(0, t+4)	0,014**	0,582
(0, t+5)	0,003***	0,954

***Significance level: $p < 0,01$ **Significance level: $p < 0,05$ *significance level: $p < 0,1$

Table 2. Result of the Change in The Average Abnormal Return from Day to Day

Days	AAR	Sig.
t-5	-0,01582	0,018**
t-4	-0,01567	0,067*
t-3	-0,00827	0,373
t-2	-0,00398	0,61
t-1	0,012205	0,493
T0	0,019412	0,308
t+1	-0,02107	0,049**
t+2	0,003727	0,749
t+3	0,011943	0,304
t+4	0,030522	0,039**
t+5	0,022816	0,29

***Significance level: $p < 0,01$ **Significance level: $p < 0,05$ *significance level: $p < 0,1$

Table 3. Shows The Difference in The Average Abnormal Return Before and After

Event Time	T value	Sig
AARsblm-AARssdh	-2,270	0,033**

***Significance level: $p < 0,01$ **Significance level: $p < 0,05$ *significance level: $p < 0,1$

In Table 2, the average change in abnormal returns is detailed for the days preceding and following the Russian invasion of Ukraine. Notably, mining sector companies registered negative abnormal returns on the day prior to the event, specifically on days $t-5$ and $t-4$. On both the fifth day ($t-5$) and the fourth day ($t-4$), the actual return fell below the expected return, and this discrepancy held statistical significance. Following the invasion, sentiment notably improved, particularly on the day immediately after the event. This positive trend persisted through the fourth day post-incident, indicating that actual returns consistently outperformed the expected returns during this period. These findings underscore significant shifts in market dynamics in response to the Russian invasion of Ukraine.

In Table 3, the average abnormal return data five days before and after the event exhibits significance at the 5% level. This suggests that the information regarding Russia's invasion of Ukraine was not swiftly absorbed by the market, indicating a momentary inefficiency. Investors, in response, carefully monitor market movements to determine their subsequent actions. If abnormal returns and market price increases are interpreted as indicators of optimism, investors may view them as positive signals. This observation aligns with the findings of a prior study by Tambunan et al., (2023), where they reported an upsurge in stock prices and positive abnormal returns, reflecting investors' inclination to purchase energy stocks post-invasion. This reaffirms that the Russian invasion of Ukraine elicited a market reaction, evident in the disparities in abnormal returns and other variables before and after the event. As in research conducted by Gavalas et al., (2022), events that have an impact on the economy can influence abnormal returns.

Conclusion and Recommendation

In this study, the day following the announcement of the invasion event witnessed a substantial negative abnormal return. This implies that investors reacted unfavorably by divesting their portfolio assets. Additionally, the fourth and fifth days preceding the event displayed notable negative abnormal returns. This situation indicates that the market did not promptly absorb all available information, allowing a select group of individuals to exploit the circumstances. This emphasizes the incomplete efficiency of the market. Subsequently, investors closely monitored these events to assess the viability of the details surrounding Russia's invasion of Ukraine. In signal theory, the expected response from signal recipients is an increase in the share value of mining sector companies, indicating a positive reaction to the news. Consequently, abnormal returns exhibited substantial differences in certain comparisons, signifying the impact of these events on investors' expectations. The positive abnormal return observed on the fourth day post-invasion suggests that investors began anticipating a favorable impact of the Russian invasion of Ukraine, especially on mining stocks. Relevant earlier research conducted by Gavalas et al., (2022), who examined the impact of the Covid-19 event on the shipping industry, indicated that positive abnormal returns occurred in the clean tanker market during the first WHO announcement.

Conducting further research is crucial to understanding mining stock price movements. Exploring additional factors such as government policies, commodity price fluctuations, and technological advancements will contribute to a more comprehensive understanding

of the sector's dynamics. Besides that, market participants and policymakers should consider geopolitical events as a critical factor in investment decision-making and incorporate them into risk assessment frameworks and investment strategies.

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