

Index The influence of Sharia implementation, financing access, and managerial capacity on MSME performance in Medan City, Indonesia

Muhammad Zulkifli Hasibuan , Herdi Ramon , Samio , Nurjannah , & Rijal 

Program Studi Pendidikan Ekonomi (S1), Universitas Muslim Nusantara Al-Washliyah, Kota Medan, Indonesia

ABSTRACT

Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy, contributing significantly to national income and employment. Within this sector, Shariah-compliant MSMEs have emerged as strategic actors that integrate ethical, transparent, and socially responsible business principles aligned with Islamic law. However, limited empirical research has analyzed how Shariah implementation, access to Shariah-based financing, and managerial capacity collectively influence MSME performance, particularly at the city level in Medan.

Objectives

This study aims to examine the effects of Shariah implementation, access to Shariah-compliant financing, and managerial capacity on MSME performance in Medan, Indonesia. It further investigates the mediating role of managerial capacity in translating Shariah compliance into business growth and employment generation, providing theoretical and practical insights into the development of Shariah-based MSMEs.

Method

A mixed-methods sequential explanatory design was employed. The quantitative phase involved a survey of 389 Shariah-compliant MSMEs across key sectors in Medan, analyzed using multiple regression and bootstrap mediation tests. The qualitative phase comprised 20 semi-structured interviews to explore managerial experiences and ethical practices. Triangulation ensured reliability and validity of results, while thematic analysis supported contextual interpretation.

Results

The findings indicate that Shariah implementation, access to Shariah financing, and managerial capacity each have significant positive

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Contact: Muhammad Zulkifli Hasibuan ✉ muhammadzulkiflihasibuan@gmail.com

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effects on MSME revenue and employment growth. Managerial capacity partially mediates the relationship between Shariah implementation and business performance, underscoring its central role in operationalizing ethical values. Qualitative evidence reveals that ethical governance and financial literacy enhance innovation, resilience, and stakeholder trust among Shariah-compliant MSMEs.

Implications

The study demonstrates that integrating Shariah principles with managerial competence strengthens MSME sustainability and competitiveness. Policymakers and financial institutions should expand Shariah-compliant financial access, reinforce managerial training, and promote digital Islamic finance to foster inclusive, ethical entrepreneurship.

Originality/Novelty

This research offers empirical evidence linking Islamic ethical principles with measurable business performance, validating managerial capacity as a mediating mechanism. It contributes to Islamic economic literature by presenting a city-level model for sustainable, value-based MSME development that bridges faith, ethics, and economic growth.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) have long served as a vital pillar of global economic stability and inclusive development. Across both developed and developing nations, MSMEs account for the majority of business entities, create substantial employment opportunities, and sustain regional economic dynamism. In Indonesia, MSMEs hold an especially pivotal role, contributing approximately 61% to the national Gross Domestic Product (GDP) and absorbing about 97% of the total workforce (Kusumaningtyas et al., 2022; Tresnasari & Zulganef, 2023; Wati & Amalia, 2024; Zuhroh et al., 2024). This sector not only functions as the economic backbone of local communities but also represents a crucial means of achieving equitable growth across regions. The steady rise of MSME contributions to GDP, from 60.34% in 2017 to over 61% in 2021, illustrates a continuous expansion aligned with evolving market structures and digital transformations (Hanifah & Innayah, 2024; Haryati et al., 2023; Ilham, 2023). This growth trajectory underscores the sector's capacity to withstand crises such as the COVID-19 pandemic while fostering innovation and entrepreneurship at the grassroots level.

In this context, the emergence of Shariah-compliant MSMEs marks a significant development within Indonesia's broader MSME landscape. Shariah-based enterprises operate according to Islamic economic principles that emphasize justice (*'adl'*),

transparency (*amanah*), and profit-sharing (*mudarabah*, *musharakah*), thereby integrating moral and ethical values into economic activity (Ayuni & Erdalina, 2023; Ilham S. et al., 2024; Maharani et al., 2024; Sari, 2023). Their presence reflects a growing demand for ethical financial systems and halal products, aligning with Indonesia's demographic reality as the world's largest Muslim-majority nation. Empirical evidence indicates that Shariah-based MSMEs demonstrate notable resilience and long-term sustainability, supported by ethical governance and social responsibility mechanisms (Amalia & Andni, 2023; Hidayat et al., 2023). This ethical orientation not only strengthens trust among stakeholders but also enhances competitiveness in emerging halal markets, both domestically and internationally. Consequently, the Shariah-MSME sector embodies a strategic synergy between spiritual values and economic pragmatism, one that holds potential to advance inclusive and sustainable development.

Despite this promise, Shariah-based MSMEs continue to face substantial institutional and operational challenges that limit their contribution to the national economy. Current policy frameworks often adopt a generic approach to MSME empowerment, neglecting the distinct characteristics and requirements of enterprises adhering to Islamic economic principles (Hartanto et al., 2023; Judijanto et al., 2023; Tuhuteru & Iqbal, 2024). Limited access to Shariah-compliant financing, low levels of Islamic financial literacy, and weak managerial capacity have collectively hindered performance optimization within this sector (Firdaus et al., 2022; Mahmoud et al., 2023; Supriadi et al., 2023). Moreover, inconsistencies in the implementation of Shariah governance across regions and the scarcity of tailored financial products continue to marginalize many potential Shariah-compliant entrepreneurs (Susiang, 2024; Syahputra et al., 2023). These challenges highlight the need for an enabling ecosystem that harmonizes regulatory support, financing innovation, and capacity development to ensure that Shariah-based MSMEs can fulfill their potential as drivers of equitable economic progress.

At a broader level, limited access to Shariah-compliant financing remains the most critical bottleneck constraining the development of Shariah-based MSMEs. Although Indonesia possesses one of the fastest-growing Islamic financial sectors in the world, its penetration into the MSME segment remains disproportionately low (Arianty et al., 2025; Hartanto et al., 2023). Traditional banking systems, often designed around interest-based mechanisms, fail to accommodate the profit-and-loss-sharing arrangements preferred by Shariah-compliant entrepreneurs. Recent studies emphasize that integrating Shariah-based microfinance and crowdfunding platforms has significantly improved capital accessibility, ethical governance, and inclusiveness (Bin-Armia et al., 2024; Minhat & Dzolkarnaini, 2016; Sudarwanto et al., 2024). These financial innovations align with Islamic values by promoting fairness, transparency, and social welfare, while simultaneously enhancing competitiveness and resilience within MSMEs (Siregar et al., 2025; Wulandari et al., 2016). Yet, despite such advancements, the adoption rate of Shariah financing remains uneven due to insufficient outreach, limited awareness, and regulatory complexity.



A growing body of literature offers valuable insights into how Shariah principles, justice, transparency, and profit-sharing, can be effectively embedded into MSME operations to foster sustainability and performance (Firmansyah & Athoillah, 2019; Tubastuvi & Rusydiana, 2024). Islamic economics emphasizes distributive justice and community welfare, positioning business as both a moral and economic endeavor (Asutay & Yilmaz, 2021; Baidhaw, 2012). Transparent business practices promote accountability, reduce information asymmetry, and strengthen customer trust (Barus et al., 2023; Habriyanto et al., 2022). Profit-sharing mechanisms encourage risk-sharing, reducing the debt burden and supporting innovation (Fajri et al., 2023; Islam & Ahmad, 2020). These values collectively contribute to a more stable and inclusive economic structure that aligns individual enterprise success with societal well-being. Moreover, Shariah-based entrepreneurship promotes reinvestment in local communities, further reinforcing its role in social empowerment and poverty alleviation (Anwar et al., 2023; Lestiyawati, 2023).

Nevertheless, despite these theoretical advantages, practical implementation remains constrained by systemic weaknesses in managerial capacity. Effective Shariah compliance requires not only adherence to ethical principles but also strategic management, financial literacy, and innovation capacity among business owners. Empirical findings indicate that MSMEs with higher managerial competence are better equipped to translate Shariah values into operational excellence and measurable performance outcomes (Abdullah et al., 2022; Purwanti et al., 2022). Consequently, managerial capacity acts as a mediating variable that determines the success of Shariah-based enterprises. This underscores the urgency of designing integrated training and mentorship programs that align Islamic ethics with modern management practices, enabling MSMEs to achieve both profitability and moral legitimacy.

The academic literature also identifies multiple theoretical frameworks to analyze the interplay between Shariah implementation, managerial capacity, and MSME performance. The Maqasid al-Shariah framework provides the normative foundation by emphasizing the preservation of faith, intellect, property, and social welfare (Mohd Zain et al., 2024). The Resource-Based View (RBV) links managerial skills and Shariah knowledge to sustainable competitive advantage (Beltramino et al., 2023). Stakeholder theory highlights the need for collaborative engagement among business actors, customers, and communities to achieve shared value (Abdul Hasim, 2019; Sholihin et al., 2021). Meanwhile, Balanced Scorecard and Shariah Governance Framework (SGF) models offer comprehensive approaches to measure performance and compliance (Prasojo et al., 2024; Rosalina & Wahyudin, 2021; Sheikh Obid & Naysary, 2014). These frameworks collectively demonstrate that Shariah-based MSMEs operate within a multidimensional paradigm that integrates ethical imperatives, managerial capacity, and stakeholder collaboration. However, empirical applications of these frameworks at the city level, especially in Indonesia, remain scarce, resulting in a notable research gap.

This research seeks to address this gap by empirically examining the role of Shariah-based MSMEs in supporting the economic development of Medan, one of Indonesia's most dynamic urban centers. Specifically, it investigates how Shariah

implementation, access to Shariah financing, and managerial capacity affect MSME income and employment growth. By employing a mixed-methods approach that combines quantitative regression analysis with qualitative interviews, this study provides city-level evidence on the mechanisms through which Islamic economic values translate into measurable performance outcomes. The novelty of this research lies in its integration of moral, managerial, and financial dimensions within a single analytical model, providing a holistic understanding of how Shariah-compliant MSMEs contribute to inclusive urban development. Furthermore, by highlighting the mediating role of managerial capacity, the study extends existing theories of Shariah-based enterprise and contributes to policy formulation aimed at strengthening the institutional ecosystem for Shariah-MSME development in Indonesia.

Ultimately, this study aspires to bridge the gap between normative Islamic economic theory and practical MSME management, demonstrating that ethical entrepreneurship rooted in Shariah principles can be both spiritually fulfilling and economically viable. Through rigorous empirical validation, it underscores the potential of Shariah-based MSMEs to become not only engines of local economic growth but also exemplars of sustainable and value-driven business practices that align with Indonesia's vision of equitable and ethical economic transformation.

LITERATURE REVIEW

Theoretical Frameworks in the Study of Shariah-Compliant MSMEs

A number of theoretical frameworks have been employed to analyze the performance, sustainability, and competitiveness of Shariah-compliant Micro, Small, and Medium Enterprises (MSMEs). Among them, *Maqasid al-Shariah* stands as a foundational framework, emphasizing that business activities should align with Islamic objectives, preserving faith, intellect, life, lineage, and property. Scholars assert that aligning MSME operations with *Maqasid al-Shariah* enhances legitimacy and long-term sustainability while embedding social welfare and ethical conduct in enterprise management (Hamdan, 2021). This framework therefore shifts the economic focus from profit maximization to value-based entrepreneurship, ensuring that financial outcomes coexist with social responsibility and justice.

Another pivotal framework is the *Resource-Based View* (RBV), which explains MSME competitiveness through the lens of unique resources and internal capabilities. RBV posits that enterprises develop sustained advantages when they cultivate resources, such as managerial expertise, Shariah knowledge, and organizational learning, that are rare and difficult to imitate (Alkahtani et al., 2020; Hanggraeni et al., 2019). Empirical research indicates that MSMEs with Shariah-trained managers exhibit superior adaptability and performance due to the integration of ethical principles into strategic planning. Likewise, *Stakeholder Theory* complements RBV by highlighting how engagement with stakeholders, customers, suppliers, and communities, strengthens loyalty, transparency, and accountability. In the context of Shariah-compliant MSMEs,

maintaining equilibrium between business objectives and community welfare fosters sustainable stakeholder relationships ([Hidayat et al., 2025](#)).

Complementing these perspectives is the *Shariah Governance Framework* (SGF), designed to ensure Islamic compliance across financial and operational activities. SGF assigns oversight roles to Shariah Supervisory Boards (SSBs), which uphold ethical standards and strengthen public trust ([Abd Rasid et al., 2022](#); [Hasan et al., 2020](#)). Studies reveal that MSMEs with strong governance mechanisms demonstrate higher credibility and resilience, particularly when guided by religious ethics. Additionally, the *Dynamic Capabilities* framework underscores the MSMEs' ability to adapt to market volatility through innovation and reconfiguration of resources ([Susiang, 2024](#)). Integrative models that combine *Maqasid al-Shariah*, RBV, and Stakeholder Theory, by linking ethics, internal capacity, and community engagement, offer a comprehensive theoretical base for understanding Shariah MSME performance ([Fathurrahman & Fitri, 2024](#); [Hartanto et al., 2023](#); [Yani et al., 2023](#)).

Empirical Evidence on Shariah-Based Financing, Ethics, and Managerial Capacity

Empirical investigations into Shariah-compliant MSMEs often employ quantitative and qualitative methodologies to capture the multifaceted impact of Shariah principles on firm performance. Regression analysis remains one of the most frequently used models to determine the relationship between Shariah financing, managerial competence, and MSME growth. Studies such as those by Viantina et al. ([2022](#)) and Sono et al. ([2023](#)) demonstrate a positive correlation between access to Shariah-based financing and MSME revenue growth, emphasizing that ethical financing structures foster business expansion by mitigating debt risk. Furthermore, *Structural Equation Modeling* (SEM) has been used to uncover mediating variables such as managerial capacity in linking Shariah compliance with innovation ([Rachmatika, 2023](#); [Zarghami, 2021](#)).

Qualitative studies complement these findings through case-based analysis and field interviews, offering context-rich insights into the lived experience of Shariah-oriented entrepreneurs. Previous studies ([Mardikaningsih et al., 2024](#); [Masrizal et al., 2024](#); [Rohmania et al., 2023](#)) report that financial literacy and comprehension of Shariah principles directly influence MSME owners' capacity to apply Islamic financial products effectively. Similarly, other studies ([Nurainee et al., 2024](#); [Soewito et al., 2023](#); [Suhud et al., 2023](#); [Syamlan et al., 2025](#)) highlight how ethical practices derived from Shariah principles enhance trust and brand loyalty, serving as an intangible asset in competitive markets. These studies collectively affirm that integrating ethical guidelines within MSME operations leads to innovation, enhanced customer engagement, and sustained profitability.

Performance variables in these studies are typically measured using both financial (revenue growth, return on assets) and non-financial indicators (innovation, employee satisfaction, community engagement). Previous studies ([Dewi, 2023](#); [Lajis, 2017](#); [Rahma & Elfaki, 2025](#); [Rahmade & Ratifi, 2025](#)) found that MSMEs financed under Shariah contracts experience higher income stability and innovation rates than those using

conventional funding. The evidence consistently shows that managerial competence plays a mediating role: enterprises with higher managerial literacy are better equipped to translate Shariah compliance into tangible performance outcomes (Handayani et al., 2022; Sono et al., 2023).

Determinants of Success and Challenges in Southeast Asian Contexts

The success of Shariah-compliant MSMEs in Southeast Asia, especially in Indonesia and Malaysia, is closely tied to structural and institutional dynamics. Access to Islamic financial services is among the foremost enablers of MSME growth. Previous studies (Ledhem & Mekidiche, 2021; Rafay & Farid, 2017; Rizvi et al., 2020) identify that the expansion of Islamic banking systems has directly contributed to capital accessibility and operational resilience among Shariah-oriented enterprises. Financial mechanisms rooted in *mudarabah* (profit-sharing) and *murabahah* (cost-plus financing) provide ethical alternatives to interest-based loans, thereby facilitating inclusive entrepreneurship (Hassan et al., 2023; Nurhayati & Suntana, 2024).

Institutional support and policy interventions play equally vital roles. Governments in Indonesia and Malaysia have initiated strategic frameworks that integrate Islamic economic principles into national SME development agendas (Yusmad et al., 2024). Malaysia's comprehensive Islamic finance ecosystem offers structured legal instruments and training initiatives that enhance compliance, whereas Indonesia continues to strengthen regional regulatory capacity to harmonize Shariah standards (Hassan et al., 2023). These policies, alongside educational outreach programs, aim to bridge knowledge gaps and support entrepreneurs in adopting Islamic financial tools effectively.

Nonetheless, Shariah-compliant MSMEs face persistent obstacles. The limited understanding of Shariah financial products remains a critical barrier to full adoption (Ali et al., 2023; Bouzekouk & Mansor, 2025; Chaudhry et al., 2020). Moreover, fragmented regulatory frameworks and inconsistent enforcement of Shariah governance across regions reduce institutional efficiency (Ashraf et al., 2022; Hilmy & Hassan, 2019). The dual challenges of compliance costs and market competition, especially with conventional MSMEs, further strain Shariah-compliant businesses. The emergence of fintech solutions, while promising, requires MSMEs to strengthen digital literacy and managerial adaptability to compete effectively (Aldhi et al., 2024; Hamid et al., 2024).

Comparative Performance: Shariah vs. Conventional MSMEs

A growing body of literature compares Shariah-compliant MSMEs with their conventional counterparts, analyzing profitability, resilience, and financing accessibility. Previous studies (Guizani & Abdalkrim, 2021; Ibrahim & Alenezi, 2024; Rukmanda et al., 2025) find that although Shariah MSMEs face tighter capital constraints, their ethical orientation promotes sustainable profitability through community trust and lower default risk. The cooperative structure of Islamic finance, anchored in risk-sharing, offers resilience during economic crises, evidenced during the

COVID-19 pandemic when Shariah MSMEs displayed faster recovery rates due to stronger stakeholder cohesion (Prihastiwi et al., 2021).

Access to finance remains a key differentiator. Sulistyowati et al. (2024) report that Shariah-compliant MSMEs often face higher perceived risk and limited product availability compared to conventional businesses. However, financial literacy acts as a significant moderating factor; Alharbi et al. (2022) demonstrate that entrepreneurs well-versed in Shariah financial instruments are more capable of leveraging Islamic financial resources effectively, thereby narrowing the performance gap. Such evidence underscores the importance of education as a catalyst for equitable financial access.

Managerial capacity also contributes significantly to performance divergence between Shariah and conventional MSMEs. Putri & Musthofa (2023) conclude that leadership and strategic decision-making skills directly affect profitability and sustainability, regardless of the financing model used. Studies further note that ethical business environments, central to Shariah compliance, stimulate innovation, improve stakeholder relations, and reinforce long-term resilience (Huang et al., 2019). These comparisons highlight that while Shariah-compliant MSMEs may operate under stricter regulatory and financial constraints, their value-based orientation can yield enduring competitive advantages when effectively managed.

Policy Interventions, Institutional Supports, and Capacity Building

Strengthening Shariah-compliant MSMEs requires an ecosystemic approach encompassing financial policy reform, institutional innovation, and capacity-building programs. Policy interventions emphasizing financial incentives, such as interest-free loans, Shariah-compliant credit guarantees, and tax benefits, have been proposed to stimulate sectoral growth (Utama et al., 2024). Simplifying regulatory frameworks is equally critical; studies recommend streamlining Shariah compliance procedures to reduce administrative burdens and expand financial accessibility for smaller enterprises (Susanty et al., 2024).

Institutional supports remain central to ensuring transparency and trust. Enhanced Shariah governance mechanisms, including active Shariah Supervisory Boards (SSBs), are instrumental in maintaining compliance integrity (Nordin et al., 2022). Furthermore, cross-sectoral partnerships between government agencies, Islamic financial institutions, and MSME networks foster collaboration and mutual capacity building. Such partnerships promote not only access to finance but also knowledge-sharing platforms where best practices in ethical entrepreneurship can be disseminated (Njinyah, 2018).

Capacity-building initiatives serve as the linchpin for sustainable growth. Training programs designed to improve Islamic financial literacy and managerial competence enable MSME owners to implement Shariah-compliant business strategies effectively (Arif, 2024; Hanafi & Ginting, 2024). Concurrently, integrating technological innovation and digital transformation into training modules enhances competitiveness by broadening market reach (Salim et al., 2021). Digital platforms can serve as conduits for Shariah financing, thereby reducing transaction costs and facilitating access for rural

entrepreneurs. Overall, literature emphasizes that multi-level coordination between policy, institution, and education is essential for enabling Shariah MSMEs to achieve both ethical and economic objectives.

Summary of Scholarly Contributions

The reviewed literature collectively demonstrates a sophisticated understanding of how Shariah principles, managerial competencies, and policy supports interact to shape MSME performance. However, several notable gaps remain. First, while theoretical frameworks such as *Maqasid al-Shariah* and RBV are widely acknowledged, empirical integration of these models in localized contexts like Indonesian urban economies remains limited. Second, although studies affirm the benefits of Shariah-compliant financing, few provide longitudinal data that track its sustained economic impact. Third, the mediating role of managerial capacity, though conceptually acknowledged, warrants deeper quantitative exploration using advanced modeling techniques such as multilevel mediation or hierarchical SEM.

Moreover, comparative analyses between Shariah and conventional MSMEs often focus on financial outcomes, overlooking qualitative dimensions such as community empowerment, trust dynamics, and ethical branding. Finally, the literature calls for more city-level empirical research to assess the practical implications of Shariah compliance in diverse socio-economic contexts, especially in emerging urban centers like Medan. Addressing these gaps will not only enrich the theoretical discourse but also provide actionable insights for policymakers seeking to strengthen the ecosystem of Shariah-compliant MSMEs in Indonesia and beyond.

Research Gap and the Significance of the Study

Despite the growing body of literature on Shariah-compliant MSMEs, significant research gaps remain in integrating ethical, managerial, and financial dimensions within localized empirical contexts. Existing studies primarily focus on macroeconomic assessments or national-level analyses, leaving limited understanding of city-level variations where Shariah implementation interacts with socio-economic diversity. Moreover, few studies empirically examine the mediating role of managerial capacity in translating Shariah compliance into measurable performance outcomes. This lack of contextualized evidence constrains policymakers and practitioners seeking to optimize Shariah-based MSME development strategies in rapidly urbanizing regions such as Medan.

The present study addresses these research gaps by providing a comprehensive, mixed-methods analysis of Shariah-based MSMEs at the city level, bridging theoretical insights with empirical data. By examining the interplay between Shariah implementation, access to ethical financing, and managerial capacity, the study contributes to refining existing models such as *Maqasid al-Shariah* and the Resource-Based View. Its significance lies in advancing both academic discourse and policy formulation, offering evidence-based strategies for strengthening the resilience,

inclusiveness, and ethical sustainability of MSMEs within Indonesia's Islamic economic framework.

METHOD

Research Design

This study used a sequential mixed-methods approach that begins with quantitative data collection, followed by qualitative in-depth. This strategy was chosen because it can combine the generalizability of the survey with the depth of interviews, so that statistical findings can be explained contextually ([Creswell & Clark, 2017](#)). Simultaneously, this design facilitates triangulation to increase the accuracy of inferences and reduce single-method bias ([Teddle & Tashakkori, 2009](#)). The orientation of the research is explanatory, namely explaining the causal relationship between the characteristics of sharia-based MSMEs and the economic growth indicators of Medan City through the framework of endogenous growth theory and Islamic economics.

Location, Population, and Unit of Analysis

The research location was determined in Medan City, a trade and service center in North Sumatra with a diverse MSME ecosystem and a large Muslim population. The research population was all MSMEs that formally listed their sharia business status, including members of sharia cooperatives, partners of sharia banks, and halal supply chain actors, registered with the Medan City Cooperatives & MSMEs Office as of December 2024. Based on office data, there were 8,412 entities recorded. The unit of analysis was the firm level because the key variables, income, workforce, and implementation of sharia principles, were measured at the business scale, not the individual.

Sampling Techniques

Quantitative research applies stratified random sampling. Stratification is based on business sector (food/beverage, fashion, creative services, and others) to maintain the heterogeneity of characteristics ([Sekaran & Bougie, 2020](#)). Slovin's formula at a 5% error rate produces a minimum sample of 367 MSMEs from a population of 8,412. To anticipate unresponsive units, the researcher added 10%, so that the questionnaire was sent to 404 respondents. In the qualitative stage, purposive sampling was used to select 20 sharia MSME owners who represented variations in scale and sector. Selection focused on informants who: (1) have implemented sharia contracts for at least three years; (2) have halal certification or collaborate with halal institutions; and (3) are willing to be interviewed in depth. This approach ensures the depth of narrative data related to Sharia practices and business growth dynamics ([Guest et al., 2020](#)).

Variables and Operational Definitions

Independent Variables

- Application of sharia principles (X_1): a composite score of 12 indicators, for example, use of mudharabah contracts, profit transparency, and avoidance of usury—measured on a Likert scale of 1–5.
- Access to Islamic financing (X_2): the amount of sharia financing facilities received during the last three years, calculated in rupiah and classified as high/medium/low.
- Managerial capacity (X_3): level of Islamic entrepreneurship literacy, assessed through 10 objective test items.

Dependent Variables

- Revenue growth (Y_1): percentage increase in average annual turnover 2022–2024.
- Labor absorption (Y_2): the difference between the number of permanent workers in 2022 and 2024 divided by the number of workers in 2022.
- Regional value-added contribution (Y_3): estimation of the proportion of Islamic MSME output to Medan City's GRDP, calculated using a simple input-output approach (Miller & Blair, 2009).

Control Variables

Business size, business age, sector, and owner education were controlled to minimize spurious bias.

Research Instruments

The quantitative instrument was a structured questionnaire with four sections: business profile, sharia implementation, capacity indicators, and economic performance. Content validity was tested by Islamic economics and methodology experts; CVR assessment index > 0.80 (Wilson et al., 2012). The qualitative instrument was a semi-structured interview guide that explored motivations for sharia implementation, experiences of accessing financing, and perceptions of economic impact. All open-ended questions were tested on three MSMEs to verify clarity and cultural sensitivity.

Data Collection Procedures

Quantitative data collection took place in January–March 2025. Questionnaires were distributed through a drop-off pick-up method supported by trained enumerators to ensure a high response rate. Returned data were verified for completeness and consistency; 389 questionnaires were declared eligible for analysis (response rate = 96%). The qualitative stage was carried out in April 2025. Face-to-face interviews were recorded with written permission and lasted \pm 60 minutes. Verbatim transcripts were processed using CAQDAS software to facilitate thematic coding (Nowell et al., 2017).

Data Analysis Techniques

Quantitative Analysis

Data were analyzed using multiple linear regression to test the effect of independent variables on each dependent variable. Assumption tests, Kolmogorov-Smirnov normality, VIF multicollinearity, and White heteroscedasticity, were performed before estimation. The best model was selected based on the lowest adjusted R^2 and Akaike Information Criterion (AIC) values. To examine the mediation effect, a bootstrap approach of 5,000 samples was used ([Preacher & Hayes, 2008](#)).

Qualitative Analysis

The analysis followed Braun and Clarke's ([2006](#)) six-stage thematic analysis: data familiarization, coding, theme searching, theme review, theme naming, and report writing. Internal validity was maintained using peer debriefing and member checking techniques. Qualitative findings were then integrated with quantitative results in a meta-inference phase to produce a comprehensive understanding.

Validity, Reliability, and Trustworthiness Test

The reliability of the questionnaire was tested using Cronbach's α ; a value > 0.70 was considered adequate ([Field, 2024](#)). Construct validity was measured through confirmatory factor analysis with loading criteria > 0.50 and AVE > 0.50 ([Hair, 2023](#)). For qualitative data, trustworthiness standards, credibility, transferability, dependability, and confirmability were met through audit trails and data triangulation ([Lincoln et al., 1985](#)).

Research Ethics Considerations

The study was guided by the Code of Ethics of Social Research and obtained approval from the Ethics Committee of the University of North Sumatra, Number KEP-FEB-032/II/2025. Participation is voluntary with written informed consent. Personal data is encrypted and stored on a protected server for 5 years, then destroyed. In publication, the identities of respondents are disguised to ensure confidentiality.

RESULTS

This study aims to examine the effect of the implementation of Sharia principles in MSMEs on economic growth in Medan City. Based on data that has been analyzed using quantitative and qualitative methods, the results obtained provide an in-depth picture of the relationship between the implementation of Sharia and the achievement of MSME economic performance, as well as the challenges faced. The results of the analysis will be discussed in two main parts: quantitative findings related to the effect of sharia implementation on economic growth, and qualitative findings that enrich the understanding of the practical experience of MSMEs in implementing sharia principles.

General Characteristics of Respondents and MSMEs

This study involved 389 sharia-based MSMEs spread across various business sectors in Medan City, with respondents from various levels of education and entrepreneurial

experience. Most of the MSMEs involved in the study, as presented in Table 1, operate in the food and beverage sector (45%), followed by the service sector (30%), fashion (15%), and other sectors (10%). In terms of business scale, the majority are micro businesses with 1 to 5 employees (60%), while the rest are small businesses with more than 5 employees.

Table 1

Characteristics of Respondents and MSMEs (N = 389)

Variables	Category	n	%
Sector	Food & Beverages	175	45.0
	Service	117	30.1
	Fashion	58	14.9
	Other	39	10.0
Business scale	Micro (1-5 employees)	233	59.9
	Small (>5 employees)	156	40.1
Operating time	≤ 3 years	77	19.8
	> 3 years	312	80.2
Consistency of Sharia implementation	High	273	70.2
	Middle	81	20.8
	Low	35	9.0

Source: Primary data. Authors' estimation.

In terms of experience, more than 80% of respondents have been operating for more than three years, with 70% of them claiming to have consistently implemented sharia principles in their operations. The implementation of sharia principles includes the use of mudharabah, musyarakah, and usury avoidance contracts in their financial transactions.

Quantitative Analysis Results

The quantitative analysis provides empirical evidence of the significant role that Shariah implementation, access to Shariah-compliant financing, and managerial capacity play in enhancing the economic performance of MSMEs in Medan City. Using multiple linear regression models, this study assessed how these independent variables influence two main performance indicators, revenue growth and labor absorption. The statistical results in Table 2 show strong positive relationships, with Shariah implementation emerging as the most influential factor. Additionally, access to ethical financing and effective managerial capacity further strengthen MSME performance. The model's reliability is supported by adjusted R^2 values of 0.41 for income and 0.34 for labor, indicating robust explanatory power and compliance with all classical statistical assumptions.

Table 2

Regression Model of the Influence of Independent Variables on the Economic Performance of MSMEs

Dependent	Independent	β	t	Sig. (p)	Interpretation
Revenue growth	Implementation of sharia principles	0.45	6.37	< 0.01	Implementation of sharia accelerates increase in turnover
	Access to sharia financing	0.35	4.88	< 0.05	Sharia funds contribute to capital turnover
	Managerial capacity	0.29	4.11	< 0.05	Business literacy improves financial performance
Absorption of labor	Implementation of sharia principles	0.38	3.95	< 0.05	Sharia practices encourage inclusive recruitment
	Access to sharia financing	0.27	2.83	< 0.05	Sharia capital enables workforce expansion
	Managerial capacity	0.21	2.14	0.03	Effective management expands HR needs
Model description	Adjusted R ² income = 0.41 Adjusted R ² labor = 0.34 All classical assumptions are met				

Source: Primary data. Authors' estimation.

The Impact of Sharia Implementation on Income Growth

Multiple linear regression analysis shows that the application of sharia principles has a significant positive effect on the growth of MSME income in Medan City. The regression results show a positive coefficient on the variable of sharia application ($\beta = 0.45$, $p < 0.01$), which means that the higher the level of application of sharia principles in the management of MSMEs, the higher the growth in income generated. The application of sharia principles, such as profit-sharing financing (mudharabah and musyarakah), allows MSMEs to access fairer and more equitable resources, which increases business sustainability and, ultimately, drives economic growth.

The Impact of Sharia Implementation on Labor Absorption

Labor absorption in sharia-based MSMEs also shows a significant positive effect. The results of the analysis show a coefficient of $\beta = 0.38$ with $p < 0.05$, which indicates that every increase in the application of sharia principles is related to an increase in the number of workers absorbed by MSMEs. Field data shows that Islamic MSMEs are more likely to provide employment opportunities to the surrounding community, including by involving workers from less formally educated groups, which is in accordance with the principle of social justice in Islamic economics.

The Influence of Access to Sharia Financing on Economic Growth

Access to sharia financing also has a significant effect on the economic growth of MSMEs. Based on the regression analysis, sharia financing has a positive coefficient (β

= 0.35, $p < 0.05$), which indicates that MSMEs that obtain financing from sharia financial institutions experience increased income and better labor absorption. Financing based on profit sharing and not interest encourages more stable business growth because the financial burden is lighter compared to conventional financing based on interest.

Managerial Capacity Mediation

Managerial capacity turns out to play a role as a significant mediating variable in the relationship between sharia implementation and MSME economic performance. The results of the mediation test using the bootstrap technique show that managerial capacity plays a strong mediator role in the relationship between the implementation of sharia principles and MSME economic growth (Indirect Effect = 0.22, $p < 0.05$). This shows that although Sharia implementation has a direct impact on economic performance, good management with adequate managerial skills can improve the results obtained. Managerial capacity building is often achieved through sharia entrepreneurship training that encourages business owners to be more careful in planning business strategies and managing resources. This kind of training is very important to ensure that sharia-based MSMEs not only comply with sharia principles but can also compete in an increasingly competitive market.

Table 3

Managerial Capacity Mediation Test (bootstrap estimation of 5,000 samples)

Mediation Path		Direct Effect(c')	Indirect Effect (a×b)	95% CI	Conclusion
Implementation of sharia→Managerial capacity→Revenue growth	of	0.32 ($p < 0.01$)	0.22	0.11 – 0.35	Partial mediation is significant
Implementation of sharia→Managerial capacity→Absorption of labor	of	0.27 ($p < 0.05$)	0.16	0.05 – 0.28	Partial mediation is significant

Source: Primary data. Authors' estimation.

Notes:

- β = standardized coefficient; CI = confidence interval.
- A p-value < 0.05 is considered significant.
- Estimation of indirect effects using bootstrap techniques.
- A concise interpretation is provided to ease reading of the results.

Qualitative Analysis Results

Implementation of Sharia Principles in MSME Operations

Qualitative findings enrich the understanding of how Sharia principles are applied in the daily lives of MSMEs. MSME owners emphasized that the implementation of sharia is not only related to halal products but also concerns ethics in business transactions. Most respondents stated that they chose not to use interest-bearing loans and preferred financing based on *mudharabah* or *musyarakah* because they felt that the system was fairer and did not burden them.

For example, one halal food business owner interviewed explained:

“We work with Islamic banks and cooperatives to get capital. We feel safer because the financing we get is based on profit sharing, not interest that keeps increasing.”

Another MSME owner added that they feel more confident in doing business because Islamic principles guarantee transparency and fairness for all parties involved.

Social Impact of Sharia MSMEs

Socially, the implementation of Sharia in MSMEs contributes to strengthening communities and empowering local communities. Several respondents stated that they are more likely to absorb labor from disadvantaged groups and provide fair wages in accordance with sharia principles. This is also reflected in the practice of fair distribution of profits to employees and business partners. For example, a service entrepreneur in Medan stated that he regularly distributes part of his profits to his workers in the form of zakat or alms, as a form of social responsibility in accordance with Islamic teachings.

Obstacles in the Implementation of Sharia

However, significant challenges arise in terms of market access and Islamic financial literacy. Some Islamic MSMEs have difficulty accessing a wider market due to limited public understanding of halal products. In addition, although many MSMEs are aware of the importance of Islamic principles, not all entrepreneurs have a deep understanding of Islamic financing, which sometimes prevents them from making maximum use of available resources.

One MSME owner in the fashion sector said:

“We want to implement Islamic financing, but we don't understand enough about the products offered by Islamic banks. That's our obstacle.”

DISCUSSION

The Effect of Shariah Implementation on MSME Performance

The findings of this study demonstrate that Shariah implementation has a significant and positive impact on the financial performance and employment growth of MSMEs in Medan. Enterprises that adopt Shariah-compliant practices, such as fairness in transactions, avoidance of *riba*, and ethical transparency, show higher revenue growth and stronger resilience against market volatility. The results further reveal that Shariah-based MSMEs cultivate deeper customer loyalty due to their moral and community-oriented business conduct, which in turn sustains profitability even in times of economic uncertainty. This confirms that ethical and religiously guided business practices are not only spiritually beneficial but also economically viable in fostering sustainable MSME performance.

These results are consistent with recent empirical studies showing that Shariah financing, rooted in shared risk and ethical collaboration, enhances MSME profitability and innovation capacity (Ho & Mohd-Raff, 2019; Sudarwanto et al., 2024). Mujanah et al.

(2022) also emphasize that Shariah principles instill values such as honesty and accountability, stimulating innovation and product differentiation among entrepreneurs. Similar to the findings of Arifah (2024), Shariah-compliant MSMEs build reputational capital and community trust, ensuring operational sustainability even under economic stress. However, while these studies affirm the benefits of Shariah compliance, they also caution that its success depends on consistent ethical implementation supported by sound management and institutional infrastructure.

Theoretically, these findings extend the *Maqasid al-Shariah* framework by empirically confirming that ethical objectives, justice, welfare, and transparency, translate into tangible business advantages. Practically, they highlight the need for MSME development programs to embed Shariah ethics in entrepreneurship training and financing schemes. Policymakers should therefore reinforce Shariah-compliant ecosystems through incentives, such as simplified access to Islamic financial instruments. This study demonstrates that aligning economic growth strategies with moral imperatives can advance both commercial viability and social equity, contributing to Indonesia's broader vision of inclusive Islamic economic development.

The Mediating Role of Managerial Capacity

The study reveals that managerial capacity plays a crucial mediating role between Shariah compliance and MSME performance. The regression and mediation analyses indicate that Shariah implementation alone is insufficient without capable management to translate ethical values into strategic and operational actions. MSMEs led by managers with stronger organizational and financial skills demonstrate higher efficiency, innovation, and adaptability. Managerial competence enhances the practical application of Shariah values, ensuring that businesses not only remain compliant but also competitive in dynamic market environments.

This finding aligns with the literature asserting that managerial competence bridges the gap between Shariah principles and business outcomes. Sukartini et al. (2019) and Md Amin et al. (2021) argue that managerial skills are essential in embedding Shariah ethics into daily operations and financial decision-making. Likewise, Faisal & Sudibyo (2020) show that effective management fosters innovation consistent with Islamic principles, allowing MSMEs to attract diverse consumers. A research by Ahmed et al. (2022) further supports that managerial capability enhances resilience, profitability, and stakeholder trust across Islamic economic sectors. These studies collectively reinforce that effective management is indispensable for sustaining Shariah-based enterprise success.

Theoretically, the study substantiates the integration of the Resource-Based View (RBV) with Islamic ethical frameworks by demonstrating that managerial capacity is a strategic intangible resource that operationalizes Shariah compliance. Practically, it suggests that MSME development should prioritize managerial training focused on both modern management and Islamic business ethics. For policymakers, the implication is to establish continuous professional education programs and capacity-building initiatives tailored for Shariah-based entrepreneurs. Enhancing managerial literacy

ensures that MSMEs can effectively apply Shariah governance, making ethical entrepreneurship a driver of both moral and economic value creation in developing economies.

Regional Comparisons: Indonesia, Malaysia, and Pakistan

The findings on Shariah-compliant MSMEs in Medan parallel regional patterns observed in Malaysia and Pakistan but also highlight distinctive structural challenges in Indonesia. While Indonesian MSMEs benefit from ethical and community-based practices that foster customer loyalty and social legitimacy, access to Islamic financing remains constrained by limited product diversity and financial literacy. The evidence from this study shows that although Islamic financial institutions are expanding, many MSMEs still rely on conventional sources due to procedural complexity and insufficient awareness of Shariah-compliant options.

Comparative studies confirm this contrast. Malaysian MSMEs benefit from well-established Islamic financial infrastructure, supported by government policies promoting Shariah-based microfinance and credit guarantees ([Asni et al., 2025](#); [Awang et al., 2020](#)). Similarly, Pakistan's growing Islamic microfinance sector has improved financing accessibility but faces governance and literacy barriers ([Haroon, 2025](#); [Jamal & Sheikh, 2013](#)). Research by Li et al. ([2025](#)) and Zahari et al. ([2020](#)) highlights that ethical commitment and corporate social responsibility (CSR) integration in Malaysia lead to greater sustainability and brand loyalty, outcomes less pronounced in Indonesia due to weaker institutional support. Md. Sawari et al. ([2025](#)) note that Pakistan's MSMEs often struggle with accountability, limiting the effectiveness of Shariah frameworks.

The comparative perspective underscores the theoretical value of contextualizing Shariah economic models within specific institutional environments. Practically, the findings suggest that Indonesia must strengthen the synergy between its Islamic banking sector, regulatory agencies, and MSME networks to emulate Malaysia's success. Policymakers should expand Shariah-compliant financial literacy initiatives and promote digital Islamic finance to overcome accessibility barriers. Regionally, cross-country collaboration in training and knowledge sharing among Islamic financial institutions can enhance consistency in governance and create a more integrated Southeast Asian Shariah economy.

The Gap Between Theoretical Shariah Governance and Practice

Despite the positive outcomes, this study reveals notable inconsistencies between theoretical Shariah governance frameworks and their practical implementation among MSMEs. Many enterprises struggle to fully comply with ethical standards due to complex regulatory procedures, limited managerial understanding, and inconsistent institutional enforcement. Field interviews highlighted that several MSME owners perceive Shariah compliance primarily as a marketing strategy rather than an integrated ethical framework, leading to partial or symbolic implementation. Such

discrepancies weaken public trust and hinder the credibility of Shariah-compliant business models.

These findings are consistent with other empirical studies highlighting similar challenges. Tresnasari & Zulganef (2023) identify ambiguity in Shariah compliance guidelines, causing uneven applications across industries. Wati & Amalia (2024) and Zuhroh et al. (2024) observe that inadequate training and awareness among MSME managers create operational gaps between ethical ideals and actual practices. Furthermore, weak regulatory oversight, particularly the limited enforcement capacity of Shariah Supervisory Boards, reduces accountability, as also noted in Malaysia and Pakistan. Consequently, despite robust theoretical frameworks, practical compliance remains fragmented, underscoring a structural governance gap across the sector.

Theoretically, this discrepancy highlights the need to refine the *Shariah Governance Framework* to accommodate MSME-specific realities. Practically, policymakers and financial institutions must strengthen regulatory coordination, standardize Shariah audit mechanisms, and implement accessible training for entrepreneurs. Establishing localized Shariah compliance centers within MSME clusters can provide ongoing advisory services and ensure practical alignment with Islamic values. This research thus contributes to both theory and policy by demonstrating that the success of Shariah governance depends not only on legal design but also on institutional capacity, educational outreach, and consistent enforcement.

Policy Implications and Capacity-Building for Inclusive Growth

The study's findings emphasize the need for coordinated policy interventions and capacity-building programs to enhance the integration of Shariah-compliant financing and entrepreneurial skills development. The quantitative results indicate that access to Shariah-based financing significantly improves MSME growth, while the qualitative findings reveal that managerial literacy amplifies this effect. Together, they highlight a twofold challenge—limited access to ethical financing and insufficient managerial capacity—that must be addressed through comprehensive policy and institutional reform.

The findings resonate with current studies recommending the expansion of Islamic financial products tailored to MSMEs, coupled with fiscal incentives for Shariah-compliant lending (Hartanto et al., 2023; Suseno et al., 2021). Tubastuvi & Rusydiana (2024) advocate for strengthened Shariah Supervisory Boards to ensure ethical integrity, while Yaakub & Buang (2024) emphasize collaborative partnerships between financial institutions and MSME associations. Research by Savitri et al. (2021) and Behl et al. (2022) further underscores the critical role of financial literacy and training programs in improving managerial capacity. Moreover, emerging literature on fintech integration (Jamil et al., 2022; Ratnawati, 2020) confirms that digital Islamic platforms can bridge geographical and bureaucratic barriers, expanding access to financing for micro-entrepreneurs.

These insights collectively reinforce the theoretical synergy between *Maqasid al-Shariah* and sustainable development frameworks, which emphasize equity,

empowerment, and ethical innovation. Policymakers must adopt a holistic approach encompassing regulatory reform, financial inclusion, and human capital development to achieve inclusive growth. Practically, this study supports the creation of a Shariah MSME Development Blueprint combining Islamic financing, managerial training, and digital innovation. Such policies not only strengthen MSME competitiveness but also align with Indonesia's strategic goals of fostering a resilient, just, and values-driven economy underpinned by Islamic ethical principles.

CONCLUSION

This study examined the impact of Shariah implementation, access to Shariah-compliant financing, and managerial capacity on the performance of Micro, Small, and Medium Enterprises (MSMEs) in Medan. The findings confirmed that all three factors significantly and positively influence business growth and employment absorption, with managerial capacity serving as a key mediating variable. The results demonstrate that Shariah-compliant enterprises that integrate ethical principles such as fairness, transparency, and social responsibility achieve higher revenue stability and resilience. These outcomes underscore the economic viability of Shariah-based practices and their capacity to contribute to sustainable and inclusive local development.

The discussion further revealed that effective managerial competence strengthens the translation of Shariah principles into operational excellence and innovation. Comparisons with Malaysia and Pakistan highlight that while Shariah-compliant MSMEs share ethical strengths, Indonesia faces structural challenges in financial accessibility and governance consistency. The study's findings reinforce the necessity of aligning ethical values with strategic management practices to enhance business sustainability. The integration of Islamic ethical frameworks with modern management theory bridges moral imperatives and competitive advantage, positioning Shariah-based MSMEs as key drivers of value-based economic growth.

Overall, this research contributes to the growing literature on Islamic entrepreneurship and ethical economics by empirically validating how Shariah principles can be operationalized through managerial capacity. The findings provide a model for linking Islamic ethics, governance, and human resource development in strengthening MSME performance. Practically, the study offers a roadmap for policymakers to improve institutional support, financial inclusion, and managerial education tailored to Shariah compliance. By demonstrating that ethical entrepreneurship fosters both economic and social welfare, this study advances the discourse on sustainable Islamic economic development and lays the groundwork for future policy and academic inquiry.

Limitation of the Study

Despite its comprehensive scope, this study has several limitations. First, it focuses exclusively on MSMEs in Medan, which may limit the generalizability of the findings to other regions with different socio-economic and regulatory contexts. Future research could expand the geographic scope to capture variations in Shariah implementation

across Indonesia or other Muslim-majority countries. Second, the cross-sectional design constrains the ability to establish long-term causal relationships between variables. A longitudinal approach could better capture the evolving impact of managerial capacity and Shariah compliance on MSME performance. Third, while the mixed-methods design enriched the analysis, the qualitative component relied on a limited number of interviews, potentially restricting the diversity of perspectives obtained.

Furthermore, this study primarily measured Shariah implementation and managerial capacity using self-reported data, which may be subject to social desirability or perception bias. Future studies could incorporate objective performance indicators, such as audited financial reports, to enhance reliability. Additionally, the current analysis did not extensively examine external environmental factors—such as macroeconomic conditions, digital transformation, and policy shifts—that may moderate the relationships observed. Addressing these limitations would allow future research to provide a more holistic and dynamic understanding of Shariah-compliant MSMEs within Indonesia’s evolving Islamic economic framework.

Recommendations for Future Research

Future studies should employ a broader, comparative approach to analyze Shariah-based MSMEs across multiple Indonesian cities or Southeast Asian economies. Such comparisons could uncover contextual nuances in regulatory effectiveness, institutional support, and cultural attitudes toward Islamic entrepreneurship. Researchers are also encouraged to adopt longitudinal and experimental designs to assess how sustained exposure to Shariah financing and managerial training influences long-term business performance. Integrating econometric and behavioral approaches would deepen understanding of how ethical and cognitive dimensions jointly shape entrepreneurial success in Shariah-compliant enterprises.

Additionally, exploring the intersection of digitalization and Shariah compliance presents a promising research frontier. Investigations into the role of Islamic fintech, halal e-commerce ecosystems, and digital literacy could reveal new pathways for enhancing financial inclusion and operational efficiency among MSMEs. Further qualitative inquiry into gender roles, youth entrepreneurship, and community-based financing models within the Shariah framework could broaden the discourse on inclusive growth. Ultimately, advancing interdisciplinary research that connects Islamic economics, management science, and technology studies will provide richer insights into fostering resilient, ethical, and competitive MSMEs in the global Islamic economy.

Author Contributions

Conceptualization	M.Z.H., H.R., S., N., & R.	Resources	M.Z.H., H.R., S., N., & R.
Data curation	M.Z.H., H.R., S., N., & R.	Software	M.Z.H., H.R., S., N., & R.
Formal analysis	M.Z.H., H.R., S., N., & R.	Supervision	M.Z.H., H.R., S., N., & R.
Funding acquisition	M.Z.H., H.R., S., N., & R.	Validation	M.Z.H., H.R., S., N., & R.
Investigation	M.Z.H., H.R., S., N., & R.	Visualization	M.Z.H., H.R., S., N., & R.
Methodology	M.Z.H., H.R., S., N., & R.	Writing – original draft	M.Z.H., H.R., S., N., & R.

Project administration	M.Z.H., H.R., S., N., & R.	Writing – review & editing	M.Z.H., H.R., S., N., & R.
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All authors have read and agreed to the published version of the manuscript.

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The study was approved by the Ethics Committee of the University of North Sumatra, Number KEP-FEB-032/II/2025.

Informed Consent Statement

Informed consent was obtained before respondents answered the questionnaire for this study.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT, DeepL, Grammarly, and PaperPal to translate from Bahasa Indonesia into American English and improve the clarity of the language and readability of the article. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

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