

Green Entrepreneurship, Green Innovation, Green Finance, and Organisational Culture: Differential Effects on MSME Performance and Business Sustainability in Medan

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ABSTRACT

Purpose – This study examines the effects of green entrepreneurship, green innovation, green finance, and organisational culture on MSME performance and sustainability, while testing MSME performance as a mediating pathway.

Design/methodology/approach – A causal quantitative survey was conducted among 656 MSMEs in Medan, Indonesia, using non-probability mixed-frame sampling. The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM).

Findings – The findings reveal differential and contrasting effects of green practices. Green finance significantly improves MSME performance but reduces sustainability, while green entrepreneurship reduces performance but improves sustainability. Green innovation positively affects both outcomes, although its effect on performance is marginally significant. Organisational culture significantly enhances sustainability but has no significant effect on performance. MSME performance also has a significant negative effect on sustainability, indicating a potential trade-off between short-term performance and long-term sustainability.

Originality/Value – This study proposes a provisional Green Capability Trade-Off perspective, challenging the assumption that green practices universally generate win-win outcomes. It highlights the need to recognize the differentiated effects of green capabilities when designing strategies for sustainable MSME development.

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1. Introduction

The capacity of companies to demonstrate rapid growth serves as an indicator of their ability to compete and generate innovations as a means of ensuring their survival. Moreover, the intensifying competitive landscape has been a catalyst for the development of novel innovations that yield competitive advantages. A variety of strategies are implemented, including price reductions, sales increases and marketing expansion. However, these measures are insufficient for competing and surviving in the market (Barczak & Kahn, 2012). Micro, small and medium-sized enterprises (MSMEs) represent a significant concern for both developed and developing countries. This is due to the significant contribution they make to a nation's economy, as well as their role in generating employment opportunities within the community (Bloom et al., 2019). The absence of innovation poses a significant challenge to the ability to compete and to sustain operations in the long term. The present study focuses on the application of innovation in producing products and processes that enable companies to excel in the market and continue in the long term.

Conversely, environmental concerns have emerged as a significant preoccupation for the general public. The following factors must be considered when formulating strategies for the development and maintenance of businesses: temperature changes, natural disasters, and the increase in waste generated by both households and industries. Furthermore, many countries are encouraging their citizens to preserve the environment so that it remains clean and green (Dahri, Saraih, et al., 2025) in order to achieve sustainability (Borah et al., 2023). The government's formulation of various policies to protect the environment presents a challenge for companies to ensure that their operational activities do not have a negative impact on the environment and meet the interests of company owners (Bossle et al., 2016; Ebrahimi & Mirbargkar, 2017). This is particularly evident in micro, small and medium-sized enterprises (MSMEs), which typically possess limited resources and have not yet prioritised environmental sustainability. Research undertaken by Koirala (2019) has demonstrated that MSMEs are responsible for in excess of 50% of global CO₂ emissions and environmental damage. It is evident that a significant proportion of MSMEs prioritise the development and enhancement of their business operations and performance. This phenomenon is evident in several European countries, where MSMEs contribute significantly to the economy, yet concurrently exert a deleterious effect on environmental degradation (Yang et al., 2019). This poses a significant challenge for MSMEs, which must develop the capacity to attain a competitive advantage. A significant proportion of MSMEs concentrate exclusively on the development and improvement of their businesses. As in several European countries, MSMEs contribute significantly to the economy but also have a negative impact on environmental damage (Yang et al., 2019). This poses a significant challenge for MSMEs, who must demonstrate the capacity to maintain a competitive advantage whilst also implementing effective strategies for environmental preservation (Dahri, Rehman, et al., 2025; R. Lee et al., 2019; Tang, 2018).

The company's overarching objective is to enhance its financial performance while ensuring its long-term sustainability, with a view to optimising the well-being of its proprietors. The contemporary issue is that the accelerated augmentation in the quantity of MSMEs cannot be equalled by the number of MSMEs that are capable of survival and competitiveness. A significant proportion of these individuals are unable to sustain themselves over an extended period, a phenomenon that has emerged as a salient issue in developing countries as they endeavour to enhance the well-being of their populations. Despite an annual increase in the

number of MSMEs, the survival rate of these enterprises is declining. Consequently, there is a need to examine the factors that influence the long-term sustainability of MSMEs.

It is imperative for companies, particularly MSMEs, to demonstrate adaptability to technological advancements and to assume responsibility towards the environment. The integration of technology has been identified as a key factor in enhancing the quality of processes and products, while concurrently achieving cost efficiency in MSMEs. However, the implementation of such initiatives is often met with challenges, particularly in developing countries, due to constrained resources (Dahri, Rehman, et al., 2025) and the prevailing perception that major corporations are responsible for a greater share of pollution and environmental degradation (Khan et al., 2021; Shahbaz et al., 2024). Consequently, companies primarily concentrate on enhancing their performance by increasing production (Achaku et al., 2022; Zimon, 2017). Conversely, consumers are becoming increasingly aware of the environmental impact of their purchasing decisions, with a corresponding preference for products that are environmentally sustainable. Consequently, companies with a lesser emphasis on the utilisation of raw materials and production processes that may result in pollution and environmental degradation are likely to be replaced by more environmentally conscious entities. It is imperative that businesses adopt strategies which take into account environmental sustainability and resource use if they are to achieve business sustainability.

The primary objective of commercial enterprises is to enhance their performance through the augmentation of revenue and the pursuit of expansion. In order to achieve this objective, a range of strategies must be given full consideration, including the utilisation of resources that have a beneficial effect on the environment. In this context, the implementation of green practices encompasses green entrepreneurship, green innovation, green finance, and an organisational culture that facilitates the establishment and execution of effective practices for the company. The extant research (Aftab et al., 2022; Khan et al., 2021; Shahbaz & Malik, 2025) indicates that the implementation of green environmental practices by companies will have a positive impact on economic and environmental performance. Moreover, this phenomenon has been demonstrated to exert a favourable impact on both the environment and the social community (Shahbaz et al., 2024).

Extensive research has been conducted on the application of the concepts of green entrepreneurship, green innovation, green finance and organisational culture in developed countries. The results of this research demonstrate a positive impact on economic growth and community welfare. However, its application in developing countries remains very limited (Aftab et al., 2022; Bhatti et al., 2024; Chien et al., 2022; Khan et al., 2021). This can be attributed to a general lack of awareness among companies regarding environmental concerns and the importance of business sustainability. Instead, the primary focus of companies remains on enhancing their performance. The objective of this study is to provide empirical evidence in support of the efficacy of environmental and green practices, as well as good governance, in enhancing the sustainability performance of MSME businesses. This study also demonstrates how the utilisation of available resources will impact company performance in the long term in accordance with the Resource-Based View (RBV) (Andersén, 2021). The study's findings will contribute to enhancing organisational performance and ensuring business sustainability through the implementation of green practices and effective governance, particularly within developed countries.

2. Literature Review & Hypothesis Development

2.1 Resource-Based View (RBV) Theory

Companies are faced with the challenge of surviving in the long term and being able to compete with similar companies. To achieve this, companies must be able to produce innovations that give them an edge over other companies. One way to do this is by utilising the resources owned by the company and developing technology.

The basis of this research is resource-based view. This theory was first introduced by Wernerfelt (1984) and later developed by Barney (1991). According to this theory (Barney, 1991; Wernerfelt, 1984), companies strive to use their resources to maintain their position in the face of competition from other companies. This theory emphasises that companies are able to utilise resources that are scarce and unique compared to other companies, thereby generating a competitive advantage (Dahri, Saraih, et al., 2025; Jiang et al., 2018; Rehman et al., 2023). Meanwhile, according to Wernerfelt (1984), company resources consist of technology, production/processes, expertise, customer loyalty, and machinery. One strategy that can be applied in this theory is that companies are able to produce environmentally friendly innovations by using resources and technology that can reduce negative impacts on the environment. The application of environmentally friendly innovation and technology is expected to provide added value and green products and implement a green supply chain as a strategy to create environmentally friendly advantages.

From an RBV perspective, the implementation of green strategies provides a significant advantage over other companies. In general, companies compete in developing their businesses through the use of their resources, which unknowingly can have a negative impact on the environment and lead to wasteful spending. Conversely, the implementation of green strategies will have a positive impact not only on the environment but also on company revenues. Companies use more efficient technologies in their use of raw materials and produce less waste. This will have a positive impact on the environment. Furthermore, companies that are able to innovate and produce environmentally friendly products provide a boost to social, economic, and environmental performance, giving the company a competitive advantage (Dahri, Saraih, et al., 2025). Therefore, the implementation of green strategies through the utilisation of available resources and technology is expected to improve the performance and sustainability of businesses, especially MSMEs, in accordance with RBV theory.

2.3 A Provisional Green Capability Trade-Off Perspective

While RBV explains why bundles of scarce, valuable resources allow a firm to build a competitive position, it does not by itself explain why green resource deployment can simultaneously help one outcome and hurt another. This study therefore extends RBV with the Natural-Resource-Based View (NRBV), which holds that environmental capabilities built through pollution prevention and product stewardship generate advantage only once they are embedded in operating routines (Hart, 1995), and with the dynamic capabilities framework, which explains why the benefits of a new capability are not realised immediately: firms must first sense green opportunities, seize them through resource reallocation, and then reconfigure processes before returns appear (Teece et al., 1997). Read together, these three perspectives motivate the provisional Green Capability Trade-Off perspective proposed in this study: green entrepreneurship, green innovation, and green finance are treated as RBV/NRBV resources whose short-term effect on MSME performance can differ in sign and magnitude from their effect on MSME sustainability, because the transition costs of acquiring and reconfiguring these capabilities (certification, process redesign, compliance, and governance of fund use) are

typically incurred before the legitimacy, efficiency, and resilience benefits materialise. Organisational culture is positioned as a background capability that supports the consistency of sustainability-oriented routines but does not, by itself, substitute for the operational mediators (innovation, digitalisation, process efficiency) needed to translate green resources into short-term performance gains. Under this framework, the hypotheses below are stated as directional effects on each outcome separately, without assuming that a positive effect on performance implies a positive effect on sustainability, or vice versa.

It is important to be explicit about the status of this perspective. The directional hypotheses developed below follow the dominant literature, which predominantly predicts beneficial (positive) green effects; the trade-off perspective itself was not specified a priori but emerged from the contrast between those expectations and the differential pattern of results subsequently observed in the data. It is therefore presented here as a provisional, emergent explanatory lens rather than as an established theory, and the confirmatory tests it implies including formal tests of statistical asymmetry are left to future research.

2.4 MSME Sustainability

In the short term, the company aims to increase profits in order to achieve the long-term goal of improving the welfare of capital owners. In achieving this, business sustainability needs to be considered in order to ensure the availability of working capital to run the company's activities. This concept of sustainability shows how companies ensure that they can continue to operate effectively and remain competitive and grow by developing appropriate strategies and innovations that give them a competitive advantage over other companies. According to RBV theory, companies use their resources to produce innovations that enable them to compete with their rivals, with the aim of gaining a competitive advantage so that the company can continue to operate. This is particularly important for MSMEs in facing competition from larger companies.

Currently, the resilience of MSMEs is an important consideration in creating innovation. Many micro, small, and medium-sized companies are unable to compete with larger companies, resulting in their inability to survive and grow into larger companies.

2.5 MSME Performance

One measure of company performance is increased sales. Companies that are able to increase sales demonstrate adaptability and competitive advantage, enabling them to compete and gain an edge over their competitors. Company performance is the ability of a company to generate revenue from its strategies and resources. Based on the resource-based view theory, companies use their resources to produce products and processes that ultimately increase sales and performance. This concept applies to all companies, including MSMEs. In the context of sustainability, MSME performance demonstrates the ability of companies that implement environmentally and socially responsible practices while remaining focused on increasing profitability (Ciuciuc et al., 2025; Rumanti et al., 2023).

For MSMEs, this is an important goal because it is related to the ability to seize opportunities in competition, thereby increasing sales. There are several important indicators that drive company performance, namely public image, capital, effective production processes, product quality, targets, public image, cost efficiency, and product diversification (Alpkan et al., 2007; Gopang et al., 2017).

Environmental issues are an obstacle to achieving performance. Companies' use of resources may have a negative impact on the environment, such as pollution or environmental damage. Government regulations and pressure from environmentally conscious consumers are

significant obstacles and challenges for MSMEs in creating environmentally-based innovations that will give them a competitive advantage over other companies. Technological developments provide a great opportunity for companies to make their processes and production more efficient and economical, which will have an impact on company performance. MSMEs that are able to seize this opportunity will benefit from reduced production costs and an improved image as being environmentally friendly. Ultimately, consumers will prefer environmentally friendly products, which will have an impact on company performance. This will also increase consumer loyalty, leading to increased sales and company sustainability. The products produced will continue to be in demand by consumers, and companies will continue to create environmentally friendly products. According to (Achmad & Wiratmadja, 2025; Ferreira et al., 2021), superior performance will encourage investment in capabilities and resources aimed at increasing competitive advantage over competitors. Likewise, companies with good performance will have the capabilities and resources to support their objectives, making it impossible for competitors to imitate them, ultimately ensuring the company's sustainability (Farida & Setiawan, 2022). Based on the above explanation, the following hypothesis can be drawn:

H1: MSME performance has a positive effect on MSME sustainability.

2.6 Green Entrepreneurship

Entrepreneurship is considered an alternative in reducing unemployment in a country. Many developed countries have begun to encourage their citizens to start their own businesses rather than seek employment with a company. Furthermore, entrepreneurship has also been shown to contribute significantly to state revenue, making it a priority in creating and developing independent employment opportunities by creating new opportunities through the products or services produced (Agusdin et al., 2023; Shane & Venkataraman, 2000).

The increasing number of environmental issues poses obstacles to developing this concept, which aims to comply with regulations (Ebrahimi & Mirbargkar, 2017) and ensure the welfare of company owners (Bossle et al., 2016). Many growing businesses have an impact on environmental damage, where pollution is produced, resources are overused, there are no strict regulations on the implementation of processes and production, and the amount of waste produced increases. Many companies are competing to innovate with the aim of gaining a competitive advantage over other companies by developing various strategies. On the other hand, these strategies do not consider their impact on the environment, which ultimately affects the environment and society. Therefore, due to pressure from the community and the long-term effects felt, it is necessary to further develop this concept so that its implementation benefits both companies and the community (Ambec & Lanoie, 2008; Dangelico & Pujari, 2010; K.-H. Lee & Min, 2015).

One of the developments in entrepreneurship is the application of green entrepreneurship. This concept is still considered new and is still being developed academically to produce sustainability and competitive advantages over other companies. This concept was developed due to the increasing concern of the community and the environment regarding environmental damage and the use of environmentally friendly and healthy products. Research on green entrepreneurship has begun to attract a lot of attention, especially among MSMEs. This concept provides an overview of the ability of MSMEs to improve their performance and compete with similar businesses. According to (Chan, 2013; Huggins et al., 2017; Ndubisi et al., 2009), green entrepreneurship is the ability of a company to innovate or create an organisation that focuses on products, services, and processes that support

environmental preservation. Green entrepreneurship is also defined as innovation generated based on environmental concerns through the creation of products, services, and market development aimed at increasing profits (Gao et al., 2019). Based on the above definition, it can be concluded that green entrepreneurship is an effort to produce products, processes, and services with consideration for the environment.

There are several terms that can be associated with green entrepreneurship (Yin et al., 2022) such as environmental entrepreneurship (Dean & McMullen, 2007; Hendrickson & Tuttle, 1997; Keogh & Polonsky, 1998), sustainable entrepreneurship (Hockerts & Wüstenhagen, 2010; Schaltegger & Wagner, 2011), and eco-entrepreneurship (Astad, 1998; Farinelli et al., 2011; Gibbs & O'Neill, 2012; Holt, 2011; Schaltegger et al., 2016). This concept emphasises production processes and products that are more environmentally conscious. The pressure from regulations and increasing environmental awareness are expected to increase the sales of MSMEs, which will ultimately improve their performance. Consistent with the provisional Green Capability Trade-Off perspective outlined above, the effect of green entrepreneurship on MSME performance and on MSME sustainability need not move in the same direction. Adopting green entrepreneurial practices typically requires upfront investment in certification, process redesign, and compliance, which can suppress short-term performance even as it builds legitimacy, differentiation, and resilience that support long-term sustainability (Dangelico & Pujari, 2010; Doran & Ryan, 2012; Sklavos et al., 2022; Triguero et al., 2013; Yin et al., 2022). Therefore, the following hypotheses were developed:

H2: Green entrepreneurship has a positive effect on MSME performance.

H3: Green entrepreneurship has a positive effect on MSME sustainability.

H4: MSME performance mediates the effect of green entrepreneurship on MSME sustainability.

2.7 Green Innovation

Rapid technological developments are encouraging companies to compete in producing new innovations that have a positive impact on the company. These innovations benefit companies by reducing costs and raw material usage, thereby increasing efficiency and effectiveness. It is hoped that these innovations will improve performance through the creation of new products and processes, which will ultimately enhance performance. However, companies are more focused on utilising their resources to compete and gain a competitive advantage. They ignore the negative impacts of these processes on the environment and surrounding communities. Due to pressure from the community and the government, companies are starting to look for ways to keep innovation going.

One concept that needs to be considered is green innovation. This concept explains effective strategies for producing products and processes without damaging the environment and increasing profits (K.-H. Lee & Min, 2015). This concept also introduces new elements used in producing goods or services (Cherrafi et al., 2018), which involve modifying systems and processes aimed at reducing the impact of environmental damage (Lisi et al., 2020; Qiu, Hu, et al., 2020). According to (Dahri, Rehman, et al., 2025), green innovation demonstrates a strategy that promotes sustainable development of companies and helps maintain competitive advantage.

The concept of green innovation has obstacles in that it requires the application of the latest technology to support processes and products (Gossart & Ozaygen, 2018; Hrabynskiy et al., 2017) and significant investment in planning and implementing innovation (Ambec & Lanoie, 2008; Cai & Li, 2018; Woo et al., 2014; Zhang et al., 2019). This poses a challenge for MSMEs in

generating competitive advantages over other companies and sustaining their businesses through the use of available resources with the aim of preserving the environment (Nunes et al., 2019).

On the other hand, this concept provides added value to companies, especially MSMEs. Many MSMEs only run their businesses based on existing trends and utilise their available resources. This results in suboptimal performance and hinders the sustainability of the company. If MSMEs are able to produce green innovations by optimally utilising technology and resources through investment, the company will generate a better competitive advantage compared to its competitors. According to RBV theory, green innovation is an important resource for companies in contributing to MSME performance (Appiah et al., 2025). Green innovation is believed to be able to improve performance through cost efficiency in producing products, product differentiation, and market expansion (Ambec & Lanoie, 2008; Aragón-Correa & Sharma, 2003; Weng et al., 2015). Companies that invest their funds in producing environmentally friendly products and processes will also project a positive image to consumers and company owners, thereby enhancing their reputation (Amores-Salvadó et al., 2014; Dangelico & Pujari, 2010; Sambasivan et al., 2013; Triguero et al., 2013). In addition, this strategy also makes the product process more efficient and economical, thereby increasing sales and profits (Ottman et al., 2006; Sklavos et al., 2022) and increasing consumer loyalty. Several studies show that the application of green innovation has a positive impact on competitive advantage (Achi et al., 2022; Qing et al., 2022; Qiu, Jie, et al., 2020). Based on the above explanation, the following hypothesis can be drawn:

H5: Green innovation has a positive effect on MSME performance.

H6: Green innovation has a positive effect on MSME sustainability.

H7: MSME performance mediates the effect of green innovation on MSME sustainability.

2.8 Green Finance

Green finance refers to various financing instruments such as credit, investment, and incentives—designed to steer economic activities towards environmental sustainability goals, without neglecting economic and social benefits. In practice, green finance does not stop at providing funds, but also brings an orientation towards managing environmental impacts and risks so that business decisions are driven towards cleaner and more efficient processes (Dai et al., 2022). Furthermore, (Abrudan et al., 2021) explains that the allocation of funds aimed at corporate responsibility for the environment that impacts business sustainability is referred to as green finance. In financial reporting, this practice encourages the continuity of corporate sustainability and has a positive impact on performance and the environment (Kolk & Pinkse, 2010; Nguyen et al., 2023). The concept of green finance aims to provide funds intended to ensure that business sustainability runs well and has a positive impact on performance and the environment (Zheng et al., 2021). This is supported by the results of research conducted (L. Wang et al., 2023) which shows that the application of green finance in companies will improve company performance, which has an impact on business sustainability.

In the context of MSMEs, access to green finance can expand funding capacity to improve production processes, such as energy efficiency, waste reduction, selection of more environmentally friendly raw materials, fulfilment of certifications/standards, and strengthening of governance and transparency (Appiah-Kubi, 2024). The accumulation of these changes has the potential to improve MSME performance through cost efficiency improvements, reputation strengthening, and market access expansion, while also

strengthening business resilience as MSMEs become better prepared to face regulatory risks and stakeholder demands related to environmental issues.

A number of empirical findings on MSMEs/MSMEs also show that the impact of green finance on business outcomes occurs largely through organisational behaviour and transparency. A study on MSMEs published in the *Journal of Cleaner Production* shows that green financing is positively associated with strengthening sustainability reporting, and that pro-environmental behaviour acts as a mechanism that bridges this relationship. The implication is that green financing can trigger internal change: MSMEs are encouraged to adopt more environmentally friendly practices, such as operational efficiency and compliance, which are then reflected in sustainability reporting (Appiah-Kubi, 2024). In terms of performance, such reporting and practices help reduce information differential pattern with creditors, investors, and buyers, increase trust, and potentially improve access to funding in the next period, which ultimately supports business stability and long-term sustainability.

Another finding on MSMEs in China published in *Sustainability* confirms that the relationship between green finance and sustainable performance is also influenced by the quality of governance and corporate social responsibility (CSR) practices. The study indicates that CSR can serve as an intermediary variable linking green finance with sustainable performance, and emphasises the link between good governance, green financing, and higher sustainable performance achievements in MSMEs (L. Wang et al., 2023). Thus, green finance can be understood not merely as additional capital, but as part of a managerial change ecosystem: green financing encourages more environmentally friendly investment, while CSR and governance improve the way MSMEs manage their socio-environmental impact, build legitimacy, and maintain business continuity—especially when market and regulatory pressures related to sustainability are intensifying. Research conducted (Dai et al., 2022; Hoang et al., 2025; K. Wang et al., 2019) shows that green finance improves performance, although whether that improvement carries through to sustainability depends on whether the funds are tied to use-of-proceeds governance and impact measurement; without such mechanisms, capital access may boost short-term output without embedding sustainable practice. Based on the above statement, the following hypothesis can be drawn:

H8: Green finance has a positive effect on MSME performance.

H9: Green finance has a positive effect on MSME sustainability.

H10: MSME performance mediates the effect of green finance on MSME sustainability.

2.9 Organisational Culture

Long-term sustainability is a company goal characterised by the achievement of desired profits. In achieving this, there are objectives, targets and strategies that the company must achieve. Teamwork and appropriate rules are important for companies to achieve good performance. One measure of this is having a good organisational culture. This concept refers to the procedures or rules that a company or organisation has in place to form a system aimed at achieving its vision and mission. According to (Kareem & Kummitha, 2025), sustainable leadership demonstrates basic principles, high-level practices and actions aimed at improving performance while taking into account ecological, social and economic well-being in the long term. Through such leadership, an organisational culture that is responsible for the environment will be created and values aimed at achieving the sustainability of an organisation, policies, and decision-making will be integrated. (Zafar et al., 2023). A good organisational culture is formed through the consistent application of rules and support from managers or owners, which are designed to improve performance and business sustainability.

Furthermore, (Shaikh et al., 2024) argue that organisational culture encourages workers to support environmentally-based processes that have an impact on the long-term sustainability of the company.

There are studies that examine how the implementation of a good organisational culture supports improved performance and sustainability. One such study (Isensee et al., 2020; Rizos, 2016) found that a good organisational culture improves performance and ensures long-term business sustainability. On the other hand, research related to organisational culture that supports business performance and sustainability, especially for MSMEs, is still very limited and the results are not consistent. Moreover, the available evidence on the culture–sustainability link in MSMEs remains limited and mixed, indicating that a strong organisational culture does not automatically translate into business sustainability. Based on the above description, the hypothesis in this study is:

H11: Organisational culture has a positive effect on MSME performance.

H12: Organisational culture has a positive effect on MSME sustainability.

H13: MSME performance mediates the effect of organisational culture on MSME sustainability.

3. Methodology

This study aims to evaluate the application of green entrepreneurship, green innovation, green finance, and organisational culture on the survival of companies by considering their performance. This research was conducted on MSMEs in Medan, including services, trade, and manufacturing. The sample size was obtained from various sources, including the Department of Cooperatives and MSMEs, as well as field data from unregistered MSMEs. This was done because few MSMEs have registered their businesses with the Department of Cooperatives and MSMEs. Because business-registration coverage among local MSMEs is low, a complete probability sampling frame could not be constructed; the study therefore employed non-probability, mixed-frame sampling that combined an enumeration of registered MSMEs (from the Department of Cooperatives and MSMEs) with field canvassing of unregistered MSMEs (a purposive-cum-convenience procedure). The sectoral distribution reported in Table 1 reflects the composition of manufacturing, trade, and service MSMEs reached through this procedure and is not claimed to be statistically representative of the wider MSME population in Medan. Questionnaires were administered on site to 670 MSMEs; because enumerators assisted respondents during completion, 656 instruments were returned complete and usable, yielding a high completion rate of 98%. Respondents were required to be the owner or the manager directly responsible for day-to-day operating and financing decisions of the MSME, since perceptions of green finance, organisational culture, and business sustainability were expected to depend on this decision-making role; the majority of respondent were owner and managers, which understanding of condition the process and product of MSMEs. The data collection technique used a questionnaire where a score of 5 indicated strong agreement and 1 indicated disagreement. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 3.2.8, using a bootstrapping procedure to obtain t-statistics and p-values for the structural paths. The number of respondents in this study was 656 MSMEs. The measurement of the research variables is as follows: the green entrepreneurship variable was measured using 5 questions adopted from research (Chen et al., 2023; Karami & Tang, 2019; Nasution et al., 2011; Nasution & Mavondo, 2008; Ndubisi & Iftikhar, 2012). The green innovation variable shows the company's ability to use its resources to produce products

or processes without damaging the environment. This variable was adopted from a study conducted by (Al-Swidi et al., 2023). The green finance variable was operationalised as MSMEs' access to and use of environmentally oriented financial resources such as green credit, green investment, and incentive- or subsidy-based environmental financing — consistent with the definition of green finance adopted in the Literature Review, rather than as the internalisation of environmental costs in products and prices; the corresponding items are reported in Appendix A. Organisational culture indicates the procedures or habits of a company in achieving the vision and mission of MSMEs. This variable is measured using (Cameron & Quinn, 2011; Harris & Ogbonna, 2001). The company performance variable indicates the company's ability to increase revenue from the previous period. This variable is adopted from (Ibhagui & Olokoyo, 2018; Machek, 2016). Company survival is the ability of a company to survive and have a competitive advantage over other businesses. This variable is adopted from the study by (Dvorský et al., 2019).

4. Result and Discussion

4.1 Demographic Characteristics

This study aims to examine the influence of green entrepreneurship, green innovation, green finance, and organisational culture on the performance and sustainability of MSMEs. This study was conducted on MSMEs in Medan City. Before performing data analysis techniques, demographic characteristics describing the characteristics of the respondents were examined. The following are the demographic results.

Table 1. Sample Characteristics

Attributes of Sample		Frequency	Percentage
Sectors	Service	23	3.5%
	Trade	208	31.7%
	Manufacture	425	64.8%
MSME Age	Below 1 year	179	27.3%
	1-5 years	254	38.7%
	Above 5 years	223	34.0%
Gender	Male	518	79.0%
	Female	138	21.0%

Source: Data processed in 2025

Table 1 presents the descriptive distribution of the study sample across sectoral classification, MSME age, and respondent gender. The sectoral composition is strongly skewed toward manufacturing, which constitutes 425 observations (64.8%), followed by trade with 208 observations (31.7%). Services are comparatively under-represented at 23 observations (3.5%). This profile indicates that the empirical setting is largely anchored in production- and processing-oriented MSMEs, with more limited coverage of service-based activities. In terms of business maturity, the sample captures heterogeneous firm-age groups. MSMEs aged 1–5 years form the largest segment (254; 38.7%), while 223 firms (34.0%) have operated for more than five years and 179 firms (27.3%) are less than one year old. The distribution suggests that the dataset includes both nascent ventures and more established enterprises, which is relevant

given that firm age often coincides with differences in organisational routines, reporting capacity, and managerial experience. Regarding gender, male owners/respondents account for 518 observations (79.0%), whereas female owners/respondents account for 138 observations (21.0%). This imbalance should be acknowledged when interpreting the findings, particularly if the subsequent analyses are sensitive to owner-level characteristics or if the study aims to generalize across gender groups.

4.2 Measurement Model Assessment

Table 2 reports the internal consistency reliability and convergent validity of the six constructs used in this study, based on Cronbach's alpha, rho_A, composite reliability (CR), and average variance extracted (AVE) obtained from the SmartPLS output.

Table 2. Reliability and Convergent Validity of Constructs

Construct	Cronbach's Alpha	rho_A	Composite Reliability (CR)	Average Variance Extracted (AVE)
Organisational Culture	0.846	0.917	0.880	0.519
Green Entrepreneurship	0.793	0.812	0.858	0.549
Green Finance	0.751	0.754	0.889	0.801
Green Innovation	0.744	0.873	0.795	0.661
MSME Performance	0.833	0.862	0.873	0.580
MSME Sustainability	0.878	0.900	0.904	0.520

Source: Data processed in 2025 (SmartPLS output)

Internal consistency reliability was assessed using Cronbach's alpha, rho_A, and composite reliability, each of which should exceed the commonly applied threshold of 0.70 (Hair et al., 2019). As shown in Table 2, Cronbach's alpha ranges from 0.744 (Green Innovation) to 0.878 (MSME Sustainability), rho_A ranges from 0.754 (Green Finance) to 0.917 (Organisational Culture), and composite reliability ranges from 0.795 (Green Innovation) to 0.904 (MSME Sustainability). All six constructs exceed the 0.70 threshold on every reliability indicator, indicating that the indicators retained for each construct consistently and reliably measure their intended latent variable. Following Dijkstra and Henseler (2015), rho_A is reported as a further, less biased estimate of construct reliability that typically falls between the more conservative Cronbach's alpha and the more liberal composite reliability; for most constructs in this study — for example, Green Entrepreneurship ($\alpha = 0.793$, $\rho_A = 0.812$, $CR = 0.858$) and MSME Performance ($\alpha = 0.833$, $\rho_A = 0.862$, $CR = 0.873$) — rho_A falls within this expected range, reinforcing the reliability evidence provided by Cronbach's alpha and CR. For Organisational Culture and Green Innovation, rho_A (0.917 and 0.873, respectively) is somewhat higher than CR, which does not violate any threshold but suggests the indicator weights for these two constructs are less evenly distributed; this is a minor pattern worth

noting but not a validity concern, since all three reliability coefficients still comfortably clear 0.70.

Convergent validity was assessed using average variance extracted (AVE), which should exceed 0.50, meaning that, on average, a construct explains more than half of the variance of its own indicators rather than measurement error (Fornell & Larcker, 1981; Hair et al., 2019). All six constructs meet this criterion, with AVE ranging from 0.519 (Organisational Culture) to 0.801 (Green Finance). The comparatively high AVE for Green Finance (0.801) indicates strong convergence among its indicators, while the AVE values for Organisational Culture (0.519) and MSME Sustainability (0.520) are close to, but still above, the minimum threshold, suggesting an acceptable but comparatively more heterogeneous indicator set for these two constructs; this is common for multidimensional constructs such as organisational culture and sustainability and does not by itself indicate a measurement problem.

Taken together, these results indicate that the measurement model satisfies the internal consistency reliability and convergent validity requirements commonly applied in PLS-SEM research (Hair et al., 2019), providing an empirical basis for proceeding to the structural model results reported in Table 9 and Table 10.

Table 3 reports the coefficient of determination (R^2) and adjusted R^2 for the two endogenous constructs in the structural model. R^2 represents the proportion of variance in an endogenous construct explained by its predictors and is the standard measure of a PLS-SEM model's in-sample explanatory power (Hair et al., 2019). As a general guideline, R^2 values of 0.75, 0.50, and 0.25 can be treated as substantial, moderate, and weak, respectively (Hair et al., 2019).

Table 3. Coefficient of Determination (R^2)

Endogenous Construct	R Square	R Square Adjusted
MSME Performance	0.287	0.283
MSME Sustainability	0.688	0.686

Source: Data processed in 2025 (SmartPLS output)

For MSME Performance, $R^2 = 0.287$ (adjusted $R^2 = 0.283$), indicating that green entrepreneurship, green finance, green innovation, and organisational culture jointly explain approximately 28.7% of the variance in MSME performance. By the guideline above, this falls just inside the “weak” range, meaning the model captures only a modest share of what drives short-term performance; this is consistent with the pattern already observed in Table 9, where one predictor (organisational culture) is non-significant and another (green innovation) is only marginally significant, leaving green entrepreneurship and green finance as the main contributors to this relatively limited explanatory power. This is not a defect in the model so much as a substantive finding: MSME performance in this sample is shaped by factors beyond the green practices tested here, which is worth acknowledging explicitly as a scope condition of the study rather than treated as a shortfall.

For MSME Sustainability, $R^2 = 0.688$ (adjusted $R^2 = 0.686$), indicating that green entrepreneurship, green finance, green innovation, organisational culture, and MSME performance jointly explain approximately 68.8% of the variance in MSME sustainability. This

falls in the “moderate-to-substantial” range, just below the 0.75 threshold for a substantial model, and is consistent with Table 9 showing that four of the five predictors of sustainability are statistically significant. The large gap between the explanatory power of the performance model (28.7%) and the sustainability model (68.8%) reinforces the provisional Green Capability Trade-Off perspective proposed in this study: green practices, and MSME performance itself, matter far more for explaining sustainability outcomes than for explaining short-term performance outcomes, which is consistent with the differential, delayed-benefit logic set out in the Literature Review.

The negligible difference between R^2 and adjusted R^2 for both constructs (0.287 vs. 0.283 for MSME Performance; 0.688 vs. 0.686 for MSME Sustainability) indicates that the explanatory power of the model is not being artificially inflated by the number of predictors relative to the sample size ($n = 656$), supporting the robustness of these R^2 estimates.

In line with best-practice reporting for PLS-SEM (Hair et al., 2019; Henseler et al., 2015), the measurement and structural model is further evaluated below through indicator outer loadings (Appendix A), discriminant validity assessed with the heterotrait–monotrait ratio (HTMT) and bootstrap confidence intervals (Table 4) and the Fornell–Larcker criterion (Table 5), structural-model collinearity via the inner variance inflation factor (VIF; Table 6), effect sizes (f^2 ; Table 7), and predictive relevance and model fit (Q^2 and SRMR; Table 8). The structural path estimates then follow in Tables 9 and 10.

Because MSME performance and MSME sustainability are conceptually adjacent, particular attention is paid to their empirical distinctness. Discriminant validity is established when HTMT values fall below the conservative 0.85 threshold and their bootstrap confidence intervals exclude 1 (Henseler et al., 2015); the Fornell–Larcker criterion, under which the square root of each construct’s AVE exceeds its correlations with the other constructs, provides converging evidence. The full item wording (Appendix A) further clarifies the distinction: MSME performance items capture short-term economic output (revenue growth, cost efficiency, product quality, and diversification), whereas MSME sustainability items capture longer-term resilience and continuity (survival, adaptive capacity, and competitive persistence).

Table 4. Discriminant Validity — Heterotrait–Monotrait Ratio (HTMT)

Construct	1	2	3	4	5	6
Organisational Culture (1)	—					
Green Entrepreneurship (2)	0.603	—				
Green Finance (3)	0.795	0.625	—			
Green Innovation (4)	0.622	0.567	0.587	—		
MSME Performance (5)	0.289	0.239	0.554	0.382	—	
MSME Sustainability (6)	0.558	0.904	0.491	0.804	0.350	—

Note: Values are heterotrait–monotrait ratios estimated with SmartPLS 3. Discriminant validity is supported when each value is below the conservative threshold of 0.85 (Henseler et al., 2015). All ratios satisfy this criterion except the Green Entrepreneurship–MSME Sustainability pair (0.904), which exceeds 0.85 and points to limited discriminant separation between these two constructs; this is acknowledged in the Limitations. Bootstrap 95% confidence intervals for the HTMT statistic were not part of the available estimation output and should be added from a bootstrapping run before final submission.

As shown in Table 4, most heterotrait–monotrait ratios lie below the conservative 0.85 threshold, supporting discriminant validity for the majority of construct pairs; the ratios involving MSME performance, for example, range from 0.239 to 0.554. Importantly, the ratio between MSME performance and MSME sustainability is only 0.350, confirming that the two outcome constructs are empirically distinct. Two ratios involving MSME sustainability are elevated: green innovation with sustainability (0.804), which remains below the threshold, and green entrepreneurship with sustainability (0.904), which exceeds it. The latter indicates limited discriminant separation between green entrepreneurship and MSME sustainability and represents a limitation of the study’s measurement model.

Table 5. Discriminant Validity — Fornell–Larcker Criterion

Construct	1	2	3	4	5	6
Organisational Culture (1)	0.720					
Green Entrepreneurship (2)	0.523	0.741				
Green Finance (3)	0.650	0.468	0.895			
Green Innovation (4)	0.448	0.379	0.385	0.813		
MSME Performance (5)	0.278	0.058	0.492	0.223	0.762	
MSME Sustainability (6)	0.523	0.769	0.378	0.517	-0.058	0.721

Note: Diagonal elements are the square root of the average variance extracted (AVE) reported in Table 2; off-diagonal elements are the latent-variable correlations. Discriminant validity holds when each diagonal value exceeds the correlations in its corresponding row and column. This holds for every construct except Green Entrepreneurship, whose correlation with MSME Sustainability (0.769) exceeds its own square-root AVE (0.741); this is consistent with the elevated HTMT for the same pair and is noted in the Limitations.

The Fornell–Larcker criterion in Table 5 yields converging evidence. For most constructs the square root of the AVE (shown on the diagonal) exceeds the construct’s correlations with all others—for example, green finance (0.895), green innovation (0.813), and MSME performance (0.762)—supporting discriminant validity. Consistent with the HTMT results, green entrepreneurship is the exception: its square-root AVE (0.741) is lower than its correlation with MSME sustainability (0.769), so the criterion is not satisfied for this pair. Both tests therefore converge on the same concern, namely the strong overlap between green entrepreneurship and MSME sustainability, while confirming that MSME performance is well separated from MSME sustainability ($r = -0.058$).

Table 6. Structural Model Collinearity (Inner VIF)

Predictor	VIF → MSME Performance	VIF → MSME Sustainability
Organisational Culture	2.035	2.035
Green Entrepreneurship	1.473	1.555
Green Finance	1.821	2.287
Green Innovation	1.312	1.326
MSME Performance	—	1.403

Note: Values below 3.3 indicate no collinearity concern; values below 5 are generally acceptable (Hair et al., 2019). All inner VIF values reported here are below 3.3, indicating no collinearity concern among the structural-model predictors.

Table 6 reports the inner variance inflation factors for the structural model. All values fall between 1.312 and 2.287, well below the conservative threshold of 3.3 and the more lenient

cut-off of 5. Collinearity among the predictor constructs is therefore not a concern, and the structural path coefficients can be interpreted without distortion.

Table 7. Effect Sizes (f^2)

Predictor	$f^2 \rightarrow$ MSME Performance	$f^2 \rightarrow$ MSME Sustainability
Organisational Culture	0.000	0.034
Green Entrepreneurship	0.055	0.762
Green Finance	0.256	0.000
Green Innovation	0.010	0.174
MSME Performance	—	0.081

Note: Values of 0.02, 0.15, and 0.35 denote small, medium, and large effects, respectively (Cohen, 1988; Hair et al., 2019).

Effect sizes are presented in Table 7. Green entrepreneurship exerts a large effect on MSME sustainability ($f^2 = 0.762$) and is the dominant driver of sustainability in the model; green finance exerts a medium-to-large effect on MSME performance (0.256); and green innovation a medium effect on MSME sustainability (0.174). Smaller effects are observed for MSME performance on sustainability (0.081), green entrepreneurship on performance (0.056), and organisational culture on sustainability (0.034). The effects of green finance on sustainability (0.000), organisational culture on performance (0.000), and green innovation on performance (0.010) are negligible.

Table 8. Predictive Relevance (Q^2) and Model Fit (SRMR)

Indicator	Value
MSME Performance — Q^2 (blindfolding)	—
MSME Sustainability — Q^2 (blindfolding)	—
SRMR (estimated model)	0.131

Note: The SRMR of the estimated model is 0.131, above the 0.08 benchmark, indicating limited approximate fit; SRMR is a conservative index for PLS-SEM and is interpreted here alongside the exploratory framing of the model. Q^2 for the endogenous constructs is not part of the reported algorithm output; the blindfolding procedure (e.g., omission distance 7) should be run in SmartPLS to obtain construct cross-validated redundancy Q^2 (values > 0 indicate predictive relevance), with PLSpredict optionally reported against a naïve benchmark.

Table 8 summarises model fit and predictive relevance. The standardised root mean square residual (SRMR) of the estimated model is 0.131, above the 0.08 benchmark; because SRMR is a conservative measure in variance-based SEM, this is interpreted as limited approximate fit and is considered in light of the exploratory framing of the model. Predictive relevance (Q^2) for the endogenous constructs is not reported here, as it requires the blindfolding procedure, which was not part of the estimation output; running blindfolding (omission distance 7) to obtain construct cross-validated redundancy Q^2 —with values above zero indicating predictive relevance—is recommended before final submission.

4.3 Hypothesis Testing

Hypothesis testing using structural equation modelling (SEM). The following are the results of the hypothesis testing.

Table 9. Hypothesis Testing in Direct Effect

	Original Sample (O)	T Statistics (O/STDEV)	P Values
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Organisational Culture -> MSME Performance	-0.014	0.168	0.867
Organisational Culture -> MSME Sustainability	0.149	2.790	0.005
Green Entrepreneurship -> MSME Performance	-0.241	3.738	0.000
Green Entrepreneurship -> MSME Sustainability	0.653	13.747	0.000
Green Finance -> MSME Performance	0.576	12.799	0.000
Green Finance -> MSME Sustainability	-0.120	3.591	0.000
Green innovation -> MSME Performance	0.099	1.918	0.056
Green innovation -> MSME Sustainability	0.249	6.733	0.000
MSME Performance -> MSME Sustainability	-0.188	6.968	0.000

Source: Data processed in 2025

Table 9 explains the hypothesis testing to examine organisational culture against MSME performance. The results show no significant effect ($\beta = -0.014$; $p = 0.867$), indicating that internal culture does not automatically translate into short-term performance output, especially when culture is not connected to innovation systems/capabilities and managerial practices that transform culture into action. This finding is consistent with the literature emphasising that culture works through interdependencies (e.g., capabilities, digitalisation, sustainability orientation), rather than as a single lever (Isensee et al., 2020).

Testing organisational culture variables against MSME sustainability shows a significant positive influence ($\beta = 0.149$; $p = 0.005$). Theoretically, a culture that supports learning, collaboration, and sustainability values tends to strengthen the consistency of environmental-social practices and organisational resilience, making it more apparent in sustainability indicators than in short-term financial performance. Integrative literature on MSMEs shows that culture correlates with the sustainability agenda and MSME business development through internal mechanisms (routine, commitment, coordination) (Isensee et al., 2020).

Next is the testing of green entrepreneurship on MSME performance. The results in Table 9 show a significant but negative value ($\beta = -0.241$; $p < 0.001$), while green entrepreneurship has a significant and very strong positive effect on MSME sustainability ($\beta = 0.653$; $p < 0.001$). The "negative to performance—positive to sustainability" pattern is often explained as short-term cost and adjustment burden: green orientation requires initial investment (processes, certification, raw materials, product redesign, compliance) that puts pressure on short-term margins/performance but improves legitimacy, capabilities, and long-term resilience. A meta-analysis of green entrepreneurial orientation also shows a consistent positive relationship with various dimensions of sustainable performance, although the magnitude of the effect may vary across contexts (Öztürk et al., 2024).

Furthermore, testing the green finance hypothesis against MSME performance shows a significant positive effect ($\beta = 0.576$; $p < 0.001$), but green finance $\rightarrow$ MSME sustainability is

significantly negative ($\beta = -0.120$; $p < 0.001$). The positive side of performance is in line with the argument that green finance can increase MSME access to capital, efficiency, and operational capacity (Appiah-Kubi et al., 2024).

However, the negative sign on sustainability indicates a possible implementation gap: green funds drive short-term economic output, but do not automatically translate into sustainable practices if they are not accompanied by governance of fund use, impact measurement, or integration of environmental practices into operations. The literature also highlights that green reporting/standard requirements can add to the administrative burden for small businesses if they are not supported by internal capabilities (Galli et al., 2024).

Testing the hypothesis of the green innovation variable on MSME performance was at the significance threshold ($\beta = 0.099$; $p = 0.056$), while green innovation $\rightarrow$ MSME sustainability was significantly positive ($\beta = 0.249$; $p < 0.001$). This is consistent with many findings that green innovation is more quickly reflected in sustainability achievements (energy/material efficiency, waste reduction, compliance), while the impact on financial performance may be delayed or depend on market context and commercialisation capabilities. Meta-analytic evidence on eco/green innovation also confirms the existence of effect variations and the role of boundary conditions (capabilities, strategies, stakeholder pressure) (Oduro, 2024).

Finally, the influence of MSME performance on MSME sustainability shows a significant but negative effect ($\beta = -0.188$; $p < 0.001$). This negative sign makes sense if the "performance" measured is financial/short-term growth: MSMEs pursuing rapid expansion may experience trade-offs against sustainability investments (compliance costs, environmental quality, social practices) or choose strategies that maximise economic output first. The "dark side" literature shows that sustainability orientation and performance are not always synergistic; the effect can turn negative when companies are willing to take trade-offs that prioritise sustainability or when implementation costs are high and benefits have not yet materialised (Kautonen et al., 2020).

Because this negative performance-to-sustainability coefficient anchors the entire trade-off reading, it warrants scrutiny before it is interpreted substantively. A negative structural path of this kind can also arise from statistical rather than theoretical sources, including conceptual or empirical overlap between the performance and sustainability constructs, suppression or multicollinearity among the exogenous constructs, common-method variance, model misspecification, or item mis-coding. To guard against these explanations, the analysis therefore inspects discriminant validity between MSME performance and MSME sustainability (HTMT, Table 4; Fornell–Larcker, Table 5), inner-model collinearity (VIF, Table 6), the total effects that combine the direct and indirect paths (Table 11), and the coding direction of the underlying items (Appendix A). Only once these alternatives are ruled out can the coefficient be read as a substantive performance–sustainability trade-off; pending full confirmation of these diagnostics, the estimate is interpreted with corresponding caution.

4.4 Indirect effect

Indirect testing examines whether green entrepreneurship, green innovation, green finance, and organisational culture affect MSME sustainability indirectly, through MSME performance as the mediating variable. The following are the results of testing the indirect effect hypothesis.

Table 10. Hypothesis Testing in Indirect Effect

	Original Sample (O)	T Statistics (O/STDEV)	P Value s
Organisational Culture -> MSME Performance -> MSME Sustainability	0.003	0.164	0.870
Green Entrepreneurship -> MSME Performance -> MSME Sustainability	0.045	3.175	0.002
Green Finance -> MSME Performance -> MSME Sustainability	-0.108	6.892	0.000
Green innovation -> MSME Performance -> MSME Sustainability	-0.019	1.933	0.054

Source: Data processed in 2025

Table 10 presents the results of the indirect effect analysis examining the mediating role of MSME Performance in the relationship between organisational culture, green entrepreneurship, green finance, and green innovation with MSME Sustainability. The significance of the indirect effects was evaluated using the bootstrapping procedure, with a significance threshold of $p < 0.05$ and a t-statistic > 1.96 .

The results show that Organisational Culture has no significant indirect effect on MSME Sustainability through MSME Performance ($\beta = 0.003$, $t = 0.164$, $p = 0.870$). Since the p-value is greater than 0.05, the hypothesis is not supported. This result is consistent with, and helps explain, the Table 9 finding that organisational culture has no significant direct effect on MSME performance ($\beta = -0.014$; $p = 0.867$): because culture does not move performance in the first place, it has nothing to transmit into sustainability through that pathway. This indicates that MSME Performance does not mediate the relationship between Organisational Culture and MSME Sustainability. Although organisational culture may contribute to internal values, norms, and working practices, these cultural characteristics may not necessarily translate into improved business performance that subsequently enhances sustainability. This pattern echoes systematic-review evidence that organisational culture affects MSME sustainability mainly through interdependent mechanisms such as routines, digitalisation, and stakeholder commitment, rather than by directly lifting short-term financial performance (Isensee et al., 2020) — which is also why, in Table 9, culture reaches MSME sustainability directly ($\beta = 0.149$; $p = 0.005$) even though the performance-mediated route documented here in Table 10 remains statistically silent.

In contrast, Green Entrepreneurship has a positive and significant indirect effect on MSME Sustainability through MSME Performance ($\beta = 0.045$, $t = 3.175$, $p = 0.002$). Therefore, the hypothesis is supported. This finding demonstrates that MSME Performance plays a significant mediating role in the relationship between Green Entrepreneurship and MSME Sustainability. The positive sign of this indirect path is notable precisely because both of its

component direct paths in Table 9 are negative: Green Entrepreneurship reduces MSME Performance ($\beta = -0.241$; $p < 0.001$), and MSME Performance in turn reduces MSME Sustainability ($\beta = -0.188$; $p < 0.001$). The product of two negative paths is positive, so the performance channel ends up reinforcing, rather than offsetting, the strong positive direct effect of Green Entrepreneurship on MSME Sustainability already reported in Table 9 ($\beta = 0.653$; $p < 0.001$). This pattern should be interpreted with care and without normative connotation. Following the mediation typology of Zhao, Lynch, and Chen (2010), this configuration represents competitive (inconsistent) mediation: the negative direct effect on performance and the negative performance-to-sustainability path combine into a positive indirect term. Statistically, this means that green entrepreneurship is associated with lower short-term performance, and lower performance is in turn associated with higher sustainability; it does not imply that reduced performance is itself desirable, nor that deliberately lowering performance is a sound strategy. The positive indirect coefficient is a property of the sign combination of two separately estimated paths, and its substantive meaning depends on the robustness of the negative performance-to-sustainability coefficient discussed above. This complements meta-analytic and mediation evidence showing that green entrepreneurial orientation reaches sustainable performance through intervening operational mechanisms rather than a simple direct boost to output — for example, Ma et al. (2025) find that green entrepreneurial orientation's effect on sustainable performance in technology firms is carried through green supply chain management practices rather than acting in isolation, underscoring that the pathway from green entrepreneurship to sustainability outcomes is conditional on how the intervening capability is used, not just its magnitude.

Furthermore, Green Finance has a negative and significant indirect effect on MSME Sustainability through MSME Performance ($\beta = -0.108$, $t = 6.892$, $p < 0.001$). Accordingly, the hypothesis is statistically supported; however, the direction of the indirect effect is negative. This finding indicates that MSME Performance significantly mediates the relationship between Green Finance and MSME Sustainability, but the mediation occurs in a negative direction. Importantly, the source of this negative sign is not that green finance weakens performance — Table 9 shows the opposite, a strong positive direct effect of Green Finance on MSME Performance ($\beta = 0.576$; $p < 0.001$). Rather, the indirect path turns negative because MSME Performance itself has a significant negative effect on MSME Sustainability ($\beta = -0.188$; $p < 0.001$, Table 9): green finance successfully raises short-term performance, but that same performance channel is precisely the one that erodes sustainability, so the benefit is "inverted" as it passes through the mediator. This is consistent with prior evidence that green financing improves MSME outcomes mainly when it is channelled through complementary mechanisms — Appiah-Kubi et al. (2024) find that green financing's effect on MSME sustainability reporting is only partially carried by pro-environmental behaviour, meaning capital access alone does not automatically convert into sustainable practice unless accompanied by governance of fund use and behavioural change. Therefore, the negative coefficient requires careful interpretation based on the direction of the individual direct paths forming the indirect

effect, and reinforces — rather than contradicts — the direct-effect trade-off already identified in Table 9.

Finally, Green Innovation has no statistically significant indirect effect on MSME Sustainability through MSME Performance at the 5% significance level ($\beta = -0.019$, $t = 1.933$, $p = 0.054$). Therefore, the hypothesis is not supported. Nevertheless, the p-value is very close to the 0.05 threshold, indicating a marginal or borderline effect. This result suggests that the mediating role of MSME Performance in the relationship between Green Innovation and MSME Sustainability is not sufficiently strong to meet the conventional 5% significance criterion. This mirrors the Table 9 finding that Green Innovation's direct effect on MSME Performance is itself only borderline ($\beta = 0.099$; $p = 0.056$): because the first leg of the mediation path is weak to begin with, the compounded indirect path through performance is even less likely to reach significance, even though Green Innovation has a robust direct effect on MSME Sustainability ($\beta = 0.249$; $p < 0.001$) that does not depend on this pathway. Green innovation may require substantial investment, technological capabilities, and time before its benefits are reflected in MSMEs performance and long-term sustainability. This is consistent with Schrank and Kijkasiwat (2024), who find that green innovation's contribution to MSME performance in Thailand depends on a firm's sustainability readiness and firm size, indicating that the innovation-to-performance leg of this kind of pathway is conditional rather than automatic, which helps explain why it does not consistently carry through as a significant indirect effect in the present sample.

Overall, the findings demonstrate that MSME Performance significantly mediates the effects of Green Entrepreneurship and Green Finance on MSME Sustainability, whereas it does not significantly mediate the effects of Organisational Culture and Green Innovation. Among the significant indirect effects, Green Entrepreneurship produces a positive indirect effect, while Green Finance produces a stronger but negative indirect effect. Read alongside Table 9, this pattern is not a separate story from the direct-effect trade-offs already reported; it is the same trade-off logic operating through a second pathway. Because MSME performance carries a consistently negative estimated effect on MSME sustainability ($\beta = -0.188$; $p < 0.001$), the sign of each indirect effect depends on the sign of the corresponding practice-to-performance path: a practice that lowers performance (green entrepreneurship) yields a positive indirect term, whereas a practice that raises performance (green finance) yields a negative indirect term. Following Zhao et al. (2010), both cases are competitive (inconsistent) mediation and are best read as a mechanical consequence of the sign combination rather than as evidence that lower performance is desirable. This differential pattern is consistent with the provisional Green Capability Trade-Off perspective proposed in this study; however, because it rests on the negative performance-to-sustainability coefficient, the interpretation is conditional on that coefficient surviving the collinearity, common-method, and discriminant-validity checks noted earlier. Read cautiously, the pattern suggests that interventions aimed only at raising short-term MSME performance could work against the sustainability agenda unless they are paired with governance mechanisms that decouple performance gains from sustainability

costs. These findings highlight that MSME Performance serves as an important transmission mechanism linking specific green-oriented business practices to sustainability, although the direction and magnitude of the mediation effects vary across the antecedent variables.

To complete the mediation assessment, Table 11 reports the direct, indirect, and total effects on MSME sustainability for each antecedent, and Table 12 summarises the outcome of all thirteen hypotheses against their predicted (positive) direction. Table 12 makes explicit that the differential and contrasting effects reported here diverge from the uniformly positive expectations that motivated the hypotheses.

Table 11. Total, Direct, and Indirect Effects on MSME Sustainability

Antecedent	Direct	Indirect	Total
Green Entrepreneurship	0.653	0.045	0.698
Green Finance	-0.120	-0.108	-0.228
Green Innovation	0.249	-0.019	0.230
Organisational Culture	0.149	0.003	0.152

Note: Indirect effects are mediated by MSME Performance. The total effect is the sum of the direct effect (Table 9) and the performance-mediated indirect effect (Table 10). Bootstrap 95% confidence intervals for the total effects to be completed from the SmartPLS total-effects output.

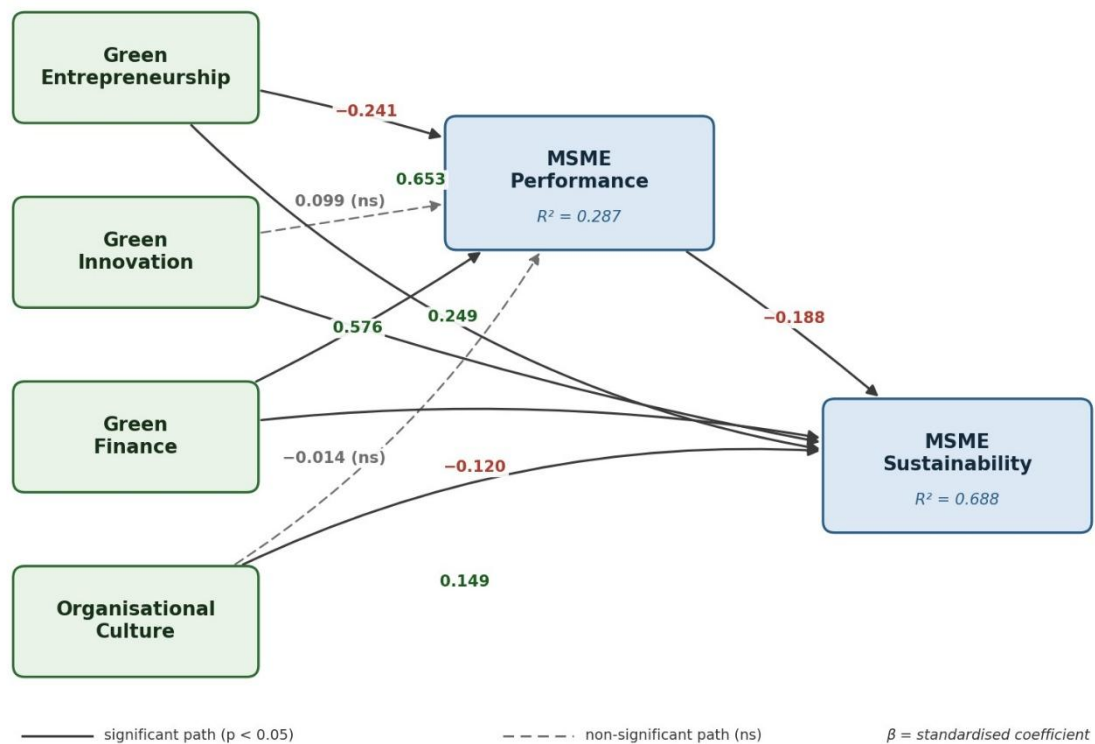
Table 12. Summary of Hypothesis Testing

H	Path	Pred.	β	p	Decision
H1	MSME Performance → MSME Sustainability	+	-0.188	<0.001	Not supported (opposite sign)
H2	Green Entrepreneurship Performance → MSME Sustainability	+	-0.241	<0.001	Not supported (opposite sign)
H3	Green Entrepreneurship Sustainability → MSME Sustainability	+	0.653	<0.001	Supported
H4	Green Entrepreneurship Sustainability (via Performance) → MSME Sustainability	+	0.045	0.002	Supported (competitive mediation)
H5	Green Innovation → MSME Performance	+	0.099	0.056	Not supported (marginal)
H6	Green Innovation → MSME Sustainability	+	0.249	<0.001	Supported
H7	Green Innovation → MSME Sustainability (via Performance)	+	-0.019	0.054	Not supported
H8	Green Finance → MSME Performance	+	0.576	<0.001	Supported
H9	Green Finance → MSME Sustainability	+	-0.120	<0.001	Not supported (opposite sign)
H10	Green Finance → MSME Sustainability (via Performance)	+	-0.108	<0.001	Significant, negative (competitive mediation)
H11	Organisational Culture → MSME Performance	+	-0.014	0.867	Not supported

H12	Organisational Sustainability	Culture	→	MSME	+	0.149	0.005	Supported
H13	Organisational Sustainability (via Performance)	Culture	→	MSME	+	0.003	0.870	Not supported

Note: "Pred." is the effect direction predicted from the dominant literature (uniformly positive). β is the standardised path coefficient. Mediation is classified following Zhao, Lynch, and Chen (2010). Several supported hypotheses carry the opposite sign to the prediction, which is the empirical basis for the provisional Green Capability Trade-Off perspective discussed above.

Figure 1. Path Analysis



Discussion

The Natural-Resource-Based View (NRBV) theory asserts that sustainable competitive advantage arises when companies build capabilities related to pollution prevention, product stewardship, and sustainable development—not just short-term efficiency (Hart, 1995). Meanwhile, the dynamic capabilities framework explains why the impact of green initiatives on performance/sustainability can vary over time: MSMEs need the ability to sense green opportunities, seize them (allocate resources), and reconfigure processes to realise their benefits (Teece et al., 1997). Through this lens, the research results show that the trade-offs and differential effects between performance and sustainability are conceptually reasonable—and relevant to filling the gap in the literature, which often assumes that green strategies always improve performance in a linear fashion.

Testing the influence of organisational culture on MSME performance shows no significant effect ($\beta = -0.014$; $p = 0.867$), but organisational culture has a significant positive effect on MSME sustainability ($\beta = 0.149$; $p = 0.005$). Theoretically, culture is a "social infrastructure" that

guides norms, coordination, and consistency of behaviour, so its effects are more easily seen in the resilience and consistency of sustainability practices (e.g., process discipline, compliance, learning, and long-term orientation) than in short-term performance. The systematic literature on MSMEs emphasises that culture, and sustainability interact with each other; when culture is not connected to work systems and execution mechanisms (procedures, metrics, and incentives), its impact on financial/operational performance can be weak (Isensee et al., 2020). In other words, your results enrich the research gap: it is not that "culture is not important", but rather that culture tends to function as a background capability that strengthens sustainability, while performance improvement requires more operational mediation channels (e.g. innovation, process efficiency, or digital transformation).

Further hypothesis testing shows that green entrepreneurship has a significant but negative effect on MSME performance ($\beta = -0.241$; $p < 0.001$), while green entrepreneurship has a very strong positive effect on MSME sustainability ($\beta = 0.653$; $p < 0.001$). This pattern is consistent with the NRBV argument and sustainable entrepreneurship literature: green entrepreneurial orientation often triggers transition costs (initial investment, changes in raw materials/processes, certification, reporting, green compliance) that suppress short-term performance, but at the same time builds legitimacy, differentiation, and capabilities that add to long-term resilience and sustainability. A meta-analysis of green entrepreneurial orientation shows a consistent and meaningful relationship with sustainable firm performance, but also confirms the heterogeneity of results depending on context and performance measures. (Öztürk et al., 2024). Thus, the theoretical contribution of the study confirms the existence of a "temporal mismatch": green entrepreneurship shows faster results on sustainability indicators (environmental/social endurance, legitimacy, continuity), while performance may be delayed until MSMEs succeed in stabilising processes, markets, and efficiency.

Furthermore, the variable of green finance on MSME performance has a significant positive and large effect ($\beta = 0.576$; $p < 0.001$), but green finance on MSME sustainability is significantly negative ($\beta = -0.120$; $p < 0.001$). Recent literature shows that access to green finance can encourage certain outputs such as sustainability activities/reporting, especially when pro-environmental behaviour and internal practices support implementation (Appiah-Kubi et al., 2024). However, the negative coefficient on sustainability in the study signals an important gap: green finance can be an effective "capital injection" to boost performance (production, sales, capacity), but it does not automatically trigger sustainability if (a) funds are not tied to use-of-proceeds and clear impact indicators, (b) MSMEs face high implementation/reporting burdens, or (c) internal culture and capabilities are not yet ready to translate financing into consistent green practices. These findings are in line with the empirical discourse that the effectiveness of sustainability orientation on performance can be reversed when organisations are willing to take costly trade-offs or when implementation demands interfere with commercial objectives—a "dark side" that needs to be acknowledged in MSME research (Kautonen et al., 2020). In practical terms, the research results suggest that green finance policies (including in Indonesia) must move from mere "access to funds" to impact-based

financing: there must be minimum standards for the use of funds, assistance, and simple (but credible) metrics so that performance improvements do not come at the expense of sustainability.

The results of testing green innovation on MSME performance were at the significance threshold ($\beta = 0.099$; $p = 0.056$), while green innovation on MSME sustainability was significantly positive ($\beta = 0.249$; $p < 0.001$). This pattern is consistent with meta-analytic literature: eco/green innovation tends to have a more stable contribution to sustainability dimensions (resource efficiency, waste/emission reduction, compliance) than to short-term financial performance, as financial impacts often depend on commercialisation success, market readiness, and internal capabilities (Oduro, 2024). In other words, your results close a gap that often appears in MSME studies: green innovation does not always immediately "pay off" in performance indicators, but it plays a real role in strengthening sustainability as a long-term outcome.

Further testing the effect of MSME performance variables on MSME sustainability shows a significant negative effect ($\beta = -0.188$; $p < 0.001$). This is a substantive result for theoretical contribution, as it confirms the trade-off between performance orientation (especially if performance is defined as short-term economic growth/results) and sustainability investments that require costs, process discipline, and the sacrifice of certain commercial opportunities. The literature on the "dark side" of sustainability orientation shows that performance can be suppressed when organisations consciously make trade-offs that prioritise sustainability goals over short-term commercial goals; consequently, the performance-sustainability relationship is not automatically positive and is highly sensitive to context, time horizon, and strategy design (Kautonen et al., 2020). Thus, your findings enrich the global and Indonesian discourse: MSMEs pursuing rapid expansion-based performance may reduce resource allocation for green/sustainability practices, unless there are locking-in mechanisms (culture, dynamic capabilities, and impact-based financing design).

In summary, the results of this study address theoretical gaps that often occur in green-MSME research: (i) many studies assume that the relationship between green and performance is universal and positive, while the results of this study show an differential relationship with potential trade-offs; (ii) the literature often separates organisational culture from green innovation/financing, even though culture appears to play a stronger role in sustainability than in performance; and (iii) green finance is often positioned as an instrument that always promotes sustainability, but the results of this study emphasise the importance of implementation readiness and governance of fund use. All of this is consistent with NRBV, which emphasises the development of green capabilities as a source of sustainable advantage, as well as dynamic capabilities, which explain why green impacts can be delayed, context-dependent, and require organisational reconfiguration (Hart, 1995). Furthermore, from a stakeholder perspective, differences in stakeholder pressure (consumers, regulators, financial institutions) can cause MSMEs to prioritise certain outcomes; salience theory explains that

stakeholders with higher legitimacy will have a greater influence on the strategic focus of MSMEs (Mitchell et al., 1997).

5. Conclusion and Suggestion

Although the test results provide strong statistical evidence for several key pathways, the interpretation of the findings needs to take into account several limitations. First, because the data design is generally observational and often cross-sectional in MSME studies, the long-term causal relationship between green strategies, performance, and sustainability is potentially influenced by time-lag and implementation dynamics (in line with the dynamic capabilities argument that the benefits of reconfiguration are not always instantaneous) (Teece et al., 1997).

Second, differences in the definitions and measurement horizons of MSME performance versus MSME sustainability may result in negative coefficients that reflect short-term trade-offs, rather than a rejection of the sustainability agenda itself—a phenomenon also recognised in the “dark side” literature when companies are willing to bear sustainability trade-offs for commercial goals (Kautonen et al., 2020).

Third, the positive effect of green finance on performance but negative on sustainability indicates the possibility of an implementation gap (governance, reporting, and internal readiness), so policy and managerial recommendations should emphasise strengthening use-of-proceeds mechanisms, mentoring, and more appropriate impact metrics for MSMEs (Appiah-Kubi et al., 2024).

Fourth, although this study documents differential and contrasting effects across the two outcomes, it does not formally test statistical asymmetry through nonlinear or interaction terms, threshold or quantile models, temporal lags, or the separate estimation of positive and negative changes. The differences in the sign and magnitude of the coefficients across outcomes are therefore described here as differential effects rather than as formally established asymmetry, and testing asymmetry explicitly is an important avenue for future research.

Fifth, the sample is dominated by manufacturing MSMEs (64.8%) and male respondents (79.0%), and firm age varies widely. Sector, firm age, firm size, and owner gender may all shape the relationships examined here; the present model does not yet include these characteristics as controls or report multi-group comparisons. Sector- and gender-based multi-group analysis, together with the inclusion of demographic controls, is therefore recommended to establish whether the identified trade-offs generalise beyond a manufacturing-dominated, male-led sample rather than being specific to it.

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Appendix A. Measurement Items and Outer Loadings

Note: Standardised outer loadings (λ) are taken from the SmartPLS estimation and correspond to the reported model; the number of items per construct matches the estimated instrument (5, 2, 2, 7, 5, and 9 items for green entrepreneurship, green innovation, green finance, organisational culture, MSME performance, and MSME sustainability, respectively). The exact wording of each item must still be inserted from the questionnaire; the SmartPLS indicator name is shown in brackets to aid matching and should be removed once the wording is added. Items marked † have $\lambda < 0.708$ and should be reviewed for possible removal, noting that all reported AVEs already reflect these items.

Code	Item statement (5-point Likert: 1 = strongly disagree ... 5 = strongly agree)	λ
GE1	(indicator: x17)	0.686
GE2	(indicator: x19)	0.619
GE3	(indicator: x116)	0.780
GE4	(indicator: x117)	0.779
GE5	(indicator: x119)	0.822
GI1	(indicator: x27)	0.760
GI2	(indicator: x28)	0.862
GF1	(indicator: x33)	0.886
GF2	(indicator: x39)	0.903
OC1	(indicator: x43)	0.674
OC2	(indicator: x45)	0.594
OC3	(indicator: x48)	0.520
OC4	(indicator: x49)	0.722
OC5	(indicator: x412)	0.908
OC6	(indicator: x413)	0.792
OC7	(indicator: x415)	0.761
PF1	(indicator: y12)	0.724
PF2	(indicator: y13)	0.666
PF3	(indicator: y14)	0.825
PF4	(indicator: y15)	0.860
PF5	(indicator: y16)	0.717
SU1	(indicator: y21)	0.846
SU2	(indicator: y22)	0.765
SU3	(indicator: y23)	0.873
SU4	(indicator: y24)	0.810
SU5	(indicator: y25)	0.740
SU6	(indicator: y26)	0.701
SU7	(indicator: y27)	0.668
SU8	(indicator: y28)	0.474
SU9	(indicator: y211)	0.506