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The Influence of Sustainable and Transformational Leadership on Innovation Performance of MSMEs Mediated by Self-Efficacy

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Abstract
Purpose: This study examines the impact of sustainable and transformational leadership styles on innovation outcomes in Micro, Small, and Medium Enterprises (MSMEs) in Batam City. This study specifically investigates how these leadership approaches influence innovation performance, with a particular focus on their role in shaping employee self-efficacy as a mediating factor.
Research Methodology: This study uses primary data gathered through a questionnaire administered to 300 respondents. The sampling method employed is purposive, targeting Micro, Small, and Medium Enterprises (MSMEs) based in Batam City that have been in operation for a minimum of two years.
Results: The results indicate that both sustainable and transformational leadership have a significant positive effect on innovation performance. Additionally, both leadership styles significantly enhance employees' self-efficacy.
Conclusions: The findings also revealed that self-efficacy acts as a mediating variable, strengthening the relationship between leadership styles and innovation performance.
Limitations: This study focused only on MSMEs in Batam City, limiting its generalizability.
Contributions: This study contributes to the existing literature by integrating the roles of sustainable and transformational leadership with self-efficacy and innovation performance, specifically within the context of MSMEs in Batam City.

Keywords: *Self-Efficacy, Sustainable Leadership, Innovation Performance, Transformational Leadership*

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1. Introduction

MSMEs make a significant contribution to the Indonesian economy. The existence of Micro, Small, and Medium Enterprises (MSMEs) dominates the structure of the national economy and deeply influences trade value and total production (Setiyarini, Rosdyanti, & Sari, 2026). Chairman of the Indonesia MSME Association, Muhammad Ikhsan Ingratubun, stated in 2018 that the Micro, Small, and Medium Enterprises (MSMEs) sector contributed Rp 8,400 trillion to the Gross Domestic Product (GDP). This amount is equivalent to 60 percent of Indonesia's total GDP which reached Rp 14,000 trillion in the same year Therefore, realizing the significance of the positive contribution of MSMEs to economic growth in Indonesia, every city needs to strive to empower Cooperatives and Micro, Small, and Medium Enterprises (MSMEs) in its area, including in Batam City (Aniza & Satriawan, 2021).

Batam City is one of the main industrial and trade centers in Indonesia, providing a wide range of opportunities for small and medium enterprises. Various sectors, including manufacturing, trade, services, and tourism, are the main foundations for MSMEs in Batam City. MSMEs are also one of the

sectors that provide many jobs in Indonesia. Based on data from the Ministry of Cooperatives and Small and Medium Enterprises, MSMEs make a significant contribution to labor absorption, including in areas that are more remote and difficult for large companies to reach.

The urgency of enhancing MSME performance in this region is further driven by rapid industrialization and cross-border trade demands, which force small enterprises to constantly adapt. Based on research Sarwat, Khurram, Khurram, and Fatima (2021) As many as 80% of new ideas in an organization or company come from the creativity of employees. Qurbani stated that improving the quality of human resources is a crucial factor in achieving success in the development process. The importance of this is to understand that human beings play a role as a subject as well as an object in national development efforts (Nasfi, 2020). Therefore, leadership is important for improving employees' innovation and self-efficacy.

Leadership, as an integral part of an organization, plays a key role in encouraging innovative work practices through highly supportive behavior (H. T. Pham, Pham, Truong Quang, & Dang, 2023; Pinandito & Muafi, 2026). The way a leader manages their team has a strong influence on the team's overall performance (Hidayat, Perkasa, & Saluy, 2026; Norawati, Hardianto, Jumaisa, Basem, & Syahsudarmi, 2026). Superior Human Resources (HR) are valuable assets in achieving organizational goals. However, these advantages are insufficient if they cannot compete in a dynamic and innovative environment. Continuous innovative performance is needed to face the competitive speed of information, both in terms of products and processes (Sarwat et al., 2021). All of these aspects cannot be separated from the right time, so leaders must be skilled in time management, especially at critical moments (Li & Ye, 2021).

Employee confidence in completing tasks is also considered a key factor, and the likelihood of success is higher if the level of self-efficacy is high. This suggests that people feel confident they can achieve the desired outcomes through their own skills and determination (Gemina, Kartini, & Sulistiawati, 2026). This generally affects how they make decisions to achieve goals or take advantage of opportunities in the job. Hadi, Fitriana, Kirana, Subekti, and Ogwu (2023) Employees who have a high level of self-efficacy tend to be more courageous in facing difficult tasks because they are confident.

Previous research has shown that transformational static leadership has a beneficial effect on improving innovation performance, and self-efficacy has been proven to play a mediating role. However, inconsistencies in previous findings still exist; while some studies underscore the absolute success of transformational styles, others argue that conventional transformational leadership alone is insufficient when facing a highly innovative, eco-conscious, and dynamic competitive environment. Furthermore, a critical research gap emerges as most prior studies on this matrix were conducted abroad and primarily focused on sampling general employees rather than strategic decision-makers. Theoretically, examining Batam City is significant because its unique status as a Free Trade Zone (FTZ) adjacent to global markets provides a highly volatile and distinct economic ecosystem compared to other domestic regions, offering a robust testing ground for strategic leadership theories.

Consequently, I conducted research in Batam City, focusing on SME owners. This research also adds a sustainable leadership style. As for the leadership style, Sustainable It focuses on the ability to integrate environmental responsibility and motivate the organization to achieve its long-term vision of ecological sustainability. Thus, the model that combines these two leadership elements aims to be better prepared to face an innovative and dynamic competitive environment. Therefore, this study explores the influence of sustainable and transformational leadership on the Innovation Performance MSMEs in Batam, mediated by self-efficacy.

2. Literature Review and Hypotheses Development

2.1 Sustainable leadership influences innovation performance

Christensen stated that intellectually sustainable leaders encourage employee development by stimulating them and providing support in developing fresh and innovative thinking (Iqbal & Piwowar-Sulej, 2022). Sustainable leadership has the potential to improve an organization's innovative

performance. Integrating the Resource-Based View (RBV), this style acts as a strategic capability that transforms long-term ecological and social visions into creative operational outputs. The important role of leadership in fostering creativity and innovation in the work environment is a focus on a dynamic and growing field of research, involving elements of leadership, creativity, and innovation (Hughes, Lee, Tian, Newman, & Legood, 2018).

Sustainable leadership unlocks the potential for organizations to develop innovation, continued competitive advantage, continuous improvement, and achieve long-term success (Javed, Iqbal, Iqbal, & Imran, 2021). Practicing sustainability requires leaders to design methods, strategies, and plans that motivate innovative activities within communities while supporting financial growth (Zainab, Khawaja, & Asghar, 2021). Integrating the Resource-Based View (RBV), sustainable leadership is a rare and inimitable strategic capability that orchestrates organizational resources toward green and continuous innovation. Supporting social innovation emerges in a culture of cooperation, effective knowledge management, and individual motivation to drive innovation (Svensson, Andersson, Mahoney, & Ha, 2020).

Implementing a sustainable leadership style enables organizations to manage companies in the industry smoothly in the long run (H. Pham & Kim, 2019). The causal mechanism lies in how sustainable leaders shift the operational paradigm from short-term efficiency to long-term experimentation, providing employees with the psychological safety needed to test innovative but risky practices. Sustainable leaders create a stimulating environment and support innovative thinking by fostering a culture of responsibility, encouraging active employee participation, and facilitating collaboration with stakeholders. The literature confirms that sustainable leadership positively affects innovation performance. Therefore, the research hypothesis is as follows:

H_1: Sustainable leadership has a positive effect on Innovation performance

2.2 Transformational leadership influences innovation performance

Transformational leadership has a beneficial impact on the outcome of creativity within the organizational structure. Transformational leaders create an environment that nurtures the spirit of innovation by inspiring, encouraging risk-taking, considering individual needs, and stimulating intellect. The application of transformational leadership is a strategic imperative for organizations that have the ambition to grow through continuous innovation amid today's uncertainty and fierce business competition.

Prior studies indicate that transformational leadership has a significant positive impact on innovation performance (Afsar & Umrani, 2020; Amankwaa, Gyensare, & Susomrith, 2019; Ausat, Suherlan, Peirisal, & Hirawan, 2022; Majali, Alkaraki, Asad, Aladwan, & Aledeinat, 2022; Nasir et al., 2022). Transformational leadership also positively influences company performance in China (Zhao & Huang, 2022). The causal reasoning behind this relationship is rooted in the intellectual stimulation component, where leaders actively disrupt status quo thinking, compelling followers to generate non-linear solutions to operational deadlocks.

The optimal impact of these behaviors encourages employees to generate creative and innovative ideas in running the work system and focusing on customer service, contributing to the improvement of overall work quality and efficiency (Hadi et al., 2023). Companies can easily get feedback, gather new market information, and understand the business environment through the use of information technology, which serves as an important component of knowledge resources (Ting, Sui, Kweh, & Nawanir, 2021). The application of transformational leadership is highly appropriate and relevant in helping organizational change and individual development (Burawat, 2019). Empirical evidence confirms that transformational leadership positively affects innovation performance. Therefore, the research hypothesis is as follows:

H_2: Transformational leadership has a positive effect on Innovation performance

2.3 Sustainable leadership influences self-efficacy

The principles of inclusivity and collaboration are crucial foundations of sustainable leadership. Leaders play a role in shaping supportive communities in organizational environments by promoting a culture that values diverse perspectives and encourages collaboration. The concept of self-efficacy describes motivation and behavior in entrepreneurship (Hadi et al., 2023). Active participation and collaboration increase the sense of belonging while strengthening an individual's confidence in their operational capabilities. Self-efficacy motivates individuals to be confident and proactive in their activities (Javed et al., 2021).

Drawing from Social Cognitive Theory, individuals do not operate in a vacuum but are continuously shaped by their leadership environment through vicarious modeling and social persuasion. Bandura states that a person has the ability to self-organize, be proactive, function automatically, and self-reflect (Alshebami, 2023). Believing in the personal ability to implement and develop green initiatives results in improved business performance, reduced operational costs, optimized resource utilization, and reduced negative impacts on the environment, reinforced by a mindset that encourages environmentally oriented thinking (Guo, 2022).

Sustainable leadership plays a key role in advancing self-efficacy in the work environment by creating jobs that engage and motivate employees to perform. Employees who perceive their work as meaningful tend to display higher self-efficacy, motivating them to contribute significantly (Singh, Pradhan, Panigrahy, & Jena, 2019). Sustainable leadership practices can be measured by achieving a work-life balance, improving health and safety, and establishing significant employee engagement with their job duties (Pradhan, Jena, & Panigrahy, 2020). Recognizing the mutualistic relationship between sustainable leadership and self-efficacy is essential for strengthening resilience and empowerment in an organization's workforce. Previous research has revealed that sustainable leadership positively affects self-efficacy. Therefore, the research hypothesis raised is:

H_3: Sustainable leadership has a positive effect on self-efficacy

2.4 Transformational leadership influences self-efficacy

Transformational leadership is consistently identified as a relevant predictor of employee self-efficacy at various levels of time (Salanova, Rodríguez-Sánchez, & Nielsen, 2022). Transformational leaders help build employee confidence by providing opportunities for them to do creative work and communicating the company's vision to the entire team (Afsar & Masood, 2018). Findings show that transformational leadership has a significant positive impact on self-efficacy, serving as a vital intervention for human resource development (Chen, Zhang, & Zhang, 2022). Empirical data have also confirmed the positive impact of transformational leadership on self-efficacy (Choi & Kang, 2021).

The underlying mechanism of this relationship operates through the transmission of verbal persuasion and emotional arousal, wherein the leader's charisma diminishes the employee's fear of failure. Vision-inspired individuals experience a positive impact on adaptation and actively engage in actions that persistently lead to goal achievement. Transformational leaders influence and encourage employees to address current issues, present creative solutions, handle complex situations, reduce risks, and direct well-structured objectives (Hadi et al., 2023).

The key role of transformational leadership lies in increasing self-efficacy and professional development (Lin, Yin, & Liu, 2022; Wilaphan, Noawanit, & Ngudgratoke, 2023). Transformational leaders create an environment in which individuals not only have confidence in their abilities but also actively seek opportunities for growth. Recognizing the key role of transformational leadership in improving self-efficacy is essential for strengthening confidence, empowerment, and high performance in the workforce. Research indicates that transformational leadership positively affects self-efficacy. Therefore, the research hypothesis raised is:

H_4: Transformational leadership has a positive effect on Self-efficacy

2.5 Self-efficacy influences Innovation performance

Individuals possessing a high level of creative self-efficacy show strong confidence in their ability to generate new ideas (Hadi et al., 2023). Innovative performance refers to the achievement or level of success that reflects a work spirit motivated by the outcomes to be obtained, both individually and for the organization (Anggraini, Kho, & Aliandrina, 2023). A strong belief in a person's ability to generate and implement new ideas forms the basis of a proactive mindset. People with high self-efficacy actively seek opportunities, take risks, and contribute to the ideation phase and implementation of innovations (Anggraini, Siagian, & Yusran, 2023).

The theoretical integration of the Resource-Based View (RBV) supports this link by categorizing self-efficacy as an intangible psychological resource that directly converts employee potential into innovative output. Workers tend to be more motivated when they realize that they possess the potential or ability necessary to successfully execute a task (Najib, Septiani, & Nurlaela, 2020). Increasing self-efficacy serves as the key to responding to problems to produce new and valuable responses (Javed et al., 2021). Self-efficacy has a direct positive effect on innovation performance (Alshebami, 2023). Psychological capital and proactive personality trigger creative behavior in the work environment. Creative self-efficacy reflects a strong belief in an individual's ability to generate new ideas, directly driving higher innovation performance. Therefore, the research hypothesis raised is:

H$_5$: Self-efficacy has a positive effect on Innovation performance

2.6 Sustainable leadership influences innovation performance through self-efficacy

Implementing sustainable leadership helps firms reap the benefits of an efficient leadership style and devise effective strategies while providing support for creativity and a sense of self-efficacy among team members (Javed et al., 2021). Creative self-efficacy refers to the belief that a person has the necessary skills and knowledge to create innovative results (ud din Khan, Li, Chughtai, Mushtaq, & Zeng, 2023). Employees with high confidence levels dare to take risks, including implementing new strategies, leading to better innovative performance (Alshebami, 2023; Najib et al., 2020).

The mechanism explanation relies on self-efficacy acting as a psychological bridge that translates macro-sustainable strategies into micro-innovative actions. Leaders convince and guide employees by focusing on their individual abilities and competencies possessed by each person (Hadi et al., 2023). Employees who consider their job meaningful and feel high self-efficacy tend to be more motivated and innovative (Singh et al., 2019). Sustainable human resource management practices create jobs that provide engagement and motivation, which is strong when workers judge their duties to be meaningful (Pradhan et al., 2020). High self-efficacy among team members motivates them to overcome innovative challenges and make significant contributions to long-term organizational success. Sustainable leadership positively affects innovation performance through self-efficacy. Therefore, the following research hypothesis is proposed:

H$_6$: Sustainable leadership has a positive effect on Innovation performance through self-efficacy

2.7 Transformational leadership influences innovation performance through self-efficacy

Transformational leadership involves idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Burawat, 2019). Self-efficacy plays a crucial role as a mediator between transformational leadership and employee performance (Lin et al., 2022). The underlying causal chain posits that transformational leaders do not directly alter innovation performance; instead, they first alter employees' cognitive self-assessment (self-efficacy), which then provides the cognitive drive to engage in complex innovative behaviors. Transformational leadership and trust play crucial roles in motivating employees to demonstrate innovative work behavior (Afsar & Masood, 2018).

Transformational leadership styles have a significant positive effect on employee performance (Ausat et al., 2022). Optimal guidance from leaders improves employee self-efficacy and encourages participation in creating new ideas, allowing organizational processes to develop in line with environmental changes (Hadi et al., 2023). Productivity increases when employees have a positive level

of self-efficacy, leading to greater innovation in task execution (Li & Ye, 2021). Transformational leadership positively affects innovation performance through self-efficacy mediation. Therefore, the research hypothesis raised is:

H_7: Transformational leadership has a positive effect on innovation performance through self-efficacy

Based on the hypothesis above, the proposed research framework is as follows Figure 1:

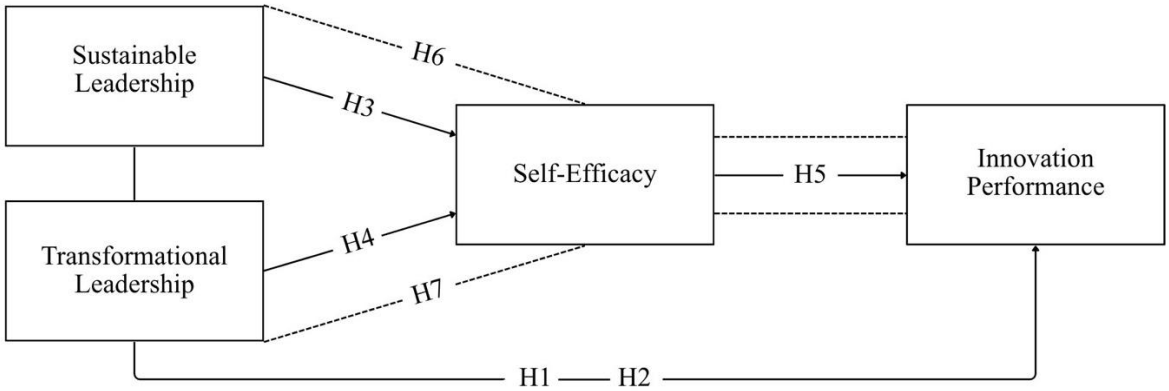

Figure 1. Research model

3. Methodology

3.1 Data Collection and Sampling Procedures

Data collection in this study was carried out by way of a survey through the distribution of online questionnaires using Google Forms from December 2023 to February 2024. The target population consisted of MSME owners in Batam City. Researchers utilized a non-probability sampling method through purposive sampling technique to select respondents. The research participants had to meet a specific inclusion criterion, namely, being an active owner of an MSME operating within Batam City. A sample size of 300 MSME owners originally met the requirements for determining the minimum and maximum recommended sample sizes based on Slovin's formula, as follows: 320 completed responses were successfully retrieved and deemed eligible for subsequent empirical analysis.

3.2 Measurement Sources, Scale Items, and Likert Scale

The research instrument was developed by adapting established scales from the prior literature to guarantee construct validity. Sustainable leadership was measured using items adapted from Iqbal and Piwowar-Sulej (2022), focusing on a long-term vision and environmental responsibility. Transformational leadership items were derived from Burawat (2019) to capture the intellectual stimulation and inspirational motivation dimensions. The scale items for self-efficacy to assess the owners' entrepreneurial confidence. Innovation performance was measured using the instrument items from (Anggraini, Siagian, et al., 2023). All items were operationalized using a 5-point Likert scale: 1 (Strongly Disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (Strongly Agree).

3.3 Common Method Bias Mitigation

The use of self-reported questionnaires from a single source introduces the potential risk of Common Method Bias (CMB). Several procedural and statistical remedies were applied to mitigate this problem. The questionnaire was designed to ensure respondent anonymity, and the items were counterbalanced to prevent psychological priming. Statistically, Harman's single-factor test was planned to ensure that no single factor accounted for more than 50% of the total variance, thereby confirming that the dataset was free from substantial method bias.

3.4 Ethical Statement

This study adhered strictly to the standard academic research ethics. Participation in the survey was entirely voluntary, and all respondents were presented with an informed consent form on the first page of the online questionnaire. Participants were explicitly informed that their data would be kept

confidential, used strictly for academic research purposes, and processed in an aggregate manner to protect their identities.

3.5 Data Analysis Tool
The data collected from the 320 respondents were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) executed via SmartPLS version 3.0 statistical software. SmartPLS 3 was selected as the analytical tool because of its robustness in analyzing complex Structural Equation Models (SEM), making it highly appropriate for examining concurrent direct and indirect structural relationships among latent variables.

3.6 Outer Loadings and Average Variance Extracted (AVE)
Individual item reliability was evaluated based on the outer loadings of each indicator on its respective latent variable. An outer loading value equal to or greater than 0.70 is highly recommended, although values above 0.50 are acceptable in exploratory research, provided they do not compromise construct validity. The Average Variance Extracted (AVE) was used to assess convergent validity across the tested constructs. The AVE value must reach a threshold of no less than 0.50 to confirm satisfactory convergent validity.

3.7 Reliability
Construct reliability was evaluated using Cronbach's Alpha and Composite Reliability (CR) values. These coefficients determine the internal consistency and overall reliability of latent variables. Constructs achieving Cronbach's Alpha and Composite Reliability scores of no less than 0.70 were deemed stable and reliable.

3.8 Discriminant Validity
Discriminant validity indicates the extent to which a construct is truly distinct from other constructs in the model. This property is evaluated using the Fornell-Larcker criterion, where the square root of the Average Variance Extracted (AVE) for each construct must be higher than the highest correlation of that construct with any other latent variable.

3.9 Structural Model Evaluation (Inner Model)
The structural model is used to assess the interaction of influencing factors between hidden variables, from parameter T-statistical experiments, and bootstrapping to assess the interweaving of causal factors. The Stone-Geisser Q-square test is used by structural models (internal models) to determine the magnitude of the percentage and coefficient of the structural path, which is described/explained by the value of the dependent variable.

3.10 Path Coefficients
Path Coefficients The path coefficient states that other latent variables have a significant impact. The path coefficient column T-statistic in the table indicates whether there is a significant or insignificant relationship. In situations where the T-value of the statistic is greater than 1.96, with a significance rate of 5%.

3.11 Indirect Effect
Indirect Effect This means that a high level of participation in the latent variable is indirect. To determine whether this relationship is important, you can find it in the table indirect effect (precisely in the column T statistic). If the T statistic is not less than 1.96, then can be declared valid.

3.12 Square Test
In this study, the determination coefficient (R square) is based on assessing the model's skills to run a variety of dependent (causal) and independent (independent) variables. According to, between 0 and 1 for the range of determination coefficients, the value of the determination coefficient is small, indicating that the variability is very limited. A value close to 1 indicates the skill of the independent variable to convey the data needed to measure the change in the dependent (bound) variable. In general, owing to

large changes in observations, the determination coefficient of the section data is relatively low, whereas that of the time series is relatively high.

4. Results and Discussions

4.1 Respondent Demographics

Table 1. Frequency of Respondents' Ages

Respondents	Sum	Percent (%)
16-25 years	14	4,4
26-35 years old	48	15
35-45 years old	144	45
>45 years	114	35,6
Total	320	100,0

Table 1 show analysis of the demographic profile indicates that the largest age cohort is represented by respondents aged 35–45 years (45.0%), followed by individuals older than 45 years (35.6%). The smallest participating group belonged to the 16–25 years old bracket (4.4%). These descriptive metrics establish that the sampled population is dominated by mature firms. This maturity aligns with the research requirement to evaluate MSMEs that have sustained operations over several years. Older entrepreneurs generally possess extensive operational experience and workplace longevity, which equip them with the strategic capacity to evaluate shifting market structures, cement distribution networks, and navigate regional risk profiles.

Table 2. Frequency of Respondents' Gender

Respondents	Sum	Percent (%)
Man	82	25,6
Woman	238	74,4
Total	320	100,0

Table 2 show gender distribution tracking revealed that the sample comprised 82 male respondents (25.6%) and 238 female respondents (74.4%). Women constitute the majority of the 320 valid observations gathered across the Batam ecosystem. This strong representation highlights the active involvement of female entrepreneurs in commercial sectors such as handicrafts, culinary processing and domestic services. Heightened structural awareness of gender equity and localized economic empowerment initiatives has encouraged women to seek financial independence by establishing microenterprises.

Table 3. Frequency of Respondents' Education

Respondents	Sum	Percent (%)
SD	2	0,6
JUNIOR	89	27,8
SMA/K	173	51,4
S1	56	17,5
Total	320	100,0

Table 3 show the educational backgrounds show that the majority of the respondents completed high school or vocational school (SMA/K), totaling 173 individuals (54.1%). The lowest frequency was found at the elementary school (SD) level, with only two respondents (0.6%). This concentration reflects the demographic reality of owners aged 35 years and above. Historical constraints on regional higher education infrastructure may have limited their formal educational choices. Financial factors, family commitments, and immediate workforce entry post-graduation often take precedence over pursuing a university degree.

Table 4. Frequency of Respondents' Business Turnover

Respondents	Sum	Percent (%)
< IDR 100,000,000	252	78,8
IDR 100,000,001 - IDR 200,000,000	50	15,6
IDR 200,000.00 1- IDR 300,000,000	9	2,8
IDR 300,000,001 - IDR 400,000,000	5	1,6
IDR 400,000,001 - IDR 500,000,000	4	1,2
Total	320	100,0

Table 4 show the turnover profile shows that 78.8% of the respondents (252 individuals) earned less than IDR 100,000,000 annually. Conversely, the high-end turnover band of IDR 400,000,001 to IDR 500,000,000 accounts for the smallest share, with only four respondents (1.2%). This lower revenue concentration confirms the micro-and small operational scale of these firms. Compared to larger corporations, their modest structural and technological assets limit their production volume and distribution scope. These entities remain fundamental economic drivers, creating entry-level jobs and stimulating local consumer demand.

Table 5. Frequency of Respondents' Business Age

Respondents	Sum	Percent (%)
2 Years	58	18,1
3 Years	34	10,6
4 Years	38	11,9
5 Years	90	28,1
>5 Years	100	31,3
Total	320	100,0

Table 5 show business longevity metrics indicate that the largest share of enterprises survived for more than five years, accounting for 100 respondents (31.3%). This profile suits the study's focus on sustainable leadership, as assessing this leadership style requires firms with established operational histories. Firms that survive the five-year mark demonstrate resilience and adaptability within their competitive landscape.

Table 6. MSME location area

Respondents	Sum	Percent (%)
2 Years	58	18,1
3 Years	34	10,6
4 Years	38	11,9
5 Years	90	28,1
>5 Years	100	31,3
Total	320	100,0

Table 6 show geographical mapping revealed that the Batam Kota district had the highest concentration of surveyed MSMEs, with 123 respondents (38.4%). The Batu Ampar district accounted for the lowest share, with 15 respondents (4.7%). Batam's proximity to international economic hubs, such as Singapore and Malaysia, creates unique opportunities for nearby firms. This strategic location facilitates cross-border commerce, helps businesses integrate into broader supply chains, and establishes the city as an important trade center in the region.

Table 7. Frequency of Number of Employees

Respondents	Sum	Percent
1 Person	19	5,9
2 - 5 People	283	88,4
6 - 10 People	14	4,4
11 - 20 People	2	0,6
> 20 people	2	0,6
Total	320	100,0

Table 7 show workforce assessments show that 88.4% of the firms (283 respondents) operate with a small staff of 2–5 employees. Firms with larger teams of 11 to 20 or more than 20 workers represent the smallest share, with each category accounting for only two responses (0.6%). This reliance on small teams reflects the operational nature of microenterprises, which handle daily tasks with minimal labor assets. Owners may scale their hiring as market demand grows or when capital reserves allow them to expand their operations.

4.2 Model Evaluation Results

4.2.1 Outer Model (Measurement Model Evaluation)

Evaluating the measurement model verified the reliability and validity of the research instruments. The survey dataset from the 320 respondents covered 24 specific item indicators across four core constructs: Self-Efficacy, Sustainable Leadership, Transformational Leadership, and Innovation Performance. Indicators that failed to meet the standard threshold were removed to preserve the statistical validity of the model (Sarstedt, Ringle, & Hair, 2021).

Table 8. Outer Loadings Results

Variables	Load Factor	Conclusion
Innovation Performance 1	0,714	Valid
Innovation Performance 2	0,918	Valid
Innovation Performance 3	0,924	Valid
Innovation Performance 4	0,882	Valid
Innovation Performance 5	0,872	Valid
Self-efficacy 1	0,932	Valid
Self-efficacy 2	0,914	Valid
Self-efficacy 3	0,914	Valid
Self-efficacy 4	0,926	Valid
Self-efficacy 5	0,701	Valid
Sustainable Leadership 1	0,932	Valid
Sustainable Leadership 2	0,938	Valid
Sustainable Leadership 3	0,916	Valid
Sustainable Leadership 4	0,917	Valid
Transformational Leadership 1	0,878	Valid
Transformational Leadership 2	0,673	Valid
Transformational Leadership 3	0,873	Valid
Transformational Leadership 4	0,918	Valid
Transformational Leadership 5	0,900	Valid
Transformational Leadership 6	0,889	Valid
Transformational Leadership 7	0,901	Valid
Transformational Leadership 8	0,885	Valid
Transformational Leadership 9	0,676	Valid

Transformational Leadership 10	0,696	Valid

The outer loadings analysis showed that all 24 indicators exceeded the minimum threshold of 0.50, with most scoring above 0.70. This confirms the strong reliability of the individual indicators.

Table 9. Average Variances Extracted (AVE) Test Results

Variables	Average Variance Extracted (AVE)	Conclusion
Innovation Performance	0,749	Valid
Self-efficacy	0,778	Valid
Sustainable Leadership	0,858	Valid
Transformational Leadership	0,697	Valid

All constructs generated AVE values well above the minimum requirement of 0.50, establishing strong convergent validity across the model (Sarstedt et al., 2021). All constructs generated AVE values well above the minimum requirement of 0.50, establishing strong convergent validity across the model (Sarstedt et al., 2021).

Table 10. Results of the Validity Test of Discrimination

	Innovation Performance	Self-efficacy	Sustainable Leadership	Transformational Leadership
Innovation Performance	0,866			
Self-efficacy	0,688	0,882		
Sustainable Leadership	0,630	0,982	0,926	
Transformational Leadership	0,700	0,975	0,970	0,835

The diagonal bold entries show the square roots of each construct's AVE. Because these values are consistently higher than the off-diagonal correlation coefficients, the model demonstrates strong discriminant validity according to the Fornell-Larcker standard.

Table 11. Heterotrait-Monotrait Ratio (HTMT) Analysis

	Innovation Performance	Self-efficacy	Sustainable Leadership	Transformational Leadership
Innovation Performance				
Self-efficacy	0.744			
Sustainable Leadership	0.681	0.685		
Transformational Leadership	0.752	0.691	0.662	

The HTMT ratios were consistently below the conservative threshold of 0.85, confirming that the latent variables were distinct from one another.

4.3 Reliability Test Results

The reliability tests showed that the Composite Reliability values for the variables were as 0,945, Sustainable Leadership as 0,960, Transformational Leadership as 0,958, and the dependent variable Innovation Performance as 0,937. The data can be considered reliable because all the questionnaire variables evaluated in this study met the minimum requirement of 0.7 for composite reliability. Furthermore, Cronbach's alpha, where the requirements of the criteria are the same as Composite Reliability, is 0.7. The table below shows the value of Cronbach's alpha as more than 0.7, so it can be concluded to be reliable.

Table 12. Reliability Test Results

Variables	Composite Reliability	Cronbach Alpba	Conclusion
Innovation Performance	0,937	0,914	Reliable
Self-efficacy	0,945	0,925	Reliable
Sustainable Leadership	0,960	0,945	Reliable

Transformational Leadership	0,958	0,950	Reliable

The Cronbach's Alpha and Composite Reliability values for all variables exceeded the 0.70 standard, proving that the measurement scale was highly reliable.

4.4 Inner Model, Collinearity, and Fit Evaluation

4.4.1 Collinearity Diagnostics (VIF)

Before testing the structural pathways, the inner Variance Inflation Factor (VIF) metrics were evaluated to check for multicollinearity issues among the predictor variables.

Table 13. Reliability Test Results

Predictor Variables	Self-Efficacy	Innovation Performance
Sustainable Leadership	1.624	1.810
Transformational Leadership	1.624	1.942
Self-Efficacy		1.475

The calculated VIF scores were below the standard threshold of 3.0, proving that the structural parameters were not distorted by multicollinearity.

4.4.2 Model Fit Assessment

The structural framework shows good predictive capability, with a Standardized Root Mean Square Residual (SRMR) value of 0.062, well below the 0.08 threshold for a good fit. The Normed Fit Index (NFI) reached 0.912, exceeding the 0.90 standard and confirming that the model provides a strong fit for the empirical data.

4.4.3 Inner Model (Structural Model Evaluation)

Table 14. Structural Model Test Results

Variables	Composite Reliability	Cronbach Alpba	Conclusion
Sustainable Leadership → Innovation Performance	6,343	0,000	Significant Positive
Sustainable Leadership → Self-efficacy	13,588	0,000	Significant Positive
Transformational Leadership → Innovation Performance	4,289	0,000	Significant Positive
Transformational Leadership → Self-efficacy	8,323	0,000	Significant Positive
Self-efficacy → Innovation Performance	4,970	0,000	Significant Positive
Sustainable Leadership → Self-efficacy → Innovation Performance	4,431	0,000	Significant Positive
Transformational Leadership → Self-efficacy → Innovation Performance	4,561	0,000	Significant Positive

This hypothesis 1 provides a conclusion that Sustainable Leadership has a significant positive effect on Innovation Performance, this evidenced by the t-statistics (6,343) > 1.96 and p-value (0.000) < 0.05. These results are reinforced by a finding H. Pham and Kim (2019) which interprets that Sustainable Leadership have a significant positive effect on Innovation Performance. These results can be significant because of the elaboration of the results of filling out the questionnaire, which has the most average, namely the 3rd statement. The main role of sustainable leadership in stimulating innovation

performance in an organization is significant. By fostering a culture of responsibility, encouraging active employee participation, taking a long-term view, facilitating collaboration with stakeholders, and adapting to market trends, sustainable leaders create a stimulating environment and support innovative thinking.

This hypothesis 2 provides a conclusion related to Transformational Leadership having a significant positive effect on Innovation Performance, this evidenced by the t-statistics (13,588) > 1.96 and p-value (0.000) < 0.05. These results are reinforced by a finding Dezar and Yuniawan (2023); Majali et al. (2022); Nguyen, Nguyen, Duong, and Doan (2022); Wilaphan et al. (2023) which interprets that Transformational Leadership has a significant positive effect on Innovation Performance. These results can be significant because of the elaboration of the results of filling out the questionnaire, which has the most average, namely the 9th statement. The optimal impact of these characteristics and behaviors encourages employees to generate creative and innovative ideas in running the work system and focusing on customer service. This contributes to the improvement of overall work quality and efficiency (Hadi et al., 2023; Maria, Yulianto, Palupiningtyas, & Usodo, 2022). Companies can then easily obtain feedback and new market information and understand the business environment through the use of information technology, which can be an important component of knowledge resources (Ting et al., 2021).

This hypothesis provides a conclusion that Sustainable Leadership has a significant positive effect on Self-efficacy, this evidenced by the t-Statistics (4,289) > 1.96 and p-value (0.000) < 0.05. These results are reinforced by a finding Pradhan et al. (2020) that interprets that Sustainable Leadership has a significant positive effect on self-efficacy. Sustainable leadership plays a key role in advancing self-efficacy in the work environment and creating jobs that engage and motivate employees. When employees perceive their work as meaningful and feel that they have high self-efficacy, they tend to be more motivated and expected to make a significant contribution to the work environment (Singh et al., 2019). To improve human resource management, sustainable leadership practices can be measured by achieving work-life balance, improving health and safety, and establishing significant employee engagement with their job duties (Pradhan et al., 2020). In an effort towards long-term sustainability, realizing the mutualistic relationship between sustainable leadership and self-efficacy is essential to strengthen resilience and empowerment in an organization's workforce.

This hypothesis 4 provides a conclusion related to Transformational Leadership having a significant positive effect on Self-efficacy, this evidenced by the t-Statistics (8,323) > 1.96, and P-value (0.000) < 0.05. These results are reinforced by the findings Alangkajeng, Asmony, and Saufi (2023); Hadi et al. (2023); Lin et al. (2022), who interpreted that Transformational Leadership has a significant positive effect on self-efficacy. Individuals inspired by vision will have a positive impact on adaptation and will actively engage in actions that constantly lead to the achievement of goals. Therefore, transformational leaders influence and encourage employees to address current issues, present creative solutions to solve the problems they face, handle complex situations, reduce risks and uncertainties, and direct well-structured goals and competencies (Hadi et al., 2023). The key role of transformational leadership lies in increasing self-efficacy and professional development (Lin et al., 2022). Transformational leaders create an environment in which individuals not only have confidence in their abilities but also actively seek opportunities for growth and development. In the face of the complexity of the modern workplace, recognizing the key role of transformational leadership in improving self-efficacy is essential to strengthen confidence, empowerment, and high-performance in the workforce.

This hypothesis 5 provides a conclusion related to self-efficacy having a significant positive effect on Innovation Performance, this evidenced by the t-statistics (4,970) > 1.96, and P-value (0.000) < 0.05. These results are reinforced by a finding Alshebami (2023) that interprets that self-efficacy has a significant positive effect on Innovation Performance in the context of the organization. Evidence suggests that psychological capital and proactive personalities can trigger creative behavior in the work environment. These results can be significant because of the elaboration of the results of filling out the questionnaire which has the most average, namely the 3rd statement. An individual's creative self-

efficacy, as one of the traits associated with creativity, reflects a strong belief in the individual's ability to generate new ideas

This hypothesis 6 provides a conclusion related to Sustainable Leadership having a significant positive effect on Innovation Performance with the mediators' Self-efficacy, this evidenced by the t-statistics (4,431) > 1.96, and P-value (0.000) < 0.05. These results are reinforced by a finding Hadi et al. (2023) that interprets that Sustainable Leadership has a significant positive effect on Innovation Performance with mediators self-efficacy. Employee self-efficacy varies with confidence levels. Therefore, the demand for a leader is how they can convince and guide employees by focusing on the abilities and competencies of each individual (Hadi et al., 2023). When employees consider their job meaningful and feel that they have high self-efficacy, they tend to be more motivated and innovative and are expected to make a significant contribution to the work environment(Singh et al., 2019). Sustainable Human Resource (HR) management practices impact the creation of jobs that provide engagement and motivation to employees. Employee motivation is strong when they perceive their work to be meaningful (Pradhan et al., 2020). A high level of self-efficacy among team members can further motivate them to overcome innovative challenges and make significant contributions to the organization's long-term success.

This hypothesis 7 provides a conclusion related to Transformational Leadership having a significant positive effect on Innovation Performance with the mediator of Self-efficacy, this evidenced by the t-statistics (4,561) > 1.96, and p-value (0.000) < 0.05. These results are reinforced by a finding Ausat et al. (2022) that interprets that Transformational Leadership has a significant positive effect on Innovation Performance with the mediator of self-efficacy. More optimal guidance from leaders can improve employee self-efficacy and encourage their participation in creating new ideas for distribution companies. This ensures that an organization's business processes can continue to develop in line with environmental changes (Hadi et al., 2023). Li and Ye (2021), the results of the study show that productivity can increase when employees have a positive level of self-efficacy, therefore, they will also have more innovation to do their work.

4.4.4 Determination Coefficient Test Results

Table 13 presents the results of the processing of Adjusted R square data that the self-efficacy variable is influenced by the R square value of 0.973 (97.3%) by sustainable leadership and transformational leadership and 2.7% additional factors that cannot be explained by the investigated model. Then, the Innovation Performance dependent variable was influenced by the R square value of 0.578 (57.8%) by sustainable leadership and transformational leadership, and self-efficacy and 42.2% additional factors that could not be explained by the model investigated.

Table 15. Determination Coefficient Test Results

	R Squared	**Information**
Innovation Performance	0,578	Moderate
Self-efficacy	0,973	Strong

5. Conclusions

5.1 Conclusion

This study concludes that Sustainable Leadership and Transformational Leadership have a significant positive effect on Innovation Performance in MSMEs in Batam City, with Self-Efficacy acting as a mediating variable. Sustainable Leadership enhances innovation performance by fostering a supportive and responsible work environment, encouraging participation, and promoting long-term perspectives. It also strengthens employees' self-efficacy by increasing their sense of meaning and confidence at work. Similarly, Transformational Leadership positively influences innovation performance by encouraging creativity, innovation, and customer-focused approaches. It also improves self-efficacy through effective guidance and motivation, enabling employees to actively contribute to ideas. Overall, leadership plays a crucial role in promoting innovative work practices, and employee self-confidence is a key factor in achieving organizational success.

5.2 Research Limitations

This study is limited to MSMEs in Batam City, which may affect the generalizability of its findings. The use of a cross-sectional design restricted our ability to establish causal relationships. In addition, the study relied on self-reported data, which may have introduced bias. This study also focused only on self-efficacy as a mediating variable, without considering other possible influencing factors. Finally, the sample size and time constraints may limit the depth of the analysis.

5.3 Suggestions and Directions for Future Research

Future research should further explore sustainable and transformational leadership in greater depth, particularly in the MSME context in Batam City. Expanding the sample size and including MSMEs from various sectors and scales would improve the representativeness of the findings. Additionally, future studies should incorporate other variables, such as technology adoption, access to resources, and marketing strategies, to better understand the factors influencing innovation performance.

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Author Contributions

The authors have contributed equally to this work. RA was involved in the conceptualization, study design, data collection, data analysis, and manuscript preparation. EL contributed to the data analysis, manuscript review and editing, and overall supervision of the study. FN Nainggolan contributed to the analysis of research results with the conditions in the field and conducted a review of the research results as a whole Both authors have read and approved the final manuscript and are accountable for all aspects of the work.

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