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Article

Exploring the challenges and opportunities for sustainability reporting adoption among small and medium enterprises: A case in a developing country in Asia

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Abstract: Sustainability has turned into a critical focus for businesses, drawing considerable interest from the commercial sector and scholarly environments. While empirical investigations have been conducted regarding sustainability reporting within small and medium enterprises, only a limited number of companies are subjected to increased pressure to adopt sustainability reporting practices, thereby ensuring enhanced transparency and disclosure in their financial and sustainability disclosures. This research, framed by Institutional Theory, delves into how challenges in sustainability reporting obstruct organizations from properly evaluating and sharing their progress on sustainability aims. With an explanatory research framework in place, we circulated survey questionnaires to 400 participants, who were randomly drawn from a population of 28,927 registered SMEs in Metro Manila, Philippines. The application of Interpretative Structural Modelling and MICMAC Analysis revealed that the absence of regulatory frameworks, governmental assistance, and sustainability infrastructure constitutes the most critical obstacles impacting other determinants. In contrast, neither the deficiency in sustainability awareness nor the inadequacy of training and skills demonstrated a considerable impact on the other identified barriers. This study clarifies the complex interactions and interrelations among the obstacles to sustainability reporting, thus providing significant perspectives for organizations aiming to overcome these difficulties. The findings suggest that business leaders and stakeholders can formulate targeted strategies and interventions to facilitate the adoption of sustainability reporting practices within organizations. The application of the institutional theory framework highlights that pressures arise from a diverse array of institutional actors, including regulators, customers, and local communities, which collectively shape corporate behavior and reporting methodologies.

Keywords: sustainability reporting; sustainability; barriers on sustainability reporting; small and medium enterprises; developing country; Asia; Philippines

1. Introduction

Sustainability reporting greatly affects how well an organization performs economically, environmentally, and socially. An increasing number of organizations are acknowledging the critical role of sustainability reporting in achieving operational success and the advantages it confers, as evidenced by the notable enhancement in both awareness levels and reporting practices, particularly in regards to investor sentiments, the promotion of transparency, and the adoption of responsible practices (Zain et al., 2024), alongside the improvement of disclosure quality to further sustainable initiatives (Malgorzata et al., 2022). The Sustainability Report fosters novel communication channels with stakeholders and actively promotes their

engagement in the decision-making process (Susana et al., 2019). Companies have traditionally taken part in voluntary reporting of their sustainability practices, but the increasing call for enhanced transparency in non-financial reporting has driven regulatory agencies across the globe to enforce stricter mandatory reporting standards for non-financial disclosures. As a result, regulatory entities across various nations advocate for corporations to present sustainability reports in conjunction with the obligatory annual financial reporting stipulations. Subsequently, the disclosure of sustainability reports has emerged as a crucial component of an organization's overarching business strategy (Esther et al., 2023; Ghosh, 2017).

The 2021 Catalogue of Establishments published by the Philippine Statistics Authority (PSA) documented a total of 1,080,810 business enterprises functioning within the nation. Small enterprises represent 8.63% (93,230) of the overall establishments, closely followed by medium enterprises at 0.41% (4437). The success of small and medium enterprises (SMEs) in creating more than 2.5 million employment slots nationwide showcases the indispensable nature of these businesses in relation to the country's economic development (Jones, 2020). Small to medium enterprises in the Philippines are progressing in applying artificial intelligence for sustainability, dealing with hurdles like poor infrastructure, limited data resources, and a lack of managerial backing (Alexander et al., 2023).

This project focused on revealing the difficulties and advantages related to integrating sustainability reporting in small and medium enterprises (SMEs). SMEs in the Philippines encounter substantial financial distress risks attributable to constrained access to capital and inadequate financial management practices, which adversely affect their developmental progress and operational stability (Rago et al., 2023). SMEs play an essential role in the economic landscape, fostering employment opportunities and influencing natural resource management through their business activities (Porciúncula and Andreoli, 2023). The emergence of sustainability reporting has been recognized as an essential mechanism for SMEs to effectively communicate their sustainable practices to relevant stakeholders. Nonetheless, the extent of sustainability reporting adoption among SMEs remains limited, hampered by various obstacles. The investigation conducted by Porciúncula and Andreoli (2023) identified that SMEs confront contradictions between their motivations, the challenges they face, and the communication of sustainable practices to their stakeholders. The findings indicated that while SMEs are driven to implement sustainable practices due to their ecological implications, they simultaneously encounter challenges such as perceived minimal economic returns, inadequate enforcement of legislative compliance, and restricted financial and practical support (Agostini et al., 2021). The research posits that a streamlined sustainability report may facilitate SMEs in both the adoption and, more significantly, the communication of sustainable business practices to their stakeholders (Porciúncula and Andreoli, 2023).

Sustainability reporting has the potential to enhance the corporate image (Seán et al., 2024). The challenges that impede implementation include a deficiency in knowledge, resources, and data tools (Nazneen et al., 2024). Although not presently mandatory for SMEs, the study delineates consequences for policymakers and practitioners to promote sustainability reporting within this sector. Sustainability reports are profoundly impacted by governance practices, social responsibility, and

environmental considerations (Santi et al., 2024). The unavailability of governmental support and regulatory frameworks aimed at ensuring adherence to environmental safety laws contributes to a reduced focus on sustainability practices among SMEs (Nazneen et al., 2024). The barriers to the uptake of sustainability reporting among SMEs may differ depending on leadership perspectives and their methods for addressing these obstacles, highlighting the importance of a detailed understanding and strategic action within the SME environment (Nuria et al., 2024). Financial limitations and an insufficient comprehension of sustainability reporting constitute the principal factors obstructing SMEs from effectively implementing sustainability reporting practices (Asif et al., 2021). SMEs must prioritize the adoption of sustainability reporting, as it significantly contributes to enhancing their environmental and social effectiveness, boosting their competitiveness, and meeting the rising expectations of stakeholders (Kassem and Trenz, 2020). A significant number of developing nations, including the Philippines, exhibit a deficiency in research studies pertaining to sustainability reporting and disclosures. There is a significant demand for educating SMEs on sustainability knowledge to increase awareness and insight into sustainability reporting practices, which are essential for the efficacy of enterprises (Partiwi et al., 2023). To foster better sustainability reporting among SMEs, regulators need to grasp the decision-making frameworks that influence these businesses, which will ultimately help in crafting more effective regulations and policies (Dolores et al., 2024).

This study investigates the core features of sustainability reporting, as well as its positive impacts and the difficulties that hinders the adoption of sustainability reporting in SMEs. A comprehensive literature review is presented alongside various dimensions of the subject matter. The methodological approaches employed, including sampling techniques and the data collection methods applied, are articulated. An analysis of the data is conducted, emphasizing quantitative analytical methods. To wrap things up, the results are explored, leading into the conclusions drawn, the effects of the research, and prospective paths for further inquiry, each of which is analyzed comprehensively.

2. Review of literature

The emergence of sustainability reporting (SR) among small and medium-sized enterprises (SMEs) is driven by a combination of perceived business benefits, regulatory pressures, and the development of practical tools and frameworks. While SMEs face unique challenges in implementing SR, such as resource constraints, the potential advantages and evolving methodologies are encouraging more SMEs to adopt these practices. Based on the study of Natarajan and Wyrick (2011), for the past two decades, numerous companies have been seen to be moving towards environmentally friendly operations. Now, this may be the case for larger companies, however, SMEs cannot keep up with the pace and are still moving towards better environmental practices (Beverly et al., 2023; Hammed et al., 2022; Nazneen et al., 2024). SMEs face several problems in the implementation of sustainable practices, hence, the slow adaptation to the change (Shoaib et al., 2024). Some of the problems that significantly affect the sustainability reporting of SMEs were found to be the lack

of a specific format and channel for reporting, lack of awareness, lack of understanding of the benefits, and lack of financial resources (Dolores et al., 2024). Other hindering factors include time, technology, organizational culture, and internal motive in implementing sustainable practices (Acheampong et al., 2024; Gde et al., 2024).

Globally, 80% of all enterprises are classified as SMEs (Arup et al., 2017; Nefedov, 2023). As such, the increasing environmental impact caused by business activities and operations can be directly attributed to SMEs (Adriana et al., 2021). Following the movement towards environmentally sustainable activities and green reporting strategies, SMEs are proposed to make better contributions to and take interest in the local environment. It was also revealed that participation from universities, local communities, local governments, and other stakeholders is ideal for better implementation of sustainable practices (Alessandra et al., 2023). Accordingly, drivers and motivators were identified and some of the high motivators are being part of a network and leveraging the network advantages, social responsibility, compliance with legislation, and growing public awareness.

The term sustainability is commonly defined as utilizing resources to meet the needs of the present without compromising the future generation's ability to meet their own needs. This notion is further emphasized by the Royal Institute of Chartered Surveyors (RICS, 2017) who described sustainability as a process that aims at "ensuring that our businesses, public services, natural resources, economy, and community have the capacity to continue into the future." The concept behind the connection between environmental awareness and the adoption of sustainability reporting is that an individual's environmental awareness may increase his or her ecological behavior. Environmental awareness is defined by Kollmuss and Agyeman (2012) as "knowing of the impact of human behavior on the environment." They stated further that there are a number of cognitive and emotional constraints on environmental awareness.

Hossain et al. (2017) conducted one of the few studies that looked into the impediments to sustainability activities. The study, however, was limited to Bangladesh, investigated only non-managerial stakeholder perspectives, and did not directly address sustainability accounting and reporting procedures. As a result, it analyzed barriers primarily from the stakeholders' perspectives, identifying that "corruption and politics, lack of coordination, lack of government initiatives including regulatory guidelines, and most importantly, lack of education and awareness of sustainability issues" have an impact on social and environmental responsibility. In terms of lack of understanding or awareness, Belal et al. (2015) argued that sustainability reporting was relatively new to enterprises in developing nations, hence, many respondents were unfamiliar with the requirements. This was supported by the majority of their interviewees, who claimed that one of the causes for nondisclosure could be lack of awareness and expertise of sustainability reporting among business executives. Companies whose staff are aware of the importance of sustainability reporting are more likely to prepare sustainability reports. This is because awareness is considered as a resource. Previous empirical results suggested that lack of awareness is one explanation for the absence of sustainability reporting. With this, in the view of developing nations like Pakistan, Bangladesh, India, and Sri Lanka, the absence of

sustainability reports due to lack of awareness of sustainability reporting and its guidelines may be predominantly applicable.

When SMEs do have SRs, they clearly outline their objectives, strategies, and sustainable policies, but there is a gap in the management, analysis, and monitoring of sustainability risks, with only 43% of the sample explicitly detailing how they assess and manage these risks (Massimiliano et al., 2024). Stakeholder theory was identified as the main driver of sustainability reporting among Spanish SMEs, indicating the importance of considering the interests of various stakeholders in their decision-making processes (Dolores et al., 2024). Legitimacy theory and the resource-based view were significant drivers of sustainability reporting in SMEs, highlighting the role of seeking legitimacy and utilizing internal resources in shaping their sustainability practices (Dolores et al., 2024). The study conducted by Acheampong et al. (2024) suggest that stakeholders should consider leveraging the resource-based view theory to encourage SMEs to adopt or enhance sustainability performance reporting practices in Ghana, emphasizing the importance of building internal capabilities and leveraging available resources effectively.

In the study conducted by Ortiz-Martínez and Marin-Hernandez (2023) suggests that the standardization of sustainability reporting focused on SMEs is crucial, as SMEs play a significant role in the economy and in achieving global sustainability goals. The integration of Tri Hita Karana and Tri Pramana principles into business practices promotes economic prosperity, environmental stewardship, and social well-being, fostering a culture of sustainability and responsible entrepreneurship (Gde et al., 2024). The research of Adriana and Mercedes (2021) identifies signs of integrated thinking within the company's organizational culture even before the International Integrated Reporting Council (IIRC) framework, indicating an alternate narrative to the one proposed by the IIRC framework. The analysis results on the study conducted by Haiyan et al. (2023) were organized in a structured summary chart according to principles of the Unified Field Chart (UFC), depicting sustainability governance intelligence derived from the consciousness of a disclosure firm and its sustainability personnel, guiding the selection and measures of material aspects for sustainability reporting by SMEs.

Numerous studies have discovered that lack of resources, lack of environmental expertise, financial and technical knowledge, and time is another environmental challenge for SMEs (Auer, 2017; Ghazilla, 2015; Ghadge, 2017; Ivy, 2024; Johnson, 2016; Malá, 2017; Nazneen et al., 2024). Although studies on sustainability are becoming more popular in developing nations, organizations have not yet adopted them to a satisfactory degree. This indicates that some businesses may still be hesitant to allocate financial and other resources to sustainability projects or reporting (Chang, 2015; Chen et al., 2015; Francis et al., 2023; McWilliams and Siegel, 2021). The absence of robust evidence supporting the cost-effectiveness of sustainability practices, as noted by Goyal et al. (2013), proves this viewpoint. Higher sustainability can be achieved with a higher cost (Altaf et al., 2023).

Additional challenges that SMEs must overcome, in addition to financial issues, include challenges in obtaining financial capital (Conway, 2015; Fresner, 2017; Halima et al., 2024; Mbuyisa, 2015; Neto, 2017; Nowotarski, 2015; Zhou, 2015) and high initial capital costs to implement good manufacturing processes (Auer, 2017;

Ghazilla, 2015; Ghadge, 2017; Johnson, 2016; Malá, 2017). Jenkins (2016) found that the main environmental barriers for small and medium enterprises were lack of resources and time, with 53% of businesses citing lack of staff time as an environmental barrier (Revell et al., 2013). SMEs are also well known for the lack of human resources for implementation and maintenance, both in terms of number of expertise (Conway, 2015; Ghazilla, 2015; Johnson, 2016; Malá, 2017; Mourtzis, 2016; Neto, 2017) and technical knowledge (Fresner, 2017; Meath, 2016; Zhou, 2015).

Financial resources are essential for SMEs to adopt environmental activities (Vernon et al., 2013). Thus, researches mentioned financial concerns as one of the biggest obstacles, which include lack of funding for environmental project, high cost of implementing environmental practices, and long period to return investment (Conway, 2015; Gamal, 2012; Hasan, 2016; Jadhav, 2014; Steur, 2020;). According to studies, approximately 70% of businesses want to make environmental improvements but they mentioned higher costs as a barrier and almost 50% think that being environmentally friendly will increase profits (Revell et al., 2013). Finally, a short-term investor mindset can lead to lack of suitable investors (Casalino et al., 2014; Hasan, 2016).

Education for Sustainability is a collection of action-oriented, learner-centered approaches that are supported by Wanda et al. (2023). It goes beyond merely raising awareness, encouraging active learner participation in activities like futures thinking or visioning, critical thinking, values clarification, and holistic or systemic thinking (Gorsk et al., 2023). It is also based on the idea that in order to deal with today's complex sustainability concerns, citizens must be capable of thinking critically and using systems approaches (Huckle and Sterling, 2016; Tilbury and Wortman, 2014). Although the government plays a crucial role in promoting sustainable construction, private players are ultimately responsible for bringing innovation and funding the advancement of green construction (Minh et al., 2023). Industry organizations are a driving force for sustainability in industrialized nations, but in Asian nations, they do not play a prominent role, leaving efforts entirely in the control of the government, except in the case of India, whose NGOs have been a key driving force (Manual, 2012). Raising awareness of the established environmental sustainability among businesses, the public, and the government, as well as providing resources, education, and opportunity for green building improvements are all things that private organizations should do (Hong et al., 2017). They can assist with the development of new or promoting already-existing benchmarking and rating systems for energy efficiency as building construction standards (Darko et al., 2017). They should act as a motivator for action by all parties involved rather than just keeping a close eye on and criticizing the government (Hong et al., 2012).

According to Vázquez et al. (2024), the choice of reporting standards, such as the Global Reporting Initiative, does not significantly impact the observed outcomes regarding environmental responsibility and transparency. Sustainability reporting standards may be unsuitable for small enterprises in general because they were established primarily with large organizations in mind (Pablo et al., 2023). Furthermore, from the standpoint of SMEs, the potential ineffectiveness of informal tools, such as codes of conduct and social and ethical standards, may be explained by the need for a larger investment in terms of time, funds, and energy. Moreover,

additional development and research is required to provide appropriate ethical tools capable of integrating new theories to small business practices (Tilley, 2020). Lozano (2012) provides an in-depth analysis of volunteer initiative contributions to sustainability reporting, although, SMEs frequently adapt tools developed for large enterprises to their own needs, even if "SMEs are not little big firms". Notwithstanding the various types of reporting standards that have been produced and developed, none of them, including the GRI recommendations, appear to fulfill the expanding needs of SMEs (EU and CREM, 2013).

The theoretical foundation of this study is shown below in **Figure 1** how barriers and motivators affect the sustainable performance of SMEs. It shows that sustainable performance is a balance of barriers and motivators that can be both internal and external.

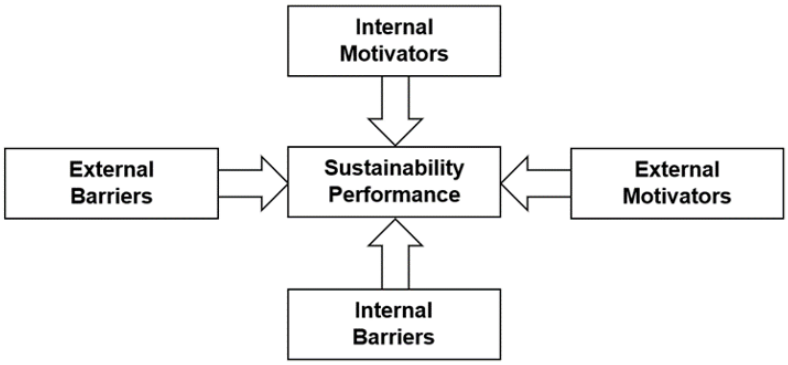

Figure 1. Hypothetical model of the research or study.

Objectives of the study:

- To determine the barriers affecting the adoption of sustainability reporting among SMEs
- To determine the motivators affecting the sustainable performance of SMEs
- To determine the factors affecting the adoption of sustainability reporting among SMEs

Hypothesis:

- Ho1: Lack of regulation, government support, and sustainability infrastructure significantly affects the adoption of sustainability reporting among SMEs.
- Ho2: Lack of demand for sustainability reporting significantly affects the adoption of sustainability reporting among SMEs.
- Ho3: Lack of resources significantly affects the adoption of sustainability reporting among SMEs.
- Ho4: Lack of training and skills significantly affects the adoption of sustainability reporting among SMEs.
- Ho5: Lack of sustainability awareness significantly affects the adoption of sustainability reporting among SMEs.

3. Materials and methods

The target population of the study consists of 28,927 SMEs operating in the NCR as of 2021. The researchers obtained the values from the MSME Statistics of the

Department of Trade and Industry (DTI). The **Table 1** below shows the breakdown of the recorded number of establishments in operation by SME, and Region as of 2022. Using the Simple Random Sampling (SRS) formula, from a population of 28,927, a sample size of 400 respondents was computed to represent the population. The data for this study were collected using a survey questionnaire that was delivered partially through face-to-face and partially through online due to time and accessibility constraints. From October 2023 to December 2023, this period is devoted to the collection of data. Based on the total survey questionnaire returns, the overall number of respondents reached 424, which is above the required threshold for ISM approach. The researchers used Microsoft Excel to randomly select the needed sample, bringing the total to 400. The total population used in this study is given in **Table 1**.

Table 1. Number of establishments in operation by SME and region as of 2022.

Region	Small (TE 10 to 99)	Medium (TE 100 to 199)	Total
City of Manila	3441	127	3568
Mandaluyong City	1173	72	1245
San Juan City	575	26	601
Marikina City	632	27	659
Quezon City	6304	317	6621
Makati City	4235	310	4545
Pasig City	2309	192	2501
Pateros	47	3	50
Taguig City	1313	142	1455
Caloocan City	1130	56	1186
Malabon City	431	28	459
Navotas City	98	6	104
Valenzuela City	1315	75	1390
Las Piñas City	645	21	666
Muntinlupa City	1105	70	1175
Parañaque City	1451	92	1543
Pasay City	1104	55	1159
Total	27,308	1619	28,927

The respondents will be described based on their age, sex, job position, number of years in the company, and years of experience, wherein the firms are described according to years of existence, capital structure, average annual income, and type of business industry. The research will gather information from firms in different industries, such as wholesale and retail trade, repair of motor vehicles and motorcycles, accommodation and food service activities, manufacturing, other service activities, financial and insurance activities, and other industry sectors. To gather the appropriate data needed for this study, the researchers adopted the descriptive survey method and distributed a survey questionnaire to their target respondents. The survey consisted of

four parts and was administered online. The first and second parts of the survey consist of items that will ask for the profile of the respondents and the firms, respectively. The next part of the survey includes the questions establishing the contextual relationship between the variables identified through reading related studies and seeking expert's opinions. The last part of the survey relates to the respondent's assessment of the key drivers in the adoption of sustainability reporting among SMEs. Moreover, the data-gathering instrument was validated by the validators who are experts in the field of this topic to ensure that it accurately assesses what it sets out to achieve and collects higher-quality, more comparable data, reducing effort and increasing data reliability. Descriptive statistics will be used to summarize survey responses and demographic characteristics of participants. After extracting the required number of respondents for the study through the help of Microsoft Excel, the researcher checked and tallied the response of the respondents for analysis and interpretation.

Interpretive Structural Modelling (ISM) and Matriced Impacts Croisés Multiplication Appliquée á un Classement (MICMAC) analysis were used to analyze the data. MICMAC analysis helps in identifying the influence and dependence of variables by examining their interactions within a system (Ebrahim et al., 2023). This method's primary objective is to analyze the driving power and dependence of the barriers. In this study, the barriers, which pertains to the barriers on sustainability reporting of SMEs, are clustered into four variables namely, autonomous variables, dependent variables, linkage variables, and independent variables. **Figure 2** shows the comprehensive flowchart used in this study.

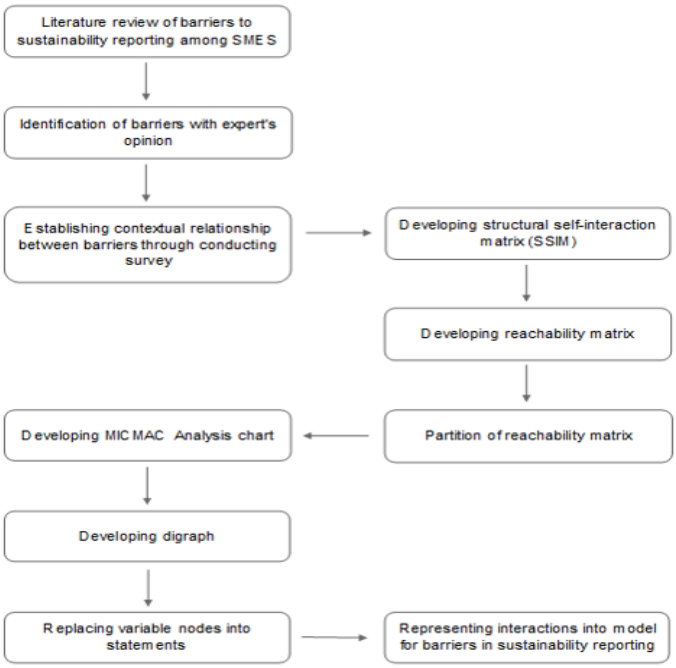

Figure 2. Comprehensive flowchart of MICMAC analysis.

ISM is an explanatory model-based method that establishes linkages between variables in a complicated system by visualizing them in a hierarchical design. ISM is a widely practiced methodology to show the interaction of system elements, such as barriers, drivers, and influencing factors (Muhammad et al., 2024; Talib et al., 2011).

4. Results and discussion

Out of the sample size of 400 respondents (n = 400) which includes males and females with ages between 20 to 50 years old were chosen. The age group of the participants is presented in **Table 2**. The demographics of the respondents in terms of gender, job position, and years of service in the company are also represented in the sample. The summary of information is shown below.

Table 2. Age of respondents.

Age	Male	Female	Total
20–25	14	35	49
26–30	33	42	75
31–35	31	23	54
36–40	42	47	89
41–45	38	39	77
46–50	27	29	56
Total	185	215	400

Source: researcher compilation.

According to **Table 3**, 46.2% of the participants were females and about 54.8% of the participants were males.

Table 3. Demographics data of respondents.

Items		Frequency	%
Gender	Male	185	46.3
	Female	215	53.8
	Total	400	100.0
Job Position	Accountant	125	31.3
	Director	26	6.5
	Executive	13	3.25
	Manager	174	43.5
	Supervisor	62	15.5
	Total	400	100.0
Years of service	< 1 year	23	5.7
	1–3 years	85	21.3
	3–6 years	128	32.0
	6–9 years	117	29.3
	> 9 years	47	11.7
	Total	400	100.0

Source: researcher compilation.

As shown in **Table 3**, 46.3% are males and 53.8% are females, it shows that the study represents a balance in gender. Majority of the participants are in managerial position (43.5%). The majority of the participants have experience in the field for 3–6 years (32.0%). In a survey conducted with women involved in SMEs in the

Philippines by Solina (2020), it has been found that participation of women in the workforce pool is also comparable with that of men. Perez et al. (2017) suggested three major intangible assets that can prompt sustainable practices, namely, (i) the commitment of top managers towards sustainability practices and issue, (ii) planning of sustainability strategies, and (iii) the usage of sustainability accounting. Moreover, Luthra et al. (2015) explained how environmental and sustainability practices were significantly affected by operational activities and strategic posture. Hence, top managers should first promote green practices that in turn can encourage sustainable practices. Furthermore, Ones et al. (2020) reported that among employees working for a multinational organization with an established environmental sustainability program, organizational tenure was positively related to employee green practices and employees who had been with the organization longer reported engaging in more employee green behaviors.

In this study, Cronbach's Alpha is a used for assessing the internal reliability of a set of items, particularly in survey research. It measures how closely related a set of items are as a group, providing an estimate of the consistency of responses across items. The results of Cronbach alpha of 0.7 or better is acceptable (Bryman and Bell, 2010). Mean and standard deviation of the data set is used to provide the outline to which the participants responded to the questions. The result of Cronbach alpha, mean and standard deviation is presented in **Table 4.**

Table 4. Reliability testing.

Items	Cronbach Alpha	Mean (X)	S. Dev
Lack of regulation, government support and sustainability infrastructure	0.922	3.67	0.68
Lack of demand for sustainability reporting	0.911	3.61	0.66
Lack of resources	0.874	3.66	0.65
Lack of training and skills	0.832	3.41	0.61
Lack of sustainability awareness	0.798	3.63	0.71

The average mean of the five factors varied from 3.41 to 3.67, the highest mean is 3.67 with standard deviation of 0.68 was related to Lack regulation, government support and sustainability infrastructure, this was followed by 3.66 attributable to lack of resources with standard deviation of 0.65. This shows that regulation and demand for sustainability reporting are the major barriers in adoption of sustainability reporting. Along with the legislation and regulation, incentives in the form of loans, grants, tax concessions and other economic benefits facilitate easy adoption and behavioral change in SMEs towards sustainable practices (Gandhi et al., 2018; Revell et al., 2013) For example, the study of Parker et al. (2019) found companies' sustainability decisions were impacted only when regulations were substantial enough and consistently enforced among all SMEs to pressure them to engage in environmental improvement and when financial support or incentives were provided to offset the costs.

In establishing the contextual relationship of the identified barriers, the data used was from the answered survey questionnaires of the qualified respondents. As presented in **Table 5** below, the data acquired from seeking experts' opinion, review

of literature, and survey from respondents were subsequently inputted into SSIM to establish the barrier's interactions with one another.

Table 5. Structural self—interaction matrix (SSIM).

Variables	**1**	**2**	**3**	**4**	**5**
1. Lack of Sustainability Awareness		X	A	A	A
2. Lack of Training and Skills			A	A	A
3. Lack of Regulation, Government Support and Sustainability Infrastructure				V	V
4. Lack of Pressures or Demand for Sustainability Reporting					X
5. Lack of Resources					

The numbers indicated in the columns represent its counterpart of barriers as listed in the rows, namely, number 1 in the column represents the Lack of Sustainability Awareness, number 2 represents Lack of Training and Skills, etc. These barriers are subsequently referred to as Barrier 1, Barrier 2, and so forth. Bearing in mind the contextual relationship for each variable, the presence of a relationship between any *i* (row-listed barrier) and *j* (column-listed barrier) and the direction of the relationship are questioned. In addition, four (4) symbols are utilized to indicate the direction of the relationship between the barriers, *i* and *j*: *X*: Barriers *i* and *j* will help in achieving each other; *V*: Barrier *i* will influence barrier *j*; A: Barrier *j* will influence barrier *i*; and *O*: Barriers in and *j* are unrelated.

As seen on **Table 5**, the results of the data gathered indicates Barrier 1 and Barrier 2 influence and helps in achieving each other, as represented by the symbol X. Both barriers mentioned were also influenced by the three other barriers, namely, Barrier 3, Barrier 4, and Barrier 5, as represented by the symbol A. Additionally, on the lower end of the table it shows that the Barrier 4 and Barrier 5 influence and helps in achieving each other. Finally, the Barrier 3 was determined to be the barrier that influences all the mentioned barriers, as represented by the symbol V.

The SSIM format were translated into final reachability matrix by converting the information in each SSIM cell into binary digits (i.e., ones or zeros) in the initial reachability matrix. This transformation is carried out according to the following rules: If the result in cell (*i*, *j*) of the SSIM is V, then the entry in cell (*i*, *j*) of the initial reachability matrix becomes 1 and the entry in cell (*j*, *i*) becomes 0; If the result in cell (*i*, *j*) of the SSIM is A, then the entry in cell (*i*, *j*) of the initial reachability matrix becomes 0 and the entry in cell (*j*, *i*) becomes 1; If the result in cell (*i*, *j*) of the SSIM is X, the entries in cells (*i*, *j*) and (*j*, *i*) of the initial reachability matrix become 1; If the result in cell (*i*, *j*) of the SSIM is O, the entries in cells (*i*, *j*) and (*j*, *i*) of the initial reachability matrix become 0.

Using **Table 6**, the number of 1 binary are counted horizontally and vertically, referring to its Driving Power and Dependence Power, respectively. It can then be seen that Barrier 3 has the lowest dependence power, which is 1 and highest driving power with 5. Additionally, Barriers 4 and 5 ties with 3 and 4 as their dependence and driving power, respectively. Lastly, Barriers 1 and 2 also ties with the highest dependence power 5 and lowest driving power which is 2. With the data derived, the barriers containing the binary of 1 are identified and grouped into the first two sets in the

succeeding tables. If the i (row-listed barrier) contains the binary of 1 in its columns, the columns are identified and grouped under the Reachability Set. On the other hand, if the j (column-listed barrier) contains the binary of 1 in its rows, the rows are identified and grouped under the Antecedent Set.

Table 6. Final reachability matrix.

Variables	**1**	**2**	**3**	**4**	**5**	**Driving Power**
1. Lack of Sustainability Awareness	1	1	0	0	0	2
2. Lack of Training and Skills	1	1	0	0	0	2
3. Lack of Regulation, Government Support and Sustainability Infrastructure	1	1	1	1	1	5
4. Lack of Pressures or Demand for Sustainability Reporting	1	1	0	1	1	4
5. Lack of Resources	1	1	0	1	1	4
Dependence Power	5	5	1	3	3	

In **Table 7**, for each barrier, Reachability and Antecedent set are shown. It can be observed that the reachability set consists of the barrier itself and the barriers that it influences, while the antecedent set consists of the barrier itself and the other barriers that influences it. The intersection set is then derived, and those with similar reachability and intersection sets are considered as the first level barrier in the ISM Hierarchy. **Table 7** represents the first iteration process, which resulted in Barriers 1 and 2 as the first level barriers, with respect to their low Driver Power value (DP = 2).

Table 7. Level partitioning iteration I.

Elements	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
1	1, 2	1, 2, 3, 4, 5	1, 2	1
2	1, 2	1, 2, 3, 4, 5	1, 2	1
3	1, 2, 3, 4, 5	3	3	
4	1, 2, 4, 5	3, 4, 5	4, 5	
5	1, 2, 4, 5	3, 4, 5	4, 5	

Table 8 represents the second iteration process. Once the level of the barrier is identified, it is then removed from the process, as seen in **Table 8**. This resulted in Barriers 4 and 5 as the second level barriers, with respect to their Driver Power value (DP = 4).

Table 8. Level partitioning iteration II.

Elements	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
1		3, 4, 5,		1
2		3, 4, 5,		1
3	3, 4, 5	3	3	
4	4, 5	3, 4, 5	4, 5	2
5	4, 5	3, 4, 5	4, 5	2

Table 9 represents the last iteration process. This resulted in Barrier 3 as the third level barrier, with respect to its Driver Power value (DP = 5).

Table 9. Level partitioning iteration III.

Elements	Reachability Set	Antecedent Set	Intersection Set	Level
1		3		1
2		3		1
3	3	3	3	3
4		3		2
5		3		2

Table 10 shows the result of the iteration process. In summary, barriers 1 and 2 are in the first level, barriers 4 and 5 are in the second level, and barrier 3 is in the third level of the ISM hierarchy. The lower-level barriers are those barriers that will influence other barriers that are above them in the hierarchy level. Since barrier 3 is the lowest level, this means that it is the barrier that has influence over all other barriers. On the other hand, barriers 1 and 2 do not have influence over other barrier except with one another since they both tied as the highest level.

Table 10. Level partitioning.

Elements	Reachability Set	Antecedent Set	Intersection Set	Level
1	1, 2	1, 2, 3, 4, 5	1, 2	1
2	1, 2	1, 2, 3, 4, 5	1, 2	1
3	3	3	3	3
4	4, 5	3, 4, 5	4, 5	2
5	4, 5	3, 4, 5	4, 5	2

At this stage, the barriers are grouped based on their Driving Power and Dependence as shown in **Figure 3**.

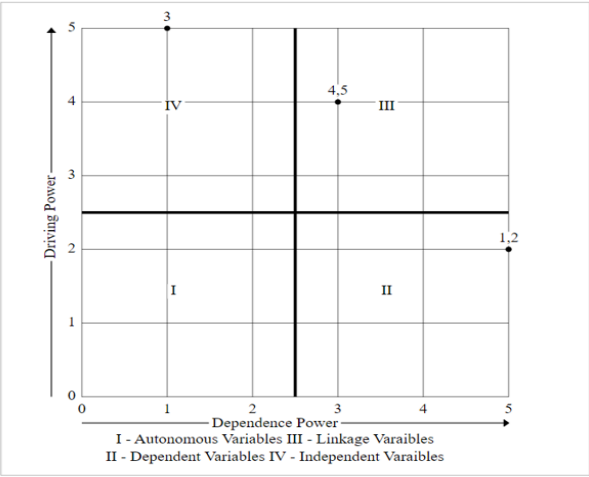

Figure 3. MICMAC analysis.

For this analysis, both the Driving and Dependence Power are retracted from the results of the Final Reachability Matrix (**Table 11**). Classification of barriers after being grouped produces variables which includes autonomous variable, dependent variable, linkage variable and independent variable as summarized in **Table 11**.

Table 11. Summary of variables and conclusion on analysis of driving power.

Variable	Description	Conclusion
Autonomous	These variables have both weak driving power and dependence power and are represented by Quadrant I. These variables are usually disconnected from the system because of their poor linkages.	The MICMAC analysis concluded that there is no barrier that falls into this quadrant.
Dependent	These variables have weak driving power but have strong dependence power and are represented by Quadrant II. The strong dependence of variables falls in this quadrant shows they need all other variables to minimize their impact.	Lack of Sustainability Awareness and Lack of Training and Skills are the barriers that fall into this quadrant.
Linkage	These variables include those barriers that have strong driving power as well as strong dependence power and are represented by Quadrant III. These variables are fluid because any changes in them will influence the others and be fed back into themselves.	Lack of Pressures or Demand for Sustainability Reporting and Lack of Resources fall into this quadrant.
Independent	These variables have strong driving power but have weak dependence power and are represented by Quadrant IV. These variables need to be addressed cautiously as they form the bottlenecks for adapting sustainability reporting among SMEs.	The analysis concluded that Lack of Regulation, Government Support and Sustainability Infrastructure barrier belongs to this quadrant.

Two barriers were classified as dependent variables, namely, the lack of sustainability awareness and lack of training and skills. The lack of pressures or demand for sustainability reporting and lack of resources fall as linkage variables. Lastly, the lack of regulation, government support and sustainability infrastructure are the only barrier in the position of independent variable. None of the selected barriers had a low driving and dependence power, thus, none was classified as an autonomous variable. **Table 12** summarizes the results of our **Figure 3** which was the MICMAC analysis as shown below:

Table 12. Summary of the classification results.

Barriers	Driving Power	Dependence Power	Variables
Lack of Sustainability Awareness	Low	Very High	Dependent
Lack of Training and Skills	Low	Very High	Dependent
Lack of Regulation, Government Support and Sustainability Infrastructure	Very High	Low	Independent
Lack of Pressures or Demand for Sustainability Reporting	High	High	Linkage
Lack of Resources	High	High	Linkage

After the interdependencies and levels are determined from the FRM **(Table 6)** and Level Partitioning **(Table 10)**, a digraph model is then developed as shown in **Figure 4** below. A digraph is used to visually represent the elements and their interdependencies in terms of nodes and edges. The nodes pertain to the small circles containing the assigned numbers of the selected barriers and the edges pertain to the arrows linking them together. The first-level barriers are positioned at the top of the digraph and second-level barriers are placed at second position and so on, until the bottom-level is placed at the lowest position in the digraph.

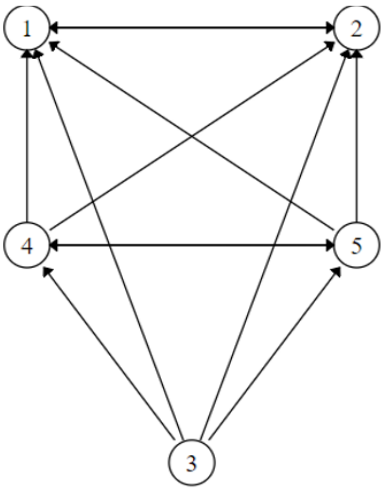

Figure 4. Digraph model.

The Digraph Model **(Figure 4)** is converted to an ISM Model **(Figure 5)** by replacing the nodes with statements. For further understanding, the directed edges are read as leads to or influences. With this model, the researchers can see what the selected barriers can influence and what can also influence them among others.

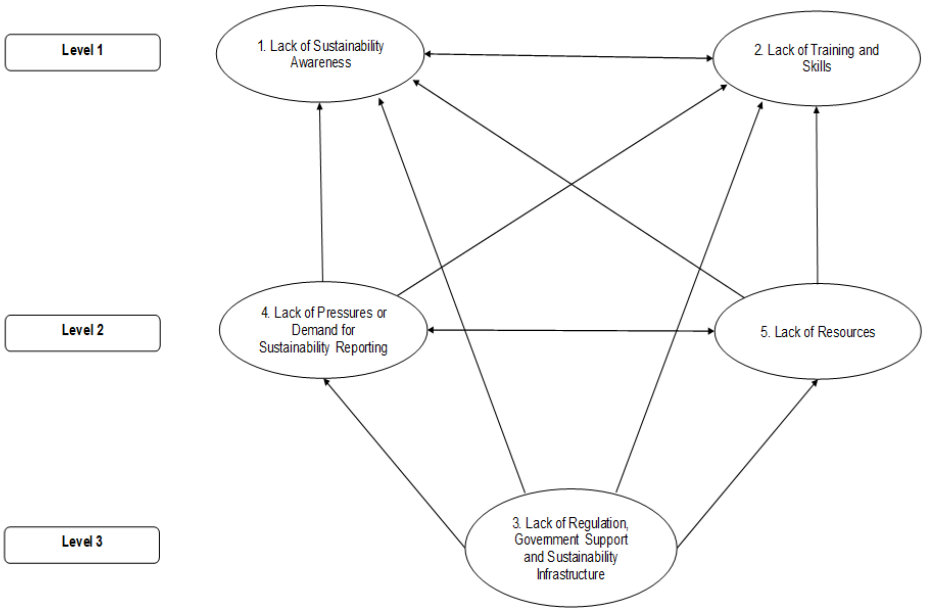

Figure 5. Interpretative structural modelling (ISM) of the study.

At the third level, the model elucidates that the absence of regulatory frameworks, governmental support, and sustainable infrastructure constitutes the foundational basis of the hierarchical framework regarding the impediments to the adoption of sustainability reporting among small and medium-sized enterprises (SMEs) in Metro Manila. This indicates that the absence of regulatory frameworks, governmental support, and sustainable infrastructure possesses the most significant driving capacity, as it affects all other identified barriers, while no singular selected barrier possesses the capability to influence it. Furthermore, it suggests that addressing this primary barrier could mitigate the effects of other impediments. A corresponding observation has been noted in the investigation led by Raut et al. (2018), which highlighted that

governmental directives and policies considerably shape other barriers. This underscores the necessity for focused attention on this barrier and indicates that organizations must surmount this obstacle to effectively implement sustainable practices. In their 2015 study, Shen et al. assert that the deficiency in regulatory oversight prompts stakeholders to prioritize financial results over their ethical duties. Furthermore, research by Mannan and others in 2016 concerning Indian small and medium manufacturing businesses pinpointed 'Governance' as a key independent factor that propels successful innovation in SMEs' practices. Conversely, the investigation by Mani et al. (2015) reveals that the absence of governmental regulations ranks among the foremost barriers, lacking the driving power to influence any other barriers beyond their own tier. In locations experiencing growth, the adoption of regulatory frameworks and standards is hardly achieved with appropriate rigor (Mazurkiewicz et al., 2015; Shen et al., 2015). Consequently, legal mandates for enhancement require more rigorous attention from environmental protection agencies and governmental bodies, necessitating the reform of laws and the amplification of pressure on entities to mitigate environmental degradation (Sayyadi et al., 2020).

The absence of pressures or demands for sustainability reporting, along with a deficiency in resources, are both situated at level two and are categorized as linkage variables. These factors represent obstacles that may affect the other identified barriers, except for the absence of regulation, governmental support, and sustainability infrastructure. According to the investigation by Mani and others in 2015, this aligns with the notion that pressures from investors and social organizations serve as connection variables, given their robust ability to impact and their significant likelihood of being affected. Moreover, the findings corroborate the assertions made by Campbell (2017), who contends that the absence of pressure from stakeholders also impacts social sustainability. In divergence, a study performed by Raut et al. (2017) established that, from the thirty-two (32) barriers recognized, community pressure was pinpointed as the third (3rd) most substantial driving force, thus classifying it as an independent variable. This conclusion diverges from the analysis done by Bux et al. (2024), which shows that the lack of consumer pressure and demand demonstrates limited driving strength along with notable dependence strength, hence categorizing it as a dependent variable.

When addressing the impediment represented by the deficiency of resources, the findings of the current research align with those presented by Raut et al. (2018). Their investigation indicates that the insufficiency of resources possesses both substantial driving and dependence attributes, thereby categorizing it as a linkage variable. This statement is additionally validated in the research undertaken by Yang et al. (2017), which classifies all identified resource barriers within quadrant III. Moreover, the scrutiny done by Goyal et al. (2017) exposes matching discoveries. In contrast to the findings articulated by Bux et al. (2024), the barrier of resource scarcity was identified as the most critical obstacle, designating it as an independent variable and underscoring the necessity for organizations to secure resources (e.g., financial and human capital) to facilitate any activities that extend beyond their routine operations. The current study elucidates that although both the absence of pressure or demand and the scarcity of resources exhibit considerable driving power, their pronounced dependence on external factors indicates susceptibility to influences stemming from a

lack of regulatory frameworks, governmental support, and sustainable infrastructure. These barriers warrant cautious consideration, as any modifications pertaining to these elements will invariably affect the others and subsequently elicit broader repercussions upon them (Govindan et al., 2013).

The absence of sustainability awareness and the deficiency in training and skills are positioned at the foundational level of the hierarchy, indicating that they exert no significant influence over any other barriers situated above their level. Such observations align with what Mani et al. (2015) found, indicating that the insufficiency of sustainability awareness is considered a dependent variable because it has a confined capacity to motivate change, with simple recognition of sustainability practices failing to lead to their authentic implementation. In opposition to the research undertaken by Bux et al. (2024), Dixit (2020), Faisal et al. (2020), Yang et al. (2017), and Zayed et al. (2020), wherein results show that a lack of awareness acts as a stronger driving factor and is referred to as either an independent or linking variable, Yang et al. (2017) also highlights the shortage of training and skills as a variable reliant on others. Nonetheless, this perspective contradicts the conclusions drawn by Raut et al. (2018), which regard this deficiency as one of the most significant barriers. The current research identifies the absence of regulatory frameworks, governmental support, and sustainability infrastructure, alongside the lack of market pressures or demands and insufficient resources, as factors contributing to both the lack of sustainability awareness and the deficiency in training and skills. In addressing these dependent barriers, it is advisable to focus on the lower-level barriers that influence them, as this approach would concurrently mitigate their impacts.

5. Conclusion

The research underscored the significance of surmounting financial limitations and fostering collaboration among stakeholders as pivotal elements in promoting sustainable practices within small and medium-sized enterprises (SMEs) in developing nations (Nazneen et al., 2024). The difficulties faced in the integration of sustainable business practices by SMEs are tied to the safety of data storage, a lack of confidence, poor support from executive leadership, resistance to tech improvements, and a limited pool of skilled workers (Shoaib et al., 2024). A range of impediments, including financial limitations, a lack of knowledge and awareness, insufficient expertise, the absence of legal and regulatory mandates, and a deficiency of motivation, were recognized as barriers to SMEs' engagement in sustainability reporting (Acheampong et al., 2024).

SMEs exhibit a notable sensitivity to governmental regulations. The predominant explanation for the insufficient uptake of sustainability reporting within SMEs is the lack of existing regulatory frameworks instituted by governmental authorities. The utilization of ISM and MICMAC analytical techniques has uncovered a significant potential to impact all other recognized barriers, underscoring that substantial attention should be directed towards this dimension. Nevertheless, concerning facilitators, the paramount factor is the reception of pressures or expectations from external stakeholders. An increasing necessity is evident for a unified sustainability reporting framework that is created to fit the needs of small and medium-sized enterprises

(SMEs) to elevate their enthusiasm. A guideline explicitly tailored for SMEs would greatly assist them in understanding the methodologies for presenting their financial, environmental, and social information. Contemporary reporting standards are primarily directed towards larger firms endowed with considerable resources, thereby creating significant challenges for SMEs in terms of effective execution. SMEs often lack excess financial and non-financial resources or demonstrate hesitance in dedicating such assets towards sustainability efforts, chiefly due to inadequate pressures or expectations from stakeholders. Despite their evident resource constraints, SMEs possess behavioral advantages that can alleviate these shortcomings, including an informal and entrepreneurial leadership style, flexible organizational capacities, and a highly driven workforce. The lack of resources, combined with the absence of stakeholder pressures, culminates in a deficiency of awareness, training, and competency, which can be addressed through improved access to green financing and funding opportunities specifically designed for SMEs. The inadequacy of sustainability awareness and the lack of necessary training and competencies have surfaced as pervasive challenges due to the presence of barriers that exert a greater influence in comparison to these two elements. Given that the findings suggest the nonexistence of an autonomous variable, one may infer that all obstacles identified in this study are interrelated and exhibit dependencies among them. This reinforces the premise that when addressing barriers, it is imperative to first outline their interconnections to effectively ascertain the most critical impediments. Future research employing Interpretive Structural Modeling (ISM) and MICMAC analysis will facilitate organizations in prioritizing barriers based on their significance, thereby ensuring that the development of strategies to mitigate the primary barrier will inevitably affect other barriers.

The subsequent recommendations and suggestions pertain specifically to each dimension. In light of the considerable influence exerted by stakeholders, including customers and governmental entities, on sustainability practices, prospective research endeavors could investigate methodologies for augmenting stakeholder engagement. This examination might address how SMEs can more adeptly harmonize their sustainability aspirations with the expectations set forth by their stakeholders. The research highlights the imperative for a proficient workforce to facilitate the implementation of sustainable practices. This indicates that SMEs ought to allocate resources toward training and development initiatives to furnish their personnel with the requisite skills to adopt innovative technologies and processes. SMEs are positioned to formulate strategic plans to address these challenges. For example, they may judiciously allocate resources to ameliorate financial limitations or invest in training to enhance their knowledge and technological competencies.

6. Implication of research

Financial limitations and insufficient educational resources are viewed as significant hurdles that stop small and medium-sized enterprises (SMEs) in developing regions from identifying and managing issues tied to environmental sustainability. This highlights the imperative for financial support and educational programs specifically tailored for SMEs to enhance their understanding and implementation of

sustainable practices. Stakeholders should consider the application of the resource-based view theory to facilitate the adoption or improvement of sustainability performance reporting among SMEs, thereby emphasizing the importance of developing internal capabilities and efficiently leveraging available resources. SMEs can formulate strategic methodologies and prudently allocate resources to confront the challenges associated with sustainability reporting, ultimately enhancing their governance practices, social responsibility, and environmental impact. The research emphasizes the absence of governmental backing and regulatory frameworks as a significant barrier to compliance with environmental safety legislation. In practical terms, this suggests that governmental entities ought to contemplate the establishment of more rigorous regulations and the provision of incentives for SMEs to incorporate sustainable practices. Such incentives may include tax reductions or recognition programs for enterprises that meet specific environmental criteria. The analysis indicates that consumer preferences play a pivotal role in the incorporation of practices aimed at environmental sustainability. This means that increasing consumer insight into the relevance of sustainability may elevate the appeal of environmentally friendly offerings, prompting SMEs to take on such strategies to fit with market standards.

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