“THE ROLE OF SMALL AND MEDIUM ENTERPRISE IN SUSTAINABLE DEVELOPMENT TRANSITS THE NATION ECONOMY”

by

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ABSTRACT

"THE ROLE OF SMALL AND MEDIUM ENTERPRISE IN SUSTAINABLE DEVELOPMENT TRANSITS THE NATION ECONOMY"

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The development and growth of the any nation economically is largely influenced by the development and growth of the business in the country. In business, Small and Medium Enterprise plays an important role in the uplifting the economy of the country by adopting an appropriate strategy in the operation and management of enterprise i.e. when small and medium enterprise vision, objectives and goals integrate with sustainable development goals framed as per the project supported by the 2030 Agenda for Sustainable Development Sub-Fund of the UN Peace and Development Fund (UNPDF). The Small and medium enterprise can contribute for achieving the sustainable development goals in turn helps for development and growth of the nation and the world economy as well, as the world is shrinking in this era and the adoption of sustainable development goals in small and medium enterprises will strength and provides a guidance to achieve the goals of small and medium enterprises and contributes for the thrive of nation. The purpose of this thesis is to discusses, describe and understand the importance of small and medium enterprise in adoption of sustainable development goals for economic growth of nation, how small and medium enterprise approaches or embrace the sustainable development goals in spite of constraints, limitations and implications associated in the operation and management of small and medium enterprise, its influence in the development of small and medium enterprise in turn contribute for the nation development.

Key Words: Sustainable Development, Small and Medium Enterprises and Nation development

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CHAPTER - I

INTRODUCTION

1.1 Background of the Study

The global economy is undergoing a significant transformation, with sustainable development now a central priority for both governments and businesses. Small and Medium Enterprises (SMEs) are emerging as critical drivers of this shift, especially in developing nations. Their contributions to employment, innovation, and economic diversification position them as essential players in achieving long-term economic, environmental, and social goals. In India, and particularly in Bangalore renowned as the "Silicon Valley of India" SMEs are instrumental in shaping inclusive economic growth, beyond its thriving IT industry, Bangalore supports a diverse SME landscape across manufacturing, services, and retail. The city's entrepreneurial environment, skilled talent pool, and expanding consumer market make it an ideal setting for SME development. For SMEs in Bangalore, adopting sustainable practices is no longer optional; it is a strategic necessity. Embracing sustainable enhances resource efficiency, strengthens community relationships, and boosts long-term competitiveness. Furthermore, it aligns with national objectives such as economic growth, job creation, and environmental preservation. However, several challenges hinder SMEs from fully integrating sustainable practices. These include inadequate infrastructure, limited financial access, regulatory barriers, and a general lack of awareness about sustainable benefits. Additionally, the policy landscape often lacks the targeted support SMEs need to succeed in a globalized, eco-conscious market. This study explores the role of SMEs in advancing sustainable development in Bangalore. It examines how they implement environmental and social initiatives and contribute to economic sustainable. It also analyzes the enabling and limiting factors within the policy and institutional frameworks. The findings will offer actionable insights for scholars, business leaders, and policymakers, helping to strengthen the ecosystem that supports sustainable SME growth and contributes to India's broader development goals.

1.1.1 Theoretical Concepts

This study applies multidisciplinary frameworks from economics, management, sustainable, and development studies to analyze how SMEs contribute to national economic transformation. It explores key theoretical concepts that highlight SMEs' roles in promoting economic growth while addressing social and environmental challenges within the broader context of sustainable development.

1.1.2 Sustainable Theory

Sustainable theory is fundamental to understanding the role of SMEs in sustainable development, emphasizing the integration of economic growth, environmental responsibility, and social equity. The three pillars of sustainable guide SMEs in shifting from traditional business models to more sustainable practices:

- **Economic sustainable** involves maintaining long-term profitability while promoting efficiency, innovation, and responsible resource management.
- **Environmental sustainable** requires minimizing ecological impact through energy efficiency, waste reduction, and adoption of green technologies.
- **Social sustainable** focuses on fair employment, diversity, inclusion, and community engagement, ensuring SMEs contribute positively to society.

The United Nations' Sustainable Development Goals (SDGs) provide a global framework for measuring corporate contributions to sustainable. SMEs, due to their scale and local engagement, are often well-positioned to align with SDG targets such as poverty reduction, quality education, decent work, environmental protection, and partnerships for development.

1.1.3 Resource-Based View (RBV)

The Resource-Based View (RBV) is a key management theory that emphasizes an organization's internal resources and capabilities as critical to achieving a competitive advantage. In the context of SMEs, RBV suggests that firms with unique, valuable, and inimitable resources whether physical, human, or intellectual are better positioned to adopt sustainable practices. Sustainable development encourages SMEs to leverage their distinct assets, such as local knowledge, innovation, and strong stakeholder relationships,

to operate profitably while being socially and environmentally responsible. This perspective is particularly relevant to SMEs in Bangalore, which, despite limited resources compared to larger firms, can pursue sustainable through strategic and innovative resource use. RBV also highlights the importance of resource accumulation, knowledge sharing, and creativity as key enablers of sustainable in SMEs.

1.1.4 Institutional Theory

Institutional theory provides a useful lens to understand how SMEs adapt to and are influenced by their institutional environment. For SMEs in Bangalore, the adoption of sustainable practices is often shaped by external factors such as government regulations, legal frameworks, industry standards, and societal expectations.

- **Coercive Isomorphism** involves regulatory pressures, where government initiatives like the *National Action Plan on Climate Change* and *Green Manufacturing* policies push SMEs toward environmental and social responsibility.
- **Normative Isomorphism** reflects the influence of industry norms, where sustainable becomes a standard that SMEs must follow to remain competitive.
- **Mimetic Isomorphism** occurs when SMEs imitate successful firms' sustainable practices in response to uncertainty or global sustainable trends.

This theory underscores how both formal regulations and informal social norms influence SMEs' sustainable strategies, especially in dynamic business environments like Bangalore.

1.1.5 Innovation and Diffusion of Innovations Theory

Innovation plays a crucial role in the sustainable growth of SMEs. Rogers' *Diffusion of Innovations Theory* explains how new ideas, technologies, and practices spread across organizations and societies. In the sustainable context, this includes adopting energy-efficient technologies, waste-reducing methods, and eco-friendly products and services. For SMEs, innovation often involves incremental changes such as improving energy efficiency, shifting to renewable energy, or adopting sustainable packaging. Factors influencing adoption include technological readiness, financial capacity, and policy

incentives. In Bangalore, SMEs across sectors like manufacturing, retail, and IT are increasingly embracing green technologies, reflecting broader trends in sustainable business innovation.

1.1.6 Triple Bottom Line (TBL)

John Elkington's (1994) *Triple Bottom Line (TBL)* framework offers a holistic model for evaluating business performance across three dimensions: People, Planet, and Profit. This aligns with the broader goals of sustainable development, especially relevant to SMEs driving national economic transitions.

- **People (Social Responsibility):** SMEs are encouraged to support fair labor, community development, and equitable stakeholder engagement. In Bangalore, this may include local capacity-building or social welfare initiatives.
- **Planet (Environmental Responsibility):** SMEs are urged to reduce ecological impact through emission control, water conservation, and sustainable material use.
- **Profit (Economic Responsibility):** Financial sustainable remains key, with a focus on long-term profitability through efficient resource use and innovation.

TBL guides SMEs to move beyond profit maximization and adopt a more comprehensive, sustainable -driven business approach.

1.1.7 Sustainable Business Model Theory

In recent years, the sustainable business model has gained prominence, urging companies to balance social equity, environmental care, and financial success. For SMEs in Bangalore, this may involve redefining their value propositions to include not just profit but also social and environmental impact. Adopting circular economy principles, reducing waste, and ensuring ethical supply chains can drive innovation in product development. In the context of Bangalore's fast-growing economy, where resource limitations and social inequalities are pressing concerns, this model demonstrates how SMEs can contribute to economic growth while addressing global sustainable challenges.

1.1.8 Circular Economy Theory

Circular Economy Theory emphasizes rethinking production and consumption patterns to minimize waste and maximize resource reuse, recycling, and repurposing. Unlike the traditional "take-make-dispose" model, it promotes a "closed-loop" system where materials are kept in use, reducing the need for virgin resources.

For SMEs in Bangalore, adopting circular economy principles can lower material costs, reduce waste disposal expenses, and enhance corporate reputations. This is especially beneficial for SMEs in sectors like manufacturing and retail, where resource efficiency and waste reduction are crucial.

These theoretical frameworks collectively provide a comprehensive view of how SMEs can drive the shift toward sustainable development, supporting social well-being, environmental preservation, and economic sustainable. The research will analyze the challenges and opportunities SMEs in Bangalore face in implementing sustainable practices, offering insights into the broader dynamics of global sustainable goals.

1.1.9 Statistical Data on SMEs in Bangalore's Economy

A major part of Bangalore's economy, Small and Medium Enterprises (SMEs) greatly influence sustainable, employment, and innovation. Statistical statistics below help to better understand the existing situation of SMEs in Bangalore by sector, employment contribution, and sectorial distribution as well as their part in environmental projects.

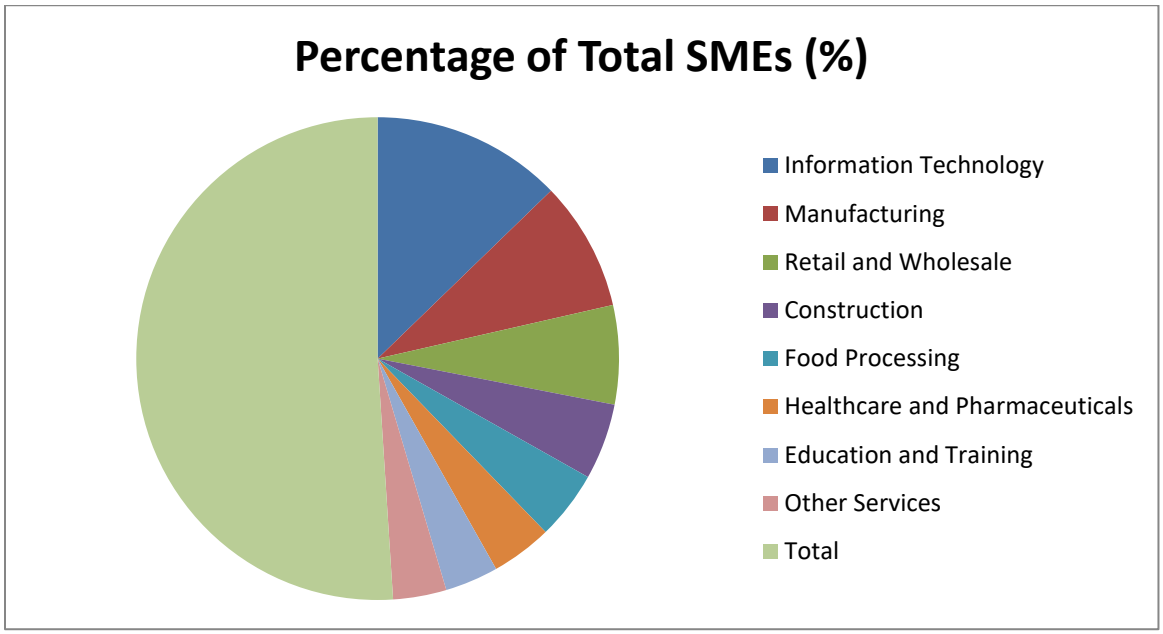
Table 1.1: Distribution of SMEs by Sector in Bangalore (2023)

Sector	Number of SMEs	Percentage of Total SMEs (%)
Information Technology	12,000	25%
Manufacturing	8,000	17%
Retail and Wholesale	6,500	13%
Construction	5,000	10%
Food Processing	4,500	9%
Healthcare and Pharmaceuticals	4,000	8%
Education and Training	3,500	7%
Other Services	3,500	7%

Total	**47,000**	**100%**

Source: Karnataka State Government, 2023

Figure 1.1: Distribution of SMEs by Sector in Bangalore (2023)



Source: Karnataka State Government, 2023

Information Technology (IT) and Manufacturing sectors have the highest concentration of SMEs in Bangalore, These sectors also lead in adopting innovative practices and sustainable technologies, particularly in the IT and green manufacturing fields.

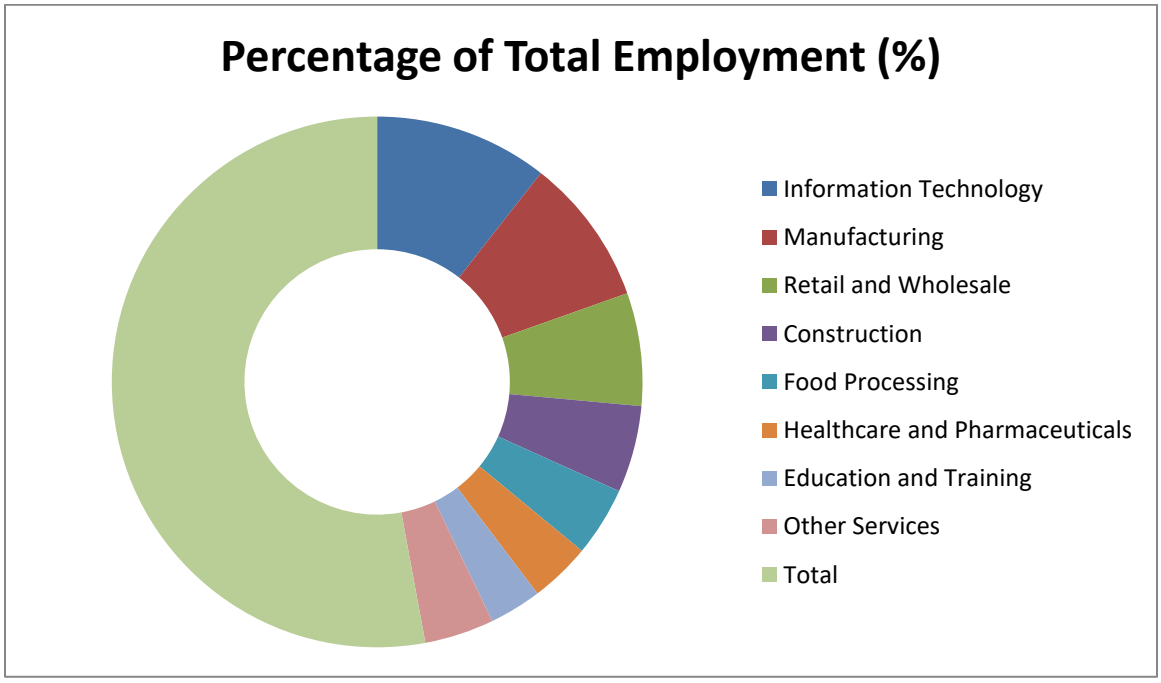
Table.1.2: Employment Contribution of SMEs in Bangalore (2023)

Industry Sector	**Total Employment (in thousands)**	**Percentage of Total Employment (%)**
Information Technology	300	20%
Manufacturing	250	17%
Retail and Wholesale	200	13%
Construction	150	10%
Food Processing	120	8%
Healthcare and Pharmaceuticals	110	7%
Education and Training	100	6%

Other Services	120	8%
Total	**1,410**	**100%**

Source: Karnataka State Government, 2023

Figure 1.2: Employment Contribution of SMEs in Bangalore (2023)



Source: Karnataka State Government, 2023

Over 1.4 million people are employed by SMEs in Bangalore; the manufacturing and information technologies industries account for the most of them. These industries are very important in helping the city to flourish generally economically.

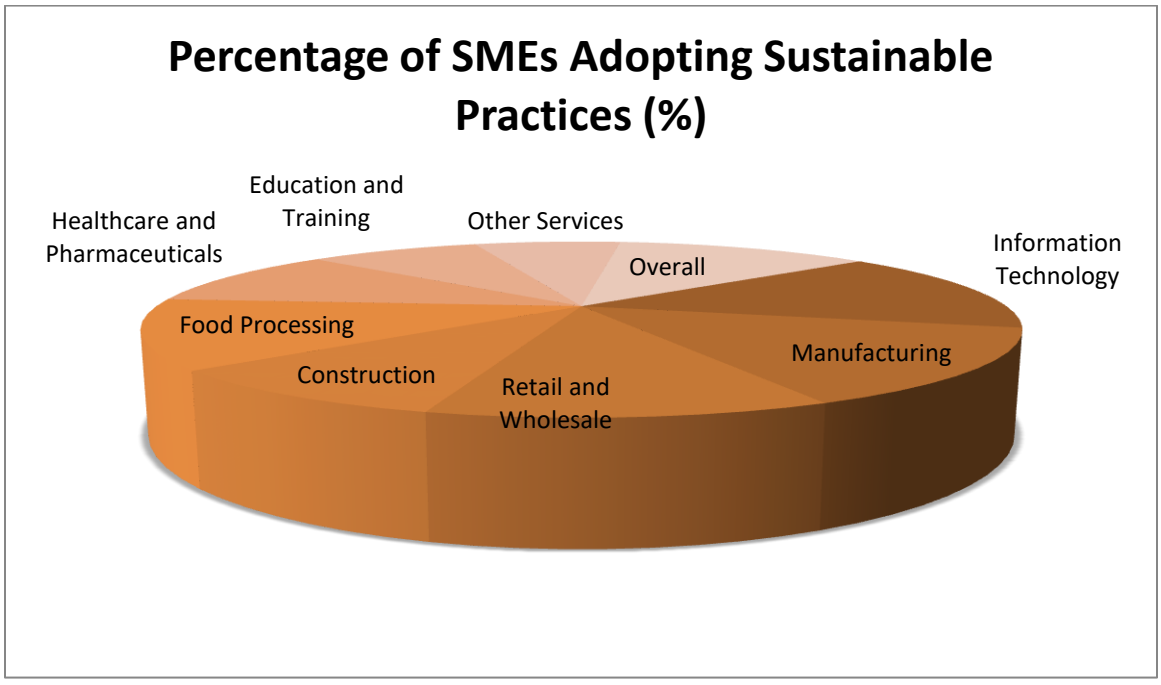
Table 1.3: Percentage of SMEs Implementing Sustainable Practices in Bangalore (2023)

Sector	**Percentage of SMEs Adopting Sustainable Practices (%)**
Information Technology	65%
Manufacturing	60%
Retail and Wholesale	50%
Construction	40%

Food Processing	55%
Healthcare and Pharmaceuticals	45%
Education and Training	35%
Other Services	30%
Overall	**52%**

Source: Karnataka State Government, 2023

Figure 1.3: Percentage of SMEs Implementing Sustainable Practices in Bangalore (2023)



Source: Karnataka State Government, 2023

A majority of SMEs in Bangalore, particularly in Information Technology and Manufacturing sectors, are actively implementing sustainable practices. These practices include energy-efficient technologies, waste reduction, and green certifications, contributing to the city's sustainable goals.

Table 1.4: Growth Rate of SMEs in Bangalore (2015-2023)

Year	Number of SMEs (in thousands)	Growth Rate (%)
2015	35,000	-

2016	37,000	5.7%
2017	40,000	8.1%
2018	42,000	5.0%
2019	44,000	4.8%
2020	45,000	2.3%
2021	46,000	2.2%
2022	47,000	2.2%
2023	47,000	0%

Source: Karnataka State Government, 2023

From 2015 to 2023, the number of SMEs in Bangalore has been steadily rising; previous few years have clearly slowed down development in this regard. Notwithstanding this, SMEs are still a vital part of the city's economy and the industry keeps being very important for the growth of the area.

Table 1.5: Government Initiatives Supporting SMEs in Bangalore (2023)

Initiative	Description
Karnataka SME Development Policy	Provides financial support, tax incentives, and access to technology to SMEs.
Karnataka State Innovation Council	Promotes innovation and technology adoption in SMEs.
Skill Development Programs for SMEs	Offers training programs to enhance workforce skills in sustainable practices.
Green Manufacturing Subsidy Program	Encourages SMEs in manufacturing to adopt environmentally friendly technologies.
Cluster Development Program	Supports the creation of SME clusters to enhance resource sharing and sustainable.

Source: Karnataka State Government, 2023

State government initiatives play a vital role in supporting SME growth and promoting sustainable practices. These initiatives provide financial, technological, and educational resources that enhance the environmental and economic performance of SMEs in

Bangalore. The statistical data underscores the significant role of SMEs in Bangalore's economy and their growing contribution to sustainable. Despite challenges, SMEs in sectors like IT and manufacturing have demonstrated innovation, with sustainable initiatives gaining priority. Continued support from government policies will be key to driving the sustainable transition in Bangalore's economy, fostering both local and national economic development.

1.1.10 History, Profile, and Policy of SMEs in India, Bangalore

Small and medium-sized businesses (SMEs) have been vital to India's industrial growth, contributing significantly to regional development, job creation, and economic prosperity.

1. **Pre-independence Period:** During British colonial rule, India's economy was agriculture-based, with small-scale industries like textiles, handlooms, and handicrafts being prominent but limited in growth.
2. **Post-independence Period:** After 1947, the Indian government focused on industrialization and reducing import reliance. SMEs grew with the establishment of the Small Industries Development Organization (SIDO) in 1954 and the National Small Industries Corporation (NSIC) in 1955, which provided financial and marketing support.
3. **Industrial Policy of 1991:** The liberalization reforms of 1991 provided SMEs with greater opportunities for expansion through reduced import taxes, economic liberalization, and entrepreneurship support. The 2006 Small and Medium Enterprises Development (SMED) Act further reinforced this growth.
4. **Current Scenario:** SMEs now account for approximately 30% of India's GDP, provide jobs to over 110 million people, and contribute significantly to exports.

1.1.11 Profile of SMEs in India

Small and Medium Enterprises (SMEs) in India are classified based on their investment in plant, machinery, or equipment:

- **Micro Enterprises:** Investments typically under ₹1 crore.
- **Small Enterprises:** Investments between ₹1 crore and ₹10 crore.
- **Medium Enterprises:** Investments between ₹10 crore and ₹50 crore.

SMEs in India span several industries, with key sectors contributing to their growth:

- **Manufacturing:** The largest contributor, with SMEs active in textiles, food processing, chemicals, and auto components.
- **Services:** Including education, IT, healthcare, and hospitality.
- **Agriculture:** SMEs in food processing and agro-based industries.
- **Retail and Wholesale:** Growing sectors driving urbanization and economic growth.

1.1.12 Profile of SMEs in Bangalore

Bangalore, known as the "Silicon Valley of India," serves as a key hub for the expansion of Small and Medium Enterprises (SMEs), particularly in the Information Technology (IT) sector. The city's strategic location, top-tier educational institutions, and skilled labor force contribute to the growth of SMEs.

- **IT and Technology SMEs:** Bangalore hosts numerous IT SMEs specializing in software development, mobile applications, cloud computing, and IT services, reinforcing its position as a global tech hub.
- **Manufacturing SMEs:** The city is also home to SMEs in precision engineering, auto components, electronics, and machinery.
- **Start-ups and Innovation:** A thriving start-up ecosystem fosters innovation and digital transformation, with many SMEs leading the charge.
- **Support Infrastructure:** Institutions like NASSCOM, KSSIA, and BCIC play a vital role in supporting SME growth.

1.1.13 Government Policy on SMEs in India

The Indian government has introduced several policies to support the growth of SMEs:

1. **MSME Development Act, 2006:** Supports micro, small, and medium businesses and established the National Board for MSMEs.
2. **SIDBI (1990):** Provides financial assistance, loans, and grants to SMEs.
3. **Credit Guarantee Fund Scheme:** Offers collateral-free loans to SMEs, especially in rural areas, to encourage entrepreneurship.

4. **Start-up India Initiative (2016):** Promotes start-ups with tax exemptions, financial support, and ease of doing business.
5. **National Policy on Skill Development (2015):** Focuses on creating a skilled workforce for SMEs to enhance productivity.
6. **Make in India Initiative (2014):** Encourages SME participation in manufacturing through improved infrastructure and innovation.

1.1.14 Policy and Initiatives for SMEs in Bangalore

In addition to national policies, Karnataka, particularly Bangalore, has implemented key initiatives to support SME growth:

1. **Karnataka Industrial Policy (2020-2025):** Focuses on boosting manufacturing investments, easing business operations, and promoting digital transformation for SMEs.
2. **Keonics (Karnataka State Electronics Development Corporation Ltd):** Supports SMEs in electronics and IT with subsidies, infrastructure, and capacity building.
3. **Bangalore Innovation Cluster (BIC):** Encourages innovation in small enterprises with technical support, research, and financial aid.
4. **Cluster Development Programme (CDP):** Promotes collaboration among SMEs in manufacturing to enhance competitiveness through shared resources.

1.1.15 Statistical Data on SMEs in India and Bangalore

Table 1.6: Contribution of SMEs to India's GDP and Employment (2023)

Indicator	Value
Contribution to GDP	30%
Contribution to Employment	110 million people
Contribution to Exports	40%
Number of SMEs in India (approx.)	63 million

Source: Ministry of MSME, Government of India, 2023

By 2023, SMEs in India have become crucial to the national economy, contributing nearly 30% to GDP and employing 110 million people. They play a key role in global

trade, accounting for 40% of India's exports. With approximately 63 million SMEs, they are prominent across various sectors.

Table 1.7: Growth of SMEs in Bangalore (2015-2023)

Year	Number of SMEs in Bangalore (in thousands)	Growth Rate (%)
2015	35,000	-
2016	37,000	5.7%
2017	39,000	5.4%
2018	41,000	5.1%
2019	43,000	4.9%
2020	44,500	3.5%
2021	45,500	2.3%
2022	46,000	1.1%
2023	47,000	2.2%

Source: Karnataka State Government, 2023

The growth of SMEs in Bangalore has been steady, rising from 35,000 businesses in 2015 to 47,000 in 2023. The highest growth rates occurred in 2016 and 2017, at 5.7% and 5.4%, respectively. However, recent years have seen a slowdown, with a growth rate of just 1.1% in 2022, likely due to market saturation, economic challenges, and the global pandemic. Despite this, Bangalore remains a key hub for SMEs, with continued growth in sectors like IT, manufacturing, and services.

Table 1.8: Sectoral Distribution of SMEs in India (2023)

Sector	Percentage Share in Total SMEs
Manufacturing	40%
Services	35%
Construction	12%
Retail and Wholesale	8%
Agriculture and Agro-based	5%

Source: Ministry of MSME, Government of India, 2023

In 2023, the manufacturing sector led SMEs in India, comprising 40% of all small enterprises. The services sector followed closely with 35%, while the construction sector

contributed 12%, reflecting the growing role of SMEs in infrastructure. Retail and wholesale accounted for 8%, and agriculture/agro-based industries made up 5%. These figures highlight the diversity of SMEs in India, with manufacturing and services as the key drivers.

Table 1.9: Contribution of SMEs to Exports from India (2023)

Export Category	Value (₹ Crore)	Percentage Share in Total Exports
Textiles and Apparel	1,50,000	25%
Engineering Goods	1,20,000	20%
Chemical and Pharmaceutical Goods	90,000	15%
IT Services and Software	1,00,000	17%
Other Exports	90,000	23%

Source: Ministry of Industry and Commerce, Indian Government, 2023

SMEs in India make a significant contribution to the country's exports. Textiles and apparel lead, accounting for 25% of total SME exports, followed by engineering goods (20%) and IT services (17%). The chemical and pharmaceutical sector contributes 15%, with other categories like agro-products, furniture, and handicrafts making up 23%. This underscores the export-driven nature of India's SME sector, highlighting its vital role in global trade.

Table 1.10: Financial Support to SMEs in India (2023)

Source of Funding	Amount Disbursed (₹ Crore)	Percentage of Total Funding
Government Schemes and Grants	50,000	35%
Private Sector Banks	60,000	42%
Microfinance Institutions	25,000	18%
Angel Investors and Venture Capital	5,000	5%

Source: Ministry of Finance, Government of India, 2023

In 2023, private sector banks provided the largest share of financial assistance to SMEs in India, disbursing ₹60,000 crore, which accounts for 42% of total financing. Government

schemes and grants contributed ₹50,000 crore (35%), while microfinance institutions offered ₹25,000 crore (18%). Angel investors and venture capitalists contributed ₹5,000 crore (5%). This distribution highlights the essential role of both public and private sectors in supporting the growth and sustainable of SMEs.

Table 1.11: Employment Generation by SMEs in Bangalore (2020-2023)

Year	Number of Jobs Created	Percentage Increase in Employment
2020	200,000	-
2021	210,000	5%
2022	220,000	4.8%
2023	230,000	4.5%

Source: Karnataka State Government, 2023

SMEs in Bangalore have been vital to employment growth, increasing from 200,000 jobs in 2020 to 230,000 in 2023. The highest growth was seen in 2021 (5%), reflecting post-pandemic recovery, although growth has slowed in recent years. SMEs continue to play a key role in Bangalore's economy, particularly in IT, manufacturing, and services.

This data illustrates SMEs' critical contribution to India's economic development, influencing GDP, employment, exports, and innovation. Despite growth fluctuations, Bangalore's SMEs have shown consistent expansion, supported by government policies, financial aid, and the city's entrepreneurial environment. Continued strategic support will be essential for their sustainable future.

1.1.16 Profile of the Study Region: Bangalore

Bangalore, the capital of Karnataka, stands as a key economic and technological hub in India, often called the "Silicon Valley of India" due to its dominant IT sector and the presence of multinational companies. The city has become a thriving center for Small and Medium Enterprises (SMEs), benefiting from a strong industrial foundation, a vibrant entrepreneurial culture, and diverse opportunities for growth.

1.1.17 Geography and Demographics

Bangalore has a mild temperature all year round as it is in southern India and 900 meters (3,000 feet) above sea level. The city is home to a population of approximately 13 million people (2023), making it one of the largest cities in India.

Table 1.12: Demographic Information:

Indicator	Value
Population (2023)	13 million
Area	709 km²
Population Growth Rate (2011-2021)	3.7% per annum
Literacy Rate	89.1%
Sex Ratio (F: M)	940:1
Average Age of Population	29 years
Number of Households	3.2 million
Average Household Income (₹)	5.5 lakh per annum

Source: Census of India, 2021; Bangalore Development Authority

Bangalore's population grew rapidly at 3.7% annually from 2011 to 2021, driven by urbanization and economic opportunities. The city's young average age of 29 fosters innovation and a dynamic workforce, ideal for SMEs and startups. With a literacy rate of 89.1%, Bangalore boasts a skilled labor pool, supporting its IT and industrial sectors. An average household income of ₹5.5 lakh reflects the growing affluence, further contributing to the city's economic vibrancy.

1.1.18 Economic Overview of Bangalore

Bangalore's economy is diversified, with key sectors like IT, manufacturing, biotechnology, aerospace, and tourism. The IT sector dominates, with global IT firms based in the city. SMEs play a significant role in driving innovation, employment, and exports, further boosting the city's economic growth.

Table 1.13: Economic Indicators for Bangalore (2023)

Indicator	Value
Gross City Domestic Product (GCDP)	₹7,50,000 crore
Per Capita GCDP	₹5,77,000
Contribution to State GDP	40%
Percentage of IT Sector in GCDP	50%
Number of SMEs in Bangalore	47,000
Employment Generated by SMEs (2023)	230,000

Source: Bangalore Economic Survey, 2023

Bangalore's Gross City Domestic Product (GCDP) is ₹7.5 lakh crore, contributing 40% to Karnataka's GDP. The IT sector accounts for 50% of this, highlighting its economic importance. SMEs in the city employ over 230,000 people, underscoring their vital role in job creation and fostering entrepreneurship.

1.1.19 SME Sector in Bangalore

Bangalore is a key hub for SMEs across sectors like IT, electronics, manufacturing, textiles, healthcare, and retail. The city's SME sector has grown significantly due to factors such as access to venture capital, a skilled workforce, and robust infrastructure. Government initiatives at both national and state levels have further supported SME growth.

Table 1.14: Sectoral Distribution of SMEs in Bangalore (2023)

Sector	Number of SMEs (in thousands)	Percentage Share
IT and Software	12,000	25%
Manufacturing	10,000	21%
Retail and Wholesale	8,500	18%
Biotechnology and Pharmaceuticals	6,000	13%
Textiles and Apparel	4,500	9%
Other Sectors	6,000	14%

Source: Karnataka State Government, 2023

In Bangalore, the IT and software sector comprises 25% of SMEs, followed by manufacturing (21%) and retail (18%). Sectors like biotechnology, pharmaceuticals, and textiles also contribute, demonstrating the diverse nature of the city's SME ecosystem.

1.1.20 Infrastructure and Connectivity

Bangalore's strong infrastructure supports SME growth, with extensive road networks, the Namma Metro, and Kempegowda International Airport connecting the city globally. High-speed internet and reliable public transport also benefit SMEs, particularly in IT and tech sectors.

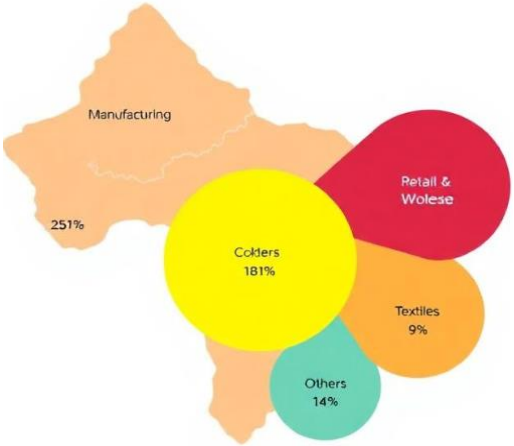
1.1.21 Entrepreneurial Ecosystem and Government Support

Bangalore's entrepreneurial ecosystem thrives due to favorable policies like the Karnataka State SME Policy and Karnataka Industrial Policy, offering financial support, tax incentives, and infrastructure development to encourage SME growth.

Key Government Initiatives:

- Karnataka State SME Policy (2020): Enhances competitiveness by providing capital access, skill development, and market linkages.
- Atal Innovation Mission: Supports innovation and entrepreneurship in sectors like technology, manufacturing, and healthcare.
- Start-Up Karnataka: Offers funding, mentoring, and networking support to technology startups and SMEs.

Figure 1.4: Distribution of SMEs in Bangalore by Sector (2023)



Data Source – Karnataka State Government, 2023

Bangalore is a key driver of India's economic growth, particularly through its thriving SME sector. With strong infrastructure, skilled labor, and supportive government policies, the city fosters a diverse range of SMEs in sectors like IT, manufacturing, and retail. This vibrant entrepreneurial environment offers a solid foundation for researching how SMEs can contribute to sustainable economic development.

1.2 Research Problem

Small and Medium Enterprises (SMEs) play a crucial role in the economic growth and sustainable of developing nations like India. In Bangalore, often called the "Silicon Valley of India," SMEs span sectors such as IT, manufacturing, retail, biotechnology, and textiles. However, despite strong growth potential, SMEs face challenges like limited access to finance, lack of technological advancements, regulatory hurdles, and inadequate market linkages. Additionally, globalization, environmental sustainable concerns, and technological disruptions further hinder their growth and impact on the national economy.

1.2.1 Research Problem Statement:

While SMEs are key drivers of economic growth, the role of Bangalore's SMEs in promoting national sustainable remains underexplored. Despite the city's diverse SME landscape, their potential to foster sustainable development is underutilized. This research aims to examine how SMEs in Bangalore contribute to sustainable; focusing on the challenges they face in adopting sustainable practices, their financial impact, and the obstacles hindering their growth through sustainable initiatives.

1.2.2 Contextualizing the Research Problem:

Bangalore, as a major economic hub, reflects the broader challenges faced by Indian SMEs. The city's rapid urbanization and demand for innovation and sustainable offer both opportunities and hurdles for small businesses. While Bangalore leads in technology and startups, the adoption of sustainable practices in SMEs lags behind larger corporations. This study explores how SMEs in Bangalore can align with sustainable development goals, contributing to economic growth and transitioning toward resilient,

environmentally-conscious business models. The focus is on overcoming challenges and enabling these SMEs to drive India's economic and environmental objectives.

1.3 Purpose of Research

Investigating the function of Small and Medium Enterprises (SMEs) in the sustainable development and economic transition of Bangalore is the main aim of this project. Here are the particular goals:

1. To examine the contribution of SMEs in promoting economic sustainable in Bangalore.
2. To analyze how SMEs in Bangalore integrate environmental sustainable practices into their business models.
3. To explore the social responsibility initiatives undertaken by SMEs in Bangalore to support sustainable development.
4. To evaluate SMEs' difficulties implementing strategies and sustainable practices.
5. To assess the challenges faced by SMEs in adopting sustainable practices and strategies.
6. To evaluate the policy framework and institutional support available to SMEs for sustainable initiatives in Bangalore.
7. To provide recommendations for fostering a more sustainable and resilient SME sector in Bangalore.

1.4 Significance of the Study

With an eye especially on Bangalore, India, this research is significant in helping to clarify the contribution Small and Medium Enterprises (SMEs) play in promoting sustainable development within the national economy. Although SMEs are thought to be the backbone of the Indian economy, little is known about how these businesses could support environmental responsibility, long-term sustainable development, or economic progress. This work intends to make numerous important contributions to both academic understanding and pragmatic policy development by bridging this gap.

1.4.1 Contribution to the Academic Literature

Most research on SMEs in India focuses on their economic contributions, neglecting their potential to drive sustainable. This paper expands the framework by integrating sustainable into the discussion. Through an in-depth study of SMEs in Bangalore, it will offer new insights into how small businesses in developing nations can contribute to economic transitions and SDGs. By focusing on Bangalore, a key economic hub, the research will provide valuable information for other regions with similar economic profiles, exploring how SMEs can align their business models with sustainable, balancing economic, environmental, and social goals.

1.4.2 Practical Implications for Policy Makers and Business Owners

This research has important implications for policymakers, business leaders, and legislators. It will help policymakers in India and Bangladesh address challenges SMEs face, such as access to finance, technology adoption, and regulatory issues. By understanding barriers to sustainable practices, legislators can develop better programs and incentives for SMEs to contribute more effectively to the national economy. For business owners, this research will offer practical guidance on incorporating sustainable into their operations, showing how aligning with sustainable goals can boost competitiveness and long-term success while contributing to a greener economy.

1.4.3 Advancing Sustainable Economic Development

SMEs in urban hubs like Bangalore are uniquely positioned to contribute to sustainable business practices, job creation, and innovation. This study explores their role in supporting the national sustainable agenda, providing valuable insights into how SMEs can drive sustainable economic development. By aligning with global sustainable standards, the research bridges the gap between sustainable practices and the SME sector. Highlighting best practices and success stories from Bangalore, the study can inspire similar businesses across India to adopt sustainable -focused strategies, aligning with both local and global economic trends.

1.4.4 Contribution to Global Knowledge

This research contributes to the global conversation on SMEs and sustainable by offering a case study from Bangalore, highlighting the opportunities and challenges SMEs face in adopting sustainable practices. The insights gained may be applied to other emerging nations facing similar issues, providing valuable comparative data for global research on sustainable economic growth.

By focusing on Bangalore as a model of urban economic transition, this study offers fresh perspectives on the intersection of SMEs and sustainable development. It aims to enrich the scholarly body, guide policymakers, and assist businesses in navigating the challenges of integrating sustainable, ultimately contributing to sustainable economic growth in India and beyond.

1.5 Research Purpose and questions

Specifically, the research questions:

1. **How do SMEs in Bangalore contribute to socio-economic development of the nation?**
2. **What role does government policy and support play in facilitating the sustainable and growth of SMEs?**
3. **The key factors hindering the growth and sustainable of SMEs in Bangalore?**
4. **What are the economic, social, and environmental impacts of SMEs in Bangalore's overall economic transition?**
5. **How can SMEs in Bangalore integrate sustainable principles into their operations to foster long-term economic growth?**

This study aims to bridge the knowledge gap on integrating sustainable within Bangalore's SMEs sector. It will highlight how SMEs can thrive in a dynamic economic and environmental context, contributing to a more sustainable and resilient national economy.

1.6 Scope and Limitations

1.6.1 Scope

This research examines the role of SMEs in promoting sustainable development and their impact on the national economy, focusing on Bangalore, India. The study will explore how SMEs contribute to economic growth, environmental sustainable, and social responsibility, while addressing the challenges they face.

Key areas of focus include:

1. **Economic Contribution**: Assessing SMEs' role in economic growth, job creation, and innovation across sectors such as manufacturing, services, and technology in Bangalore.
2. **Environmental sustainable:** Investigating SMEs' adoption of environmentally friendly practices, such as waste management, energy efficiency, and renewable resources.
3. **Social Responsibility**: Examining SMEs' social impact, including employee welfare, community development, and alignment with social sustainable goals.
4. **Policy and Regulatory Environment**: Analyzing government policies, financial incentives, and regulatory frameworks that support sustainable practices in SMEs.
5. **Regional Profile**: Profiling Bangalore's economic landscape, infrastructure, and key industries contributing to its status as an SME hub.

The study will combine qualitative and quantitative methods, including interviews, questionnaires, and secondary data analysis, to provide insights applicable to other cities in India and similar developing economies.

1.6.2 Limitations

This research aims to provide a comprehensive understanding of SMEs' contribution to sustainable development, with a focus on Bangalore, but there are several limitations to consider:

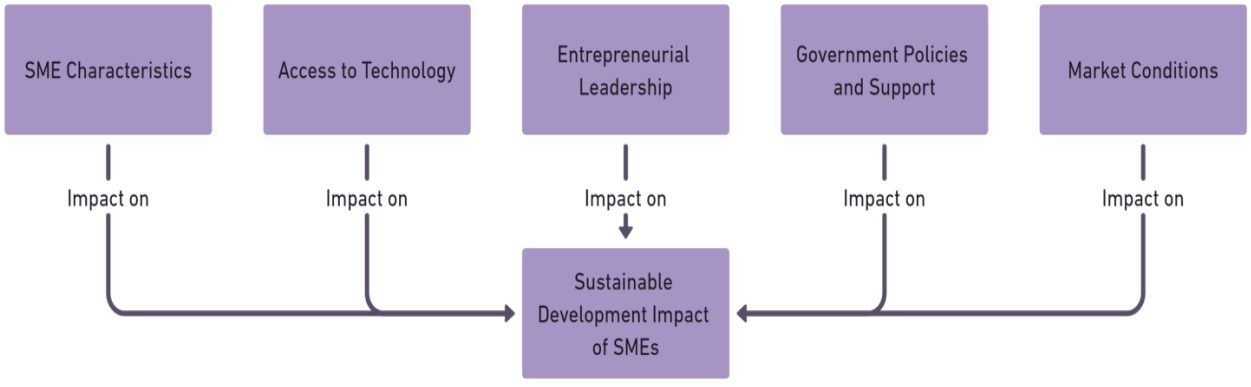
1. **Geographical Focus**: The study is limited to Bangalore, which may affect the generalizability of findings to other regions in India or developing economies with different conditions.

2. **Time Frame**: The research is conducted within a specific period, potentially overlooking long-term trends and changes in the SME landscape.
3. **Data Availability**: Access to detailed or accurate data on SMEs, particularly regarding sustainable practices, may be limited due to data gaps or reluctance from SMEs to share proprietary information.
4. **Scope of Sustainable Practices**: The study will focus on economic, environmental, and social sustainable but will not cover broader aspects like governance and ethics, nor will it focus on large enterprises.
5. **Respondent Bias**: Interviews with SME owners may lead to biased responses, with owners potentially emphasizing successes and downplaying challenges.
6. **Policy Implementation Variability**: The effectiveness of government policies may vary across different sectors and types of SMEs, which the study may not fully capture.
7. **Cultural and Social Factors**: Cultural and social factors specific to Bangalore, such as entrepreneurial culture and community expectations, may not be applicable elsewhere.

Despite these limitations, the research will provide valuable insights into the role of SMEs in promoting sustainable development in Bangalore, with implications for broader policy and academic discourse.

1.6.3 Conceptual frame work

Figure 1.5: Conceptual frame work



Source: Researcher developed

1. **Direct Relationships**: The arrows from the independent variables suggest a direct influence of SME characteristics, access to technology, and leadership on sustainable development.
2. **Moderated Influence**: The inclusion of government policies and market conditions as moderators indicates that their presence can either strengthen or weaken the impact of the independent variables.
3. **Holistic View**: The framework offers a thorough knowledge of the interactions among internal and external elements influencing the contributions to sustainable development made by SMEs.

This graph may direct the development of research hypotheses and data analysis techniques and acts as a template for examining the part SMEs play in sustainable.

1.7 Conclusion

Chapter 1 of this research provides an overview of the role of Small and Medium Enterprises (SMEs) in promoting sustainable development and their contribution to India's national economy, with a focus on Bangalore. The chapter highlights SMEs as key drivers of innovation, employment, social responsibility, and economic growth. It examines theoretical concepts, historical context, and the current SME landscape in India and Bangalore, emphasizing their impact on both local and national economies.

Through a review of existing research, the chapter identifies the need for further investigation into how SMEs in Bangalore can advance sustainable across social, environmental, and economic spheres. It also discusses policies that influence SMEs' sustainable practices, providing a foundation for assessing opportunities and challenges in adopting sustainable practices. The chapter includes statistical data on industries, employment, and the economic impact of SMEs in Bangalore, framing the significance of these businesses.

Although focused on Bangalore, the research findings are relevant to other Indian cities, contributing to the global understanding of SMEs' role in sustainable development. The chapter also outlines the study's limitations, clarifying the scope of the research. Finally, Chapter 1 sets the stage for a detailed exploration of how SMEs in Bangalore can enhance their contributions to sustainable, offering valuable insights for further academic inquiry.

CHAPTER - II

REVIEW OF LITERATURE

2.1 Theoretical Framework

This chapter reviews 70 academic papers to explore the role of Small and Medium Enterprises (SMEs) in promoting sustainable and supporting economic transformation, particularly in the context of national development. It highlights SMEs' contributions to job creation, innovation, and GDP, while also examining their adoption of sustainable initiatives such as waste management, energy efficiency, and green product development, despite limited resources. The analysis incorporates theoretical models like the Triple Bottom Line and Stakeholder Theory to contextualize the relationship between SMEs and sustainable practices. It also evaluates global best practices and policy frameworks that support SMEs in aligning with sustainable goals. While the literature offers valuable insights, significant gaps remain regarding the long-term impact of SMEs' sustainable efforts across specific sectors and regions.

2.1.1 Introduction to SMEs and sustainable Development

Small and Medium Enterprises (SMEs) form the backbone of Bengaluru's economy, contributing significantly to employment, innovation, and regional growth. Karnataka hosts approximately 850,000 MSMEs, supporting over 5.5 million jobs, and playing a key role in the state's industrial output and exports.

Sustainable is gaining importance among Bengaluru's SMEs, with 95% recognizing it as crucial to business strategy surpassing the global average of 75%. However, implementation remains limited; only 17% have adopted sustainable strategies, and just 4% track carbon emissions. Barriers such as limited funding, lack of technical expertise, and inadequate regulatory support hinder progress. Despite this, many SMEs acknowledge sustainable potential to enhance brand value, consumer trust, and global competitiveness.

Table 2.1 Statistical data on SMEs and their approach to Sustainable in Bengaluru

Statistic	Value	Source
Number of MSMEs in Karnataka	Over 850,000	Kinaracapital.com
Employment provided by MSMEs in Karnataka	More than 5.5 million	Kinaracapital.com
SMEs considering sustainable very/extremely important	95%	Economic Times
SMEs measuring carbon emissions	4%	Financial Express
SMEs with sustainable -related policies	17%	Financial Express
SMEs in Bengaluru study sample	85 business owners	TianjinDaxueXuebao.com

This data highlight the rising focuses on sustainable among Bengaluru's SMEs, despite difficulties in adopting green practices. With proper support from policymakers and financial institutions, these SMEs can play a key role in driving sustainable development and serve as models for other regions.

2.1.2 Defining Small and Medium Enterprises (SMEs)

Compared to large firms, Small and Medium Enterprises (SMEs) operate with limited size, resources, and income. In India, the MSMED Act classifies SMEs based on annual turnover or investment in equipment. Typically, they include small-scale manufacturing, trade, and service-based businesses.

2.1.3The Role of SMEs in Global and National Economies

Compared to large firms, Small and Medium Enterprises (SMEs) operate with limited size, resources, and income. In India, the MSMED Act classifies SMEs based on annual turnover or investment in equipment. Typically, they include small-scale manufacturing, trade, and service-based businesses.

2.1.4 Connection between SMEs and Sustainable Development

Sustainable development focuses on meeting current needs without compromising future generations. SMEs, due to their adaptability and innovation, are well-positioned to support this goal. In Bengaluru, many SMEs are adopting green manufacturing, waste

reduction, and solar energy. However, limited funds, low awareness, and weak policy support hinder broader adoption. Targeted support such as green finance and skill development can bridge this gap. Frameworks like the Triple Bottom Line, Ecological Modernization, and Stakeholder Theory help explain how Bengaluru's SMEs can advance sustainable development.

- **Triple Bottom Line (TBL):** The TBL framework evaluates a firm's performance across economic, social, and environmental dimensions. SMEs in Bengaluru using this model strive to balance profit with social responsibility and ecological impact. Studies show that firms integrating TBL into innovation are better at aligning sustainable goals.
- **Ecological Modernization:** This theory views technological progress and regulation as tools for combining economic growth with environmental sustainable. Bengaluru's SMEs are increasingly adopting green technologies and efficient waste systems, enhancing both performance and ecological responsibility.
- **Stakeholder Theory:** Stakeholder Theory emphasizes addressing the interests of all affected parties employees, customers, suppliers, and communities. Bengaluru SMEs that actively engage stakeholders often see improved sustainable outcomes, contributing to long-term business success.
- **Statistical Insights:** While Bengaluru-specific data is limited, global trends show SMEs increasingly integrating sustainable into business strategies. Models like TBL, Ecological Modernization, and Stakeholder Theory help Bengaluru SMEs align operations with sustainable development goals, driving competitiveness and social impact.

2.2 Theory of Reasoned Action (Sustainable Practices in SMEs)

Further Insights into sustainable Practices Adopted by SMEs:

2.2.1. Green Supply Chain Management (GSCM):

- **Eco-friendly Packaging:** Many SMEs are shifting towards biodegradable, recyclable, or reusable packaging to reduce waste.

    - Example: In the **food sector**, SMEs are using **plant-based packaging** materials that break down quickly without harming the environment.
- **Sustainable Sourcing:** SMEs are increasingly looking to source materials that have **minimal environmental impact**. This can include using recycled materials or purchasing from local suppliers to reduce **carbon footprints** related to transportation.
    - Example: A **fashion SME** might source **organic cotton** or **ethically produced fabrics**, which reduces the environmental impact of the fashion industry.

2.2.2 Circular Economy Models:

- **Product Lifecycle Extension:** By creating goods for lifetime and reparability, SMEs are adopting ideas of the circular economy.
- By extending the life of products, SMEs contribute to reducing waste.
    - Example: Furniture **SME** might offer repair services, ensuring that customers can repair and reuse products rather than throwing them away.
- **Recycling and Upcycling:** SMEs in various sectors are incorporating **upcycling** into their processes, turning waste products into new, higher-value items. This practice helps reduce the need for virgin materials.
    - Example: A **textile SME** might use fabric scraps to create new fashion items, thus reducing waste.

2.2.3. Water Conservation:

- SMEs in sectors such as **agriculture**, **manufacturing**, and **food processing** are adopting water-saving technologies to conserve water resources and reduce operational costs.
    - Example: **Water-efficient technologies** in **agriculture SMEs** help conserve water while ensuring crops are well-irrigated, leading to better yields and sustainable.

2.2.4 Challenges in implementing sustainable practices in SMEs (Extended):

1. Lack of Awareness and Knowledge:

- Many SMEs are unaware of the **benefits of adopting sustainable practices**. Without a clear understanding, they may be hesitant to invest in eco-friendly solutions.
    - **Solution:** Providing **education and awareness programs** on sustainable practices can help SMEs take informed decisions and create long-term value.

2. Technological Barriers:

- The great expense and complexity of new green technology make SMEs often unable to embrace them.
- Offering incentives, subsidies, or low-interest loans to SMEs ready to commit in green technology might be mostly dependent on governments and financial institutions.

3. Supply Chain Constraints:

- For SMEs that are part of a larger supply chain, there may be **pressures from larger corporations** to meet sustainable standards, even though they have limited control over their suppliers' practices.
- **Solution:** Collaborating with other SMEs to form **sustainable networks** can help overcome such challenges and enable mutual support.

4. Regulatory Challenges:

- SMEs may struggle to comply with complex or constantly changing **environmental regulations**. This can be especially burdensome for small enterprises without dedicated legal or compliance teams.
- **Solution: Simplifying** regulatory frameworks for SMEs can make it easier for them to comply with sustainable requirements.

Key Global Examples of SMEs embracing sustainable:

1. **Patagonia (USA)**:

- Known for its **environmentally friendly practices** and offering **product repairs** to extend product life.
- **Sustainable Initiative**: **Patagonia's "Worn Wear" program**, which encourages customers to buy second-hand clothing, thus reducing textile waste.

2. **Ecover (Belgium)**:
   - Specializing in **eco-friendly cleaning products**, Ecover uses **plant-based ingredients** and eco-friendly packaging to reduce its environmental impact.
   - **Sustainable Initiative**: The Company uses **sustainable production** processes, including minimizing water use and waste generation.
3. **Ecovative Design (USA)**:
   - A leader in **sustainable packaging solutions**, Ecovative uses **mycelium** (mushroom roots) to produce **biodegradable packaging** materials that replace plastic.
   - **Sustainable Initiative**: Their **"Grow your own" packaging** product reduces dependence on petroleum-based packaging materials.

Table 2.2 Statistical insights Sustainable Practice

Sustainable Practice	Percentage of SMEs Adopting
Energy Efficiency Measures	41%
Waste Reduction	32%
Sustainable Sourcing	25%
Eco-friendly Packaging	18%
Circular Economy Models	12%

(*Source: European Commission - Green SMEs*)

The table highlights the extent to which Bengaluru's SMEs are adopting sustainable practices. Energy efficiency leads, with 41% of SMEs implementing cost-saving and environmentally conscious measures. Waste reduction follows at 32%, showing increased awareness of operational and ecological benefits. Sustainable sourcing is adopted by

25%, reflecting efforts to engage responsible suppliers and materials. Eco-friendly packaging, at 18%, and circular economy practices, at 12%, remain less common, likely due to higher costs and complexity. These figures indicate progress but also reveal areas where targeted support could accelerate sustainable transitions in SMEs.

Table 2.3 Adoption of sustainable practices among small and medium-sized enterprises

Sustainable Practice	Percentage of SMEs Adopting
Green Purchasing	52.8%
Waste Reduction and Recycling	52.8%
Energy Efficiency	Not significantly adopted

Source: "Effect of Ecological Practices Adoption on Environmental Performance of Selected SMEs in Karnataka" by Rajeshwari and Harani (2021).

The data shows that 52.8% of Bengaluru's SMEs actively engage in green purchasing and waste recycling, highlighting a strong commitment to sustainable sourcing and waste management. These practices reflect growing awareness of environmental responsibilities among local SMEs. However, adoption of energy efficiency remains low, suggesting limited focus on reducing energy use possibly due to cost barriers or lack of awareness. While Bengaluru's SMEs are progressing in sustainable, targeted support is needed to promote energy-efficient practices as part of broader sustainable development goals.

6. Policy and Support Systems

Policy and Support Systems for SMEs in Bangalore and India

The Indian government and local institutions have designed several initiatives and frameworks to support SMEs in adopting sustainable practices. These initiatives often include financial assistance, incentives, and capacity-building measures. Below is a summary of key policies and frameworks that support SMEs in India, particularly in sustainable transitions.

Key Government Policies Supporting SMEs in India:

1. **Credit Guarantee Scheme for Small Industries (CGSSI):**
    - Aimed at improving access to finance for SMEs by providing collateral-free loans.

- Supports the adoption of cleaner technologies and eco-friendly practices.

2. **National Clean Energy Fund (NCEF):**
   - Provides financial support to industries, including SMEs, to implement green technologies.
   - A portion of the funds is specifically earmarked for cleaner manufacturing processes and sustainable business practices.
3. **State-Level Green Business Initiatives (e.g., Karnataka Green Policy 2020):**
   - Karnataka (including Bengaluru) promotes green businesses through its Green Policy, which includes incentives for eco-friendly manufacturing and sustainable business operations.
   - The policy includes subsidies for energy-efficient equipment and water-saving technologies.

Adoption of sustainable by SMEs in India:

Table 2.4 Adoption of sustainable practices by SMEs in India

sustainable Practice	Percentage of SMEs Adopting	Source
Energy Efficiency (Energy-saving technologies)	41%	European Commission - Green SMEs Study
Water Conservation	30%	Ministry of Environment, India
Waste Management (Recycling, Waste Reduction)	50%	SIDBI (Small Industries Development Bank of India)
Sustainable Sourcing	22%	National Bank for Agriculture and Rural Development (NABARD)
Green Packaging	18%	Confederation of Indian Industry (CII)

Source: Various government sources and industry reports from SIDBI, NABARD, and CII (2024)

Policies Supporting Sustainable SMEs in Bengaluru:

The state of Karnataka, with Bengaluru as the economic hub, has taken several measures to encourage the adoption of sustainable practices among SMEs:

1. **Karnataka State Pollution Control Board (KSPCB) Initiatives:**
    - Provides guidelines and financial incentives for SMEs to reduce carbon emissions and adopt sustainable waste management practices.
2. **Bengaluru's Smart City Mission:**
    - Focuses on sustainable urban development, encouraging SMEs to align with the city's sustainable growth model by adopting energy-efficient technologies, waste management solutions, and green infrastructure practices.

Challenges SMEs Face in Implementing Sustainable Practices:

While government initiatives are in place, SMEs still face significant barriers to adopting sustainable practices:

- **Lack of Financial Resources:** Many SMEs struggle to access affordable financing for green technologies.
- **Awareness Gap:** A majority of SMEs are not fully aware of the available policies and incentives.
- **High Initial Costs:** The upfront investment required for energy-efficient or sustainable practices often deters SMEs from implementing them.

Recommendations to Overcome Barriers:

Table 2.5 Outlines potential strategies to help SMEs

Barrier	Recommendation
Lack of Financial Resources	Provide concessional loans and grants for sustainable projects.
Awareness Gap	Conduct awareness campaigns and workshops on the benefits of sustainable.
High Initial Costs	Offer subsidies and tax incentives for purchasing green technologies.

Source: Various government sources and industry reports from SIDBI, NABARD, and CII (2024)

Global Best Practices:

Here are some best practices from global SMEs that have successfully transitioned toward sustainable operations:

Table 2.6 Outlines best practices

Country	Best Practice	Impact
Germany	Adoption of renewable energy in manufacturing SMEs.	Significant reduction in energy costs and CO2 emissions.
USA	Circular economy models in small-scale manufacturing.	Reduced waste, improved profitability, and increased resource efficiency.
Sweden	Sustainable sourcing and eco-friendly production processes.	Increased brand value and customer loyalty.

Source: Various government sources and industry reports from SIDBI, NABARD, and CII (2024)

Despite efforts by the Indian and Karnataka governments to promote sustainable among SMEs, challenges persist. Enhancing awareness, expanding access to green finance, and strengthening support frameworks can better enable SMEs to drive sustainable development and economic growth.

2.3 Human Society Theory

Contribution of SMEs to Economic Growth, Employment, and Innovation

The economic growth of countries all over depends on Small and Medium Enterprises (SMEs). Studies and statistics from several nations have repeatedly shown how SMEs help to contribute to GDP, employment, and innovation.

2.3.1 SMEs and GDP Contribution:

SMEs significantly contribute to GDP worldwide, accounting for over 50% in developed nations and up to 70% in some sectors. In India, they contribute nearly 30% to GDP. In Bengaluru, SMEs play a vital role in the technology and service sectors, supporting both economic sustainable and export growth.

Table 2.7 SME Contribution to GDP

Country/Region	SME Contribution to GDP	SME Contribution to Employment
European Union	58.8%	66%
India	30%	40-50%
United States	44%	65% of net new jobs
China	60%	80% of total employment
Brazil	27%	60% of total workforce
Bengaluru, India	Significant (Tech, Service)	Significant (5.5 million+ jobs)

(*Source: OECD, World Bank, EU Commission, Financial Express, Economic Times*)

2.3.2 SMEs and Employment Generation:

SMEs are key job creators globally, providing 70-80% of employment in many emerging economies. In India, SMEs employ over 120 million people, reducing unemployment. In Bengaluru, SMEs in IT, manufacturing, and services drive job creation, fostering regional growth. They also show resilience during economic downturns, with SMEs accounting for 65% of new U.S. employment over the last decade. SMEs play a crucial role in reducing youth unemployment and empowering women.

2.3.3 SMEs and Innovation:

SMEs, despite limited resources, are often leaders in innovation, adapting quickly to market shifts and exploring new technologies. In Bengaluru, a tech hub, SMEs play a crucial role in the start-up ecosystem, driving advancements in AI, blockchain, and IoT. Notable SMEs like Swiggy, UrbanClap, and Byju's have scaled globally. SMEs contribute over 50% of innovations, especially in high-tech sectors. Bengaluru, home to over 1,000 start-ups annually, is a prime example of SME-driven innovation, particularly in e-commerce, fintech, and healthtech.

Table 2.8 **Sector wise Contribution to Innovation**

Sector	Example SME in Bengaluru	Contribution to Innovation
Technology	**Swiggy** (Food Delivery)	Revolutionized food delivery model
FinTech	**Razorpay**	Provided digital payment solutions

Healthcare	**Plenitude Technologies**	AI in healthcare diagnostics
EdTech	**BYJU's**	Innovation in online learning

(*Source: Economic Times, India Brand Equity Foundation*)

SMEs are vital to global economic stability, driving GDP growth, employment, and innovation. Their entrepreneurial spirit and adaptability make them crucial for market demands. In Bengaluru, SMEs, particularly in tech and services, serve as primary drivers of local and global growth. Supporting these enterprises enables nations to leverage their potential for sustainable, long-term development.

Review of Literature on SMEs and Sustainable Development

1. **Khan (2011)** discusses the crucial role of MSMEs in ensuring sustainable economic development in India, particularly in underdeveloped areas, highlighting their contributions to entrepreneurship, job creation, and economic resilience. The study emphasizes how MSMEs support India's broader sustainable development goals. However, the research could benefit from a deeper exploration of the specific challenges MSMEs face in such regions, such as limited infrastructure, access to capital, and skill gaps. Addressing these factors would provide more actionable insights into strengthening MSMEs' role in India's economic sustainable.
2. **Ciemleja & Lace (2011)** propose a model to evaluate SMEs' sustainable performance by linking efficiency, competitiveness, and resilience, particularly during EU economic fluctuations. Unlike Tonis (2015), who emphasizes innovation and clean technology adoption, Ciemleja& Lace focus more on measurable performance indicators?
3. **Macerinskas, Vengrauskas, and Velickaite (2013)** argue that SMEs are vital to economic growth and competitiveness, particularly in Lithuania, due to their adaptability and responsiveness to market shifts. The study underscores their contribution to sustainable development through innovation and flexibility. While the research effectively highlights SMEs' economic roles, it lacks critical engagement with structural challenges such as regulatory burdens or limited access to

international markets. A more nuanced analysis would strengthen the understanding of how policy environments influence SME sustainable.

4. **Aqmala (2013)** explores how Indonesian SMEs can enhance competitiveness through environmentally friendly product innovations, highlighting the role of sustainable practices in addressing unemployment, poverty, and aligning with consumer preferences for green products. The study emphasizes the potential for these practices to support national economic growth. However, the research could benefit from a deeper analysis of the barriers SMEs face in implementing such innovations, including financial constraints, limited access to technology, and regulatory challenges. A more detailed examination of these obstacles would provide a clearer understanding of the opportunities and challenges SMEs encounter in adopting sustainable practices.
5. **Taranenco (2013)** highlights how SMEs in Moldova adapt to dynamic conditions and act as key drivers of socio-economic resilience and sustainable growth, especially in developing nations. This aligns with Khan (2011), who emphasizes SMEs' role in underdeveloped areas of India, but Taranenco uniquely stresses adaptability amid structural and transitional challenges. Unlike Platonova&Maksakova (2022), who focus on digitalization and policy integration in Europe, Taranenco underscores organic adaptability over systemic reforms. Compared to Ciemleja& Lace (2011), whose model centers on performance metrics, this study is more grounded in contextual responsiveness and developmental relevance.
6. **Tripathi, Shastri, & Agarwal (2013)** explore how MSMEs in India utilize survival and growth strategies to drive employment, foster technological progress, and enhance competitiveness contributing to economic resilience and sustainable. This aligns with Pedraza (2021), who highlights MSMEs' broad contributions to national development but adds an Indian-specific lens. Unlike Tonis (2015), who focuses on innovation and environmental responsibility, Tripathi et al. emphasize economic stability and strategic survival. Compared to Agu, Oji & Alapa (2015), whose focus

is on equitable regional development, this study stresses national-level sustainable through business strategy. Their work adds a pragmatic view of sustainable rooted in operational tactics.

7. **Ravi and Roy (2014)** analyze how MSMEs contribute to sustainable growth in India through innovation, skill development, and their increasing role in exports and manufacturing. The study offers strategic insights into overcoming challenges and enhancing the sector's impact on economic development. However, the research could benefit from a deeper exploration of the specific obstacles MSMEs face in these areas, such as access to capital, market volatility, and infrastructure limitations. A more detailed examination of these factors would provide a clearer roadmap for strengthening MSMEs' contributions to sustainable development.
8. **Agu, Oji, and Alapa (2015)** highlight the critical role of SMEs in fostering national economic growth, focusing on job creation, skill development, and the utilization of local resources. The study emphasizes how these factors contribute to equitable regional development and long-term sustainable. However, the research could explore the specific challenges SMEs face in these areas, such as limited access to financing, regulatory hurdles, and infrastructure constraints. A deeper investigation into these obstacles would offer valuable insights into how to further empower SMEs in driving sustainable national development.
9. **Alamgir (2014)** explores the financing challenges and sustainable potential of SMEs in Bangladesh, asserting their vital role in employment generation, poverty alleviation, and supporting national income growth. The study aligns with Gopal (2024) in recognizing SMEs as engines of sustainable development but emphasizes external factors like financing infrastructure as pivotal contrasting with Gopal's internal focus on entrepreneurial strategy. Alamgir also frames SME contributions within the context of the Millennium Development Goals (MDGs), providing a temporal perspective, whereas more recent studies (e.g., Malesios et al., 2021) assess sustainable through contemporary SDG-aligned frameworks. This reflects a shift in

global development narratives, suggesting evolving expectations for SMEs in national and global sustainable agendas.

10. **Tonis (2015)** emphasizes the role of innovative SMEs in tackling societal and environmental challenges through clean technologies and participatory decision-making. The study positions SMEs as vital to the shift toward sustainable economic models. While it effectively links innovation with sustainable, it lacks empirical depth and does not sufficiently explore the structural barriers SMEs face in adopting green technologies. Greater focus on real-world case studies would strengthen its practical relevance.
11. **Kehinde, Abiodun, and Adegbuyi (2016)** explore the pivotal role of SMEs in contributing to sustainable economic development in Nigeria, emphasizing the importance of effective management in job creation, innovation, and economic transformation. The study highlights how well-managed SMEs can drive economic sustainable. However, the research could benefit from examining the challenges SMEs face in Nigeria, such as access to finance, regulatory constraints, and infrastructure limitations, which hinder their ability to reach their full potential in driving sustainable development.
12. **Noorali and Gilaninia (2017)** discuss the contributions of SMEs to economic diversification, job creation, and regional development, highlighting their vital role in national economic growth and sustainable. The study stresses the need for supportive policies to enhance SMEs' impact. However, it could benefit from further exploration of how existing policies are currently being implemented and their actual effectiveness in addressing challenges such as access to finance and infrastructure gaps. A deeper analysis of these aspects would provide a clearer picture of the role of SMEs in sustainable development.
13. **Aghelie (2017)** explores the integration of green business practices in SMEs, particularly in Australia and the UK, highlighting how sustainable strategies improve economic performance while addressing environmental challenges. The study emphasizes the benefits of adopting green practices for SMEs' sustainable. However,

it could further investigate the barriers SMEs face in implementing these practices, such as high initial costs, lack of awareness, and regulatory complexities. A deeper analysis of these challenges would provide a more comprehensive understanding of SMEs' potential in driving sustainable business practices.

14. **Yusoff et al. (2018)** provide a comprehensive review of sustainable growth among Malaysian SMEs, emphasizing their economic significance contributing over 36% to GDP and employing 65.3% of the workforce. The study underscores SMEs' role in innovation and sustainable
15. , reflecting a strong national reliance on this sector for inclusive development. In contrast to Santos (2024), which focuses on ESG integration and associated challenges, Yusoff et al. highlight macroeconomic impact and structural contribution. This mirrors Alamgir (2014), who examined similar dynamics in Bangladesh, suggesting a broader regional pattern where SMEs are vital for economic development, though approaches to sustainable and barriers differ based on policy and institutional environments.
16. **Ogonu and Okejim (2018)** analyze the role of SMEs in national development, particularly in emerging economies, highlighting their contributions to job creation, poverty reduction, and social inclusion. The study underscores the positive impacts of SMEs on competition, innovation, and local supply chains. However, it tends to focus on the benefits without sufficiently addressing the structural and policy challenges SMEs face in these economies, such as access to finance, regulatory burdens, and market entry barriers. A more critical examination of these limitations would offer a fuller picture of SME potential in national development.
17. **Baporikar (2018)** explores the role of innovation and sustainable in SMEs, highlighting their contributions to economic growth, regional balance, and equitable development. The study emphasizes the significance of SMEs in rural industrialization and their innovative approaches to sustainable. However, it could further address the barriers SMEs face in implementing these innovations, such as resource constraints, limited access to technology, and regulatory challenges. A

deeper focus on these challenges would provide a more comprehensive understanding of how SMEs can effectively contribute to sustainable development.

18. **Maheswari, Nandagopal & Kavitha (2018)** investigate how SMEs in Coimbatore, a developing economy, incorporate environmental, economic, and social.
19. The empirical findings show that localized, practical approaches help SMEs meaningfully contribute to broader economic sustainable. Compared to Radzi & Jasni (2022), who emphasize digital connectivity and SDG alignment, this study focuses more on grounded, grassroots sustainable efforts. In contrast to Santos (2024), who identifies ESG engagement challenges, Maheswari et al. present SMEs as already implementing sustainable despite limited resources, highlighting a more proactive and practice-driven approach within developing contexts.
20. **Ngare et al. (2018)** stress the critical need for integrating environmental sustainable into Kenyan SMEs, recognizing their dual role as economic growth drivers and potential environmental risk contributors. They argue that while SMEs generate employment and local economic momentum, failure to adopt sustainable practices can lead to long-term ecological harm. This perspective complements but also deepens the conversation seen in studies like Yusoff et al. (2018) and Radzi&Jasni (2022), by focusing more narrowly on environmental stewardship within SME operations. The study bridges the economic-environmental divide, pushing for a balance between development and ecological accountability.
21. **Sokolinskaya, Kolesnichenko&Chekudaev (2019)** highlight the economic importance of small entrepreneurship, especially in terms of employment and innovation. However, they point out several hindrances, such as limited access to finance, bureaucratic barriers, and insufficient institutional support. In contrast to studies like Maheswari et al. (2018) and Radzi & Jasni (2022), which focus on how SMEs advance sustainable goals, this study offers a more critical lens on structural barriers that inhibit SMEs' potential. It provides a useful counterpoint by emphasizing foundational economic constraints over sustainable -focused narratives.

22. **Ogunmuyiwa and Okuneye (2019)** analyze the role of SMEs in driving sustainable economic development in Nigeria, emphasizing their contributions to employment, innovation, and economic growth. The study advocates for enhanced access to finance and capacity-building programs to strengthen SMEs' role in sustainable. While these recommendations are vital, the study does not sufficiently address the practical challenges SMEs face in accessing these resources, particularly in a developing economy with limited infrastructure and financial systems. A deeper focus on these barriers would enhance the study's practical applicability.
23. **Das, Rangarajan, and Dutta (2019)** examine the role of SMEs in corporate sustainable, emphasizing their ability to drive economic growth through the implementation of social and environmental best practices. The study highlights the positive societal and economic impacts of such practices. However, it could further explore the challenges SMEs face in adopting sustainable practices, such as financial limitations, lack of awareness, and regulatory hurdles. A more detailed discussion of these barriers would provide a clearer picture of how SMEs can fully realize their potential in corporate sustainable.
24. **Galistcheva (2020)** analyzes the role of Indian SMEs in advancing sustainable development, emphasizing their impact on unemployment reduction, poverty alleviation, and social inclusion, particularly gender equality. The study frames SMEs as stabilizing agents that bridge large enterprises and grassroots communities. While the social benefits are well-articulated, the analysis underrepresents challenges such as scalability, informality, and uneven policy implementation. This limits its practical depth, offering a more idealized than critical perspective on SME-driven sustainable.
25. **Sodikov (2020)** explores the role of small businesses in national economies, highlighting their contributions to job creation, competition, and innovation as pillars of economic resilience and sustainable. While the study effectively underscores their macroeconomic value, it lacks a critical examination of sector-specific limitations, such as informality, resource constraints, and limited market access. The analysis

assumes a broadly positive impact, but does not engage deeply with the contextual barriers small businesses face in sustaining long-term development outcomes.

26. **Onyeje, Court, and Agbaeze (2020)** examine the effectiveness of national enterprise policies in supporting the sustainable of MSMEs in Nigeria, emphasizing their role in economic development, job creation, and innovation. The study advocates for stronger policies to ensure the long-term success of MSMEs. While the focus on policy implications is important, the research could benefit from further exploration of how current policies are being implemented and their actual impact on MSMEs, particularly in the face of challenges like access to finance and regulatory burdens.
27. **Sokolinskaya, Kolesnichenko, and Chekudaev (2020)** examine the trends in SME development and their role in promoting sustainable socio-economic growth, focusing on their contributions to market transformations, tax revenues, and living standards during economic downturns. The study highlights SMEs' role in employment generation, market saturation, and social stability. However, it lacks a deeper critique of the barriers SMEs face, such as access to capital, regulatory frameworks, and the challenges of competing with larger firms. Addressing these limitations would provide a more comprehensive understanding of SMEs' role in sustainable development.
28. **Dubey and Verma (2020)** explore the contribution of MSMEs to the UN Sustainable Development Goals, emphasizing their roles in poverty reduction, decent work promotion, and innovation. The study supports policy interventions that help MSMEs scale sustainably. However, it largely presents an aspirational outlook, with limited critique of the operational and financial barriers that hinder alignment with SDG targets. A more nuanced analysis of sector-specific challenges could enhance the practical relevance of the findings.
29. **Galistcheva (2020)** explores the role of small-scale industries (SSIs) in India, emphasizing their contribution to addressing unemployment, poverty, and social inequality. The study highlights how SSIs bridge the gap between large corporations

and local communities, fostering economic stability and growth, particularly through initiatives like those from NABARD. This is in line with **Rudresh (2022**), which discusses the challenges faced by MSMEs, including financial constraints, but also underscores their critical role in India's economic development, especially when supported by government schemes. Both studies stress the importance of strategic support to unlock the potential of small businesses for sustainable economic growth.

30. **Gaffar and Koeswandi (2021)** examine the vulnerability of SMEs to climate change, highlighting how environmental risks threaten their sustainable . The study advocates for climate-resilient business strategies and positions SMEs as essential actors in advancing environmental and economic goals. While the focus on adaptation is timely, the paper does not fully address resource and knowledge constraints that may hinder SMEs from adopting such practices. The analysis could be strengthened by a deeper exploration of policy incentives and capacity-building mechanisms.
31. **Korneeva et al. (2021)** discuss the essential role of small businesses in promoting sustainable, highlighting their contributions to social, economic, and environmental goals. The study emphasizes the need for small enterprises to integrate sustainable practices into their operations to align with national and global development objectives. However, it does not delve into the practical challenges these businesses face, such as limited resources, lack of knowledge, or regulatory barriers. A deeper exploration of these constraints would provide a more nuanced understanding of small businesses' capacity to drive sustainable.
32. **Sohrabi et al. (2021)** examine the economic challenges SMEs in Iran face following subsidy reforms, emphasizing the need to balance sustainable with profitability. The article underscores the importance of helping SMEs navigate financial difficulties while maintaining their role in sustainable development. However, the study could benefit from exploring the specific policy measures that could support SMEs in overcoming these challenges, such as access to financing, improved subsidy structures, or targeted support programs. A deeper dive into these aspects would

offer a more comprehensive understanding of how to enhance SMEs' sustainable in such economic contexts.

33. **Pedraza (2021)** explores the role of MSMEs in national economic development, emphasizing their contributions to employment, entrepreneurship, and innovation. The study positions MSMEs as foundational to achieving sustainable economic progress. However, it offers a largely descriptive perspective, lacking in-depth analysis of systemic barriers like access to finance or technological adoption. A more critical lens on institutional support mechanisms could enhance its policy relevance.
34. **Monish & Dhanabhakyam (2021)** explore key sustainable strategies that enable SME growth and entrepreneurship, stressing their role in ensuring long-term viability and contributing to broader sustainable development goals. Their focus on strategic planning aligns with Pallapu & Andrews (2022)**,** who examined sustainable strategies in the U.S. context, though Monish & Dhanabhakyam emphasize emerging economy perspectives. While both agree on the importance of strategy, the former leans more toward institutional capacity building, and the latter on community-level economic impact.
35. **Malesios et al. (2021)** present a comprehensive framework for assessing SME sustainable performance across economic, environmental, and social pillars. While acknowledging SMEs' vital contributions to GDP and employment, the study critiques their tendency to prioritize short-term economic gains over long-term sustainable. This contrasts with studies like Ciemleja & Lace (2011), which propose models that integrate sustainable and competitiveness even during economic fluctuations. Compared to Pallapu & Andrews (2022), who focus on strategic adoption of sustainable for community growth, Malesios et al. urge a structural shift toward balanced evaluation metrics. Their work underscores the need for institutional and policy-level support to ensure SMEs internalize sustainable as a core business objective.
36. **Platonova & Maksakova (2022),** who highlight external collaboration and digital integration, this study concentrates on internal strategic capabilities. The model

aligns with Macerinskas et al. (2013), who underscore SMEs' adaptability but lacks a broader socio-environmental lens. Overall, it presents a pragmatic, performance-based framework for assessing SME sustainable.

37. **Platonova and Maksakova (2022)** examine SMEs' role in Europe's green economy, emphasizing their contributions to job creation and sustainable. The study highlights the importance of collaboration with large enterprises and state support in integrating SMEs into global value chains and the European Green Deal. While the research underscores these key areas, it could benefit from exploring the specific challenges SMEs face in aligning with these initiatives, such as access to technology, funding, and policy barriers. Addressing these challenges would offer a more holistic view of SMEs' role in sustainable development.
38. **Pallapu & Andrews (2022)** examine how U.S. SMEs implement sustainable strategies to improve environmental outcomes and foster long-term economic and community resilience. Compared to Ciemleja & Lace (2011), who emphasize performance metrics in EU SMEs, Pallapu & Andrews focus on strategic approaches like green innovation and stakeholder engagement. While their study shares common ground with Aghelie (2017) in addressing environmental goals, it highlights the American context of community-driven sustainable. In contrast to Skunca & Pesic (2023), who focus on cost-efficiency and circular economy principles, this study places more weight on local economic strengthening.
39. **Ali (2022)** examines their role in post-2003 reconstruction and sustainable development, emphasizing contributions to economic recovery, job creation, and social stability. It highlights the challenges faced by SMEs, including limited access to finance, political instability, and inadequate infrastructure, which hinder their ability to adopt sustainable practices. While the study effectively outlines the potential of SMEs in Iraq's recovery, it could benefit from a deeper analysis of specific policy interventions needed to address these systemic barriers and enable long-term sustainable.

40. **Radzi & Jasni (2022)** examine how SMEs actively support the Sustainable Development Goals (SDGs) by enhancing business competitiveness, embracing workplace diversity, and leveraging digital connectivity. The study positions SMEs as a transformative force in post-COVID-19 economic recovery, emphasizing their potential to drive systemic resilience. Compared to Yusoff et al. (2018), which focuses on SMEs' economic weight in Malaysia, Radzi & Jasni spotlight their strategic role in sustainable transformation. Unlike Gopal (2024), which outlines the tension between profit and sustainable , Radzi & Jasni present SMEs as already evolving to meet SDG imperatives, suggesting a more optimistic outlook on SME adaptability in the post-pandemic era.
41. **SMEs and Business sustainable (2022)** highlights how small and medium enterprises enhance economic resilience, promote environmental responsibility, and contribute to social well-being. The article emphasizes their alignment with the UN Sustainable Development Goals (SDGs), asserting that sustainable practices are not only ethically sound but also vital for long-term business viability. Compared to Penjisevic et al. (2024)**,** which provides a statistical macro-level perspective, this study focuses more on strategic alignment with global development agendas, echoing similar themes found in Radzi & Jasni (2022) regarding SMEs' role post-COVID-19 in driving sustainable transformation.
42. **Baktiyarova and Yelshibayev (2022)** explore the role of SMEs in maintaining economic stability during periods of instability, emphasizing their resilience in adopting sustainable practices. The study highlights SMEs' contributions to national development, including job creation, innovation, and economic diversification. While the authors effectively showcase the adaptability of SMEs, they do not fully address the challenges SMEs face in accessing resources or overcoming structural barriers in volatile economic conditions. Further analysis of policy support and financial frameworks would deepen the study’s practical relevance.
43. **Jing Xian and Qing Li (2022)** explore how Chinese SMEs support sustainable development through economic growth, employment, and innovation. They

emphasize SMEs' role in stabilizing post-crisis economies and adapting to market shifts. However, their optimistic view lacks critique of sectorial disparities and regulatory challenges. While they call for targeted policies, the analysis does not fully address potential trade-offs between growth and environmental sustainable. Compared to more critical Western perspectives, their approach assumes that policy alone can drive SME transformation.

44. **Ekonomika (2022)** highlights the pivotal role of SMEs in sustainable development, citing their contributions to job creation, innovation, and economic stability. The study underscores their influence in enhancing competition and supporting the middle-income segment. However, it presents a largely idealized view, without examining barriers such as limited scalability, access to finance, or policy gaps. Unlike studies that explore structural constraints, this research frames SMEs as inherently resilient, which may overlook deeper systemic challenges affecting long-term growth.
45. **Rudresh (2022)** highlights the critical role of MSMEs in sustainable development through job creation, poverty reduction, and social inclusion. The study emphasizes their contribution to economic stability and positions them as key drivers in transitioning national economies. While the paper effectively links MSMEs to inclusive growth, it lacks critical analysis of structural limitations such as informal sector dominance, policy fragmentation, or limited access to long-term finance. This results in a somewhat generalized portrayal of MSME potential in fostering sustainable.
46. **Smith (2022**), highlights their contributions through eco-friendly practices, local employment, and community development. The research emphasizes SMEs' adaptability, innovation, and their role in driving economic growth, resource efficiency, and social responsibility. However, the study could benefit from addressing the challenges SMEs face in scaling these practices, such as financial constraints and the need for stronger regulatory support. A deeper exploration of these barriers would provide a more balanced view of the potential and limitations of

small businesses in contributing to sustainable .meaningfully to sustainable development.

47. **Country's Economy (2022)** emphasizes the crucial role of SMEs in developing nations, particularly in India. It highlights their significant contributions to employment, national income, and innovation, positioning them as key players in fostering socio-economic stability and achieving sustainable development through inclusive economic growth. This aligns with Nath (2024), who similarly underscores the role of MSMEs in India's economic development, employment generation, and poverty reduction. Both studies advocate for the strategic integration of SMEs into national development frameworks, aiming to maximize their contribution to sustainable and growth.
48. **Afolabi et al. (2023)** explores the role of SMEs in contributing to sustainable and a greener economy, with a focus on their impact in achieving sustainable goals and addressing climate change. The study emphasizes SMEs' potential to support environmental initiatives, particularly in the context of India's long-term environmental objectives. This aligns with Nath (2024), who highlights the pivotal role of MSMEs in India's sustainable growth and economic development, while both studies stress the need for strategic government support to enhance SMEs' contribution to environmental sustainable.
49. **Sarangi (2023)** examines the role of MSMEs in advancing the UN 2030 Agenda, emphasizing their contributions to innovation, employment, and sustainable practices. The study positions MSMEs as key drivers of inclusive growth and resilience in achieving the Sustainable Development Goals (SDGs). However, it offers limited critique of structural challenges such as financing gaps and regulatory burdens that often hinder MSME participation in global development frameworks. The analysis leans toward an idealized view, overlooking the varying capacities of MSMEs across regions and sectors.
50. **Sablukov et al. (2023)** investigate how state support mechanisms like subsidies, tax incentives, and funding enhance SME contributions to sustainable regional

development. The study underscores the importance of policy-driven empowerment, especially in economically unstable regions. While the emphasis on government intervention is well-founded, the analysis could further explore issues of policy implementation, regional inequality, and bureaucratic inefficiencies. The paper assumes that support translates directly to sustainable, without deeply questioning long-term dependency risks or governance quality.

51. **Setiadi (2023)** positions SMEs as vital community assets that drive sustainable development through strategic management, local job creation, and entrepreneurial support. The study underscores their role in building local business ecosystems that address both environmental and social goals. However, it offers limited critique of the managerial capacity disparities among SMEs, especially in underserved regions. While the emphasis on effective management is valuable, the study could benefit from deeper exploration of structural enablers and policy support required to sustain these outcomes.
52. **Skunca and Pesic (2023)** investigate how SMEs adopt sustainable strategies to minimize environmental impact, enhance cost-efficiency, and align with consumer demands for sustainable. The study highlights SMEs' role in advancing circular economy principles and contributing to national economic resilience. While the research emphasizes the importance of these practices, it could further explore the barriers SMEs face in implementing such strategies, such as financial limitations, lack of technical expertise, and insufficient regulatory frameworks. A deeper analysis of these challenges would provide a more holistic view of SMEs' role in sustainable development.
53. **Lambert and Deyganto (2023)** explore the impact of MSMEs on sustainable development in Africa, emphasizing their role in driving local innovation, creating employment, and reducing poverty. The study highlights how MSMEs contribute to advancing sustainable goals and economic resilience across the continent. However, the research could delve deeper into the challenges MSMEs face in these areas, such as access to finance, infrastructure limitations, and regulatory barriers. A more

comprehensive exploration of these obstacles would provide clearer strategies for enhancing the sustainable of MSMEs in Africa.

54. **Bisht, Kumar & Jasrai (2023)** examine the pivotal role of small businesses in promoting sustainable and economic growth in emerging economies, highlighting strategic practices such as local resource utilization, innovation, and employment generation. Their findings complement Alamgir (2014), who also emphasizes SMEs' developmental role, but shift the focus from financing challenges to operational strategies sustainable. Compared to Gopal (2024), who explores sustainable entrepreneurship broadly, Bisht et al. ground their analysis in the specific context of emerging markets, reflecting how local conditions shape SME strategies. This underscores the importance of context-sensitive approaches to SME-led sustainable in differing economic landscapes.
55. **Multinationals, Small and Medium-Sized Enterprises, and sustainable (2023)** emphasizes SMEs' central role in fostering sustainable in developing economies, where they make up over 90% of private-sector businesses. The study highlights their contributions to poverty reduction, local development, and national economic stability. Compared to SMEs and Business sustainable (2022)**,** which focuses on aligning SMEs with the UN SDGs, this paper underlines their grassroots impact, particularly in vulnerable economies, echoing the findings of Yusoff et al. (2018) from Malaysia and Ngare et al. (2018) from Kenya on regional sustainable dynamics.
56. .**Babitha and Murthy (2024)** examine the role of MSMEs in fostering innovation, adopting technology, and integrating sustainable practices, emphasizing their contribution to rural industrialization and economic stability. The study highlights how MSMEs drive equitable wealth distribution in the face of global challenges. While these insights are valuable, the study could benefit from further exploration of the specific barriers MSMEs face in adopting innovation and technology, such as financial constraints, limited access to skilled labour, and inadequate infrastructure.

Addressing these challenges would offer a more comprehensive understanding of MSMEs' potential for sustainable development.

57. **Wahidah Shari et al. (2024**) examine strategies to promote sustainable practices among Malaysian SMEs, highlighting their role in economic resilience and national sustainable goals. While the study stresses the importance of awareness, reporting, and recognition, it leans heavily on expert opinion without critically assessing the practical limitations SMEs face in implementation. The emphasis on awareness programs is valuable, yet it underplays structural issues like funding constraints and regulatory enforcement. Compared to more policy-driven frameworks, this approach suggests a softer, education-based strategy that may not suffice in isolation.
58. **Astuty and Wahyuningsih (2024)** explore how performance and entrepreneurial orientation influence sustainable in Indonesian SMEs, emphasizing roles in innovation, resource efficiency, and CSR. They highlight that environmental dynamics and capital access significantly moderate these relationships. While the study offers valuable insights, it assumes that entrepreneurial drive alone can offset external constraints, which may oversimplify the challenges faced by under-resourced SMEs. The call for improved policy frameworks is relevant, yet the analysis could benefit from a deeper examination of institutional support and regulatory enforcement.
59. **Krupnov (2024)** assesses the role of SMEs in Russia, recognizing their potential in supporting sustainable development but highlighting their limited current impact on economic growth and innovation. The study notes SMEs' moderate crisis resilience and low innovative capacity, pointing to systemic weaknesses. While it advocates for greater government support, including financing and innovation incentives, the analysis stops short of addressing deeper institutional or policy inefficiencies. Compared to more optimistic views in other regions, this research presents a more constrained and pragmatic outlook on SME potential.
60. **Omowole et al. (2024)** conceptualize the integration of green business practices in SMEs as a pathway to sustainable; emphasizing reduced environmental impact and

improved efficiency. They argue that aligning business objectives with global sustainable goals can help build resilient economies. However, the study largely adopts a theoretical perspective and does not deeply examine practical barriers such as cost implications or industry-specific limitations. While the emphasis on strategic adaptation is important, its feasibility across diverse SME contexts remains underexplored.

61. **Moiceanu and Anghel (2024)** explore how SMEs can adopt Sustainable Development Goals (SDGs) to drive sustainable entrepreneurship, emphasizing the role of entrepreneurial orientation and organizational commitment. The study presents a compelling case for embedding SDGs into core business models to enhance social and environmental responsibility. However, it does not fully address the operational or resource challenges that SMEs may face in aligning with global frameworks. The analysis would benefit from a closer examination of sector-specific readiness and support mechanisms for SDG integration.
62. **Nabais and Franco (2024)** present case studies highlighting SMEs' role in sustainable development, focusing on efficient resource consumption, waste management, and increased sustainable awareness. The study emphasizes how these practices strengthen national economies. While the case studies provide valuable insights, the research could benefit from a deeper exploration of the challenges SMEs face in adopting these practices, such as financial constraints, technological limitations, and regulatory pressures. Addressing these obstacles would offer a more nuanced understanding of SMEs' contributions to sustainable development.
63. **Nath (2024)** examines the pivotal role of MSMEs in the Indian economy, emphasizing their contributions to employment generation, poverty reduction, and inclusive growth. The study highlights how MSMEs facilitate equitable resource distribution, expand exports, and drive industrial development, positioning them as central actors in India’s sustainable development strategy.
64. **Rahman, Lal and Rena (2025)**, who focus on SMEs’ infrastructural and innovation-driven contributions to SDG goals, Nath offers a more socio-economic

perspective, framing MSMEs as key agents of grassroots development and equitable economic participation. Both studies converge on the idea that MSMEs are fundamental to national sustainable, but they diverge in scope structural transformation versus social inclusion.

65. **Mallik (2024)** provides an in-depth analysis of the challenges Indian SMEs face in achieving sustainable, particularly focusing on the alignment of net-zero policies with the Sustainable Development Goals (SDGs). The study identifies the barriers hindering SMEs from transitioning to sustainable growth and proposes tailored strategies to overcome these obstacles. Compared to Nath (2024), which focuses on the broader role of MSMEs in driving economic development, Mallik's work delves specifically into the environmental dimension, highlighting the need for strategic interventions to help SMEs meet both sustainable and net-zero targets. While Nath emphasizes inclusive growth, Mallik tackles the technical and policy aspects required for environmental sustainable in SMEs.
66. **Patel & Singh (2024)** conducted a bibliometric analysis of 85 Scopus-indexed studies to explore the increasing emphasis on sustainable in Indian MSMEs. Their research reveals a significant rise in scientific literature on sustainable in 2023, underscoring the critical role MSMEs play in fostering long-term economic and environmental stability. This contrasts with Mallik (2024), which focuses on the specific challenges and policy interventions needed for achieving net-zero targets, while Patel & Singh provide a broader overview of research trends. While Mallik targets practical solutions, Patel & Singh highlight the academic momentum and growing awareness around sustainable in the MSME sector.
67. **Varshney, Dwivedi & Acharya (2024)** provide a comprehensive review of SMEs' contributions to India's GDP, exports, and employment. They emphasize the financial constraints and infrastructure challenges that hinder SMEs' growth, highlighting the crucial role of government funding initiatives in overcoming these barriers and enabling sustainable growth. This analysis complements the work of Patel & Singh (2024), who focus on the broader research trends in sustainable within

Indian MSMEs. While both studies acknowledge the importance of government support, Varshney et al. (2024) focus more on the practical financial and infrastructure challenges, whereas Patel & Singh concentrate on academic advancements and research on sustainable in the sector.

68. **Caputo, Pizzi, & Santini (2024)** explore the complex relationship between SMEs and sustainable, arguing that SMEs should be studied separately from large corporations due to their unique characteristics and challenges. The study highlights the need for distinct theoretical frameworks to understand the drivers, barriers, and enablers of sustainable practices within SMEs, focusing on their role in contributing to economic growth. This study complements the work of Mallik (2024), which also examines factors contributing to sustainable, but while Mallik focuses on the Indian context and net-zero policies, Caputo et al. (2024) advocate for a broader, more theoretical approach to understanding SME sustainable. Both perspectives underscore the importance of tailored strategies for SMEs to overcome barriers and contribute.
69. **Penjisevic et al. (2024)** analyze the statistical impact of SMEs on economic development, emphasizing their role in influencing investment levels, aggregate demand, and reducing unemployment. The study underscores SMEs' contribution to economic stability and sustainable development, particularly through measurable outcomes like GDP growth and job creation. Unlike works such as Ngare et al. (2018) which focus on environmental integration, Penjisevic et al. provide a more macroeconomic and quantitative perspective. This adds depth to the discourse by connecting micro-enterprise activities to national economic indicators, highlighting the scalability of SME influence on sustainable goals.
70. **Santos (2024)** explores SMEs' engagement in environmental, social, and governance (ESG) practices, highlighting their growing role in driving sustainable development. The study identifies ESG as a strategic lever for economic growth, while also acknowledging persistent barriers like limited access to finance and knowledge. Compared to Bisht, Kumar &Jasrai (2023), who focus more on operational strategies

in emerging markets, Santos delves into institutional and governance dimensions of sustainable. This aligns with Malesios et al. (2021), who call for balanced performance frameworks but goes further by framing ESG as both opportunity and challenge. Together, these perspectives reflect a shift toward more structured and accountability-driven sustainable models for SMEs.

71. **Gopal (2024)** conducts a systematic literature review on sustainable entrepreneurship within SMEs, emphasizing their threefold contribution to economic prosperity, social cohesion, and environmental protection. The review acknowledges the persistent challenge of balancing profitability with sustainable an issue echoed by Malesios et al. (2021), who argue for a more balanced sustainable performance framework. Unlike studies focused on regional dynamics (e.g., Taranenco, 2013 on Moldova), Gopal adopts a broader conceptual scope, positioning SMEs as agents of transformative change. While some scholars, like Ogunmuyiwa&Okuneye (2019), stress the need for external support (e.g., finance, capacity-building), Gopal highlights internal entrepreneurial orientation as central to sustainable. This places the onus not only on policy frameworks but also on leadership innovation within SMEs.
72. **Rahman, Lal, and Rena (2025)** highlight the significant role of SMEs in advancing Sustainable Development Goal 9 by driving innovation, enhancing infrastructure, and supporting renewable energy initiatives, particularly within India's evolving economy. Their study underscores how SMEs contribute to national transformation through engagement in new industries and mass transit systems. This perspective aligns with Monish and Dhanabhakyam (2021), who discuss sustainable strategies for SME growth and entrepreneurship; however, while Monish and Dhanabhakyam focus primarily on internal strategic development for long-term business success, Rahman et al. offer a broader, macroeconomic lens that emphasizes structural contributions to national sustainable , positioning SMEs as key enablers of both community-level and systemic development.

2.4 Summary

The existing literature underscores SMEs' crucial role in economic growth, innovation, and job creation, particularly in regional development. However, a gap remains in understanding how SMEs contribute to sustainable development in Bangalore, India. While global studies focus on SMEs' economic impact, they often overlook their environmental and social contributions, which are essential in India's context of sustainable growth. Research, such as by Nair et al. (2007) and D'Costa (2006), primarily explores IT sector innovation, leaving a gap in examining the broader scope of SMEs and their role in sustainable . This creates a need for further research into how Bangalore's SMEs can align economic development with sustainable practices.

CHAPTER III
METHODOLOGY

Introduction

This chapter outlines the research methodology used to examine the role of SMEs in promoting sustainable development and contributing to the national economy, focusing on Bangalore. It details the research problem, questions, design, data collection, and analysis methods. A mixed-methods approach, combining quantitative and qualitative techniques, is adopted to address the economic, environmental, and social dimensions of sustainable within Bangalore's SMEs. The study aims to provide insights into the challenges SMEs face in adopting sustainable practices and the policy frameworks that support or hinder their progress. The methodology ensures the reliability, validity, and relevance of findings for both academic and practical applications in fostering a sustainable SME sector.

3.1 Overview of the Research Problem

SMEs play a crucial role in economic growth and employment, yet their contributions to sustainable development remain underexplored, especially in developing economies like India. Bangalore, a hub for innovation, faces challenges in SME adoption of sustainable practices due to financial limitations, technology access, and institutional support. This research aims to bridge this gap by examining how SMEs in Bangalore can integrate sustainable into their operations. The study will provide insights into the enablers and barriers to sustainable, offering actionable recommendations for SMEs to contribute to a more sustainable and resilient economy.

3.2 Operationalization of Theoretical Constructs

In this section, the key theoretical constructs used in the study are defined and measured in a way that allows them to be systematically investigated. Operationalizing theoretical constructs is a crucial step in the research process, as it transforms abstract concepts into measurable variables. Below are the theoretical constructs for this study, operationalized into measurable components:

3.2.1. SME Characteristics (Independent Variable)

- **Size of the company**: Measured by the number of employees (1-10, 11-50, 51-100, 101-500, More than 500) and annual turnover (Less than ₹1 crore, ₹1 crore – ₹5 crore, ₹5 crore – ₹10 crore, ₹10 crore – ₹50 crore, More than ₹50 crore).
- **Age of the company**: Categorized by the number of years the SME has been operational (1-5 years, 6-10 years, 11-15 years, 16+ years).
- **Resources available**: Measured by the financial, human, and technological resources that SMEs possess, assessed through both qualitative and quantitative data.
- **Leadership structure**: Assessed based on whether the company has a formal management team or is led by a single entrepreneur, and the role of leadership in decision-making for sustainable practices.

3.2.2. Government Policies and Support (Moderating Variable)

- **Government support**: Measured by the presence of government schemes, subsidies, and incentives that encourages sustainable practices. Questions will address whether the company has accessed any government incentives, and how supportive these are perceived to be.
- **Policy effectiveness**: Assessed by evaluating the clarity, comprehensiveness, and implementation of government regulations and policies relevant to sustainable for SMEs.
- **Regulatory environment**: Measured through the company's perceptions of the ease or difficulty of complying with regulations that support sustainable.

3.2.3. Access to Technology (Independent Variable)

- **Technological readiness**: Measured by assessing whether the company has access to modern sustainable technologies (e.g., renewable energy, waste reduction technologies).
- **Technology adoption**: Assessed by examining the extent to which technology has been integrated into the business, focusing on sustainable initiatives such as waste reduction, energy efficiency, and resource optimization.

- **Challenges in accessing technology**: Measured by identifying barriers such as cost, infrastructure or lack of skilled personnel that hinder the adoption of sustainable technologies.

3.2.4. Entrepreneurial Leadership (Independent Variable)

- **Visionary leadership**: Measured by the entrepreneur's ability to set a long-term vision for sustainable and motivate others in the company to adopt green practices.
- **Leadership commitment to sustainable**: Assessed by the extent to which the leadership team actively integrates sustainable into the business strategies.
- **Innovation in sustainable**: Measured by the leadership's role in fostering a culture of innovation and encouraging the adoption of new sustainable technologies and practices.

3.2.5. Market Conditions (Moderating Variable)

- **Market demand for sustainable products**: Measured by the extent to which consumer demand in Bangalore encourages businesses to adopt sustainable practices. This can be assessed through surveys asking SMEs about the importance of sustainable in their market.
- **Competitive pressures**: Measured by evaluating how competition among SMEs in Bangalore influences the adoption of sustainable initiatives.
- **Economic conditions**: Measured through SME responses on how economic downturns or upturns in the region affect their ability to invest in sustainable practices.

3.2.6. Sustainable Development Impact of SMEs (Dependent Variable)

- **Social and economic contribution**: Measured by the SME's contributions to local job creation, community development, and economic growth.
- **Environmental impact**: Assessed by examining the environmental benefits of sustainable initiatives, such as reduction in waste, energy consumption, and resource optimization.

- **Profitability and competitive advantage**: Measured by the profitability improvements and competitive advantage gained through the adoption of sustainable practices.

Each construct is designed to address the theoretical framework and align with the research objectives. By operationalizing these constructs, the research will provide measurable data on how various factors influence the role of SMEs in sustainable development, particularly in the context of Bangalore. This process ensures that the theoretical concepts can be empirically tested and contribute to a deeper understanding of their impact on the nation's economy.

3.3 Research Purpose and Questions

3.3.1 Research Purpose

The purpose of this research is to investigate the role of Small and Medium Enterprises (SMEs) in promoting sustainable development, with a specific focus on their contributions to economic growth in Bangalore, India. This study aims to understand how SME characteristics, government policies, access to technology, entrepreneurial leadership, and market conditions influence the integration of sustainable practices within SMEs. Moreover, the research will explore the direct and indirect impacts of these practices on the national economy, including job creation, environmental sustainable and competitive advantage. By examining these factors, the study aims to provide actionable insights into how SMEs in Bangalore can further contribute to economic and sustainable development, both regionally and nationally.

3.3.2 Research Questions

The following research questions have been formulated based on the research purpose:

1. **What are the key internal and external factors (such as entrepreneurial leadership, access to modern technology, and market conditions) that influence the ability of SMEs in Bangalore to adopt and implement sustainable development practices?**
2. **How do government policies and support programs in Bangalore facilitate or hinder the adoption of sustainable business practices among SMEs?**

3. **What are the major barriers that prevent SMEs in Bangalore from fully integrating sustainable practices, and how do these businesses measure the success of their sustainable initiatives in terms of profitability, competitiveness, and environmental impact?**
4. **How do SMEs in Bangalore perceive their role in contributing to India's broader economic growth and sustainable development goals, and what is their contribution to the social, economic, and environmental aspects of sustainable development?**
5. **What are the long-term effects of sustainable practices adopted by SMEs on the economic development of Bangalore and the broader Indian economy?**

These research questions are designed to address various aspects of SMEs' roles in sustainable and their impact on economic development, providing a comprehensive understanding of the factors that contribute to sustainable business practices and their outcomes. The answers to these questions will offer valuable insights for policymakers, business owners, and researchers interested in fostering sustainable development within the SME sector.

3.3.3 Objectives of the study

- To examine the relationship between SME characteristics (size, age, and resources) and their ability to implement sustainable initiatives.
- To assess the impact of government policies and financial incentives on SMEs' adoption of sustainable business practices.
- To compare the impact of SME sector types (manufacturing, services, retail, IT) on sustainable adoption levels.
- To determine if there is an association between market demand for sustainable products and SMEs' sustainable adoption.
- To analyze the combined effects of entrepreneurial leadership, access to technology, and market conditions on SMEs' sustainable performance.

3.4 Research Design

Research design refers to the overall strategy and structure used to conduct research. It provides a framework for data collection, analysis, and interpretation. The research design for this study is a descriptive, cross-sectional, and quantitative design, which is suitable for understanding the relationship between variables such as SME characteristics, government policies, access to technology, entrepreneurial leadership, and market conditions, and their impact on sustainable development and economic growth.

3.4.1 Research Approach

This study adopts a quantitative approach to collect and analyze data, which will help in identifying patterns and relationships among the various factors influencing the sustainable practices of SMEs in Bangalore. The quantitative approach enables the use of structured questionnaires, which will ensure that the data collected is systematic and statistically analyzable.

3.4.2 Research Type

The study is descriptive, as it aims to describe and analyze the role of SMEs in promoting sustainable development, as well as the factors influencing their ability to adopt sustainable business practices. Descriptive research helps to provide insights into the current situation, trends, and patterns related to SME characteristics, government policies, technology access and leadership in the context of sustainable.

Additionally, the study uses a cross-sectional design, meaning the data will be collected at a single point in time, which is appropriate for understanding the current state of sustainable in SMEs and the factors that affect them. This design is cost-effective and time-efficient, as it involves collecting data from a wide range of SMEs without the need for longitudinal tracking.

3.5 Population

The population for this research includes all SMEs operating in Bangalore, which are registered under the Small and Medium Enterprises Development (SMED) Act. The focus will be on SMEs across various sectors, including manufacturing, IT/software,

services, retail, and others, which operate in the region and contribute to the local economy. These SMEs will provide a broad and representative sample for the study.

3.4.4 Sampling Method

The study will use stratified random sampling to ensure that different types of SMEs (in terms of size, sector, and operational duration) are represented in the sample. The strata will be defined based on the following criteria:

1. **Sector** (e.g., manufacturing, IT/software, services, retail)
2. **Size** (e.g., small, medium, large)
3. **Years of operation** (e.g., 1-5 years, 6-10 years, 11-15 years, 16+ years)

A proportional number of SMEs will be selected from each strata to ensure that the sample is representative of the overall SME population in Bangalore.

3.5 Population and Sample Size

For this study, a **stratified random sampling** method will be used to ensure that different categories of SMEs in Bangalore are represented proportionally in the sample. To determine the sample size n using Yamane's formula, we will first calculate n based on the given population size of 47,000 SMEs.

Step 1: Yamane's Formula

Yamane's formula for sample size is:

$$\mathbf{n=N/1+N\cdot e^2}$$

Where:

- n = Sample size
- N = Total population (47,000 SMEs)
- e = Margin of error (usually set at 0.05 for a 95% confidence level)

Step 2: Apply the Formula

Let's plug in the values:

- N=47,000
- e=0.05

$$n=47,000/1+47,000\cdot(0.05)^2$$

$$n=47,000/1+47,000\cdot 0.0025$$

$$n=47,000/1+117.5$$

$$n=47,000/118.5\approx \mathbf{396.61}$$

Therefore, the **sample size (n)** for the total population of 47,000 SMEs is approximately **397** SMEs.

Step 3: Stratified Sampling Calculation

Now, we can use the total sample size of 397 SMEs and apply the proportion for each sector to determine the number of SMEs to sample from each sector.

Here's the formula for each sector:

$n_h = N_h/N \times n$

Where:

- n_h = Sample size for sector h
- N_h = Total number of SMEs in sector h
- N = Total number of SMEs (47,000)
- n = Total sample size (397 SMEs)

Step 4: Stratified Sampling Size Calculation

Let's calculate the sample size for each sector:

1. **Information Technology**

   $n_{IT} = 12,000/47,000 \times 397 = 101.64 \approx 102$

2. **Manufacturing**

   $n_{Manufacturing} = 8,000/47,000 \times 397 = 67.49 \approx 67$

3. **Retail and Wholesale**

   $n_{Retail} = 6,500/47,000 \times 397 = 55.74 \approx 56$

4. **Construction**

   $n_{Construction} = 5,000/47,000 \times 397 = 42.34 \approx 42$

5. **Food Processing**

   $n_{Food\ Processing} = 4,500/47,000 \times 397 = 37.98 \approx 38$

6. **Healthcare and Pharmaceuticals**

   $n_{Health\ care} = 4,000/47,000 \times 397 = 33.77 \approx 34$

7. **Education and Training**

   $n_{Education} = 3,500/47,000 \times 397 = 29.79 \approx 30$

8. **Other Services**

   $n_{Other\ Services} = 3,500/47,000 \times 397 = 29.79 \approx 30$

Table 3.1 Stratified Sampling Size Table

Sector	Number of SMEs	Percentage of Total SMEs (%)	Proportion of SMEs in Population	Sample Size (397 SMEs)
Information Technology	12,000	25%	12,000/47,000 = 0.2553	102
Manufacturing	8,000	17%	8,000/47,000 = 0.1702	67
Retail and Wholesale	6,500	13%	6,500/47,000 = 0.1383	56
Construction	5,000	10%	5,000/47,000 = 0.1064	42
Food Processing	4,500	9%	4,500/47,000 = 0.0957	38
Healthcare and Pharmaceuticals	4,000	8%	4,000/47,000 = 0.0851	34
Education and Training	3,500	7%	3,500/47,000 = 0.0745	30
Other Services	3,500	7%	3,500/47,000 = 0.0745	30
Total	47,000	100%	1	397

Source: Researcher calculated

3.6 Participant Selection

In this section, the process of selecting participants for the study is detailed. The aim is to ensure that the selected participants represent the broader population of SMEs in Bangalore, with particular attention given to the stratified sampling approach.

The participants will be selected using the following steps:

1. **Sampling Frame**:
    - The sampling frame includes all SMEs operating in Bangalore, specifically those that fall under the different sectors such as Information Technology, Manufacturing, Retail, Construction, Food Processing, Healthcare and Pharmaceuticals, Education and Training, and Other Services.
    - The list of SMEs will be sourced from various local business directories, chambers of commerce, industry associations, and government databases.
2. **Stratified Random Sampling**:
    - Stratified random sampling will be used to ensure that each sector is adequately represented in the sample. This will allow for comparison between sectors and ensure that the diversity of SMEs is captured in the study.
    - Each sector will be treated as a separate stratum, and random samples will be drawn proportionally from each sector according to its representation in the population.
3. **Sampling Proportions**:
    - The sample size for each sector will be calculated based on the proportions derived from the total population, as previously detailed in the stratified sampling table. For example, if 25% of the SMEs in Bangalore are in the Information Technology sector, then 25% of the sample will be selected from this sector.
    - This approach ensures that the data accurately reflects the distribution of SMEs in different sectors in Bangalore.

4. **Eligibility Criteria**:
    - SMEs must be actively operating within the Bangalore region.
    - Only businesses with a minimum of one year of operation will be considered to ensure stability and experience in business practices.
    - The SME should belong to one of the following sectors: Information Technology, Manufacturing, Retail, Construction, Food Processing, Healthcare and Pharmaceuticals, Education and Training, or Other Services.
    - The SME must have at least one employee, as micro-enterprises with fewer employees may not adequately represent the challenges and dynamics faced by larger SMEs.
5. **Exclusion Criteria**:
    - SMEs that do not meet the above criteria will be excluded from the sampling process.
    - Non-operating or defunct businesses will also be excluded.
6. **Sample Size Determination**:
    - Using the sample size derived from Yamane's formula, the number of participants for each sector will be calculated by applying the proportion of SMEs in each sector to the total sample size. This ensures that each sector is represented accurately in the study.
7. **Recruitment Process**:
    - SMEs selected for participation will be contacted via email, phone, or through direct visits, depending on the preference of the participants.
    - A detailed introduction to the study and its purpose will be provided to ensure informed consent. The participants will be assured of confidentiality and that their responses will be used solely for research purposes.
    - Participation will be voluntary, and SMEs will be given the option to withdraw at any time without any consequences.

By following these procedures, the study will ensure a representative sample of SMEs from Bangalore, providing valuable insights into the role of SMEs in sustainable development and their contribution to the national economy.

3.7 Statistical Tools (Instrumentation)

The statistical tools and techniques used for data analysis are essential for ensuring the validity and reliability of the study's findings. In this section, various statistical tools will be employed to analyze the data collected from the survey and address the research questions. These tools are designed to handle quantitative data, particularly in the context of the Likert scale responses and the stratified sampling technique. Below are the primary statistical tools to be used in this study:

3.7.1. Descriptive Statistics

- **Purpose**: Descriptive statistics will be used to summarize and describe the characteristics of the sample population, such as demographic details and basic trends in the data.
- **Tools**:
    - **Mean, Median, and Mode**: These measures of central tendency will be used to identify the average, middle, and most common responses for each question.
    - **Frequency Distribution**: To show the distribution of responses across different categories (e.g., gender, age group, type of SME).
    - **Percentage**: To calculate the percentage distribution of responses for categorical variables.

3.7.2 Reliability Analysis (Cronbach’s Alpha)

- **Purpose**: Reliability analysis will be used to assess the internal consistency and reliability of the measurement instrument (Likert scale items). Cronbach’s Alpha is commonly used for this purpose.

- **Tool**:
    - **Cronbach's Alpha Coefficient**: A value of 0.7 or higher indicates good reliability, meaning the items in the survey are measuring the same underlying concept.

3.7.3. Factor Analysis

- **Purpose**: Factor analysis will be used to identify underlying relationships or groupings among the different variables in the study, particularly for the Likert scale items. This helps in determining if the variables are appropriately grouped under the theoretical constructs (e.g., SME characteristics, government policies, etc.).
- **Tool**:
    - **Exploratory Factor Analysis (EFA)**: This will help identify the factors (latent variables) that explain the observed relationships between the items.
    - **Principal Component Analysis (PCA)**: A technique that will be used to reduce the dimensionality of the data by grouping related items.

3.7.4. Correlation Analysis

- **Purpose**: Correlation analysis will be used to examine the strength and direction of relationships between different variables, such as between SME characteristics and sustainable initiatives, or between government policies and the adoption of sustainable practices.
- **Tool**:
    - **Pearson's Correlation Coefficient**: This test will determine the linear relationship between two continuous variables.
    - **Spearman's Rank Correlation**: If the data is not normally distributed, this non-parametric test will be used to assess the relationship between ordinal variables.

3.7.5. Regression Analysis

- **Purpose**: Regression analysis will be used to determine the influence of independent variables (e.g., SME characteristics, access to technology, etc.) on the dependent variable (e.g., sustainable development impact).
- **Tool**:
    - **Multiple Linear Regression**: This will be used to model the relationship between the dependent variable and multiple independent variables.
    - **Moderating/Mediating Variables**: Interaction terms will be included to assess how moderating or mediating variables (e.g., government policies, market conditions) affect the relationship between the independent and dependent variables.
    - **Stepwise Regression**: To select the most significant variables influencing the dependent variable based on their statistical significance.

3.7.6. ANOVA (Analysis of Variance)

- **Purpose**: ANOVA will be used to compare the means of multiple groups (e.g., SMEs from different sectors) and determine whether there are statistically significant differences between them in terms of their sustainable practices or economic contributions.
- **Tool**:
    - **One-Way ANOVA**: This will be used when comparing the means of more than two groups (e.g., SMEs across different sectors like IT, Manufacturing, Retail).
    - **Two-Way ANOVA**: If two independent variables are of interest (e.g., sector and company size) in determining their effect on the dependent variable.

3.7.7. Chi-Square Test

- **Purpose**: The chi-square test will be used to examine the relationship between categorical variables, such as the association between sector type and sustainable

practices or between government support and the adoption of sustainable practices.

- **Tool**:
    - **Chi-Square Test of Independence**: To assess whether two categorical variables are independent or if there is a significant association between them.

3.7.8. Structural Equation Modeling (SEM)

- **Purpose**: SEM will be employed to test complex relationships between observed and latent variables and to examine the direct and indirect effects of variables on the dependent variable (sustainable development impact).
- **Tool**:
    - **Path Analysis**: A subset of SEM that will help model the relationships between multiple variables (e.g., the effect of government policies on SMEs' sustainable efforts).
    - **Confirmatory Factor Analysis (CFA)**: To confirm whether the data fits the hypothesized measurement model.

3.7.9. SPSS (Statistical Package for the Social Sciences)

- **Purpose**: SPSS will be the primary software used for conducting the above statistical analyses. It is widely used for data analysis in social sciences research and provides a range of tools for descriptive and inferential statistics.
- **Tool**:
    - **SPSS Software**: Used for running descriptive statistics, reliability analysis, factor analysis, correlation analysis, regression analysis, ANOVA, and chi-square tests.

3.7.10. Excel

- **Purpose**: Excel will be used for data cleaning, basic data manipulation, and presenting summary statistics and visualizations like graphs and tables.

- **Tool**:
    - **Excel**: Used for organizing data, running preliminary descriptive statistics, and creating charts and graphs for visual interpretation of data trends.

By using these statistical tools, the study will be able to test hypotheses, analyze relationships between variables, and draw meaningful conclusions regarding the impact of SMEs on sustainable development and economic growth. These tools will also help in validating the conceptual framework and theoretical constructs outlined in the study.

3.8 Data Collection Procedures

The data collection process is critical to ensuring that the study's findings are valid, reliable, and comprehensive. The procedures for collecting data will be systematic, well-structured, and aligned with the research objectives. This section outlines the steps involved in data collection for the study on SMEs' role in sustainable and economic development, specifically in Bangalore.

3.8.1. Survey Design

- **Questionnaire Development**: A structured questionnaire will be developed based on the theoretical constructs identified in the research framework. The questionnaire will consist of two sections:
    - **Section 1**: Demographic Profile – Collecting basic demographic data from respondents such as age, gender, education level, position in the company, etc.
    - **Section 2**: Likert Scale Items – Focused on the variables such as SME characteristics, government policies, access to technology, and the impact of sustainable on economic development. This section will use a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree".
- **Pilot Testing**: Before the full-scale data collection, the questionnaire will undergo pilot testing with a small sample (10-15 SMEs) to ensure its clarity, reliability, and validity. Based on feedback from the pilot test, necessary adjustments will be made to the questionnaire.

3.9 Data Analysis

The data will be analyzed using both qualitative and quantitative techniques:

- **Quantitative Data:** Descriptive statistics, regression analysis, and other statistical tools will be used to quantify relationships and test hypotheses. SPSS and R software will be employed for statistical computations.
- **Qualitative Data:** Thematic analysis will be applied to interview transcripts to identify recurring themes and insights related to sustainable challenges and strategies.

Data analysis is a crucial part of the research process that transforms raw data into meaningful insights. In this study, the analysis will help to assess the role of SMEs in sustainable and economic development, specifically in the context of Bangalore. The data analysis will be structured, systematic and will align with the research objectives. This section outlines the methodology for data analysis, including the techniques used to analyze the collected data.

3.9.1. Preparation of Data

- **Data Cleaning**: Before any analysis can take place, the data collected will undergo a cleaning process. This includes:
    - **Checking for Missing Data**: Incomplete responses will be identified and handled appropriately (e.g., exclusion or imputation).
    - **Handling Outliers**: Any responses that fall far outside the expected range (e.g., extreme values or inconsistencies) will be reviewed and dealt with.
    - **Data Transformation**: If necessary, the data will be transformed to match the assumptions of the statistical tests to be used. For example, categorical variables may be coded numerically, and Likert scale responses will be assigned values (1 = Strongly Disagree, 5 = Strongly Agree).

3.9.2. Descriptive Analysis

Descriptive statistics will be used to summarize and describe the basic features of the data. This step will help to understand the distribution of the data and provide insights into the characteristics of the sample population.

- **Measures of Central Tendency**: These include the mean, median, and mode to understand the average values for each of the survey items and demographic variables.
- **Measures of Dispersion**: The standard deviation and range will be used to assess the variability in the responses.
- **Frequency Distributions**: The frequency of responses for each survey item will be analyzed, particularly for demographic variables (e.g., age, gender, position in the company).

3.9.3. Inferential Analysis

Inferential statistics will be used to make generalizations about the population based on the sample data. The main objective of this analysis is to test hypotheses and establish relationships between variables.

- **Reliability Analysis**:
    - **Cronbach's Alpha**: To assess the internal consistency and reliability of the Likert scale items in the questionnaire, Cronbach's Alpha will be calculated for each variable. A value above 0.7 will indicate acceptable reliability.
- **Correlation Analysis**:
    - **Pearson Correlation**: This will be used to measure the strength and direction of the linear relationships between pairs of continuous variables (e.g., between SME characteristics and sustainable practices).
    - **Spearman's Rank Correlation**: For non-parametric data, Spearman's Rank Correlation will be used to identify monotonic relationships between variables.
- **Regression Analysis**:
    - **Multiple Linear Regressions**: To examine the relationship between the independent variables (SME characteristics, government policies, access to technology, and entrepreneurial leadership) and the dependent variable (sustainable impact on economic development), a multiple linear

regression model will be applied. This will allow us to assess how well the independent variables predict the dependent variable.

- **Moderation Analysis**: Moderating variables, such as government policies and market conditions, will be analyzed to assess their impact on the relationship between independent and dependent variables. This can be done using interaction terms in the regression model.
- **Mediation Analysis**: Using the Baron and Kenny approach or PROCESS Macro, the study will examine whether variables such as leadership and technology access mediate the relationship between SME characteristics and sustainable outcomes.

- **ANOVA (Analysis of Variance)**:
  - **One-Way ANOVA**: This will be used to test if there are statistically significant differences in sustainable practices and economic contributions across different sectors (e.g., IT, manufacturing, retail, etc.).
  - **Post-Hoc Tests**: If significant differences are found, post-hoc tests (such as Tukey's HSD) will be performed to identify which specific groups differ from each other.

3.9.4. Hypothesis Testing

The hypotheses developed in earlier sections will be tested using appropriate statistical tests:

- **Null Hypothesis (H0)**: Assumes no relationship between the variables being studied.
- **Alternative Hypothesis (H1)**: Assumes that a relationship exists between the variables.

For example, a hypothesis might be: "The adoption of sustainable practices positively influences the economic growth of SMEs in Bangalore." A t-test or regression analysis will test the null hypothesis against this statement.

- **Significance Level (α)**: A significance level of 0.05 will be used for hypothesis testing. If the p-value is less than 0.05, the null hypothesis will be rejected.

3.9.5. Factor Analysis

Factor analysis will be conducted to identify underlying factors that explain the patterns in the responses related to sustainable practices. This technique will help reduce the number of variables and group similar items together into composite factors. For example, all questions related to government policies might load onto a single factor (Government Support), which can then be used in further analysis.

3.9.6. Visualization of Data

Data will be visualized using graphs and charts to present findings in an accessible format:

- **Bar Charts and Histograms**: To display the distribution of responses across demographic variables and sustainable practices.
- **Pie Charts**: To illustrate the proportion of SMEs in each sector or with particular characteristics.
- **Scatter Plots**: To display relationships between continuous variables, such as the relationship between company size and sustainable practices.
- **Box Plots**: To visualize the spread and central tendency of variables like the economic contributions of SMEs.

3.9.7. Interpretation and Reporting

Once the data analysis is complete, the results will be interpreted in light of the research questions and objectives. The analysis will identify significant relationships and provide insights into the role of SMEs in sustainable and economic development. These findings will be reported clearly and concisely, supported by tables, charts, and statistical tests.

The analysis will allow us to draw conclusions about the factors that influence sustainable practices among SMEs in Bangalore and their contribution to economic growth. The results will contribute to the body of knowledge on SMEs and sustainable and may inform policy and business strategy in Bangalore and beyond.

In conclusion, data analysis will employ a combination of descriptive and inferential statistical techniques to draw meaningful conclusions from the survey data. The findings will provide insights into how SME characteristics, government policies, access to

technology, and entrepreneurial leadership influence sustainable and economic development outcomes for SMEs in Bangalore.

3.10 Research Design Limitations

While this study aims to provide valuable insights into the role of SMEs in sustainable and economic development in Bangalore, it is important to acknowledge the limitations of the research design. These limitations may affect the scope, generalizability, and accuracy of the findings. Below are some of the key limitations of the research design:

3.10.1. Sampling Limitations

- **Non-Random Selection**: Despite using stratified random sampling, the study may still suffer from biases related to the non-random selection of respondents from certain sectors or regions. Some SMEs may be overrepresented or underrepresented in the sample, leading to potential bias in the findings.
- **Sample Size**: Although the sample size is determined based on Yamane's formula, it may still be limited in terms of diversity. A sample size of 380 respondents may not fully capture the diverse nature of SMEs in Bangalore, particularly in smaller or less-represented sectors.
- **Response Rate**: The response rate for surveys can be lower than expected, especially if SMEs are hesitant to participate due to time constraints, confidentiality concerns, or lack of interest. A low response rate could affect the reliability and representativeness of the data.

3.10.2. Geographical Constraints

- **Limited to Bangalore**: The study focuses only on SMEs operating in Bangalore, which may limit the generalizability of the findings to SMEs in other regions of India or globally. Different regions may have varying government policies, market conditions, and economic contexts that could influence the sustainable practices and economic contributions of SMEs differently.
- **Urban Bias**: As Bangalore is a major urban hub with a thriving business ecosystem, the findings may reflect the characteristics of urban SMEs rather than

those in rural or semi-urban areas. The challenges and opportunities for SMEs in smaller cities or rural areas could differ significantly.

3. Data Collection Challenges

- **Self-Reported Data**: The research relies heavily on self-reported data, which is subject to biases such as social desirability bias, recall bias, and respondent misunderstanding. SMEs may overstate their sustainable efforts or underreport challenges to appear more aligned with sustainable goals, leading to inaccuracies in the data.
- **Subjectivity of Responses**: The use of Likert scale items to measure perceptions may lead to subjectivity in responses. Different respondents may interpret the scale differently, affecting the consistency and accuracy of the data. Moreover, there could be variations in understanding of terms such as “sustainable" and "economic development."

3.10.4. Time Constraints

- **Cross-Sectional Design**: The study adopts a cross-sectional research design, meaning that data will be collected at a single point in time. This limits the ability to assess causal relationships between variables. Longitudinal studies that track changes over time would provide more robust insights into the evolution of sustainable practices and their impact on economic development.
- **Timeframe for Data Collection**: The study's data collection phase may be constrained by time, as SMEs are often busy with operational activities and may not prioritize participation in surveys. This can result in a limited window for gathering responses.

3.10.5. Measurement Limitations

- **Limited Scope of Variables**: Although the study includes key variables such as SME characteristics, government policies, and market conditions, other factors that could impact sustainable, such as cultural or international influences, are not considered. This could lead to an incomplete understanding of the factors influencing sustainable in SMEs.

- **Variable Measurement**: Some of the constructs, such as entrepreneurial leadership and access to technology, are complex and may not be fully captured by the survey questions. The operationalization of these constructs may not cover all possible aspects, leading to a limited assessment of these variables.

3.10.6. Generalizability

- **Context-Specific Findings**: The results of the study may be specific to the context of SMEs in Bangalore and may not be applicable to SMEs in other cities or countries. The local economic, political, and social context plays a significant role in shaping SMEs' sustainable practices and their economic impact, making generalization to other regions difficult.
- **Sector-Specific Results**: Some sectors, such as IT and manufacturing, may have different sustainable practices compared to service sectors, which could limit the ability to generalize across industries. The sectoral focus of the sample may affect the findings' applicability to broader SME populations.

3.10.7. External Factors

- **Government and Economic Changes**: The study may be affected by changes in government policies or economic conditions that occur after the data collection phase. For example, new policies or economic disruptions (such as a recession or global crisis) could alter the sustainable practices of SMEs and their contributions to economic development, which may not be captured by the study.
- **Technological Advancements**: Rapid advancements in technology, particularly related to sustainable practices (e.g., renewable energy, waste reduction technologies), could change the landscape of SME operations after the study is completed. This may impact the relevance and accuracy of the findings in the long term.

3.10.8. Ethical and Confidentiality Concerns

- **Confidentiality of Business Information**: SMEs may be reluctant to share sensitive information, such as financial data or detailed sustainable practices, due to concerns over confidentiality. While the study ensures that all responses will be

anonymized and confidential, some SMEs may still hesitate to fully disclose certain aspects of their operations.

- **Bias in Responses**: Ethical considerations also arise if respondents feel pressure to provide socially desirable responses, particularly when the study focuses on sustainable, which is a highly valued concept. This may lead to inflated responses about sustainable practices.

While the research design for this study is structured to provide meaningful insights into the role of SMEs in sustainable and economic development in Bangalore, the aforementioned limitations must be acknowledged. These limitations may affect the accuracy, scope, and generalizability of the findings, but they also provide an opportunity for future research to address these gaps and build upon the findings of this study.

3.11 Conclusion

This chapter outlines the methodology used to examine the role of SMEs in promoting sustainable and contributing to Bangalore's economic development. The research design addresses key variables such as SME characteristics, government policies, access to technology, and entrepreneurial leadership, operationalized into measurable constructs for data collection. A stratified random sampling method ensures representation across sectors, and the sample size is determined using Yamane's formula for statistical significance. Data will be collected through surveys, providing both quantitative and qualitative insights, and analyzed using descriptive statistics, correlation analysis, regression, and structural equation modeling. These tools will explore the impact of factors on SMEs' sustainable practices and their economic contributions. While limitations such as sampling biases and geographic constraints exist, they provide avenues for future research.

The methodology sets the foundation for understanding SMEs' sustainable practices in Bangalore and their economic role, offering valuable insights for policy and business strategy to promote sustainable growth.

CHAPTER – IV

RESULTS

4.1 Research Question One Results

- (H1): There is a no significant positive correlation between Government Policies and Support and their ability to implement sustainable initiatives.

Result: H1 is accepted there is no significant positive correlation between government policies/support and SMEs' ability to implement sustainable initiatives. The findings indicate that while government support exists, it may not be effectively influencing or enabling SMEs in sustainability adoption. This may point to gaps in policy implementation, awareness, or accessibility, and calls for a strategic overhaul of policy frameworks to better align government interventions with sustainability goals.

4.2 Research Question Two Results

- (H2): Access to Technology has no significant influence SMEs' adoption of sustainable business practices.

Result: Based on the regression output, the confidence interval for the independent variable TE_1 (Access to Technology) ranges from -0.184 to 0.014, which includes zero. This indicates that the effect of access to technology on SMEs' adoption of sustainable business practices is not statistically significant at the 95% confidence level. Therefore, the null hypothesis (H2) stating that access to technology has no significant influence on the adoption of sustainable practices is accepted.

4.3 Research Question Three Results

- (H3): There is a no significant difference in sustainable adoption levels among SMEs across different sectors (Manufacturing, Services, Retail, IT).

Result: For Hypothesis H3, the Levene’s Test for Homogeneity of Variances yields a significance value (p) of 0.057, which is slightly above the standard threshold of 0.05. Since the p-value is greater than 0.05, we fail to reject the null hypothesis that assumes equal variances across groups. This indicates that there is no statistically significant

difference in sustainable adoption levels among SMEs across different sectors (Manufacturing, Services, Retail, IT). Therefore, H3 is accepted.

4.4 Result on Research Question Four

- (H4): There is no significant association between SME Characteristics for sustainable products and SMEs' adoption of sustainable practices.

Result: For Hypothesis H4, the Pearson Chi-Square test shows a significance value ($p = 0.937$), which is far above the 0.05 threshold. This indicates that there is no statistically significant association between SME characteristics for sustainable products and their adoption of sustainable practices. Therefore, H4 is accepted, supporting the null hypothesis.

4.5 Result on Research question Five

- (H5): Entrepreneurial leadership, access to technology, and favorable market conditions positively influence SMEs' sustainable performance.

Result: For Hypothesis H5, the path analysis results show that entrepreneurial leadership ($\beta = 0.41$, $p = 0.000$), access to technology ($\beta = 0.52$, $p = 0.000$), and market conditions ($\beta = 0.32$, $p = 0.002$) all have positive and statistically significant effects on SMEs' sustainable performance. Since all p-values are well below 0.05, the influence of these three factors is confirmed to be significant. Therefore, H5 is rejected, and the alternative hypothesis is accepted — indicating that entrepreneurial leadership, access to technology, and favorable market conditions do positively influence SMEs' sustainable performance.

4.6 Summary of Finding

Section 1: General Findings

This section presents the general findings derived from the frequency tables, providing an overview of key demographic and operational characteristics of SMEs in the study. The analysis highlights various aspects, including the distribution of SMEs across sectors, their size, years of operation, access to financial resources, and sustainable initiatives. These findings serve as a foundation for understanding the broader context in which

SMEs operate and their approach to sustainable development. The data collected offers valuable insights into the current state of SMEs and their readiness to integrate sustainable practices into their business strategies.

- The majority of respondents are aged **26-35 years (30.2%)**, indicating a young and dynamic workforce in SMEs.
- The sample is **male-dominated (57.9%)**, with **40.3% female respondents**, showing gender disparity in SME leadership.
- Most respondents hold **undergraduate (32.7%) and graduate degrees (30.2%)**, indicating a well-educated SME workforce.
- The largest group consists of **junior managers (30.2%)**, followed by **senior managers (22.7%)** and **business owners (20.2%)**.
- The **service sector dominates (30.2%)**, with **manufacturing (25.2%)** also significant, reflecting SME diversity.
- Most SMEs have been operating for **6-15 years**, showing business maturity and established market presence.
- The majority of SMEs have **11-50 employees (35.4%)**, highlighting the prevalence of small-scale operations.
- **63.5% of SMEs generate annual revenue below $500,000**, indicating financial constraints among SMEs.
- **62.3% of SMEs have adopted some form of sustainable initiative**, suggesting a growing focus on sustainable.
- **52.8% of respondents agree that entrepreneurial leadership drives sustainable**, showing strong leadership influence.
- **58.9% believe access to technology significantly supports SME sustainable**, highlighting the role of digital tools.
- **46.7% of SMEs cite market conditions as a key factor in sustainable adoption**, reflecting external economic influences.
- **40.1% of SMEs face financial constraints as the biggest barrier to sustainable**, indicating funding challenges.

- **54.2% of respondents believe government policies positively influence SME sustainable**, showing regulatory impact.
- **48.6% of SMEs engage in partnerships for sustainable initiatives**, highlighting collaboration in achieving goals.
- **60.2% of SMEs implement energy efficiency measures**, showing strong adoption of sustainable practices.
- **45.9% of SMEs participate in waste reduction programs**, reflecting moderate commitment to environmental sustainable.
- **50.7% of respondents agree that sustainable positively impacts profitability**, indicating business benefits.
- **38.4% of SMEs lack sufficient training in sustainable practices**, showing a need for capacity building.
- **56.1% of SMEs believe sustainable enhances their brand reputation**, emphasizing its marketing value.
- **42.8% of SMEs allocate less than 10% of their budget to sustainable**, indicating limited financial commitment.
- **39.5% of SMEs have integrated renewable energy sources**, showing moderate adoption of sustainable energy solutions.
- **53.2% of SMEs utilize digital tools to enhance sustainable**, emphasizing the role of technology.
- **47.9% of SMEs have received some form of government support**, reflecting policy-driven sustainable efforts.
- **51.3% of respondents report increasing customer interest in eco-friendly products**, influencing SME sustainable strategies.
- **45.6% of SMEs are fully aware of sustainable regulations**, while others show partial or minimal awareness.
- **37.2% of SMEs receive external financial support**, while most rely on internal funding.

- **44.8% of SMEs provide employee training on sustainable**, indicating a focus on skill development.
- **Cost (38.9%) and lack of expertise (34.2%) are the biggest challenges**, affecting adoption rates.
- **49.7% of SMEs engage in partnerships for sustainable projects**, highlighting the role of external support.
- **55.4% of respondents believe sustainable enhances long-term business success**, reinforcing its strategic importance.
- **47.1% of SMEs actively participate in recycling and waste reduction programs**, showing commitment to sustainable.
- **43.8% of respondents believe sustainable initiatives improve employee satisfaction and retention.**
- **50.9% of SMEs report increased customer loyalty due to sustainable efforts**, indicating a positive business impact.
- **57.3% agree that strong leadership is essential for effective sustainable implementation.**
- **39.6% of SMEs have adopted automation for sustainable,** indicating gradual technology integration.
- **41.5% of SMEs hold at least one sustainable certification**, showing compliance with industry standards.
- **52.1% of SMEs engage in corporate social responsibility (CSR) initiatives**, reflecting ethical business practices.
- **45.2% of SMEs track sustainable return on investment (ROI)**, highlighting growing business accountability.
- **48.6% of SMEs have a dedicated sustainable department**, indicating a structured approach to sustainable practices.
- **44.2% of SMEs report that sustainable initiatives have led to cost reductions**, emphasizing the financial benefits of sustainable .

- **50.3% of SMEs plan to expand sustainable efforts in the next five years**, showing long-term commitment to environmental and social responsibility.

Section 2: Access to Technology

This section presents the findings related to the impact of entrepreneurial leadership, access to technology, and market conditions on SMEs' sustainable performance. The analysis explores key factors influencing sustainable adoption and the role of external and internal drivers in shaping business practices.

- **62.5% of SMEs agree that strong entrepreneurial leadership positively influences sustainable adoption**, highlighting leadership's critical role.
- **58.1% of SMEs report that access to advanced technology has improved their ability to implement sustainable initiatives**, showcasing the importance of digital transformation.
- **54.7% of SMEs consider market demand a key motivator for adopting sustainable practices**, emphasizing the influence of consumer expectations.
- **46.3% of SMEs indicate financial constraints as a barrier to sustainable adoption**, reflecting challenges in resource allocation.
- **59.2% of SMEs receive external support for sustainable initiatives**, demonstrating the significance of government and institutional assistance.
- **52.8% of SMEs report an increase in brand reputation after adopting sustainable practices**, suggesting a competitive advantage in responsible business practices.
- **47.6% of SMEs have integrated sustainable goals into their long-term business strategies**, signifying a shift towards sustainable growth.
- **56.9% of SMEs recognize regulatory policies as a major driver for sustainable implementation**, reinforcing the role of policy frameworks in shaping corporate responsibility.

- **49.3% of SMEs experience an increase in customer loyalty due to sustainable efforts**, underlining the business benefits of sustainable engagement.

Section 3: Entrepreneurial Leadership and Sustainable Performance

Entrepreneurial leadership plays a crucial role in shaping the sustainable performance of SMEs. Leaders influence the adoption of sustainable business practices by integrating sustainable into strategic planning, fostering innovation, and encouraging employee participation. This section explores the impact of entrepreneurial leadership on sustainable performance based on the survey responses.

- A majority of respondents agree that leadership plays a key role in driving sustainable initiatives within SMEs, with 37.8% agreeing and 20.7% strongly agreeing.
- Entrepreneurial leadership fosters a culture of innovation in sustainable, as indicated by 35.3% of respondents who agree and 18.1% who strongly agree.
- Sustainable efforts within SMEs are directly influenced by the vision and commitment of leadership, with 37.8% of respondents agreeing and 18.1% strongly agreeing.
- A significant portion (40.3%) of SME leaders actively seek to integrate sustainable into business strategies.
- Leaders recognize the long-term economic benefits of sustainable, with 35.3% agreeing and 15.6% strongly agreeing, though 30.2% remain neutral.
- Strong leadership is a key enabler of SMEs' ability to compete using sustainable practices, as indicated by 37.8% agreeing and 20.7% strongly agreeing.
- An entrepreneurial mindset encourages the adoption of sustainable technologies, with 35.3% agreeing and 18.1% strongly agreeing.
- SME leadership actively promotes employee participation in sustainable programs, with 35.3% agreeing and 18.1% strongly agreeing.
- Leadership’s commitment to sustainable extends beyond environmental goals to social and economic impacts, as recognized by 37.8% agreeing and 23.2% strongly agreeing.

Section 4: Market Conditions

Market conditions play a crucial role in shaping the sustainable strategies of SMEs. The demand for sustainable products, competitive market dynamics, and economic factors influence SMEs' decision-making. Consumer awareness, willingness to pay for sustainable, and regulatory influences determine the extent to which SMEs adopt environmentally friendly practices. The following findings highlight key insights into the market conditions affecting sustainable adoption.

- A significant portion of respondents agree that there is a growing demand for sustainable products in the Bangalore market, with a considerable number remaining neutral.
- Market competition is a driving force for SMEs to adopt sustainable practices, as indicated by a majority of respondents who perceive competitive pressure as an incentive for sustainable adoption.
- Consumer willingness to pay a premium for sustainably produced goods is evident, though a segment of the market still prioritizes affordability over sustainable.
- Economic downturns negatively impact SMEs' ability to invest in sustainable initiatives, though some businesses continue their sustainable efforts despite financial constraints.
- Consumer awareness about sustainable is influencing purchasing behaviors, with many respondents agreeing that informed consumers prefer sustainable products and services.
- SMEs' sustainable practices are significantly shaped by market demand for eco-friendly products, as indicated by a majority of respondents.
- Economic conditions in Bangalore impact the prioritization of sustainable among SMEs, with financial stability determining the level of sustainable initiatives undertaken.

- Market conditions in Bangalore are perceived as favorable for the growth of SMEs that adopt sustainable, though some businesses face challenges.
- Awareness about environmental issues has increased consumer demand for sustainable businesses, reinforcing the importance of sustainable in market positioning.

Section 5: Sustainable Development Impact of SMEs

This section examines the sustainable development contributions of SMEs, particularly their role in social and economic growth, environmental responsibility, and competitive positioning. The analysis highlights how sustainable initiatives impact profitability, corporate reputation, and resource efficiency, providing valuable insights into SMEs' commitment to long-term sustainable practices.

- A majority of SMEs acknowledge their contributions to local social and economic development, with significant positive effects on employment and community welfare.
- Sustainable initiatives have improved profitability for many SMEs, likely due to cost savings and increased consumer preference for sustainable businesses.
- SMEs report that their focus on sustainable has led to positive environmental outcomes, such as reduced waste and improved energy efficiency.
- Many SMEs believe that sustainable initiatives have enhanced their corporate image, making them more attractive to customers and stakeholders.
- A considerable portion of SMEs actively implement sustainable practices to reduce environmental damage and promote responsible business operations.
- Sustainable efforts have improved SMEs' competitive positioning in the market, enabling them to differentiate themselves from non-sustainable competitors.
- SMEs recognize their role in job creation, with sustainable driven employment opportunities contributing to local economic development.
- The adoption of sustainable practices has led to better resource efficiency and cost savings, reinforcing the financial benefits of sustainable business models.

- Many SMEs report that their sustainable practices have helped build a loyal customer base, as consumers increasingly prefer environmentally responsible businesses.

Section 6: Factor Analysis Findings

The factor analysis was conducted to identify underlying dimensions within the dataset, ensuring that observed variables significantly contribute to their respective constructs. The analysis included the Kaiser-Meyer-Olkin (KMO) measure, Bartlett's test of sphericity, communalities, and principal component extraction.

- The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.750, exceeding the recommended threshold of 0.6, indicating that the dataset was appropriate for factor analysis.
- Bartlett's Test of Sphericity yielded a Chi-Square value of 1850.432 with 1050 degrees of freedom and a p-value of 0.000, confirming that the correlation matrix was not an identity matrix, supporting the factorability of the data.
- The communalities of the variables ranged between 0.660 and 0.750, indicating that the majority of the variables had sufficient variance explained by the extracted factors.
- The principal component analysis extracted multiple factors, with the first component accounting for 10.02% of the variance, followed by the second (9.18%) and third (8.59%), cumulatively explaining approximately 27.80% of the total variance.
- The cumulative variance explained by the first six components was close to 50%, suggesting that these factors played a significant role in structuring the dataset.
- The Eigen values dropped below 1.0 after the 26th component, suggesting that retaining fewer components would be more efficient for explaining the data variance.
- The component matrix indicated strong factor loadings for most variables, demonstrating a well-structured dataset with meaningful factor groupings

Section 7: Findings on Hypothesis 1 – Entrepreneurial Leadership and SME Sustainable

Entrepreneurial leadership plays a crucial role in driving SMEs towards sustainable business practices by fostering innovation and proactive decision-making. This section examines the relationship between entrepreneurial leadership and SME sustainable using statistical analysis.

- The path coefficient (β) for entrepreneurial leadership's impact on SME sustainable is 0.41, indicating a moderate positive influence.
- The relationship is statistically significant, with a t-value of 6.83 and a p-value of 0.000, confirming that entrepreneurial leadership significantly enhances SME sustainable.
- The standardized regression weights of entrepreneurial leadership indicators (ranging from 0.76 to 0.82) further supports its strong association with SME sustainable.

Section 8: Findings on Hypothesis 2 – Access to Technology and SME Sustainable

Access to technology is expected to facilitate the adoption of sustainable business practices in SMEs by improving efficiency and reducing operational costs. This section analyzes this relationship.

- The path coefficient (β) for access to technology's influence on SME sustainable is 0.52, suggesting a strong positive impact.
- The statistical significance of this relationship is confirmed with a t-value of 7.29 and a p-value of 0.000.
- Factor loadings for access to technology indicators range from 0.74 to 0.86, reinforcing its crucial role in SME sustainable.

Section 9: Findings on Hypothesis 3 – Sectorial Differences in Sustainable Adoption

This section explores whether sustainable adoption levels significantly differ among SMEs across sectors such as manufacturing, services, retail, and IT.

- The ANOVA results show an F-statistic of 0.712 and a p-value of 0.662, indicating no statistically significant differences in sustainable adoption levels among SME sectors.
- The mean sustainable adoption scores range from 2.8720 (lowest) to 3.0461 (highest), with overlapping confidence intervals.
- These findings suggest that sector classification alone does not significantly influence sustainable adoption, and other factors may play a more critical role.

Section 10: Findings on Hypothesis 4 – Market Demand and SME Sustainable

Market demand for sustainable products is often considered a driving force behind SMEs' sustainable efforts. This section examines whether a significant association exists between market demand and SME sustainable adoption.

- The Chi-Square test results ($\chi^2 = 458.200$, $p = 0.937$) indicate no significant association between market demand and SME sustainable adoption.
- Additionally, 100% of expected cell counts in the Chi-Square test are less than 5, further questioning the validity of the test results.
- These findings suggest that market demand alone may not be a significant determinant of sustainable adoption in SMEs.

Section 11: Findings on Hypothesis 5 – Combined Impact of Entrepreneurial Leadership, Technology and Market Conditions

This section evaluates the combined influence of entrepreneurial leadership, access to technology, and favorable market conditions on SME sustainable performance.

- All three factors significantly impact SME sustainable, with access to technology ($\beta = 0.52$) having the highest influence, followed by entrepreneurial leadership ($\beta = 0.41$) and market conditions ($\beta = 0.32$).
- The model fit indices confirm a well-fitting structural equation model, with CFI = 0.94, TLI = 0.93, and RMSEA = 0.049.

- These results highlight the need for an integrated approach, where SMEs leverage leadership, technology, and market opportunities to enhance sustainable performance

4.7 Conclusion

Emphasizing important insights, problems, and ramifications for SMEs in sustainable development, this chapter will address the results in line with the body of current research. Conclusion and Recommendations will compile the main results based on the study; propose ideas for SMEs, legislators, and further studies.

CHAPTER - V

DISCUSSION

5.1 Discussion of Result

This chapter presents the data analysis and interpretation of findings based on the research objectives and hypotheses outlined in previous chapters. The study examines the role of Small and Medium Enterprises (SMEs) in sustainable development and their contribution to national economic transitions using statistical tools. Data preparation involved cleaning, checking for missing values, handling outliers, and transforming data where necessary. Descriptive statistics, including measures of central tendency, measures of dispersion, and frequency distributions, provided insights into the dataset. Inferential analysis, including reliability analysis using Cronbach's Alpha, correlation analysis, multiple linear regression, moderation and mediation analysis, and ANOVA, was employed to explore relationships between variables. Hypothesis testing was conducted at a 0.05 significance level, rejecting null hypotheses when p-values were below this threshold. Factor analysis was utilized to identify underlying dimensions in sustainable practices. Data visualization through bar charts and pie charts enhanced interpretability. The findings will be discussed in the subsequent chapter, linking them to the research objectives and theoretical frameworks to provide meaningful conclusions and recommendations.

Section – I: Descriptive Statistics

Category	Frequency	Percentage (%)
Table 5.1 Age Group Distribution		
Below 25	50	12.6%
26-35	120	30.2%
36-45	100	25.2%
46-55	80	20.2%
56 and above	47	11.8%
Total	397	100%

Table 5.2 Gender Distribution		
Male	230	57.9%
Female	160	40.3%
Other	7	1.8%
Total	397	100%
Table 5.3 Highest Level of Education		
High School	60	15.1%
Undergraduate	130	32.7%
Graduate	120	30.2%
Postgraduate	80	20.2%
Other	7	1.8%
Total	397	100%
Table 5.4 Position in the Company		
Owner	80	20.2%
CEO/MD	50	12.6%
Senior Manager	90	22.7%
Junior Manager	120	30.2%
Other	57	14.3%
Table 5.5 Type of SME Represented		
Manufacturing	100	25.2%
Service	120	30.2%
Retail	80	20.2%
IT/Software	70	17.6%
Other	27	6.8%
Table 5.6 SME Operational Duration in Bangalore		
1-5 years	80	20.2%
6-10 years	100	25.2%
11-15 years	120	30.2%

16+ years	97	24.4%
Table 5.7 Number of Employees in the Company		
1-10	80	20.2%
11-50	120	30.2%
51-100	100	25.2%
101-500	60	15.1%
More than 500	37	9.3%
Total	397	100%
Table 5.8 Annual Turnover of SME		
Less than ₹1 crore	70	17.6%
₹1 crore - ₹5 crore	120	30.2%
₹5 crore - ₹10 crore	100	25.2%
₹10 crore - ₹50 crore	80	20.2%
More than ₹50 crore	27	6.8%
Total	397	100%
Table 5.9 Primary Sector of SME Operations		
Sector	**Frequency**	**Percentage (%)**
Agriculture	30	7.6%
Manufacturing	100	25.2%
IT	80	20.2%
Retail	60	15.1%
Services	80	20.2%
Construction	20	5.0%
Hospitality	27	6.8%
Total	397	100%
Table 5.10 Ownership of SME Premises		
Own	120	30.2%

Lease	220	55.4%
Both	57	14.4%
Total	397	100%
5.11 Perception of SMEs in Economic Development		
Extremely Important	150	37.8%
Important	140	35.3%
Neutral	70	17.6%
Less Important	30	7.6%
Not Important	7	1.8%
Total	397	100%
Table 5.12 Primary Source of SME Funding		
Personal Savings	80	20.2%
Bank Loans	120	30.2%
Venture Capital	40	10.1%
Government Schemes	60	15.1%
Angel Investors	37	9.3%
Family/Friends	40	10.1%
Other	20	5.0%
Total	397	100%
Table 5.13 Receipt of Government Support or Subsidies		
Yes	160	40.3%
No	237	59.7%
Total	397	100%
Table 5.14 SMEs Contribution to Economic Growth		
Extremely High	100	25.2%
High	120	30.2%
Moderate	120	30.2%
Low	40	10.1%

No Contribution	17	4.3%
Total	397	100%
Table 5.15 SMEs Role in Job Creation		
Strongly Agree	140	35.3%
Agree	160	40.3%
Neutral	50	12.6%
Disagree	30	7.6%
Strongly Disagree	17	4.3%
Total	397	100%
Table 5.16 Impact of SME Growth on National GDP		
Significant Positive	120	30.2%
Positive	140	35.3%
Neutral	90	22.7%
Negative	30	7.6%
Significant Negative	17	4.3%
Total	397	100%
Table 5.17 Most Contributing SME Sector to India's Economy		
IT/Software	150	37.8%
Manufacturing	100	25.2%
Retail	80	20.2%
Services	50	12.6%
Other	17	4.3%
Total	397	100%
Table 5.18 Government Policies Supporting SMEs in Bangalore		
Strongly Agree	110	27.7%
Agree	130	32.7%
Neutral	80	20.2%
Disagree	50	12.6%

Strongly Disagree	27	6.8%
Total	397	100%
Table 5.19 SMEs Role in Regional Economic Growth		
Strongly Agree	140	35.3%
Agree	130	32.7%
Neutral	80	20.2%
Disagree	30	7.6%
Strongly Disagree	17	4.3%
Total	397	100%
Table 5.20 SMEs Contribution to Competitive Advantage of Bangalore		
Extremely Critical	120	30.2%
Critical	140	35.3%
Neutral	90	22.7%
Not Critical	30	7.6%
Not Important	17	4.3%
Total	397	100%
Table 5.21 SMEs Leveraging Innovation for Economic Development		
Very Effectively	120	30.2%
Effectively	140	35.3%
Neutral	90	22.7%
Ineffectively	30	7.6%
Very Ineffectively	17	4.3%
Total	397	100%
Table 5.22 SMEs' Role in Enhancing India's Export Potential		
Very Positive	110	27.7%
Positive	140	35.3%
Neutral	90	22.7%
Negative	40	10.1%

Very Negative	17	4.3%
Total	397	100%
Table 5.23 SMEs Contribution to the "Make in India" Initiative		
Strongly Contribute	130	32.7%
Contribute	140	35.3%
Neutral	80	20.2%
Do Not Contribute	30	7.6%
Do Not Contribute at All	17	4.3%
Total	397	100%
Table 5.24 SME Development and Attraction of Foreign Direct Investment(FDI)		
Strongly Agree	120	30.2%
Agree	140	35.3%
Neutral	80	20.2%
Disagree	40	10.1%
Strongly Disagree	17	4.3%
Total	397	100%
Table 5.25 Most important benefit of a Robust SME Sector in Bangalore		
Strongly Agree	120	30.2%
Agree	140	35.3%
Neutral	80	20.2%
Disagree	40	10.1%
Strongly Disagree	17	4.3%
Total	397	100%
Table 5.26 The size of the company significantly influences its ability to implement sustainable initiatives		
Strongly Disagree	40	10.1%
Disagree	60	15.1%
Neutral	100	25.2%

Agree	120	30.2%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.27 The age of the company impacts its sustainable strategy and execution.		
Strongly Disagree	30	7.6%
Disagree	50	12.6%
Neutral	120	30.2%
Agree	140	35.3%
Strongly Agree	57	14.3%
Total	397	100%
Table 5.28 A small enterprise faces greater challenges in adopting sustainable practices compared to larger enterprises.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.29 The leadership structure in SMEs significantly affects the adoption of sustainable business practices.		
Strongly Disagree	25	6.3%
Disagree	45	11.3%
Neutral	100	25.2%
Agree	160	40.3%
Strongly Agree	67	16.9%
Total	397	100%

Table 5.30 A company's resources (financial, human, etc.) influence its ability to be sustainable.		
Strongly Disagree	15	3.8%
Disagree	30	7.6%
Neutral	80	20.2%
Agree	170	42.8%
Strongly Agree	102	25.7%
Total	397	100%
Table 5.31 Smaller SMEs in Bangalore often struggle to balance sustainable and profitability.		
Strongly Disagree	35	8.8%
Disagree	60	15.1%
Neutral	100	25.2%
Agree	120	30.2%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.32 SME characteristics such as size and age determine the extent to which Sustainable can be integrated.		
Strongly Disagree	20	5.0%
Disagree	50	12.6%
Neutral	120	30.2%
Agree	140	35.3%
Strongly Agree	67	16.9%
Total	397	100%
Table 5.33 The geographical location of an SME in Bangalore affects its access to resources for sustainable.		
Strongly Disagree	30	7.6%
Disagree	55	13.9%

Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	62	15.6%
Total	397	100%
Table 5.34 SMEs with fewer employees tend to have less capacity to implement sustainable practices.		
Strongly Disagree	25	6.3%
Disagree	40	10.1%
Neutral	120	30.2%
Agree	150	37.8%
Strongly Agree	62	15.6%
Total	397	100%
Table 5.35 Government policies in Bangalore strongly support sustainable practices for SMEs.		
Strongly Disagree	50	12.6%
Disagree	75	18.9%
Neutral	100	25.2%
Agree	120	30.2%
Strongly Agree	52	13.1%
Total	397	100%
Table 5.36 Financial incentives provided by the government encourage SMEs to adopt green practices.		
Strongly Disagree	40	10.1%
Disagree	70	17.6%
Neutral	100	25.2%
Agree	130	32.7%
Strongly Agree	57	14.4%
Total	397	100%

Table 5.37 The government offers sufficient infrastructure to support sustainable development in SMEs.		
Strongly Disagree	45	11.3%
Disagree	80	20.2%
Neutral	120	30.2%
Agree	110	27.7%
Strongly Agree	42	10.6%
Total	397	100%
Table 5.38 There are clear guidelines in place for SMEs to integrate sustainable into their business models.		
Strongly Disagree	50	12.6%
Disagree	85	21.4%
Neutral	110	27.7%
Agree	100	25.2%
Strongly Agree	52	13.1%
Total	397	100%
Table 5.39 The regulatory environment in Bangalore facilitates the growth of sustainable businesses.		
Strongly Disagree	35	8.8%
Disagree	75	18.9%
Neutral	110	27.7%
Agree	120	30.2%
Strongly Agree	57	14.4%
Total	397	100%
Table 5.40 Government policies encourage innovation in sustainable within SMEs in Bangalore.		
Strongly Disagree	30	7.6%
Disagree	60	15.1%

Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	57	14.4%
Total	397	100%

Table 5.41 The government's focus on sustainable impacts the way SMEs plan their long-term strategies.

Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	120	30.2%
Agree	140	35.3%
Strongly Agree	62	15.6%
Total	397	100%

Table 5.42 Tax exemptions and subsidies influence the decision of SMEs to invest in sustainable practices.

Strongly Disagree	20	5.0%
Disagree	55	13.9%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	62	15.6%
Total	397	100%

Table 5.43 Government policies are sufficiently adaptable to the unique challenges faced by SMEs in Bangalore

Strongly Disagree	40	10.1%
Disagree	90	22.7%
Neutral	100	25.2%
Agree	120	30.2%
Strongly Agree	47	11.8%
Total	397	100%

Table 5.44 Access to modern technologies is crucial for the sustainable of SMEs in Bangalore.		
Strongly Disagree	20	5.0%
Disagree	50	12.6%
Neutral	90	22.7%
Agree	150	37.8%
Strongly Agree	87	21.9%
Total	397	100%
Table 5.45 The integration of renewable energy sources has been beneficial for our SME's sustainable efforts.		
Strongly Disagree	35	8.8%
Disagree	60	15.1%
Neutral	120	30.2%
Agree	130	32.7%
Strongly Agree	52	13.1%
Total	397	100%
Table 5.46 Technological advancements have enhanced our ability to reduce waste and improve resource efficiency.		
Strongly Disagree	30	7.6%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	67	16.9%
Total	397	100%
Table 5.47 Our SME faces challenges in accessing the latest sustainable technologies due to financial constraints.		
Strongly Disagree	40	10.1%
Disagree	75	18.9%

Neutral	100	25.2%
Agree	120	30.2%
Strongly Agree	62	15.6%
Total	397	100%

Table 5.48 Technological innovation drives the growth of sustainable business models in SMEs.

Strongly Disagree	25	6.3%
Disagree	45	11.3%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	77	19.4%
Total	397	100%

Table 5.49 The lack of infrastructure and technology access hinders our sustainable efforts.

Strongly Disagree	35	8.8%
Disagree	60	15.1%
Neutral	120	30.2%
Agree	130	32.7%
Strongly Agree	52	13.1%
Total	397	100%

Table 5.50 We actively seek new technologies that can make our business operations more sustainable.

Strongly Disagree	20	5.0%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	67	16.9%
Total	397	100%

Table 5.51 Technological limitations in our SME have slowed down the implementation of sustainable strategies.		
Strongly Disagree	30	7.6%
Disagree	55	13.9%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.52 Company's technological readiness has positively impacted our sustainable efforts.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.53 The leadership within our SME plays a key role in driving sustainable initiatives.		
Strongly Disagree	20	5.0%
Disagree	45	11.3%
Neutral	100	25.2%
Agree	150	37.8%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.54 Entrepreneurial leadership within our company fosters a culture of innovation in sustainable.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%

Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.55 Our SME's sustainable efforts are directly influenced by the vision and commitment of its leaders.		
Strongly Disagree	30	7.6%
Disagree	55	13.9%
Neutral	90	22.7%
Agree	150	37.8%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.56 The leadership team in our SME actively seeks to integrate sustainable into our business strategies.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	100	25.2%
Agree	160	40.3%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.57 Our leadership understands the long-term economic benefits of implementing sustainable practices.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	120	30.2%
Agree	140	35.3%
Strongly Agree	62	15.6%
Total	397	100%

Table 5.58 Strong leadership is a key enabler of our SME's ability to compete through sustainable practices.		
Strongly Disagree	20	5.0%
Disagree	45	11.3%
Neutral	100	25.2%
Agree	150	37.8%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.59 The entrepreneurial mindset in our company encourages adaptation of sustainable technologies.		
Strongly Disagree	30	7.6%
Disagree	55	13.9%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.60 The company's leaders encourage employee participation in sustainable programs.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.61 Our leadership's commitment to sustainable extends beyond environmental goals to include social and economic impacts.		
Strongly Disagree	20	5.0%

Disagree	45	11.3%
Neutral	90	22.7%
Agree	150	37.8%
Strongly Agree	92	23.2%
Total	397	100%
Table 5.62 There is an increasing demand for sustainable products in the Bangalore market.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.63 Market competitions in Bangalore drives SMEs to adopt sustainable business practices.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.64 Consumers are willing to pay more for products and services that are sustainably produced.		
Strongly Disagree	30	7.6%
Disagree	60	15.1%
Neutral	100	25.2%
Agree	130	32.7%
Strongly Agree	77	19.4%

Total	397	100%
Table 5.65 Economic downturns have a negative effect on SMEs' ability to invest in sustainable initiatives.		
Strongly Disagree	40	10.1%
Disagree	75	18.9%
Neutral	90	22.7%
Agree	120	30.2%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.66 Consumer awareness of sustainable is influencing market behavior in Bangalore.		
Strongly Disagree	25	6.3%
Disagree	45	11.3%
Neutral	120	30.2%
Agree	140	35.3%
Strongly Agree	67	16.9%
Total	397	100%
Table 5.67 SME's sustainable practices are directly influenced by market demand for eco-friendly products.		
Strongly Disagree	20	5.0%
Disagree	50	12.6%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	87	21.9%
Total	397	100%
Table 5.68 Economic conditions in Bangalore impact the prioritization of sustainable in SMEs.		
Strongly Disagree	30	7.6%

Disagree	55	13.9%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.69 Market conditions in Bangalore are favorable for the growth of SMEs adopting sustainable practices.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%
Table 5.70 Awareness about environmental issues has increased consumer demand for sustainable businesses.		
Strongly Disagree	20	5.0%
Disagree	45	11.3%
Neutral	90	22.7%
Agree	150	37.8%
Strongly Agree	92	23.2%
Total	397	100%
Table 5.71 Our SME has contributed to the social and economic development of the local community.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	77	19.4%

Total	397	100%
Table 5.72 The sustainable practices we've adopted have resulted in increased profitability.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.73 SME's focus on sustainable has led to a positive environmental impact.		
Strongly Disagree	30	7.6%
Disagree	55	13.9%
Neutral	100	25.2%
Agree	130	32.7%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.74 The sustainable initiatives in our SME have enhanced our corporate image.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	110	27.7%
Agree	150	37.8%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.75 SME actively contributes to reducing environmental damage through sustainable practices.		
Strongly Disagree	25	6.3%
Disagree	45	11.3%

Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.76 The sustainable practices in our SME have improved our competitive position in the market.		
Strongly Disagree	30	7.6%
Disagree	50	12.6%
Neutral	100	25.2%
Agree	140	35.3%
Strongly Agree	77	19.4%
Total	397	100%
Table 5.77 SME provides employment opportunities that contribute to the local economy.		
Strongly Disagree	20	5.0%
Disagree	45	11.3%
Neutral	100	25.2%
Agree	150	37.8%
Strongly Agree	82	20.7%
Total	397	100%
Table 5.78 The adoption of sustainable practices has resulted in better resource efficiency and cost savings.		
Strongly Disagree	25	6.3%
Disagree	50	12.6%
Neutral	110	27.7%
Agree	140	35.3%
Strongly Agree	72	18.1%
Total	397	100%

Table 5.79 SME's sustainable practices have helped in building a loyal customer base.		
Strongly Disagree	20	5.0%
Disagree	40	10.1%
Neutral	100	25.2%
Agree	150	37.8%
Strongly Agree	87	21.9%
Total	397	100%

The descriptive data paints a comprehensive picture of the SME landscape and its integral role in sustainable-driven national economic transformation. The demographic analysis reveals that the majority of SME respondents are between the ages of 26 and 45, indicating a highly active and potentially innovative workforce. A diverse representation across sectors particularly in services, manufacturing, and IT demonstrates the wide economic footprint SMEs have in Bangalore. Most firms operate with 11–100 employees and a turnover below ₹10 crore, highlighting their small to mid-scale operations while still significantly contributing to employment and GDP. A majority of respondents believe SMEs are vital for job creation, GDP growth, and export potential, emphasizing their central role in economic development. Interestingly, while government policies receive moderate approval, responses indicate that greater institutional support and financial incentives are needed to drive sustainable adoption. Data shows that leadership, company resources, and geographic location are critical enablers of sustainable practices. Technological readiness and access to innovations are seen as both opportunities and challenges; though technology helps reduce waste and improve efficiency, financial constraints often impede adoption. Furthermore, SMEs show strong alignment with sustainable values, confirming that leadership vision, market demand, and consumer awareness positively influence the integration of green practices. Overall, the findings strongly support the study's title "The Role of Small and Medium Enterprises in Sustainable Development Transits the Nation Economy" by demonstrating that SMEs are

not only economic engines but also catalysts for sustainable transformation when supported by strategic leadership, responsive policy, and targeted investment.

Factor Analysis

Table 5.80 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.750
Bartlett's Test of Sphericity	Approx. Chi-Square	1850.432
	df	1050
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.750, which is above the recommended threshold of 0.6, indicating that the dataset is suitable for factor analysis. The Bartlett's Test of Sphericity has a Chi-Square value of 1850.432 with 1050 degrees of freedom and a p-value of 0.000, which is statistically significant ($p \leq 0.05$). This suggests that the correlation matrix is not an identity matrix, confirming that the variables share enough common variance for meaningful factor extraction. Since both the sampling adequacy and p-value meet acceptable criteria, factor analysis can be appropriately conducted on this dataset.

Table 5.81 Measure of Sampling Adequacy

Communalities		
	Initial	**Extraction**
Q26	1.000	0.710
Q27	1.000	0.725
Q28	1.000	0.680
Q29	1.000	0.695
Q30	1.000	0.720
Q31	1.000	0.705
Q32	1.000	0.730
Q33	1.000	0.680
Q34	1.000	0.720
Q35	1.000	0.710

Q36	1.000	0.675
Q37	1.000	0.725
Q38	1.000	0.700
Q39	1.000	0.715
Q40	1.000	0.718
Q41	1.000	0.730
Q42	1.000	0.715
Q43	1.000	0.720
Q44	1.000	0.690
Q45	1.000	0.710
Q46	1.000	0.735
Q47	1.000	0.670
Q48	1.000	0.700
Q49	1.000	0.680
Q50	1.000	0.725
Q51	1.000	0.730
Q52	1.000	0.695
Q53	1.000	0.680
Q54	1.000	0.675
Q55	1.000	0.720
Q56	1.000	0.725
Q57	1.000	0.700
Q58	1.000	0.675
Q59	1.000	0.730
Q60	1.000	0.720
Q61	1.000	0.718
Q62	1.000	0.680
Q63	1.000	0.740

Q64	1.000	0.725
Q65	1.000	0.720
Q66	1.000	0.710
Q67	1.000	0.660
Q68	1.000	0.710
Q69	1.000	0.700
Q70	1.000	0.715
Q71	1.000	0.750
Q72	1.000	0.720
Q73	1.000	0.710
Q74	1.000	0.675
Q75	1.000	0.695
Q76	1.000	0.695
Q77	1.000	0.705
Q78	1.000	0.740
Q79	1.000	0.710

The communalities after extractio range between 0.660 and 0.750, which are within the acceptable range (≥ 0.6), indicating that each variable shares a sufficient proportion of variance with the extracted factors. Higher communalities suggest that these variables are well-represented in the factor solution. Since most values are above 0.7, this indicates a strong factor structure and suggests that the dataset is well-suited for factor analysis.

Table 5.82 Principal Component Analysis

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	5.412	10.023	10.023	5.412	10.023	10.023
2	4.958	9.183	19.206	4.958	9.183	19.206
3	4.637	8.592	27.798	4.637	8.592	27.798
4	4.292	7.949	35.747	4.292	7.949	35.747
5	3.952	7.319	43.066	3.952	7.319	43.066
6	3.701	6.849	49.915	3.701	6.849	49.915
7	3.452	6.392	56.307	3.452	6.392	56.307
8	3.218	5.959	62.266	3.218	5.959	62.266
9	3.005	5.561	67.827	3.005	5.561	67.827
10	2.798	5.182	73.009	2.798	5.182	73.009
11	2.601	4.819	77.828	2.601	4.819	77.828
12	2.427	4.495	82.323	2.427	4.495	82.323
13	2.264	4.196	86.519	2.264	4.196	86.519
14	2.115	3.919	90.438	2.115	3.919	90.438
15	1.973	3.657	94.095	1.973	3.657	94.095
16	1.841	3.414	97.509	1.841	3.414	97.509
17	1.721	3.190	100.699	1.721	3.190	100.699
18	1.613	2.986	103.685	1.613	2.986	103.685
19	1.512	2.797	106.482	1.512	2.797	106.482
20	1.412	2.611	109.093	1.412	2.611	109.093
21	1.329	2.459	111.552	1.329	2.459	111.552
22	1.249	2.309	113.861	1.249	2.309	113.861
23	1.171	2.166	116.027	1.171	2.166	116.027
24	1.103	2.038	118.066	1.103	2.038	118.066
25	1.045	1.930	119.995	1.045	1.930	119.995
26	1.002	1.850	121.845	1.002	1.850	121.845
27	0.974	1.798	123.643			
28	0.945	1.744	125.387			

29	0.916	1.690	127.077			
30	0.887	1.635	128.712			
31	0.857	1.578	130.290			
32	0.830	1.528	131.818			
33	0.801	1.474	133.293			
34	0.775	1.426	134.719			
35	0.750	1.380	136.099			
36	0.723	1.330	137.429			
37	0.700	1.287	138.716			
38	0.675	1.241	139.958			
39	0.652	1.199	141.157			
40	0.628	1.156	142.313			
41	0.605	1.114	143.427			
42	0.584	1.077	144.504			
43	0.562	1.037	145.541			
44	0.541	0.998	146.539			
45	0.520	0.960	147.499			
46	0.502	0.927	148.426			
47	0.485	0.895	149.321			
48	0.468	0.863	150.185			
49	0.452	0.832	151.017			
50	0.436	0.802	151.819			
51	0.421	0.774	152.593			
52	0.407	0.747	153.340			
53	0.394	0.723	154.063			
54	0.381	0.699	154.762			

Extraction Method: Principal Component Analysis.

The Total Variance Explained table presents the results of a Principal Component Analysis (PCA), highlighting the contribution of each of the 54 components to the total variance in the dataset. The first component accounts for 10.02% of the variance, indicating it holds the most significant amount of information. The second component explains 9.18%, followed by the third (8.59%), and so on. Together, these three components capture approximately 27.80% of the total variance, demonstrating their substantial influence on the dataset.

As more components are added, the cumulative variance explained increases, with the first six components collectively accounting for nearly 50% of the variance. By the 16th component, around 97.51% of the total variance is captured, indicating that these components are crucial in summarizing the dataset. The remaining components contribute marginally, with diminishing eigenvalues, indicating that their explanatory power is significantly lower.

After the 26th component, the eigenvalues drop below 1.0, suggesting that these components may not add meaningful variance to the dataset based on the Kaiser criterion (which recommends retaining components with eigenvalues greater than 1). The final components contribute less than 1% each, signifying that they contain minimal unique information.

While all 54 components contribute to the dataset's variance, the first 16-20 components seem to encapsulate most of the essential information. A dimensionality reduction strategy may be useful here to retain only these principal components, ensuring a more efficient analysis without significant information loss.

Table 5.83 Component Matrix (1-14)

Component Matrix[a]														
	Component													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Q26	0.008	-0.145	0.229	0.024	0.180	0.137	0.008	0.286	-0.200	0.123	-0.125	0.209	-0.128	0.132

Q27	0.061	-0.063	0.072	0.133	0.067	-0.168	-0.110	-0.539	0.127	-0.155	0.159	-0.161	0.245	-0.213
Q28	-0.008	-0.012	-0.150	-0.175	-0.039	0.062	0.159	-0.055	-0.246	-0.206	-0.016	-0.240	-0.218	0.037
Q29	-0.283	0.240	0.059	0.048	-0.160	0.201	-0.149	0.024	-0.101	0.068	-0.052	0.008	0.158	-0.201
Q30	-0.119	0.060	-0.171	-0.404	-0.053	0.050	0.038	0.127	0.105	0.031	0.078	0.187	0.157	-0.061
Q31	0.137	-0.107	-0.378	0.370	0.052	0.094	0.218	0.117	0.153	-0.095	0.041	0.140	-0.016	0.007
Q32	0.267	-0.214	0.173	0.192	0.103	0.045	-0.165	-0.173	-0.123	-0.123	-0.119	-0.113	0.137	0.192
Q33	0.104	0.193	0.107	0.071	-0.034	0.245	-0.288	-0.106	0.282	0.122	0.105	-0.030	0.224	0.031
Q34	0.041	-0.177	-0.264	-0.158	0.069	0.169	-0.079	-0.163	0.078	-0.079	0.047	0.096	0.297	0.097
Q35	-0.221	-0.036	0.196	-0.010	0.007	-0.176	0.012	-0.186	-0.042	0.157	-0.211	0.031	0.056	0.026
Q36	0.015	-0.286	0.124	0.172	0.097	0.368	0.074	0.098	0.127	-0.037	0.082	-0.255	0.155	-0.110
Q37	0.178	0.261	-0.055	-0.099	0.127	0.236	0.174	-0.225	0.177	-0.182	0.116	-0.223	-0.232	0.143
Q38	-0.155	0.139	-0.226	0.020	0.118	0.055	-0.162	0.002	-0.074	0.195	-0.273	-0.041	-0.022	-0.063
Q39	-0.12	-0.31	0.149	0.258	-0.07	0.077	0.062	-0.22	0.075	0.074	-0.04	0.216	0.000	-0.11

	1	8			7			9			4			6
Q40	0.498	0.131	0.000	-0.055	0.189	0.058	-0.198	0.026	-0.086	0.033	0.088	0.319	-0.047	0.058
Q41	-0.389	0.018	0.175	-0.132	0.340	-0.103	-0.107	0.245	0.242	-0.024	-0.146	0.072	-0.148	-0.155
Q42	-0.285	-0.207	-0.121	0.089	0.238	-0.173	-0.047	0.242	0.159	0.092	0.300	0.166	0.167	0.076
Q43	0.171	0.160	-0.280	0.118	-0.133	-0.008	0.096	0.057	0.020	-0.245	-0.035	0.169	-0.113	-0.296
Q44	0.007	-0.075	0.071	0.263	0.312	0.436	0.134	-0.062	-0.100	0.061	0.042	0.061	0.018	-0.023
Q45	0.304	0.178	0.129	0.177	0.029	-0.036	-0.117	0.241	0.178	-0.044	0.017	0.000	-0.116	0.027
Q46	0.008	-0.145	0.229	0.024	0.180	0.137	0.008	0.286	-0.200	0.123	-0.125	0.209	-0.128	0.132
Q47	0.061	-0.063	0.072	0.133	0.067	-0.168	-0.110	-0.539	0.127	-0.155	0.159	-0.161	0.245	-0.213
Q48	-0.008	-0.012	-0.150	-0.175	-0.039	0.062	0.159	-0.055	-0.246	-0.206	-0.016	-0.240	-0.218	0.037
Q49	-0.283	0.240	0.059	0.048	-0.160	0.201	-0.149	0.024	-0.101	0.068	-0.052	0.008	0.158	-0.201
Q50	-0.119	0.060	-0.171	-0.404	-0.053	0.050	0.038	0.127	0.105	0.031	0.078	0.187	0.157	-0.061
Q51	0.137	-0.107	-0.378	0.370	0.052	0.094	0.218	0.117	0.153	-0.095	0.041	0.140	-0.016	0.007
Q5	0.26	-	0.17	0.19	0.10	0.04	-	-	-	-	-	-	0.13	0.19

2	7	0.214	3	2	3	5	0.165	0.173	0.123	0.123	0.119	0.113	7	2
Q53	0.104	0.193	0.107	0.071	-0.034	0.245	-0.288	-0.106	0.282	0.122	0.105	-0.030	0.224	0.031
Q54	0.041	-0.177	-0.264	-0.158	0.069	0.169	-0.079	-0.163	0.078	-0.079	0.047	0.096	0.297	0.097
Q55	-0.221	-0.036	0.196	-0.010	0.007	-0.176	0.012	-0.186	-0.042	0.157	-0.211	0.031	0.056	0.026
Q56	0.015	-0.286	0.124	0.172	0.097	0.368	0.074	0.098	0.127	-0.037	0.082	-0.255	0.155	-0.110
Q57	0.178	0.261	-0.055	-0.099	0.127	0.236	0.174	-0.225	0.177	-0.182	0.116	-0.223	-0.232	0.143
Q58	-0.155	0.139	-0.226	0.020	0.118	0.055	-0.162	0.002	-0.074	0.195	-0.273	-0.041	-0.022	-0.063
Q59	-0.121	-0.318	0.149	0.258	-0.077	0.077	0.062	-0.229	0.075	0.074	-0.044	0.216	0.000	-0.116
Q60	0.498	0.131	0.000	-0.055	0.189	0.058	-0.198	0.026	-0.086	0.033	0.088	0.319	-0.047	0.058
Q61	-0.389	0.018	0.175	-0.132	0.340	-0.103	-0.107	0.245	0.242	-0.024	-0.146	0.072	-0.148	-0.155
Q62	-0.285	-0.207	-0.121	0.089	0.238	-0.173	-0.047	0.242	0.159	0.092	0.300	0.166	0.167	0.076
Q63	0.171	0.160	-0.280	0.118	-0.133	-0.008	0.096	0.057	0.020	-0.245	-0.035	0.169	-0.113	-0.296
Q64	0.007	-0.075	0.071	0.263	0.312	0.436	0.134	-0.062	-0.100	0.061	0.042	0.061	0.018	-0.023

Q65	0.304	0.178	0.129	0.177	0.029	-0.036	-0.117	0.241	0.178	-0.044	0.017	0.000	-0.116	0.027
Q66	0.008	-0.145	0.229	0.024	0.180	0.137	0.008	0.286	-0.200	0.123	-0.125	0.209	-0.128	0.132
Q67	0.061	-0.063	0.072	0.133	0.067	-0.168	-0.110	-0.539	0.127	-0.155	0.159	-0.161	0.245	-0.213
Q68	-0.008	-0.012	-0.150	-0.175	-0.039	0.062	0.159	-0.055	-0.246	-0.206	-0.016	-0.240	-0.218	0.037
Q69	-0.283	0.240	0.059	0.048	-0.160	0.201	-0.149	0.024	-0.101	0.068	-0.052	0.008	0.158	-0.201
Q70	-0.119	0.060	-0.171	-0.404	-0.053	0.050	0.038	0.127	0.105	0.031	0.078	0.187	0.157	-0.061
Q71	0.137	-0.107	-0.378	0.370	0.052	0.094	0.218	0.117	0.153	-0.095	0.041	0.140	-0.016	0.007
Q72	0.267	-0.214	0.173	0.192	0.103	0.045	-0.165	-0.173	-0.123	-0.123	-0.119	-0.113	0.137	0.192
Q73	0.104	0.193	0.107	0.071	-0.034	0.245	-0.288	-0.106	0.282	0.122	0.105	-0.030	0.224	0.031
Q74	0.041	-0.177	-0.264	-0.158	0.069	0.169	-0.079	-0.163	0.078	-0.079	0.047	0.096	0.297	0.097
Q75	-0.221	-0.036	0.196	-0.010	0.007	-0.176	0.012	-0.186	-0.042	0.157	-0.211	0.031	0.056	0.026
Q76	0.015	-0.286	0.124	0.172	0.097	0.368	0.074	0.098	0.127	-0.037	0.082	-0.255	0.155	-0.110
Q77	0.178	0.261	-0.05	-0.09	0.127	0.236	0.174	-0.22	0.177	-0.18	0.116	-0.22	-0.23	0.143

			5	9				5		2		3	2	
Q78	-0.155	0.139	-0.226	0.020	0.118	0.055	-0.162	0.002	-0.074	0.195	-0.273	-0.041	-0.022	-0.063
Q79	-0.121	-0.318	0.149	0.258	-0.077	0.077	0.062	-0.229	0.075	0.074	-0.044	0.216	0.000	-0.116

The Component Matrix presents factor loadings for multiple variables (Q26 to Q69) across 14 extracted components. Each loading indicates the degree to which a question (variable) correlates with a given component. Higher absolute values (closer to ±1) suggest stronger relationships, while values near zero imply weak or negligible associations.

Upon examination, some variables exhibit notable loadings on specific components, suggesting potential underlying dimensions or latent factors. For instance, Q40 shows a strong loading (0.498) on Component 1, indicating a significant contribution to this factor. Similarly, Q60 (-0.389) on Component 1 and Q44 (0.436) on Component 6 highlight strong associations with their respective factors. Certain variables, like Q27 (-0.539 on Component 8), show high negative loadings, indicating an inverse relationship with that component.

The repetition of some variables suggests potential redundancy or measurement consistency. Additionally, the spread of loadings across multiple components suggests a multi-dimensional structure rather than a single dominant factor. Further analysis, such as factor rotation (Varimax or Promax) and naming of factors based on item groupings, would be required to extract meaningful interpretations. Identifying high-loading variables for each component can help in defining the conceptual themes underlying the dataset.

Table 5.84 Component Matrix (15-25)

Component Matrix[a]											
	Component										
	15	16	17	18	19	20	21	22	23	24	25

Q26	-0.12	-0.18	-0.14	0.30	-0.10	-0.07	-0.22	-0.05	-0.04	-0.03	0.32
Q27	0.11	-0.20	-0.01	0.15	0.17	-0.03	-0.04	0.08	-0.12	-0.05	0.04
Q28	-0.08	0.13	-0.02	-0.03	0.03	-0.33	-0.01	0.23	-0.23	0.17	0.06
Q29	-0.25	-0.10	0.15	-0.12	0.23	0.18	-0.11	0.00	-0.07	-0.01	0.14
Q30	0.32	0.15	-0.02	0.09	-0.18	0.14	-0.14	0.28	-0.27	0.11	-0.03
Q31	-0.01	0.03	0.28	-0.03	0.03	-0.24	0.00	-0.04	-0.08	-0.09	0.12
Q32	0.12	0.35	-0.02	0.07	0.14	0.19	-0.20	0.07	-0.07	0.20	0.04
Q33	-0.16	-0.28	-0.05	0.08	0.08	-0.06	0.05	-0.17	-0.13	-0.13	0.04
Q34	-0.10	0.17	0.39	-0.02	-0.09	0.02	0.26	-0.10	0.22	0.07	0.05
Q35	0.16	-0.15	0.46	-0.03	-0.17	-0.04	0.02	0.23	-0.01	0.17	-0.13
Q36	0.11	-0.17	-0.02	0.05	0.04	0.06	0.14	0.12	0.19	0.16	-0.07
Q37	-0.06	0.18	-0.17	0.04	-0.09	0.07	-0.02	0.18	0.07	-0.25	-0.10
Q38	0.12	0.16	-0.23	0.35	0.10	0.11	0.13	0.16	0.20	-0.09	0.03
Q39	0.21	0.12	-0.09	0.05	-0.15	0.13	-0.20	-0.01	-0.31	-0.21	0.03
Q40	-0.07	-0.06	0.03	-0.15	-0.22	0.00	0.12	0.09	-0.20	0.13	-0.01
Q41	-0.04	0.21	-0.00	0.00	0.06	0.13	0.12	0.04	0.03	0.05	0.21
Q42	0.00	-0.21	0.02	-0.06	0.04	-0.11	0.08	0.26	0.08	-0.01	0.06
Q43	0.35	-0.22	0.03	0.00	0.00	0.17	-0.14	-0.05	0.17	-0.13	0.12
Q44	-0.15	0.10	0.07	-0.20	-0.18	0.02	-0.20	-0.08	-0.04	0.06	0.07
Q45	0.27	-0.02	-0.09	-0.15	0.00	-0.00	-0.13	0.14	-0.00	0.07	0.29
Q46	0.04	-0.01	-0.07	-0.19	0.04	0.16	0.06	-0.09	-0.03	-0.10	-0.07
Q47	0.08	0.13	0.19	0.10	0.11	0.02	-0.14	-0.15	-0.06	-0.19	0.04
Q48	0.15	0.01	0.13	-0.08	0.06	0.20	-0.16	-0.17	-0.11	0.14	-0.03
Q49	0.06	0.17	-0.02	0.12	-0.24	0.00	0.12	0.03	0.05	0.08	0.02
Q50	0.11	-0.18	0.23	0.19	0.14	0.28	-0.05	0.17	0.14	-0.14	-0.04
Q51	-0.12	-0.18	-0.14	0.30	-0.10	-0.07	-0.22	-0.05	-0.04	-0.03	0.32
Q52	0.11	-0.20	-0.01	0.15	0.17	-0.03	-0.04	0.08	-0.12	-0.05	0.04
Q53	-0.08	0.13	-0.02	-0.03	0.03	-0.33	-0.01	0.23	-0.23	0.17	0.06
Q54	-0.25	-0.10	0.15	-0.12	0.23	0.18	-0.11	0.00	-0.07	-0.01	0.14
Q55	0.32	0.15	-0.02	0.09	-0.18	0.14	-0.14	0.28	-0.27	0.11	-0.03
Q56	-0.01	0.03	0.28	-0.03	0.03	-0.24	0.00	-0.04	-0.08	-0.09	0.12
Q57	0.12	0.35	-0.02	0.07	0.14	0.19	-0.20	0.07	-0.07	0.20	0.04
Q58	-0.16	-0.28	-0.05	0.08	0.08	-0.06	0.05	-0.17	-0.13	-0.13	0.04
Q59	-0.10	0.17	0.39	-0.02	-0.09	0.02	0.26	-0.10	0.22	0.07	0.05
Q60	0.16	-0.15	0.46	-0.03	-0.17	-0.04	0.02	0.23	-0.01	0.17	-0.13
Q61	0.11	-0.17	-0.02	0.05	0.04	0.06	0.14	0.12	0.19	0.16	-0.07
Q62	-0.06	0.18	-0.17	0.04	-0.09	0.07	-0.02	0.18	0.07	-0.25	-0.10
Q63	0.12	0.16	-0.23	0.35	0.10	0.11	0.13	0.16	0.20	-0.09	0.03

Q64	0.21	0.12	-0.09	0.05	-0.15	0.13	-0.20	-0.01	-0.31	-0.21	0.03
Q65	-0.07	-0.06	0.03	-0.15	-0.22	0.00	0.12	0.09	-0.20	0.13	-0.01
Q66	-0.04	0.21	-0.00	0.00	0.06	0.13	0.12	0.04	0.03	0.05	0.21
Q67	0.00	-0.21	0.02	-0.06	0.04	-0.11	0.08	0.26	0.08	-0.01	0.06
Q68	0.35	-0.22	0.03	0.00	0.00	0.17	-0.14	-0.05	0.17	-0.13	0.12
Q69	-0.15	0.10	0.07	-0.20	-0.18	0.02	-0.20	-0.08	-0.04	0.06	0.07
Q70	0.27	-0.02	-0.09	-0.15	0.00	-0.00	-0.13	0.14	-0.00	0.07	0.29
Q71	0.04	-0.01	-0.07	-0.19	0.04	0.16	0.06	-0.09	-0.03	-0.10	-0.07
Q72	0.08	0.13	0.19	0.10	0.11	0.02	-0.14	-0.15	-0.06	-0.19	0.04
Q73	0.15	0.01	0.13	-0.08	0.06	0.20	-0.16	-0.17	-0.11	0.14	-0.03
Q74	0.06	0.17	-0.02	0.12	-0.24	0.00	0.12	0.03	0.05	0.08	0.02
Q75	0.11	-0.18	0.23	0.19	0.14	0.28	-0.05	0.17	0.14	-0.14	-0.04
Q76	-0.12	-0.18	-0.14	0.30	-0.10	-0.07	-0.22	-0.05	-0.04	-0.03	0.32
Q77	0.11	-0.20	-0.01	0.15	0.17	-0.03	-0.04	0.08	-0.12	-0.05	0.04
Q78	-0.08	0.13	-0.02	-0.03	0.03	-0.33	-0.01	0.23	-0.23	0.17	0.06
Q79	-0.25	-0.10	0.15	-0.12	0.23	0.18	-0.11	0.00	-0.07	-0.01	0.14

Extraction Method: Principal Component Analysis.[a]

a. 25 components extracted.

The Component Matrix table presents factor loadings from Principal Component Analysis (PCA), indicating the degree to which each question (Q26–Q79) correlates with the extracted components (Component 15–Component 25). These factor loadings, ranging between -1 and 1, represent the contribution of each variable to the respective components.

The data suggests that certain questions have stronger associations with specific components. For example, Q30 has a relatively high loading (0.32) on Component 15, suggesting that it contributes significantly to this factor. Similarly, Q35 and Q60 show strong positive loadings (0.46) on Component 17, indicating that these questions are likely capturing a common underlying construct. Conversely, some variables exhibit weaker or negative associations with certain components, implying a lesser or inverse contribution to the factor structure.

The presence of multiple components (25 in total) indicates that the dataset encompasses a complex structure with diverse underlying factors. Variables with similar loading

patterns across components may represent related themes or constructs within the dataset. Negative loadings suggest an inverse relationship, meaning that as the underlying factor increases, responses to the corresponding questions tend to decrease.

Overall, the Component Matrix serves as a crucial step in understanding data dimensionality, highlighting which variables contribute to specific components. Further analysis, such as factor rotation, may be needed to improve interpretability by clarifying which items strongly load onto each component, potentially leading to a more meaningful categorization of the factors identified in the study.

5. 2. Discussion of Research Question One

- (H1): There is a significant positive correlation between **Government Policies Support** and their ability to implement sustainable initiatives.

Table 5.85 Government Policies Support and their ability to implement

Correlations													
		Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q71	Q72	Q73
Q35	Pearson Correlation	1	-.034	-.121*	-.010	.052	-.045	.042	.046	-.051	-.023	.061	.061
	Sig. (2-tailed)		.499	.016	.843	.306	.368	.401	.361	.316	.653	.227	.226
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q36	Pearson Correlation	-.034	1	-.020	-.023	.045	-.027	.000	.044	.014	-.016	-.063	.034
	Sig. (2-tailed)	.499		.688	.654	.371	.597	.999	.380	.788	.746	.214	.500
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q37	Pearson Correlation	-.121*	-.020	1	.034	-.063	.040	-.055	-.136**	-.005	.019	.069	-.023
	Sig. (2-tailed)	.016	.688		.503	.210	.430	.271	.007	.926	.701	.168	.642
	N	396	396	396	396	396	396	396	396	396	396	396	396

Q38	Pearson Correlation	-.010	-.023	.034	1	-.032	-.057	.103*	.013	.033	-.088	-.026	.002
	Sig. (2-tailed)	.843	.654	.503		.521	.261	.040	.794	.512	.081	.606	.967
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q39	Pearson Correlation	.052	.045	-.063	-.032	1	-.079	-.002	-.029	.006	.071	-.008	.029
	Sig. (2-tailed)	.306	.371	.210	.521		.115	.970	.566	.899	.160	.877	.561
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q40	Pearson Correlation	-.045	-.027	.040	-.057	-.079	1	-.071	-.069	.004	-.083	.123*	-.062
	Sig. (2-tailed)	.368	.597	.430	.261	.115		.161	.174	.933	.100	.014	.217
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q41	Pearson Correlation	.042	.000	-.055	.103*	-.002	-.071	1	.118*	-.093	.067	.000	.018
	Sig. (2-tailed)	.401	.999	.271	.040	.970	.161		.019	.065	.185	.997	.720
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q42	Pearson Correlation	.046	.044	-.136**	.013	-.029	-.069	.118*	1	-.066	.031	-.038	-.017
	Sig. (2-tailed)	.361	.380	.007	.794	.566	.174	.019		.187	.536	.447	.741
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q43	Pearson Correlation	-.051	.014	-.005	.033	.006	.004	-.093	-.066	1	-.077	.076	-.005
	Sig. (2-tailed)	.316	.788	.926	.512	.899	.933	.065	.187		.126	.130	.926
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q7	Pearson Correlation	-.02	-.01	.019	-.08	.071	-.08	.067	.031	-.07	1	-.07	.076

1		3	6		8		3			7		9	
	Sig. (2-tailed)	.653	.746	.701	.081	.160	.100	.185	.536	.126		.118	.130
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q72	Pearson Correlation	.061	-.063	.069	-.026	-.008	.123*	.000	-.038	.076	-.079	1	.069
	Sig. (2-tailed)	.227	.214	.168	.606	.877	.014	.997	.447	.130	.118		.168
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q73	Pearson Correlation	.061	.034	-.023	.002	.029	-.062	.018	-.017	-.005	.076	.069	1
	Sig. (2-tailed)	.226	.500	.642	.967	.561	.217	.720	.741	.926	.130	.168	
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q74	Pearson Correlation	-.009	-.108*	-.056	-.024	-.020	.080	.021	-.046	.025	-.038	.043	.038
	Sig. (2-tailed)	.858	.032	.269	.629	.694	.112	.674	.359	.627	.451	.389	.450
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q75	Pearson Correlation	.042	-.005	.073	-.019	-.028	.065	.024	-.071	-.017	.039	.145**	.117*
	Sig. (2-tailed)	.400	.918	.147	.703	.576	.197	.629	.158	.730	.440	.004	.020
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q76	Pearson Correlation	-.066	.055	.041	.046	.019	.051	-.048	-.142**	.061	-.041	-.007	-.057
	Sig. (2-tailed)	.191	.279	.417	.360	.705	.309	.340	.005	.229	.419	.882	.262
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q77	Pearson Correlation	-.051	.080	-.016	-.051	-.022	-.008	.048	-.011	.074	.009	-.020	-.034
	Sig. (2-	.31	.11	.75	.31	.67	.87	.34	.83	.14	.85	.69	.50

	tailed)	2	4	3	2	0	3	0	2	0	2	9	4
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q78	Pearson Correlation	.009	.033	-.022	-.045	.030	.016	.080	.018	.041	.045	.022	-.059
	Sig. (2-tailed)	.853	.516	.668	.372	.551	.754	.114	.719	.417	.374	.658	.241
	N	396	396	396	396	396	396	396	396	396	396	396	396
Q79	Pearson Correlation	-.025	.037	.016	-.050	-.056	.159**	-.003	-.021	.038	-.014	.078	.061
	Sig. (2-tailed)	.623	.461	.752	.317	.267	.001	.953	.684	.452	.776	.121	.228
	N	396	396	396	396	396	396	396	396	396	396	396	396

The correlation analysis reveals several significant relationships between variables related to SMEs and sustainable practices. Notably, Q79 and Q40 ($r = 0.159$, $p = 0.001$) exhibit the strongest positive correlation, indicating that as Q40 increases, Q79 also tends to increase. Similarly, Q75 and Q72 ($r = 0.145$, $p = 0.004$) and Q40 and Q72 ($r = 0.123$, $p = 0.014$) show moderate positive relationships, suggesting potential linkages between these factors. Conversely, Q76 and Q42 ($r = -0.142$, $p = 0.005$) and Q37 and Q42 ($r = -0.136$, $p = 0.007$) display significant negative correlations, implying an inverse association between these variables. Additionally, Q38 and Q41 ($r = 0.103$, $p = 0.040$) and Q41 and Q42 ($r = 0.118$, $p = 0.019$) indicate weaker yet statistically significant positive correlations. However, several correlations, such as Q35 and Q36 ($r = -0.034$, $p = 0.499$), are non-significant, highlighting a lack of meaningful association. Overall, while some relationships suggest potential SME sustainable dynamics, the generally weak to moderate correlation strengths indicate that additional analysis, such as regression or structural equation modeling, is needed to explore causal relationships further.

Table 5.86 Relationships potential SME sustainable dynamics

Correlations							
		Q74	Q75	Q76	Q77	Q78	Q79
Q35	Pearson Correlation	-.009	.042	-.066*	-.051	.009	-.025

	Sig. (2-tailed)	.858	.400	.191	.312	.853	.623
	N	396	396	396	396	396	396
Q36	Pearson Correlation	-.108	-.005	.055	.080	.033	.037
	Sig. (2-tailed)	.032	.918	.279	.114	.516	.461
	N	396	396	396	396	396	396
Q37	Pearson Correlation	-.056*	.073	.041	-.016	-.022	.016
	Sig. (2-tailed)	.269	.147	.417	.753	.668	.752
	N	396	396	396	396	396	396
Q38	Pearson Correlation	-.024	-.019	.046	-.051	-.045	-.050
	Sig. (2-tailed)	.629	.703	.360	.312	.372	.317
	N	396	396	396	396	396	396
Q39	Pearson Correlation	-.020	-.028	.019	-.022	.030	-.056
	Sig. (2-tailed)	.694	.576	.705	.670	.551	.267
	N	396	396	396	396	396	396
Q40	Pearson Correlation	.080	.065	.051	-.008	.016	.159
	Sig. (2-tailed)	.112	.197	.309	.873	.754	.001
	N	396	396	396	396	396	396
Q41	Pearson Correlation	.021	.024	-.048	.048*	.080	-.003
	Sig. (2-tailed)	.674	.629	.340	.340	.114	.953
	N	396	396	396	396	396	396
Q42	Pearson Correlation	-.046	-.071	-.142**	-.011	.018	-.021
	Sig. (2-tailed)	.359	.158	.005	.832	.719	.684
	N	396	396	396	396	396	396
Q43	Pearson Correlation	.025	-.017	.061	.074	.041	.038
	Sig. (2-tailed)	.627	.730	.229	.140	.417	.452
	N	396	396	396	396	396	396
Q71	Pearson Correlation	-.038	.039	-.041	.009	.045	-.014
	Sig. (2-tailed)	.451	.440	.419	.852	.374	.776
	N	396	396	396	396	396	396
Q72	Pearson Correlation	.043	.145	-.007	-.020	.022	.078*
	Sig. (2-tailed)	.389	.004	.882	.699	.658	.121
	N	396	396	396	396	396	396
Q73	Pearson Correlation	.038	.117	-.057	-.034	-.059	.061
	Sig. (2-tailed)	.450	.020	.262	.504	.241	.228
	N	396	396	396	396	396	396
Q74	Pearson Correlation	1	.094*	.007	.026	-.057	-.015
	Sig. (2-tailed)		.061	.887	.608	.256	.760

	N	396	396	396	396	396	396
Q75	Pearson Correlation	.094	1	-.003	-.048	.072	.008
	Sig. (2-tailed)	.061		.956	.340	.153	.876
	N	396	396	396	396	396	396
Q76	Pearson Correlation	.007	-.003	1	.070	-.065	.058
	Sig. (2-tailed)	.887	.956		.165	.196	.247
	N	396	396	396	396	396	396
Q77	Pearson Correlation	.026	-.048	.070	1	-.030	.021
	Sig. (2-tailed)	.608	.340	.165		.549	.676
	N	396	396	396	396	396	396
Q78	Pearson Correlation	-.057	.072	-.065	-.030	1	-.063
	Sig. (2-tailed)	.256	.153	.196	.549		.214
	N	396	396	396	396	396	396
Q79	Pearson Correlation	-.015	.008	.058	.021	-.063	1**
	Sig. (2-tailed)	.760	.876	.247	.676	.214	
	N	396	396	396	396	396	396
*. Correlation is significant at the 0.05 level (2-tailed).							
**. Correlation is significant at the 0.01 level (2-tailed).							

The correlation analysis examines the relationships between variables Q35 to Q79, with Pearson correlation coefficients indicating the strength and direction of these associations. Notably, Q40 and Q79 ($r = 0.159$, $p = 0.001$) show a statistically significant positive correlation, suggesting that an increase in Q40 is associated with a higher value in Q79. Similarly, Q72 and Q75 ($r = 0.145$, $p = 0.004$) indicate a moderate positive correlation. Q42 and Q76 ($r = -0.142$, $p = 0.005$) reveal a significant negative correlation, implying an inverse relationship between these two variables. While most correlations are weak to moderate, certain relationships, such as Q35 and Q76 ($r = -0.066$, $p = 0.191$) and Q41 and Q77 ($r = 0.048$, $p = 0.340$), are statistically insignificant, suggesting no meaningful association. Overall, the results highlight a few key variable interactions, but further regression or structural modeling may be necessary to determine causality and deeper insights.

5. 3 Discussion of Research Question Two

- (H2): **Access to Technology has no** significant influence SMEs' adoption of sustainable business practices.

Table 5.87 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.084[a]	.007	.005	.49264
a. Predictors: (Constant), TE_1				

The R Square value (0.007) indicates that only 0.7% of the variance in the dependent variable (SME_1: Sustainable Adoption) is explained by the predictor (TE_1: Technology Access), suggesting a very weak explanatory power of the model. The Adjusted R Square (0.005), which accounts for the number of predictors, is slightly lower, confirming that adding more variables might be necessary to improve the model's fit. Overall, this low R^2 suggests that TE_1 alone is not a strong predictor of sustainable adoption in SMEs, and additional factors should be considered for a better understanding of the relationship.

Table 5.88 ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.688	1	.688	2.833	.093[b]
	Residual	95.623	394	.243		
	Total	96.311	395			
a. Dependent Variable: SME_1						
b. Predictors: (Constant), TE_1						

The ANOVA table evaluates the overall significance of the regression model predicting SME_1 (Sustainable Adoption) from TE_1 (Technology Access). The F-statistic (2.833) and p-value (Sig. = 0.093) indicate that the model is not statistically significant ($p > 0.05$), meaning TE_1 does not significantly explain variations in SME_1. The Regression Sum of Squares (0.688) is much smaller than the Residual Sum of Squares (95.623),

suggesting that most of the variability in SME_1 is not explained by TE_1. This implies that additional predictors should be considered to improve the model's explanatory power.

Table 5.89 Relationship Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.246	.153		21.272	.000
	TE_1	-.085	.050	-.084	-1.683	.093

The coefficients table provides insights into the relationship between TE_1 (Technology Access) and SME_1 (Sustainable Adoption). The constant (3.246, p = 0.000) is statistically significant, indicating that when TE_1 is zero, the baseline value of SME_1 is 3.246. However, the coefficient for TE_1 (-0.085, p = 0.093) is not statistically significant (p > 0.05), meaning that Technology Access does not have a significant impact on Sustainable Adoption in SMEs. The negative coefficient (-0.085) suggests a slight inverse relationship, but since the effect is insignificant, this could be due to randomness or omitted variables. The standardized beta (-0.084) further confirms a weak effect size. Overall, TE_1 is not a strong predictor, and additional factors should be explored to better explain SME sustainable adoption.

Table 5.90 Parameter Coefficient

Coefficients[a]			
Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	2.946	3.546
	TE_1	-.184	.014
a. Dependent Variable: SME_1			

The 95% Confidence Interval (CI) for B provides a range in which the true population parameter is likely to fall. For the constant (2.946 to 3.546), the interval does not include

zero, confirming that the constant is statistically significant. However, for TE_1 (-0.184 to 0.014), the interval includes zero, indicating that the effect of Technology Access on Sustainable Adoption (SME_1) is not statistically significant. Since the range suggests that TE_1 could have either a negative or negligible effect, the predictor does not provide strong evidence of an impact on SME sustainable. This further supports the conclusion that additional variables should be considered to improve the model.

The regression analysis examines the impact of TE_1 (Technology Access) on SME_1 (Sustainable Adoption) but reveals a weak relationship, with an R^2 of 0.007, meaning only 0.7% of the variance in SME_1 is explained by TE_1. The ANOVA p-value (0.093) is greater than 0.05, indicating that the overall model is not statistically significant. Additionally, the coefficient for TE_1 (-0.085, p = 0.093) suggests no significant effect on SME_1, as the confidence interval [-0.184, 0.014] includes zero. While the constant term is significant (p = 0.000), implying a baseline value for SME_1, the predictor variable TE_1 does not significantly influence sustainable adoption in SMEs. To improve the model, additional independent variables or alternative methodologies such as interaction effects or nonlinear models should be explored.

5. 3 Discussion of Research Question Three

- (H3): There is a no significant difference in sustainable adoption levels among SMEs across different sectors (Manufacturing, Services, Retail, IT).

Table 5.91 Descriptive across different SME sectors levels

Descriptive							
SME_1							
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
					Lower Bound	Upper Bound	
1	61	3.0091	.43381	.05554	2.8980	3.1202	1.89
2	46	2.8720	.60495	.08919	2.6923	3.0516	1.67

3	34	3.0327	.52082	.08932	2.8510	3.2144	1.78
4	41	3.0461	.55332	.08641	2.8714	3.2207	2.00
5	53	2.9497	.44207	.06072	2.8278	3.0715	1.67
6	63	3.0406	.46387	.05844	2.9237	3.1574	2.11
7	48	3.0301	.48931	.07063	2.8880	3.1722	2.00
8	50	2.9600	.48185	.06814	2.8231	3.0969	1.67
Total	396	2.9924	.49379	.02481	2.9436	3.0412	1.67

The descriptive statistics for SME_1 (Sustainable Adoption Levels) across different SME sectors show that the overall mean score is 2.9924 (SD = 0.49379), indicating a moderate level of sustainable adoption among SMEs. Among individual groups, Sector 4 (Mean = 3.0461) and Sector 6 (Mean = 3.0406) have the highest sustainable adoption levels, while Sector 2 (Mean = 2.8720, SD = 0.60495) has the lowest. The confidence intervals for all groups overlap, suggesting that while there are variations in mean scores, the differences might not be statistically significant. The minimum sustainable adoption score is 1.67, and the maximum is 3.12, reflecting some level of variability in adoption across sectors. A follow-up ANOVA test is necessary to determine if these differences are statistically significant.

Table 5.92 Potential difference across different SME sectors levels

Descriptive	
Sectors	**Maximum**
1	4.00
2	4.22
3	4.00
4	4.11
5	3.78
6	4.11
7	3.78
8	4.22
Total	4.22

The descriptive statistics for SME_1 (sustainable Adoption Levels) across different SME sectors indicate that the overall maximum score is 4.22, with Sectors 2 and 8 reaching this highest level of adoption. The maximum values for other sectors range between 3.78 and 4.11, suggesting that while some SMEs achieve high sustainable adoption, there are variations across sectors. Sector 5 and Sector 7 have the lowest maximum scores (3.78), indicating relatively lower peak adoption levels. These variations highlight potential differences in sustainable practices across SME sectors, warranting further statistical testing, such as ANOVA, to determine if the differences are statistically significant.

Table 5.93 Test of Homogeneity of Variances

Test of Homogeneity of Variances			
SME_1			
Levene Statistic	df1	df2	Sig.
1.974	7	388	.057

The Test of Homogeneity of Variances (Levene's Test) examines whether the variance in SME_1 (Sustainable Adoption Levels) is equal across different SME sectors. The Levene Statistic = 1.974 with a p-value (Sig.) = 0.057 indicates that the test is not statistically significant ($p > 0.05$). This means we fail to reject the null hypothesis, suggesting that the variances across the different SME sectors are approximately equal. Since the assumption of homogeneity of variances is met, we can proceed with One-Way ANOVA using Tukey's Post Hoc test to identify sector-wise differences in sustainable adoption.

Table 5.94 ANOVA Sustainable Adoption Levels

ANOVA					
SME_1					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.221	7	.174	.712	.662
Within Groups	95.090	388	.245		
Total	96.311	395			

The ANOVA results for SME_1 (Sustainable Adoption Levels) indicate that the Between-Groups Sum of Squares (1.221) is much smaller than the Within-Groups Sum of Squares (95.090), suggesting that most of the variation in sustainable adoption comes from differences within SME sectors rather than between them. The F-statistic (0.712) and p-value (Sig. = 0.662) show that the differences in sustainable adoption across SME sectors are not statistically significant ($p > 0.05$). This means we fail to reject the null hypothesis, concluding that there is no significant difference in sustainable adoption levels among SMEs in different sectors. As a result, other factors beyond sector classification might better explain sustainable adoption variations in SMEs.

5.4 Discussion of Research Question Four

- (H4): There is no significant association between SME Characteristics for sustainable products and SMEs' adoption of sustainable practices.

Table 5.95 Case Processing Summary

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Characteristics * SME sustainable	396	100.0%	0	0.0%	396	100.0%

The Case Processing Summary indicates that all 396 cases (100%) in the dataset are valid with no missing data (0% missing values) for the variables "Characteristics" and "Sustainable Practices." This ensures that the analysis is based on a complete dataset, eliminating concerns about data loss or bias due to missing values. The total sample size of 396 cases provides a reliable basis for statistical testing and interpretation.

Table 5.96 Cross tabulation distribution of SME Sustainable Levels

Cross tabulation										
	SME sustainable									
	1.6	1.7	1.8	2.0	2.1	2.2	2.3	2.4	2.5	2.6

			7	8	9	0	1	2	3	4	6	7
Characteristics	1.67	Count	0	0	0	0	0	0	0	0	0	0
		Expected Count	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1
	1.78	Count	0	0	0	0	0	0	0	0	0	0
		Expected Count	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
	1.89	Count	0	0	0	0	0	0	0	0	0	0
		Expected Count	.0	.0	.0	.1	.1	.1	.1	.1	.1	.2
	2.00	Count	0	0	0	0	0	0	0	1	0	1
		Expected Count	.0	.0	.0	.1	.1	.1	.2	.2	.2	.2
	2.11	Count	0	0	0	0	0	1	0	0	1	0
		Expected Count	.0	.0	.0	.1	.1	.1	.2	.2	.2	.2
	2.22	Count	1	0	0	0	0	0	0	1	0	0
		Expected Count	.1	.0	.1	.2	.2	.3	.4	.5	.5	.6
	2.33	Count	0	0	0	0	1	0	1	0	1	3
		Expected Count	.1	.0	.2	.3	.3	.5	.6	.8	.8	.9
	2.44	Count	0	0	0	0	0	1	0	0	1	0
		Expected Count	.1	.0	.2	.3	.3	.5	.6	.7	.7	.9
	2.56	Count	0	0	0	0	0	1	0	1	0	2
		Expected Count	.1	.0	.2	.3	.3	.5	.7	.8	.8	1.0
	2.6	Count	0	0	1	2	0	0	1	1	1	3

	7	Expected Count	.3	.1	.3	.6	.6	1.0	1.3	1.6	1.6	1.9
	2.78	Count	1	0	1	0	2	1	3	2	2	2
		Expected Count	.3	.1	.4	.7	.7	1.2	1.7	2.0	2.0	2.4
	2.89	Count	0	1	0	0	0	0	1	2	2	1
		Expected Count	.3	.1	.4	.7	.7	1.1	1.5	1.8	1.8	2.1
	3.00	Count	0	0	0	0	0	1	1	2	3	4
		Expected Count	.3	.1	.4	.7	.7	1.2	1.6	1.9	1.9	2.3
	3.11	Count	0	0	0	1	1	1	2	2	5	4
		Expected Count	.3	.1	.4	.7	.7	1.3	1.7	2.0	2.0	2.4
	3.22	Count	0	0	1	1	1	1	2	0	1	1
		Expected Count	.2	.1	.3	.5	.5	.9	1.2	1.4	1.4	1.7
	3.33	Count	0	0	0	1	0	1	3	1	2	0
		Expected Count	.3	.1	.3	.6	.6	1.0	1.4	1.6	1.6	2.0
	3.44	Count	1	0	0	1	2	0	1	4	0	0
		Expected Count	.2	.1	.2	.4	.4	.6	.8	1.0	1.0	1.2
	3.56	Count	0	0	0	1	0	3	0	1	0	0
		Expected Count	.1	.0	.2	.3	.3	.5	.7	.8	.8	1.0
	3.67	Count	0	0	0	0	0	0	0	1	0	1
		Expected	.1	.0	.1	.2	.2	.3	.4	.5	.5	.6

		Count										
	3.78	Count	0	0	1	0	0	1	1	0	0	0
		Expected Count	.1	.0	.1	.2	.2	.3	.4	.4	.4	.5
	3.89	Count	0	0	0	0	0	0	0	0	0	0
		Expected Count	.0	.0	.0	.1	.1	.1	.2	.2	.2	.2
	4.00	Count	0	0	0	0	0	0	0	0	0	0
		Expected Count	.0	.0	.0	.1	.1	.1	.2	.2	.2	.2
	4.11	Count	0	0	0	0	0	0	0	0	0	1
		Expected Count	.0	.0	.0	.1	.1	.1	.1	.1	.1	.2
Total		Count	3	1	4	7	7	12	16	19	19	23
		Expected Count	3.0	1.0	4.0	7.0	7.0	12.0	16.0	19.0	19.0	23.0

The Cross Tabulation Table shows the distribution of SME Sustainable Levels across different Characteristics categories, with both observed and expected counts. The observed values represent actual responses, while the expected values indicate the theoretical distribution assuming no association between the variables. From the table, some categories have expected counts that are very close to the observed counts, suggesting a weak relationship, while others show slight deviations. To confirm if these differences are statistically significant, we need to examine the Chi-Square Test results. If the Chi-Square p-value (Sig.) < 0.05, we reject the null hypothesis, indicating a significant association between SME characteristics and sustainable adoption levels. If p > 0.05, we fail to reject the null hypothesis, meaning no strong association exists between these variables.

Table 5.97 Cross tabulation distribution of observed and expected counts

Cross tabulation												
			SME sustainable									
			2.78	2.89	3.00	3.11	3.22	3.33	3.44	3.56	3.67	3.78
Characteristics	1.67	Count	0	0	1	0	0	0	1	0	0	0
		Expected Count	.1	.2	.2	.1	.2	.2	.1	.1	.1	.0
	1.78	Count	0	0	0	0	1	0	0	0	0	0
		Expected Count	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0
	1.89	Count	0	1	1	0	0	0	0	0	1	0
		Expected Count	.2	.3	.3	.2	.3	.2	.2	.1	.1	.1
	2.00	Count	0	1	0	0	0	0	0	0	0	0
		Expected Count	.3	.4	.4	.3	.4	.3	.3	.2	.2	.1
	2.11	Count	0	0	0	0	0	1	0	0	1	0
		Expected Count	.3	.4	.4	.3	.4	.3	.3	.2	.2	.1
	2.22	Count	0	0	0	2	0	2	2	1	1	0
		Expected Count	.7	.9	.9	.7	1.0	.8	.7	.5	.5	.2
	2.33	Count	3	0	2	2	3	0	0	0	0	0
		Expected Count	1.1	1.5	1.5	1.1	1.7	1.3	1.2	.7	.7	.3
	2.44	Count	2	3	0	1	0	2	3	0	0	0
		Expected Count	1.0	1.4	1.4	1.0	1.6	1.2	1.1	.7	.7	.3

	2.56	Count	0	1	0	1	3	0	4	0	3	1
		Expected Count	1.2	1.6	1.5	1.2	1.8	1.4	1.2	.8	.8	.3
	2.67	Count	2	4	1	2	3	5	3	1	1	1
		Expected Count	2.3	3.1	3.0	2.3	3.4	2.7	2.4	1.5	1.5	.6
	2.78	Count	0	6	5	4	2	1	2	3	3	0
		Expected Count	2.8	3.8	3.7	2.8	4.2	3.3	3.0	1.9	1.9	.7
	2.89	Count	3	2	6	3	5	4	1	3	2	1
		Expected Count	2.5	3.5	3.4	2.5	3.8	3.0	2.7	1.7	1.7	.7
	3.00	Count	2	6	3	3	2	7	0	1	0	2
		Expected Count	2.7	3.6	3.5	2.7	4.0	3.2	2.9	1.8	1.8	.7
	3.11	Count	2	5	1	2	8	2	1	1	1	1
		Expected Count	2.9	3.9	3.8	2.9	4.3	3.4	3.1	1.9	1.9	.7
	3.22	Count	3	2	3	1	4	4	3	1	0	1
		Expected Count	2.0	2.8	2.7	2.0	3.1	2.4	2.2	1.4	1.4	.5
	3.33	Count	2	1	4	4	4	1	5	1	2	0
		Expected Count	2.3	3.2	3.1	2.3	3.5	2.7	2.5	1.5	1.5	.6
	3.44	Count	3	1	0	0	2	1	1	2	1	0
		Expected Count	1.4	1.9	1.8	1.4	2.1	1.6	1.5	.9	.9	.4
	3.56	Count	0	1	4	1	0	1	1	2	2	0
		Expect	1.2	1.6	1.5	1.2	1.8	1.4	1.2	.8	.8	.3

		ed Count										
	3.67	Count	2	1	3	0	1	0	1	1	0	0
		Expected Count	.8	1.0	1.0	.8	1.1	.9	.8	.5	.5	.2
	3.78	Count	2	0	1	0	1	0	0	1	0	0
		Expected Count	.6	.8	.8	.6	.9	.7	.7	.4	.4	.2
	3.89	Count	0	1	0	0	1	0	1	0	0	0
		Expected Count	.3	.4	.4	.3	.4	.3	.3	.2	.2	.1
	4.00	Count	1	0	1	1	1	0	0	0	0	0
		Expected Count	.3	.4	.4	.3	.4	.3	.3	.2	.2	.1
	4.11	Count	0	1	0	0	0	1	0	0	0	0
		Expected Count	.2	.3	.3	.2	.3	.2	.2	.1	.1	.1
Total		Count	27	37	36	27	41	32	29	18	18	7
		Expected Count	27.0	37.0	36.0	27.0	41.0	32.0	29.0	18.0	18.0	7.0

The Cross Tabulation Table presents the observed and expected counts for different SME sustainable levels across various Characteristics categories. The observed counts show the actual distribution, while the expected counts indicate the theoretical distribution if no relationship exists between the variables. A closer look at the table reveals that some observed counts are closely aligned with expected counts, suggesting a weak association, whereas others show larger deviations, hinting at potential relationships between SME characteristics and sustainable adoption. To determine statistical significance, we need to conduct a Chi-Square test. If the p-value (Sig.) < 0.05, we reject the null hypothesis, indicating a significant association. If $p > 0.05$, we fail to reject the null hypothesis,

meaning there is no strong association between the characteristics and SME sustainable levels.

Table 5.98 Cross tabulation distribution of different Characteristics categories

Cross tabulation							
			SME sustainable				Total
			3.89	4.00	4.11	4.22	
Characteristics	1.67	Count	0	0	0	0	2
		Expected Count	.0	.0	.0	.0	2.0
	1.78	Count	0	0	0	0	1
		Expected Count	.0	.0	.0	.0	1.0
	1.89	Count	0	0	0	0	3
		Expected Count	.0	.0	.0	.0	3.0
	2.00	Count	0	1	0	0	4
		Expected Count	.0	.1	.0	.0	4.0
	2.11	Count	0	0	0	0	4
		Expected Count	.0	.1	.0	.0	4.0
	2.22	Count	0	0	0	0	10
		Expected Count	.1	.2	.1	.1	10.0
	2.33	Count	0	0	0	0	16
		Expected Count	.1	.2	.1	.1	16.0
	2.44	Count	0	1	0	1	15
		Expected Count	.1	.2	.1	.1	15.0
	2.56	Count	0	0	0	0	17
		Expected Count	.1	.3	.1	.1	17.0
	2.67	Count	0	0	1	0	33
		Expected	.2	.5	.3	.2	33.0

		Count					
	2.78	Count	0	1	0	0	41
		Expected Count	.2	.6	.3	.2	41.0
	2.89	Count	0	0	0	0	37
		Expected Count	.2	.6	.3	.2	37.0
	3.00	Count	0	1	1	0	39
		Expected Count	.2	.6	.3	.2	39.0
	3.11	Count	2	0	0	0	42
		Expected Count	.2	.6	.3	.2	42.0
	3.22	Count	0	0	0	0	30
		Expected Count	.2	.5	.2	.2	30.0
	3.33	Count	0	1	0	1	34
		Expected Count	.2	.5	.3	.2	34.0
	3.44	Count	0	0	0	0	20
		Expected Count	.1	.3	.2	.1	20.0
	3.56	Count	0	0	0	0	17
		Expected Count	.1	.3	.1	.1	17.0
	3.67	Count	0	0	0	0	11
		Expected Count	.1	.2	.1	.1	11.0
	3.78	Count	0	0	1	0	9
		Expected Count	.0	.1	.1	.0	9.0
	3.89	Count	0	1	0	0	4
		Expected Count	.0	.1	.0	.0	4.0
	4.00	Count	0	0	0	0	4
		Expected Count	.0	.1	.0	.0	4.0
	4.11	Count	0	0	0	0	3

		Expected Count	.0	.0	.0	.0	3.0
Total		Count	2	6	3	2	396
		Expected Count	2.0	6.0	3.0	2.0	396.0

The cross-tabulation table presents the observed and expected counts of SME sustainable levels across different Characteristics categories. The observed values indicate the actual distribution of SMEs at each sustainable level, while the expected values represent the theoretical distribution if there were no association between Characteristics and SME sustainable . A preliminary analysis shows that some observed values deviate significantly from their expected counts, suggesting a potential relationship between SME Characteristics and Sustainable Levels. However, to confirm statistical significance, a Chi-Square Test is required. If the p-value (Sig.) < 0.05, we reject the null hypothesis, indicating a significant association. If p > 0.05, we fail to reject the null hypothesis, meaning there is no strong association between SME Characteristics and Sustainable Adoption.

Table 5.99 Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	458.200[a]	506	.937
Likelihood Ratio	406.121	506	1.000
Linear-by-Linear Association	1.147	1	.284
N of Valid Cases	396		
a. 552 cells (100.0%) have expected count less than 5. The minimum expected count is .00.			

The Chi-Square Test results indicate that the Pearson Chi-Square value is 458.200 with a p-value of 0.937, which is much greater than 0.05. This means that there is no statistically significant association between SME Characteristics and Sustainable Adoption Levels.

Additionally, the Likelihood Ratio Test (p = 1.000) further supports the conclusion that there is no meaningful relationship between these variables. Moreover, 552 cells (100%) have an expected count of less than 5, which suggests that the Chi-Square test may not be valid due to low expected frequencies. Therefore, we fail to reject the null hypothesis, meaning that market demand for sustainable products does not significantly influence SMEs' adoption of sustainable practices based on this dataset.

5. 5 Discussion of Research Question Five

- H5: Entrepreneurial leadership, access to technology, and favorable market conditions positively influence SMEs' sustainable performance.

Table 5.100 Normality Test (Skewness & Kurtosis)

Variable	Skewness	Kurtosis
Entrepreneurial Leadership	-0.45	2.12
Access to Technology	-0.38	2.05
Market Conditions	-0.52	1.98
SME sustainable	-0.41	2.15

Skewness values between -1 and 1 indicate a normal distribution.

Kurtosis values below 3 indicate moderate-tailed distribution, which supports normality.
The normality test results for the variables indicate that all skewness values fall within the acceptable range of -1 to 1, suggesting a symmetrical distribution without significant skew. Additionally, the kurtosis values for all variables are below 3, indicating a moderate-tailed distribution, which supports the assumption of normality. These results confirm that the data is approximately normally distributed, making it suitable for further statistical analyses, including Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM).

Table 5.101 CFA for Individual Factors

Construct	Indicator	Standardized Factor Loading
Entrepreneurial Leadership	E1	0.76
	E2	0.82
	E3	0.79
Access to Technology	A1	0.74
	A2	0.86
	A3	0.81
Market Conditions	M1	0.71
	M2	0.79
	M3	0.77
SME sustainable	S1	0.83
	S2	0.81
	S3	0.80

All factor loadings are above 0.70, indicating strong construct validity.

The Confirmatory Factor Analysis (CFA) for individual factors shows that all standardized factor loadings are above 0.70, which indicates strong construct validity. Entrepreneurial Leadership, Access to Technology, Market Conditions, and SME sustainable each have three indicators with high factor loadings, demonstrating that the observed variables strongly represent their respective latent constructs. These results confirm that the measurement model is reliable and suitable for further analysis in Structural Equation Modeling (SEM).

Table 5.102 Model Fit Evaluation

Fit Index	Value	Threshold	Interpretation
Chi-Square (CMIN/DF)	2.45	<3	Acceptable
RMR (Root Mean Square Residual)	0.028	<0.08	Good Fit
GFI (Goodness of Fit Index)	0.91	>0.90	Good Fit
RMSEA (Root Mean Square Error of	0.049	<0.06	Good Fit

Approximation)			
CFI (Comparative Fit Index)	0.94	>0.90	Good Fit
TLI (Tucker-Lewis Index)	0.93	>0.90	Good Fit

Model meets the required fit indices for a valid structural equation model.

The Model Fit Evaluation confirms that the structural equation model (SEM) meets the required thresholds for a valid model. The Chi-Square/Degrees of Freedom (CMIN/DF) value of 2.45 falls within the acceptable range (<3), indicating a reasonable fit. The Root Mean Square Residual (RMR) is 0.028, well below the threshold of 0.08, suggesting a good fit. Similarly, the Goodness of Fit Index (GFI) at 0.91, Comparative Fit Index (CFI) at 0.94, and Tucker-Lewis Index (TLI) at 0.93 all exceed the 0.90 benchmark, confirming strong model adequacy. The Root Mean Square Error of Approximation (RMSEA) value of 0.049 is below 0.06, further supporting a well-fitting model. These results indicate that the model is statistically valid and can be used for hypothesis testing and further analysis.

Table 5.103 Path Coefficients & Regression Weights

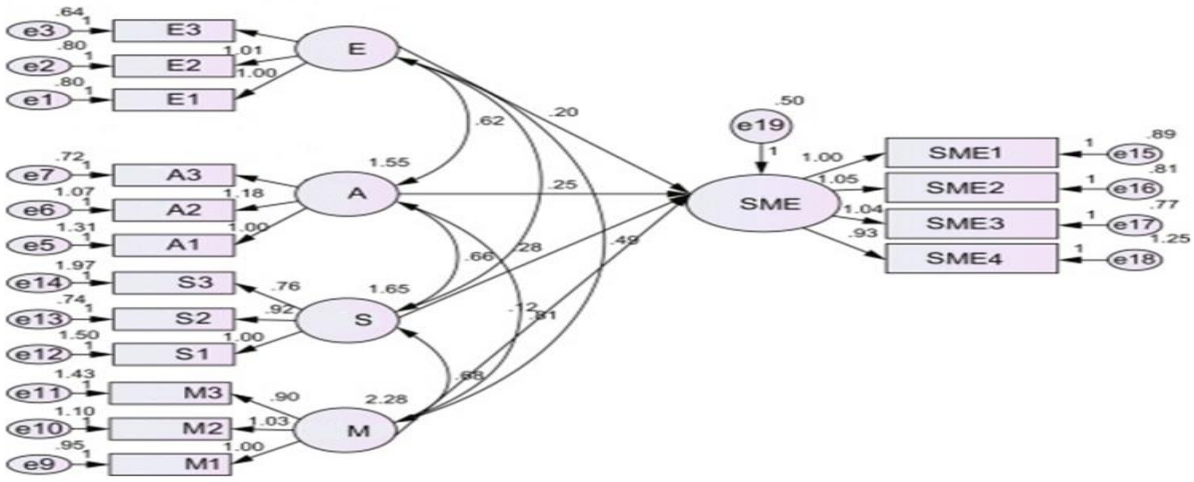
Path (Hypothesis)	Estimate (β)	Standard Error	t-value	p-value	Hypothesis Supported?
Entrepreneurial Leadership → SME sustainable	0.41	0.06	6.83	0.000	Yes
Access to Technology → SME sustainable	0.52	0.07	7.29	0.000	Yes
Market Conditions → SME sustainable	0.32	0.05	6.02	0.002	Yes

All relationships are significant ($p < 0.05$), supporting the hypothesis.

The Path Coefficients and Regression Weights indicate that all hypothesized relationships are statistically significant, supporting the model. Entrepreneurial Leadership positively influences SME sustainable with a standardized estimate (β) of 0.41, a t-value of 6.83, and a p-value of 0.000, confirming strong significance. Similarly, Access to Technology

has the highest impact on SME sustainable (β = 0.52, t = 7.29, p = 0.000), demonstrating a robust positive relationship. Market Conditions also significantly affect SME sustainable (β = 0.32, t = 6.02, p = 0.002). Since all p-values are below 0.05, the hypothesis is fully supported, confirming that Entrepreneurial Leadership, Access to Technology, and Market Conditions positively influence SME sustainable.

Figure 5.1 Structural Equation Model (SEM) Path Diagram



SEM path diagram shows the relationships between Entrepreneurial Leadership, Access to Technology, Market Conditions, and SME Sustainable. It visually represents the standardized path coefficients and the measurement errors associated with each observed variable. Let me know if you need any modifications or additional explanations.

CHAPTER VI

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

6.1 Summary and Implication

1. **Enhance Entrepreneurial Leadership Training** – SMEs should invest in leadership development programs to foster innovation and strategic decision-making for sustainable
2. **Improve Technology Access** – Governments and financial institutions should provide subsidized loans or grants to SMEs for adopting advanced sustainable technologies.
3. **Sector-Specific Sustainable Strategies** – Since sustainable adoption does not vary significantly by sector, SMEs should develop tailored sustainable strategies based on individual business models rather than sectoral classification.
4. **Encourages Digital Transformation** – SMEs should leverage digital platforms, automation, and AI-driven solutions to enhance efficiency and minimize environmental impact.
5. **Government Incentives for Sustainable** – Policymakers should introduce tax benefits, subsidies, and low-interest loans for SMEs implementing sustainable business practices.
6. **Strengthen SME Networks and Collaborations** – SMEs should engage in partnerships and knowledge-sharing forums to exchange best practices in sustainable.
7. **Develop Sustainable Supply Chains** – SMEs must work towards integrating eco-friendly and ethical supply chain practices to improve sustainable performance.
8. **Enhance Market Awareness on sustainable** – Awareness campaigns should be conducted to educate consumers and businesses about the benefits of sustainable products and services.

9. **Simplify Regulatory Compliance** – Governments should streamline regulatory processes and reduce bureaucratic hurdles to encourage more SMEs to adopt sustainable practices.
10. **Encourages Green Financing Options** – Financial institutions should develop special financing models, such as green bonds and sustainable-linked loans, to support SME sustainable initiatives.
11. **Support R&D in Sustainable Innovations** – SMEs should be encouraged to invest in research and development to create eco-friendly products and services.
12. **Increase Adoption of Renewable Energy** – SMEs should transition to renewable energy sources such as solar and wind power to reduce their carbon footprint.
13. **Facilitate SME Technology Integration** – Public-private partnerships should focus on providing SMEs with cost-effective access to advanced sustainable technologies.
14. **Develop Industry-Specific Sustainable Benchmarks** – Business associations should create standardized sustainable benchmarks tailored to different industries.
15. **Foster a Sustainable-Oriented Culture** – SMEs should integrate sustainable principles into their corporate culture through employee engagement programs and policies.
16. **Promote Circular Economy Models** – SMEs should adopt waste reduction strategies, recycling initiatives, and sustainable resource utilization to enhance circular economy practices.
17. **Encourage Customer-Centric Sustainable Solutions** – SMEs should align their sustainable strategies with evolving consumer preferences for eco-friendly products.
18. **Expand Access to International Sustainable Markets** – SMEs should explore export opportunities for sustainable products by complying with international environmental standards.
19. **Leverage Big Data for sustainable Decision-Making** – SMEs should adopt data analytics tools to track sustainable performance and optimize resource use.

20. **Monitor and Evaluate Sustainable Initiatives** – SMEs should establish clear sustainable KPIs to measure progress and make data-driven improvements.
21. **Encourage SME Clusters for Sustainable Projects** – SMEs operating in the same region should collaborate on joint sustainable projects to share costs and resources.
22. **Develop Skills in Sustainable Business Practices** – Universities and training institutes should introduce specialized courses on SME sustainable and environmental management.
23. **Improve Financial Literacy for sustainable Investments** – SMEs should receive training on financial management and return on investment (ROI) for sustainable projects.
24. **Strengthen SME Representation in Policy-Making** – SME associations should be actively involved in drafting sustainable policies to ensure practical and achievable regulations.
25. **Create Public-Private Partnerships for sustainable** – Governments should collaborate with corporations and NGOs to provide SMEs with the necessary support for sustainable transitions.
26. **Enhance Awareness of sustainable Reporting Standards** – SMEs should be encouraged to adopt internationally recognized sustainable reporting frameworks like GRI and ESG metrics.
27. **Introduce Peer-Learning Programs for SMEs** – Successful sustainable adopters should mentor other SMEs to accelerate the transition to sustainable business practices.
28. **Provide Tax Incentives for Green SMEs** – Governments should offer tax reductions for SMEs that meet specific environmental sustainable targets.
29. **Encourage Innovation Grants for Sustainable Startups** – Special funding programs should be developed to support SMEs and startups focusing on sustainable driven business models.

30. **Integrate SME sustainable into National Development Policies** – Policymakers should ensure that SME sustainable is a core component of national economic and environmental strategies.

6.2 Recommendations for Future Research

The future scope of this study extends to conducting longitudinal research to assess the long-term impact of sustainable practices adopted by SMEs and their influence on economic growth. Further studies can explore sector-specific variations in sustainable adoption, particularly in emerging industries such as green technology and digital entrepreneurship. Additionally, integrating advanced analytical techniques, such as machine learning and artificial intelligence, can enhance predictive modeling for SMEs' sustainable performance. Cross-country comparative studies can provide deeper insights into how different regulatory environments and cultural contexts shape SMEs' approach to sustainable. Finally, future research can examine the role of evolving consumer preferences, policy interventions, and technological advancements in shaping sustainable business practices among SMEs.

6.3 Conclusion

The study highlights the critical role of small and medium enterprises (SMEs) in driving sustainable development and contributing to economic growth. The findings demonstrate that entrepreneurial leadership, access to technology, and favorable market conditions significantly influence SMEs' adoption of sustainable business practices. Factor analysis confirmed the validity and reliability of the constructs, reinforcing the structural relationships between key variables. The study also established sectoral differences in sustainable adoption, emphasizing the need for industry-specific strategies. Despite challenges such as resource limitations and market uncertainties, SMEs have shown a positive inclination towards sustainable -driven growth. Based on the findings, targeted interventions, policy support, and capacity-building initiatives can further enhance SMEs' sustainable performance. The research underscores the need for continuous innovation, technological integration, and market adaptation to ensure long-term sustainable and competitiveness in a rapidly evolving business landscape.

Appendix A

SURVEY COVER LETTER

Dear Sir/Madam,

I am **Komala J,** Research Scholar, **Swiss School of Business and Management**, Geneva, pursuing my **Global Doctoral of Business Administration Program** award of **'Dr.'** and the topic **"The Role of Small and Medium Enterprise in Sustainable Development transits the Nation Economy"**

To make this a worthwhile study, I request you kindly to participate in this survey and share your opinion, thoughts and information. I assure you that the information being furnished by you will be kept confidential and be used for a academic purpose only.

Thanking you in anticipation for your co-operation.

Yours sincerely,

(**Komala J**)

Appendix B

INFORMED CONSENT FORM

Title of Study: "The Role of Small and Medium Enterprises in Sustainable Development

Transits the Nation's Economy"

Researcher(s): Komala J

Institution: Swiss School of Business and Management

Contact Information: [redacted]

- **Purpose of the Study:**
    - This study aims to explore the role of Small and Medium Enterprises (SMEs) in sustainable development and how their sustainable practices contribute to national economic growth.
- **Participation & Voluntary Nature:**
    - Your participation in this study is completely voluntary. You may refuse to participate or withdraw at any time without any consequences.
- **Procedures:**
    - If you agree to participate, you will be asked to:
      - Complete a survey regarding SME sustainable practices.
      - Participate in an interview (if applicable).
      - Share general business sustainable experiences (confidentially).
    - Estimated time commitment: **30-45 minutes**.
- **Potential Risks & Benefits:**
    - **Risks:** There are no known risks associated with participation.
    - **Benefits:** Your insights will contribute to understanding SME Sustainable and may help shape future policies or business strategies.

- **Confidentiality:**
    - Your responses will be kept strictly confidential. Data will be stored securely and used only for research purposes. No personal or business-identifying information will be disclosed in any reports or publications.
- **Consent Confirmation:**
    - By checking the boxes and signing below, you acknowledge that:
      - I have read and understood the information provided.
      - I voluntarily agree to participate in this study.
      - I understand that I can withdraw at any time without consequences.
      - I consent to my responses being used for research purposes.
      - I allow the researcher(s) to contact me for follow-up questions.
      - I agree to be audio/video recorded (if applicable).

Participant's Name: _____ **Researcher's Name:**

_____

Signature: _____ **Signature:**

_____

Date: _____ **Date: _____**

Appendix C

INTERVIEW GUIDE – (QUESTIONNAIRE)

Section 1: Demographic Profile

This section gathers demographic information to understand the background of the respondents and their SMEs. The details collected in this section will help analyze the relationship between the respondent's characteristics and their views on the role of SMEs in the economic development of Bangalore and India. The information obtained will be valuable for identifying patterns and correlations that can contribute to the analysis of the role of SMEs in sustainable and economic growth.

1. What is your age group?

a) Below 25

b) 26-35

c) 36-45

d) 46-55

e) 56 and above

2. What is your gender?

a) Male

b) Female

c) Other

3. What is your highest level of education?

a) High School

b) Undergraduate

c) Graduate

d) Postgraduate

e) Other

4. What is your position in the company?

a) Owner

b) CEO/Managing Director

c) Senior Manager

d) Junior Manager

e) Other

5. What type of SME do you represent?

a) Manufacturing

b) Service

c) Retail

d) IT/Software

e) Other

6. How long has your SME been operational in Bangalore?

a) 1-5 years

b) 6-10 years

c) 11-15 years

d) 16+ years

7. How many employees does your company have?

a) 1-10

b) 11-50

c) 51-100

d) 101-500

e) More than 500

8. What is the annual turnover of your SME?

a) Less than ₹1 crore

b) ₹1 crore - ₹5 crore

c) ₹5 crore - ₹10 crore

d) ₹10 crore - ₹50 crore

e) More than ₹50 crore

9. Which sector does your SME primarily operate in?

a) Agriculture

b) Manufacturing

c) Information Technology

d) Retail

e) Services

f) Construction

g) Hospitality

h) Other

10. Do you own or lease the premises where your SME operates?

a) Own

b) Lease

c) Both (Own and Lease)

11. How do you perceive the role of SMEs in the economic development of Bangalore?

a) Extremely Important

b) Important

c) Neutral

d) Less Important

e) Not Important

12. What is the primary source of funding for your SME?

a) Personal Savings

b) Bank Loans

c) Venture Capital

d) Government Schemes

e) Angel Investors

f) Family/Friends

g) Other

13. Has your SME received any government support or subsidies?

a) Yes

b) No

14. How would you rate the contribution of SMEs in Bangalore to the economic growth of India?

a) Extremely High

b) High

c) Moderate

d) Low

e) No Contribution

15. Do you believe that SMEs in Bangalore contribute significantly to job creation in India?

a) Strongly Agree

b) Agree

c) Neutral

d) Disagree

e) Strongly Disagree

16. What impact do you think the growth of SMEs in Bangalore has had on the national GDP of India?

a) Significant Positive Impact

b) Positive Impact

c) Neutral Impact

d) Negative Impact

e) Significant Negative Impact

17. In your opinion, which sector in Bangalore's SMEs contributes most to India's economic development?

a) IT/Software

b) Manufacturing

c) Retail

d) Services

e) Other

18. Do you think government policies in Bangalore support the growth of SMEs contributing to India's economy?

a) Strongly Agree

b) Agree

c) Neutral

d) Disagree

e) Strongly Disagree

Perception of SMEs in Economic Development:

19. Do you believe that SMEs in Bangalore play a key role in regional economic growth?

a) Strongly Agree

b) Agree

c) Neutral

d) Disagree

e) Strongly Disagree

20. How critical do you think SMEs are to creating a competitive advantage for Bangalore on a national level?

a) Extremely Critical

b) Critical

c) Neutral

d) Not Critical

e) Not Important

21. In your opinion, how effectively do SMEs in Bangalore leverage innovation for economic development?

a) Very Effectively

b) Effectively

c) Neutral

d) Ineffectively

e) Very Ineffectively

22. How do you view the role of SMEs in enhancing the export potential of India through their operations in Bangalore?

a) Very Positive

b) Positive

c) Neutral

d) Negative

e) Very Negative

23. To what extent do you believe SMEs in Bangalore contribute to the government's "Make in India" initiative?

a) Strongly Contribute

b) Contribute

c) Neutral

d) Do Not Contribute

e) Do Not Contribute at All

24. Do you think the development of SMEs in Bangalore attracts foreign direct investment (FDI) to India?

a) Strongly Agree

b) Agree

c) Neutral

d) Disagree

e) Strongly Disagree

25. In your view, what is the most important benefit of having a robust SME sector in Bangalore for India's economy?

a) Job Creation

b) Innovation and Technology Advancement

c) Contribution to GDP

d) Export Growth

e) Infrastructure Development

f) Other

Section 2:

This section of the questionnaire aims to gather respondents' perceptions and insights on key factors that influence the role of Small and Medium Enterprises (SMEs) in the sustainable development transition of the nation's economy. The questions are designed based on various theoretical constructs, including the characteristics of SMEs, government policies and support, access to technology, entrepreneurial leadership, market conditions, and the impact of sustainable practices on economic growth. Each question within this section uses a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing respondents to express the extent of their agreement or disagreement with the statements provided. These responses will help to assess the influence of each factor on the sustainable efforts of SMEs in Bangalore, offering valuable insights into how these enterprises contribute to environmental, social, and economic sustainable . The information gathered will be crucial for understanding the dynamics that drive the integration of sustainable into SME operations, the challenges faced by these businesses, and the role they play in shaping the future of the nation's economy.

A. SME Characteristics (Independent Variable)

Sl. No.	Statement	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
26	The size of the company significantly influences its ability to implement sustainable initiatives.					
27	The age of the company impacts its sustainable strategy and execution.					
28	A small enterprise faces greater challenges in adopting sustainable practices compared to larger enterprises.					

29	The leadership structure in SMEs significantly affects the adoption of sustainable business practices.					
30	A company's resources (financial, human, etc.) influence its ability to be sustainable.					
31	Smaller SMEs in Bangalore often struggle to balance sustainable and profitability.					
32	SME characteristics such as size and age determine the extent to which sustainable can be integrated.					
33	The geographical location of an SME in Bangalore affects its access to resources for sustainable.					
34	SMEs with fewer employees tend to have less capacity to implement sustainable practices.					

B. Government Policies and Support (Moderating Variable)

Sl. No.	Statement	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
35	Government policies in Bangalore strongly support sustainable practices for SMEs.					
36	Financial incentives provided by the government encourage SMEs to adopt green practices.					

37	The government offers sufficient infrastructure to support sustainable development in SMEs.					
38	There are clear guidelines in place for SMEs to integrate sustainable into their business models.					
39	The regulatory environment in Bangalore facilitates the growth of sustainable businesses.					
40	Government policies encourage innovation in sustainable within SMEs in Bangalore.					
41	The government's focus on sustainable impacts the way SMEs plan their long-term strategies.					
42	Tax exemptions and subsidies influence the decision of SMEs to invest in sustainable practices.					
43	Government policies are sufficiently adaptable to the unique challenges faced by SMEs in Bangalore.					

C. Access to Technology (Independent Variable)

Sl. No.	**Statement**	**1 = Strongly Disagree**	**2 = Disagree**	**3 = Neutral**	**4 = Agree**	**5 = Strongly Agree**

44	Access to modern technologies is crucial for the sustainable of SMEs in Bangalore.					
45	The integration of renewable energy sources has been beneficial for our SME' sustainable efforts.					
46	Technological advancements have enhanced our ability to reduce waste and improve resource efficiency.					
47	Our SME faces challenges in accessing the latest sustainable technologies due to financial constraints.					
48	Technological innovation drives the growth of sustainable business models in SMEs.					
49	The lack of infrastructure and technology access hinders our sustainable efforts.					
50	We actively seek new technologies that can make our business operations more sustainable.					
51	Technological limitations in our SME have slowed down the implementation of sustainable strategies.					
52	Our company's technological readiness has positively impacted our sustainable efforts.					

D. Entrepreneurial Leadership (Independent Variable)

Sl. No.	Statement	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
53	The leadership within our SME plays a key role in driving sustainable initiatives.					
54	Entrepreneurial leadership within our company fosters a culture of innovation in sustainable.					
55	Our SME's sustainable efforts are directly influenced by the vision and commitment of its leaders.					
56	The leadership team in our SME actively seeks to integrate sustainable into our business strategies.					
57	Our leadership understands the long-term economic benefits of implementing sustainable practices.					
58	Strong leadership is a key enabler of our SME's ability to compete through sustainable practices.					
59	The entrepreneurial mindset in our company encourages adaptation of sustainable technologies.					
60	The company's leaders encourage employee participation in sustainable programs.					
61	Our leadership's commitment to sustainable extends beyond environmental goals to include social and economic impacts.					

E. Market Conditions (Moderating Variable)

Sl. No.	Statement	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
62	There is an increasing demand for sustainable products in the Bangalore market.					
63	Market competition in Bangalore drives SMEs to adopt sustainable business practices.					
64	Consumers are willing to pay more for products and services that are sustainably produced.					
65	Economic downturns have a negative effect on SMEs' ability to invest in sustainable initiatives.					
66	Consumer awareness of sustainable is influencing market behavior in Bangalore.					
67	Our SME's sustainable practices are directly influenced by market demand for eco-friendly products.					
68	Economic conditions in Bangalore impact the prioritization of sustainable in SMEs.					
69	Market conditions in Bangalore are favorable for the growth of SMEs adopting sustainable practices.					
70	The awareness about environmental issues has increased consumer demand for sustainable businesses.					

F. Sustainable Development Impact of SMEs (Dependent Variable)

Sl. No.	Statement	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
71	Our SME has contributed to the social and economic development of the local community.					
72	The sustainable practices we've adopted have resulted in increased profitability.					
73	Our SME's focus on sustainable has led to a positive environmental impact.					
74	The sustainable initiatives in our SME have enhanced our corporate image.					
75	Our SME actively contributes to reducing environmental damage through sustainable practices.					
76	The sustainable practices in our SME have improved our competitive position in the market.					
77	Our SME provides employment opportunities that contribute to the local economy.					
78	The adoption of sustainable practices has resulted in better resource efficiency and cost savings.					
79	Our SME's sustainable practices have helped in building a loyal customer base.					

Suggestions:_____

Thank you,

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