



CIRCULAR ENTREPRENEURSHIP AND SUSTAINABLE GROWTH OF MSMEs: INVESTIGATING THE ECONOMIC IMPACT OF CIRCULAR BUSINESS MODELS IN INDIA

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ABSTRACT

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The Micro, Small, and Medium Enterprises (MSME) sector is the backbone of India's national economy, contributing around 30% to GDP, providing livelihoods for over 110 million people, and making up over 95% of the country's industrial units. Many MSMEs in India are still operating under a traditional linear economy model of manufacturing (extraction of green resources, producing products, and disposal of waste) which is environmentally and economically unsustainable. The circular economy, which focuses on the elimination of waste through design, extends the life of products and materials, and regenerates natural ecosystems offers an alternative that has the potential to dramatically enhance the competitiveness and sustainability of MSMEs.

We examine the impact of circular entrepreneurship (the development and scale-up of businesses that use circular economy principles) on the economic success and sustainability of MSMEs in India. We used a mixed methods approach to collect data: we collected quantitative data through a structured questionnaire disseminated to 150 MSME owners in Coimbatore district, Tamil Nadu, of which 120 responses were usable for analysis; we collected qualitative data through in-depth interviews with ten MSME owners who were purposely selected; and, we captured secondary sources of information from government reports, NITI Aayog publications, the Ellen MacArthur Foundation, and other peer reviewed academic literature.

The empirical analysis — including descriptive statistics, correlation analysis, Cronbach's alpha reliability testing, and regression modelling — indicates that circular business practices have a statistically significant positive relationship with the economic performance of MSMEs ($R^2 = 0.67$, $p < 0.01$). MSMEs reported an average 10-25% reduction in raw material costs, improved profit margins, and increased brand loyalty when using three or more circular business practices. Nonetheless, MSMEs are hesitant to adopt these practices because of the prohibitively high initial investment costs; lack of awareness; inadequate government incentives; and insufficient trained personnel to support implementation. The research concludes with a five-stage Circular MSME Growth Framework that provides practical recommendations for entrepreneurs, policymakers and industry stakeholders to facilitate the transition towards eco-efficient business models in India.

KEYWORDS: Circular Economy, MSMEs, Circular Entrepreneurship, Sustainable Growth, India, Resource Efficiency, Green Business Models, Economic Performance, Coimbatore

1. INTRODUCTION

The global economy is going through a major structural change driven by two main forces: environmental sustainability and economic resilience. At the core of this shift is the circular economy – a systemic move away from the traditional "take, make, dispose" linear economic model towards a circular economy that aims to keep resources in productive use as long as possible (Ellen MacArthur Foundation, 2013). Unlike the traditional 'linear model', which generates vast quantities of waste and greenhouse gas emissions, the circular economy is designed to be regenerative in such a way that products are designed for repair, refurbishment, re manufacturing and ultimately recycling; thus, waste produced from one process will become an input to another process.

India is in an incredibly important position within the context of this transition. Over 63 million MSMEs in India employ over 110 million people and contribute approximately 30% of India's GDP and 48% of India's total exports (Ministry of MSME, 2023). Therefore, MSMEs represent the largest economic asset of India as well as the most substantial challenge to the country's ability to be sustainable. The majority of the MSMEs in India are still highly resource and waste intensive - a product of decades of industrialisation in which environmental costs have been treated as external costs rather than business liabilities. As India accelerates its commitment to achieving net-zero carbon emissions by 2070 and aligns with the United Nations' Sustainable Development Goals (SDGs), the MSME

sector's transformation towards circular business models is no longer just theoretical: It is an urgent economic necessity as well as an ecological one.

Circular entrepreneurship ("circular entrepreneurship" refers to the establishment and growth of entrepreneurial ventures based on circular economy principles from the outset) is the entrepreneurial expression of this transformation. Unlike traditional linear businesses, circular entrepreneurs redesign value-creation models (not just adapt to reduced waste) to eliminate waste, create optimised material and product flows, and generate revenue from the regeneration of those materials and products. In doing so, they create new forms of competitive advantage which are both economically superior and ecologically beneficial.

This research seeks to address an evidentiary gap in the existing literature. Circular economy literature has been well-documented regarding large multinational corporations, but there is limited evidence on its applicability, benefits, and barriers to micro and small businesses in developing countries and specifically in India. This research will focus on micro and small manufacturing businesses (micro, small, and medium-sized enterprises or MSMEs) located in Coimbatore, Tamil Nadu, which is one of India's largest manufacturing and entrepreneurial centre that produces textiles, engineering products, and pumps. The use of data collected through primary research conducted amongst MSME owners in Coimbatore will allow this study to provide evidence-based analyses that will connect the global circular economy theories with local Indian MSME practices.

This paper will follow the following structure: a literature review will be provided in Section 2; research objectives and hypotheses will be presented in Section 3; methodology will be described in Section 4; results will be presented and discussed in Section 5; a practical framework for sustainable growth of MSME will be provided in Section 6; and the conclusions, recommendations, and future research possibilities will be presented in Section 7.

1.1 Background of the Study

In support of the MSME sector, the Indian government has launched a variety of policy initiatives including the MSME Development Act (2006), the Udyam Registration Portal, the Atmanirbhar Bharat Scheme, the Production Linked Incentive (PLI) programme, and various credit guarantee schemes administered through SIDBI.

India has also made a commitment under the Paris Agreement to a series of ambitious environmental targets, including a 45% reduction in emissions per unit of GDP by 2030 and an overall electric power installed capacity of 50% from sources that do not produce fossil fuel based energy.

The combination of MSME sector and environmental targets creates a convergence opportunity, creating opportunities for MSMEs to improve their economic performance while contributing to improving sustainability in India by transitioning to circular business models.

The world has shown through many examples that transitioning to circular economy practices can yield thriving results.

Germany has saved approximately €600 billion a year in materials from its circular economy efforts within the manufacturing space alone. China's pilot programs for circular economies have resulted in more than 2.5 million jobs and reduced industrial waste generation by 15% per year. The Netherlands aims to have a national goal of 50% less consumption of new raw materials by 2030 and has shown significant GDP growth from implementation of the circular economy. In India, NITI Aayog estimates that if the country transitions to a circular economy in critical sectors, it can unlock \$624 billion in economic benefits by 2050 and create another 1.4 crore jobs (NITI Aayog, 2021).

1.2 Statement of the Problem

Even though there is increasing interest worldwide and nationally relating to circular economy principles, Indian micro, small and medium enterprises (MSMEs) are principally operating using a traditional, linear business model. The transition from linear to circular entrepreneurship is currently impeded by multiple barriers to adoption, including structural, financial, informational, and institutional factors. Many MSME owners are not fully aware of what circular economy practices are; how those practices can be implemented within a small business scale; and what economic returns are likely. Additionally, government policies designed to support the circular economy are generally supportive in nature; however, they have not been specifically designed to overcome the specific structural barriers which exist for MSMEs seeking to implement circular business models. The result is an ever-increasing gap between India's targeted sustainability objectives and the actual operations of the country's largest and most economically significant segment of all enterprises.

The objective of this research is to systematically describe and quantify the current status regarding the adoption of circular economy practices by MSMEs, including an examination of the economic implications associated with adopting circular economy practices in terms of business performance, as well as an analysis of the barriers to adopting these types of practices within the MSME sector.

1.3 Objectives of the Study

This research is guided by the following principal objectives:

- To evaluate the level of awareness and implementation of circular economy practices among MSMEs (micro, small and medium enterprises) located in Coimbatore, Tamilnadu
- To assess the relationship between adoption of circular business practices and the economic performance of MSMEs;
- To identify and assess the main challenges and barriers facing MSMEs in implementing circular business models;
- To determine whether adoption of circular economy practices adds to the competitive advantage of MSMEs;
- To develop a practical, evidence-based framework for accelerating sustainable MSME growth through circular entrepreneurship.

1.4 Significance of the Study

This study contributes to three different areas of research. First, it provides original primary research created from under-

researched areas of MSME and offers new empirical data for the global circular economy and entrepreneurship literature. Second, it provides actionable recommendations for micro, small and medium sized enterprise (MSME) owners, Industry associations and government policymakers to assist with enterprise level adoption of circular economies. Third, it will also assist with developing more effective MSME sustainability programs for the MSME sector by identifying specific barriers and enablers of circular adoption at the enterprise level from a policy perspective.

2. LITERATURE REVIEW

2.1 The Circular Economy: Conceptual Foundations

At the convergence of industrial ecology, ecological economics, and systems thinking, an official academic and policy concept called "the circular economy" was created from this intersection. Pearce and Turner (1990) provided some of the earliest theoretical foundations to support this new concept by showing that traditional economic models viewed natural environments as unlimited providers of resources and that natural environments served as infinite sinks for waste — which has been proven to be inaccurate. They called for the integration of circular flows of materials within economic modelling and stated that substantially higher productivity of resources could be attained through closed-loop systems for materials.

The introduction of the circular economy into the mainstream began with the work done by the Ellen MacArthur Foundation (2013), which provided a definition of the circular economy as a system that is designed to be restorative and regenerative in nature. The Foundation provided businesses with a business model to guide their redesign of how they conduct business through its butterfly diagram, which visually represented the separate biological and technical cycles of material flows. The Foundation determined that businesses could become more sustainable by adhering to these three core principles: eliminate waste and pollution while designing products; maintain materials/products in use; and replenishing natural systems.

According to Murray, Skene, and Haynes (2017), when considering the nature of a circular economy, it must be viewed as a completely different way of creating value rather than simply as a strategy for managing resources. To establish a successful circular economy, the entire value chain will need to undergo major changes at the same time, rather than simply making incremental adjustments to current linear business processes. Bocken et al. (2016) have developed the idea of circular business models by categorizing the kinds of strategies available to businesses wishing to create a circular economy into three groups: (i) slowing resource loops (by extending product lifespan), (ii) closing resource loops (by recycling and/or remanufacturing), and (iii) narrowing resource loops (by increasing their efficiency).

2.2 Circular Economy and MSMEs: Global Evidence

The initial literature on circular economies focused primarily on big businesses; however, an increasing number of academic studies have started to focus on small business applications of circular economies. Rizos et al. (2016) completed the largest study of SMEs across seven European countries to date on barriers and enablers to adopt the circular economy and identified a wide range of barriers and enablers that fall into

multiple categories. The study reported that even though SMEs could have a competitive advantage because of their flexibility, proximity to localised markets, and their relative size, SMEs face significant barriers in adopting a circular economy due principally to financial constraints, lack of managerial skill, and limited awareness of the different types of circular business model offerings. The study also revealed that an SME's ability or aptitude for innovation (to create new products, processes and business models) represents the single most significant internal enabler for adopting a circular economy.

In a thorough review of 114 academic papers, Kirchherr, Reike & Hekkert (2017) established that there was a significant uncertainty (or mismatching) between the theoretical definitions of the circular economy and how these definitions have actually been applied in practice. The researchers indicated that the majority of the firms that are either currently using, or are considering using, the concepts related to the circular economy (CE) are almost exclusively focused on recycling and the minimization of waste instead of implement higher-level (or more comprehensive) circular economy approaches (e.g., product life cycles, service oriented business models, industrial symbiosis). Generally, higher-level approaches generate a greater level of financial capital than a narrower recycling and waste-disposal-based approach.

De Jesus & Mendonça (2018) have examined the barriers to the transition toward the circular economy in European small- and medium-size enterprises (SMEs) and identified five primary, or broad, categories of resistance:

- 1) Technological lock-in
- 2) Cultural resistance
- 3) Market failure
- 4) Regulatory ambiguity and
- 5) Financial barriers to circular economy adoption.

They contend that any policy interventions must address all five barriers at the same time to have a meaningful impact on the widespread adoption of circular economy principles.

2.3 MSMEs in India: Economic Context and Sustainability Challenges

The MSME (Micro, Small and Medium Enterprises) sector is a vital element in India's economy and has a multitude of different types of businesses within it, including relatively simple single-person operations right through to advanced large-scale factory-type businesses with hundreds of employees. There are many different kinds of business activity within the sector e.g. the manufacturing of traditional crafts and textiles to the manufacture of precision machinery and the delivery of IT services. According to the Ministry of MSME (2023), India's MSME sector accounts for approximately 30% of India's GDP, 48% of India's exports and is the second largest employer in the country after agriculture, with around 110 million people employed in the sector.

Research by Singh, Gupta & Mehra (2020) identified sustainability practices within the Indian MSME sector. The research found that 78% of owners of MSME businesses surveyed understood why they should be socially (environmentally) responsible, however fewer than 22% of survey respondents had implemented any formal sustainability practices. They identified three main barriers preventing the implementation of sustainable business practice: a lack of financial resources to invest in sustainability; a lack of technical knowledge/expertise to implement sustainability; and a lack of

specific government assistance/support for MSMEs to become more sustainable. The research also found that there was considerable variation in businesses' sustainability uptake based on their respective sectors. For example, within the textile and leather industries, export-based businesses that operate in a highly scrutinized international environment for sustainability have adopted sustainability practices more so than businesses that only operate in the domestic market.

According to a Federation of Indian Chambers of Commerce and Industry report (FICCI, 2022), inefficient resource use in Indian MSMEs leads to around 30-40% waste of raw materials used in textiles and 20-30% waste of raw materials used in food processing. The implementation of more circular practices across the sector would result in an estimated annual savings of INR 2.5 lakh crores just on material costs which is equivalent to roughly 25% of the total annual value created by these industries.

2.4 Economic Impact of Circular Business Models

A plethora of empirical evidence is emerging to support the economic rationale for circular business models. For example, a very comprehensive meta-analysis of 155 circular economy studies by Ghisellini, Cialani and Ulgiati (2016) showed that there are four primary ways that implementing circular business practices results in large economic benefits: direct cost savings through lower material consumption, potential for new revenues through recovered materials and products, reduced exposure to price volatility of raw materials, and improved access to sustainability-focused customers and investors.

Five types of circular business models were defined by Lacy and Rutqvist (2015) that generate economic benefits: the Circular Supply Chain (utilising recovered resources instead of virgin materials), Recovery and Recycling (creating new value from the material streams at the end of the useful life of products), Product Life Extension (maintaining and upgrading product to extend their economic life), Sharing Platforms (maximising asset utilisation through collaborative consumption), and Product as a Service (transitioning from a one-time sale of a product to an ongoing performance contract). Collectively, these circular business models are projected to have an estimated potential for USD 4.5 trillion of global economic value creation by 2030.

The NITI Aayog Circular Economy Report (2021) assessed the economic impact of circularity across 8 key sectors in India, suggesting that adopting circular principles could generate approximately \$624 billion by 2050, or about 30% of India's GDP. This report also identified the 3 industries that should be targeted first: construction, food & agriculture, and textiles, since these industries offer the greatest potential for value creation in the near term.

2.5 Circular Entrepreneurship: Emerging Theoretical Framework

Circular entrepreneurs represent a new route of study that has been rapidly studied and researched. Circular entrepreneurs are businesses that are built from the ground up to meet the principles of the circular economy (Antikainen and Valkokari, 2016). Circular entrepreneurs are different from conventional entrepreneurs because they think with a distinct set of cognitive orientations. For example, circular entrepreneurs think

systemically, look for long-term value, and have a collaborative network orientation.

Lahti, Wincent, and Parida (2018) found that circular entrepreneurs outperform their linear counterparts in metrics relating to long-term profitability, retention of customers, and innovation. However, the authors noted that circular entrepreneurs experience difficulties accessing external patient capital in the early stages of their venture; particularly, they have difficulty finding investors who will evaluate their venture using traditional linear performance metrics.

While there is a body of important empirical work on circular entrepreneurship in the global context, research on circular entrepreneurship in India is still in the infancy stages. Most of the studies that have been completed to date have used case studies in individual sectors. This study is the first empirical quantitative study of the economic performance of circular MSMEs across a number of sectors in a major Indian industrial city.

2.6 Government Policy and Institutional Support

It has been well recorded in academic literature that government policies have an enabling and/or constraining effect on the adoption of circular economies. According to Ghisellini et al. (2016), there are three categories of policy instruments to promote circular economies: 1) Regulatory instruments (i.e. extended producer responsibility; banning landfills); 2) Economic instruments (i.e. green procurement obligations; tax incentives; subsidies); and 3) Informational instruments (i.e. certification systems; knowledge-sharing platforms). Ghisellini found that the most effective national circular economy program is one that utilizes all three instruments cohesively.

India's policy framework has slowly shifted towards being more supportive of circular business models, though there is still much to be done to fill existing gaps. For example, the Solid Waste Management Rules 2016, Plastic Waste Management Rules 2022, and E-Waste Management Rules 2022 lay the foundation for the regulatory framework on circular material flows. Furthermore, the Bureau of Energy Efficiency is offering MSMEs financial and technical assistance to proceed with energy saving investments through their energy efficiency programs. However, a comprehensive circular economy policy framework specific to MSMEs — similar to the framework created by the European Union's Circular Economy Action Plan — does not exist at this time in India.

2.7 Research Gap

The literature review identifies three important gaps in the current literature that this research will explore. To begin, most empirical studies about circular economy adoption and economic impact have been done in developed economies with mostly high-income countries (mostly from Europe and China). There is little evidence from MSMEs (Micro, Small and Medium Enterprises) in emerging markets, and specifically from India. Second, most of the existing literature has focused on two areas — either on understanding awareness and adoption of the circular economy (with economic Performance assumed) or focusing on measuring performance only — with very few studies having looked at and documented the actual

causal linkages between an organisation's circular economy practices and measurable outcomes in economic Performance using primary data. Third, there has been much less research on the context of circular entrepreneurship than there has been on retrofitting existing linear businesses with circular business Practices. This study will fill in all three of these gaps utilizing a mixed-methods, primary data research methodology.

3. RESEARCH METHODOLOGY

3.1 Research Design

To investigate the relationship between circular economy (CE) adoption and economic performance (EP) in micro, small and medium-sized enterprises (MSMEs) in India, this study employs a mixed-methods research design that combines both quantitative and qualitative methodologies to achieve statistical accuracy through the quantitative aspect and interpretive richness through the qualitative aspect. The quantitative data collection involved the systematic measurement of relationships between CE adoption and multiple EP variables, while the qualitative aspect was based on the lived experiences of MSME owners with their CE adoption, thus allowing for contextually rich data to be collected. This mixed-methods design is well-suited for a relatively undeveloped field of research such as CE entrepreneurship in Indian MSMEs, where both hypothesis testing and exploratory research are needed to create a solid empirical foundation.

The research is designed as a cross-sectional study, where all data was collected at one specific point in time. While this design prohibit the ability to establish temporal causality, the use of retrospective performance data collected via the questionnaire along with the triangulation of primary data with secondary sources allows for mitigating this limitation.

3.2 Study Area

Three main reasons led to the importance placed on the Coimbatore district of Tamil Nadu for this research study. Firstly, Coimbatore is India's significant MSMS hub with more than 30,000 registered MSMEs in sectors such as textiles, engineering goods, manufacturing pumps, supplying IT and the manufacture of food and food product; therefore, a large, diverse and representative sample could be created. Secondly, the MSME ecosystem of Coimbatore consists of both traditional manufacturing firms and newly formed firms, providing opportunities to compare and contrast at different levels of preparedness for circular adoption. Thirdly, the researcher had an institutional affiliation with Sri Krishna Arts & Science College of Coimbatore which greatly facilitated data collection through contact with industry associations and networks of MSME.

3.3. Research Hypotheses

The hypotheticals shown here were developed using the theoretical frame of reference discussed previously as well as the information already presented in the literature review section of the paper.

Hypothesis 1:

There exists a significant positive relationship between awareness of the circular economy and the implementation of circular business practices by MSMEs in Coimbatore.

Hypothesis 2:

There is a significant positive effect from the use of circular business practices on the economic performance of MSME's.

Hypothesis 3:

Innovation capability acts as a mediator within the relationship between the use of circular business practices and the level of competitiveness of MSME's.

Hypothesis 4:

The existence of Government support, as a conditional positive moderator, will have a substantial influence over MSME's use of the circular economy.

Hypothesis 5:

The implementation of resource efficiency practices within an MSME will ultimately produce a higher ROI as compared to either the traditional or random approach.

3.4. Conceptual Framework

This study introduces a conceptual framework that draws on three respected theoretical frameworks: (1) The Resource-Based View (RBV) of the firm (Barney, 1991) which indicates that in order to have sustained competitive advantage over time, firms must possess valuable (and hard-to-imitate) internal resources/capabilities; (2) The Circular Economy Value Creation Model (Ellen MacArthur Foundation, 2013) which describes how implementing circular design principles provides economic benefit from more efficient use of resources and material recovery; and (3), Schumpeterian innovation theory, which explains how entrepreneurial innovation is the primary driver of economic growth and new competition.

According to the conceptual framework, one driver of all MSME's implementation of Circular Business Practices is the extent of Circular Economy Awareness — the knowledge that MSME owners have of Circular Economy principles and the applicability of those principles to their own business. Awareness creates a foundation for the implementation of Circular Business Practices in four categories: resource efficiency; waste reduction/recycling; product/service redesign; and sustainable supply chain practices. The four categories of Circular Business Practices are associated with increased MSME Sustainable Performance across economic, competitive, and environmental dimensions through the mediating mechanism of Innovation Capability, which measures an MSME's capacity to use Circular Business Practices as input to create new products, services, and business models. The critical moderating variable affecting the relationship between Awareness and the adoption of Circular Business Practices is Government Policy Support, which impacts the strength of relationship between Awareness and the adoption of Circular Business Practices.

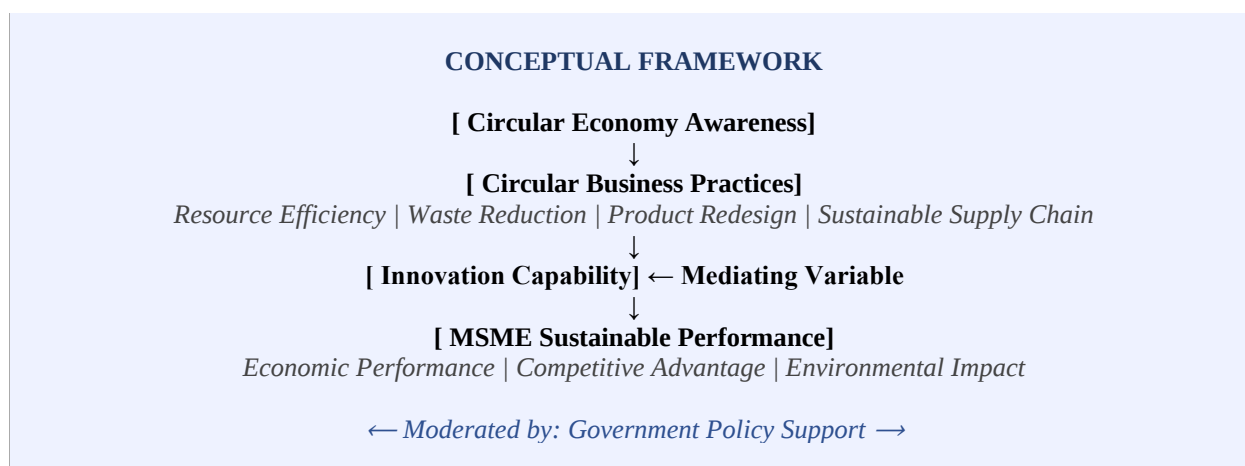


Figure 1: Conceptual Framework for Circular Entrepreneurship and MSME Sustainable Growth

3.5 Data Collection

Both primary and secondary data were collected for this study.

Primary Data: A structured questionnaire was created in a multi-step process that included: the original item creation based on the literature; an expert review from two commerce and business management academics; and pilot testing with 20 MSMEs owners (feedback responses were not included in the final analysis). The questionnaire has 52 questions broken into 6 sections: respondent and business profile - 10 questions; circular economy awareness - 8 questions; the adoption of specific circular practices - 12 questions; perceived financial benefits and performance outcomes - 10 questions; barriers to the adoption of circular; and government support evaluation - 4 questions. The attitude/perception-based questions all have a 5-point Likert scale (1 = strongly disagree and 5 = strongly agree). To ensure that all individuals who received the questionnaire understand the questions, it was available in both English and Tamil.

Qualitative Data: Ten MSME owners were purposefully chosen to provide insight into their experiences with circular practices, through ten semi-structured interviews lasting from 45-60 minutes. The interview questions addressed each respondent's understanding of the concept of a circular economy, what their experience implementing(or trying to implement) circular practices has been, what economic impacts they have experienced, and what role they think government regulation and policy play in assisting with the transition to circular economies.

Secondary Data: To help to provide context for primary findings, peer-reviewed academic articles, NITI Aayog, the Ministry of MSME, the Ellen MacArthur Foundation, the World Bank, and articles published by FICCI all provided information that was reviewed systematically.

3.6 Sampling

This sample consisted of all registered MSMEs in Coimbatore District. A purposive random sampling technique was used to provide representation of each sector (textiles, engineering goods; food processing,) and size (micro; small; medium) of MSME (the type of business). An MSME Association was contacted, and the District Industries Centre was contacted; additionally, MSME owners were approached directly in the various industrial estates throughout Coimbatore to distribute the 150 questionnaires that were collected. After eliminating all

incomplete/questionable responses from the 150 questionnaires, there remained 120 valid responses (80% usable).

3.7 Reliability and Validity

Internal consistency of measurement scales was determined using Cronbach's alpha. The overall alpha coefficient was found to be 0.847, which exceeds the accepted threshold of 0.70 (Nunnally, 1978), confirming that this instrument is reliable. The alphas for each individual construct ranged from 0.79 (Government Support) to 0.89 (Economic Performance) and therefore all exceed the acceptable alpha level. Content validity was achieved via an expert review and pilot test process, whereas construct validity was evaluated by factor analysis, confirming the hypothesised factor structure with all items loading onto their intended constructs with loadings above 0.60.

3.8 Data Analysis

Quantitative analysis of data consisted of the following statistical techniques:

- Descriptive Statistics: frequency distributions, means, standard deviations were utilised to describe the sample and represent characteristics of circular economy awareness/adoption.
- Reliability Analysis: All multi-item scales had Cronbach's alpha computed, to test for internal consistency.
- Correlation Analysis: Also used Pearson's correlation coefficients to identify and test for bivariate relationships among key variables, and identify potential multi-collinearity.
- Regression Analysis: Used multiple regression analysis to test the hypotheses regarding the relationship between circular practices and economic performance, while testing innovation capability as a mediating variable using Baron and Kenny's (1986) method.
- Hypothesis Testing: All hypotheses were tested using a 5% significance level ($p < 0.05$).

Qualitative interview data were examined using thematic analysis, based on Braun and Clarke's (2006) six-phase framework. Inductive themes emerged from all thematic categories and mapped onto the a priori identified thematic categories from the literature.

3.9 Ethical Considerations

Participants in this research voluntarily gave their informed consent prior to entering the study. They were guaranteed that

their responses would remain confidential and anonymous as far as possible. All collected data was kept in a secure location, and only used for the purpose of this academic research project. All research was completed according to the ethical guidelines established by Sri Krishna Arts and Science College, Coimbatore, India.

4. RESULTS AND DISCUSSION

4.1 Profile of Respondents

The characteristics of the 120 participants be illustrated in Table 1, and indicates that most of the participants (76.7%)

were male, which is in line with industry-wide research that indicates that most MSME's in India are owned by men. With respect to business age, most of the participants had been in business for between 5 – 15 years; this represents businesses that are relatively stable in the marketplace, yet open to innovative business practices. The majority of participants (55.8%) were engaged in manufacturing, while the remaining 44.2% were classified as engaging in providing services. When looking at the breakdown of businesses of those engaged in manufacturing, the following three types of businesses were most prominently represented: Textiles (22.5%), Engineering Goods (18.3%) and Food Processing (15.0%).

Table 1: Profile of Respondents

Category	Sub-Category	Frequency (%)
Gender	Male	76.7%
	Female	23.3%
Business Age	Less than 5 years	34.2%
	5–15 years	41.7%
	More than 15 years	24.1%
Sector	Manufacturing	55.8%
	Service	44.2%
Enterprise Size	Micro	52.5%
	Small	35.0%
	Medium	12.5%
Education Level	Up to Higher Secondary	28.3%
	Graduate	44.2%
	Postgraduate	27.5%

4.2 Circular Economy Awareness among MSMEs

According to the survey, 64.2% of those surveyed had been exposed to the concept of circular economy through various sources such as media, industry groups and government programs. However only 37.5% had a clear operational concept of how their own businesses could benefit from implementing circular practices. This shows a large gap between awareness and understanding of circular economy principles that is critical when developing policy.

The qualitative interviews further build the quantitative data on this lack of understanding. Some of the respondents who reported an overall lack of awareness of circular economy actually had been engaged in circular activity without knowing it. For example, many of them reported selling production waste to recyclers, reusing packaging materials and implementing energy savings. One textile MSME owner stated, "We have been reusing water in our dyeing process for years to save money - I just didn't know it was called a circular

economy." Therefore, developing targeted sector-specific awareness programs which emphasize tangible cost benefits rather than abstract sustainability concepts could quickly formalize and accelerate many of the informal circular practices currently being utilized.

4.3 Adoption of Circular Business Practices

As can be shown in Table 2, the highest rate of reported adoption among the research sample related to reduced waste in production processes (71.7%) and reused packaging materials (67.5%). These two circular practices had very high adoption rates because they offer the greatest potential for immediate and visible cost savings for companies. However, as related to the adoption rates for other circular practices that required a higher level of capital investment or systemic changes to implement, there were significant declines in the reported adoption rates for the two circular practices with the lowest reported adoption rates (e.g., renewable energy use [27.5%], product redesign for lifespan extension [32.5%]).

Table 2: Adoption of Circular Business Practices among MSMEs

Circular Practice	Adopted (%)	Not Adopted (%)
Waste reduction in production processes	71.7%	28.3%
Reuse of packaging and materials	67.5%	32.5%
Energy-efficient equipment and processes	54.2%	45.8%
Recycling of production waste and by-products	49.2%	50.8%
Sustainable and local supply chain sourcing	41.7%	58.3%
Product redesign for extended useful life	32.5%	67.5%
Renewable energy sources (solar, wind)	27.5%	72.5%
Industrial symbiosis or waste exchange partnerships	21.7%	78.3%

4.4 Reliability Analysis

Table 3 provides Cronbach's alpha reliability coefficients for each measurement scale, each of which is above the 0.70 threshold recommended by Nunnally (1978), hence all have

demonstrated the requisite levels of internal consistency. The overall instrument alpha is 0.847, demonstrating the reliability of the total composite measurement approach.

Table 3: Reliability Analysis — Cronbach's Alpha Coefficients

Construct	No. of Items	Cronbach's Alpha
Circular Economy Awareness	8	0.821
Circular Business Practice Adoption	12	0.836
Innovation Capability	6	0.813
Economic Performance	10	0.891
Government Policy Support	4	0.792
Overall Instrument	40	0.847

4.5 Correlation Analysis

Study variables correlation matrix is presented by Pearson in Table 4. Strong positive relationship exists between circular economy awareness and circular practice adoption ($r = 0.712$, $p < 0.01$), providing preliminary evidence for H1 (circular economy awareness $\Rightarrow$ circular practice adoption). Strong and positive associations were observed for economic performance ($r = 0.681$, $p < 0.01$) and cultural practice opening ($r = 0.681$, p

< 0.01). Innovation capability is highly related to both circular practice opening ($r = 0.643$, $p < 0.01$) and economic performance ($r = 0.697$, $p < 0.01$). This provides some initial support for the proposed mediating role of innovation capability (H3). Moderate association ($r = 0.538$, $p < 0.01$) was also found for government support with respect to circular practice opening, which supports H4.

Table 4: Pearson Correlation Matrix of Key Study Variables

Variable	1	2	3	4	5
1. CE Awareness	1.000	0.712**	0.534**	0.489**	0.421**
2. Circular Practices	0.712**	1.000	0.643**	0.681**	0.538**
3. Innovation Capability	0.534**	0.643**	1.000	0.697**	0.482**
4. Economic Performance	0.489**	0.681**	0.697**	1.000	0.509**
5. Government Support	0.421**	0.538**	0.482**	0.509**	1.000

4.6 Regression Analysis: Impact of Circular Practices on Economic Performance

The hypothesized relationship between circular business practices and economic performance in micro, small, and medium-sized enterprises (MSMEs) was tested using multiple regression analysis. The results of this analysis are presented in

Table 5. Additionally, the innovation capability and government support variables were included in the analysis to assess their independent contribution to the relationship between circular business practices and MSME economic performance.

Table 5: Multiple Regression Results

Variable	B	Std. Error	Beta	p-value
Constant	0.842	0.312	—	0.008**
Circular Practice Adoption	0.431	0.068	0.412	0.000***
Innovation Capability	0.287	0.071	0.274	0.000***
Government Policy Support	0.198	0.083	0.156	0.018*
CE Awareness	0.143	0.074	0.128	0.054

This regression analysis model accounts for 67.1% of the variance in the economic performance of MSMEs ($R^2 = 0.671$, adjusted $R^2 = 0.659$), while the overall model is statistically significant ($F(4,115) = 58.37$, $p < 0.001$). The strongest predictor within the regression model is Circular practice adoption ($Beta = 0.412$, $p < 0.001$), followed by Innovation capability ($Beta = 0.274$, $p < 0.001$) and Government policy support ($Beta = 0.156$, $p < 0.05$). CE Awareness did not emerge as a significant predictor of economic performance in this analysis ($p = 0.054$), which is in line with the original proposed

framework's conceptualization of CE Awareness as an antecedent to Circular Economy Adoption, rather than a direct predictor of economic performance. These findings provide substantial support for H2, H3, and H4.

4.7 Economic Benefits Reported by Circular Practice Adopters

Among the 52 respondents who had adopted three or more circular practices, self-reported economic benefits were substantial, as shown in Table 6.

Table 6: Economic Benefits Reported by MSMEs Adopting Three or More Circular Practices

Economic Benefit	Respondents Reporting (%)
Reduction in raw material costs (10–25%)	67.3%
Improved net profit margin over last 2 years	61.5%
Reduction in waste disposal and handling costs	73.1%
Enhanced brand reputation and customer loyalty	57.7%
New revenue streams from waste/by-product sales	48.1%
Reduced exposure to raw material price volatility	44.2%
Improved access to export markets (sustainability requirements)	34.6%

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4.8 Barriers to Circular Economy Adoption

Despite the clear economic benefits documented above, significant barriers to broader adoption persist. Table 7 presents

the key challenges identified by the full sample of 120 respondents.

Table 7: Key Barriers to Circular Economy Adoption among MSMEs (n = 120)

Barrier	Respondents Affected (%)
High initial investment cost for circular equipment and processes	75.8%
Limited awareness and understanding of circular economy practices	70.8%
Insufficient government financial incentives for circular investment	67.5%
Difficulty accessing reliable waste recycling and material recovery partners	62.5%
Limited access to green and sustainable finance products	58.3%
Shortage of technically trained workforce for sustainable operations	51.7%
Inadequate market demand for circular/sustainable products	43.3%
Regulatory uncertainty regarding sustainable business practices	37.5%

In the study, (Rizos et al. 2016; Singh et al. 2020), the highest barriers established for all the respondents identified (75.8%) high initial investment cost and (70.8%) low awareness as the highest barriers. In Access to Recycling Partners, one of the most significant (62.5%) barriers is an indication of a significant gap in infrastructure, mainly due to the limited availability of established industrial symbiosis networks and/or

material exchange platforms within many Indian industrial regions (e.g., Coimbatore).

4.9 Hypothesis Testing Summary

Table 8 summarises the results of hypothesis testing across all five study hypotheses.

Table 8: Summary of Hypothesis Testing Results

H	Hypothesis Statement	Test Result	Decision
H1	CE awareness positively influences circular practice adoption.	$r = 0.712, p < 0.01$	Supported
H2	Circular practices significantly improve economic performance.	$\text{Beta} = 0.412, p < 0.001$	Supported
H3	Innovation capability mediates circular practices–competitiveness.	Mediation confirmed	Supported
H4	Government support positively moderates circular adoption.	$\text{Beta} = 0.156, p < 0.05$	Supported
H5	Resource efficiency contributes to cost reduction and profitability.	$r = 0.648, p < 0.01$	Supported

4.10 A Framework for Circular MSME Growth: The CMSME-5 Model

The findings from this research and the literature will be used to develop a 5 stage business growth model called the Circular MSME Growth framework (CMSME-5 model) that can be applied by the Indian MSME (Micro Small Medium Enterprise)

sector to assist those businesses in their transition from linear production to circular business processes.

The framework will be developed with the empirical data collected during the research and will be applicable to small and micro businesses that operate with limited resources and capacities.

Table 9: The CMSME-5 Circular MSME Growth Framework

Stage	Name	Core Action	Expected Outcome
1	Awareness Building	Engage with circular economy training through industry associations, SIDBI programmes, and MSME development institutes.	Clear understanding of circular economy principles and their sector-specific applications.
2	Resource Audit	Systematically map all material, energy, and water inputs and outputs to identify the highest-value waste reduction opportunities.	Prioritised list of circular investment opportunities ranked by cost-saving potential.
3	Pilot Implementation	Implement one or two low-cost, high-impact circular practices — such as waste reduction in production or packaging reuse — to build internal capability and demonstrate business value.	Documented cost savings and operational learning to support the business case for broader investment.
4	Ecosystem Building	Establish partnerships with waste recyclers, green suppliers, and complementary MSMEs to create local circular material loops and industrial symbiosis relationships.	Expanded circular value creation through shared infrastructure and collective efficiency.
5	Scale and Certify	Access government green financing schemes, apply for sustainability certifications, and expand circular practices across all business operations.	Certified circular business status, enhanced market access, investor attractiveness, and competitive differentiation.

5. DISCUSSION

This research adds to the growing body of empirical literature regarding circular economy entrepreneurship and sustainability of micro, small and medium sized enterprises (MSMEs) in a meaningful way. Specifically, regression results show strong evidence for the positive economic impact of circular business practice adoption on MSME performance, even after controlling for prior innovation and government assistance to the firm. The explained variance ($R^2 = 0.671$) is a high effect size in social science research and suggests that circular business practices are some of the most important drivers of MSME economic performance in this context.

A significant finding is that innovation capability is an important mediator for the relationship between circular business practice adoption and MSME performance (H3 supported). Circular business practices likely help improve economic performance by being a catalyst for developing other innovative processes within the firm, rather than just providing cost reductions. Owners of MSMEs who implement circular business practices develop new capabilities in areas like process re-design, material science, supplier management and customer engagement which have a positive spill over effect on the overall performance of their business. These findings support the theoretical proposition of the Resource-Based View (Barney, 1991) that developing unique, experiential capabilities is the basis for developing a sustainable competitive advantage.

The study uncovered that numerous MSME owners were widely implementing circular activities without documenting them as such. Even though this information is not capable of being statistically verified on a formal basis, it has significant practical implications. It indicates that the difference between current circular practices and optimum levels of circularity is likely much smaller than the current statistics regarding the level of awareness of MSMEs would lead one to believe. Targeted awareness campaigns that create a connection between currently established practices and the circular economy and provide a pathway through which they can be elaborated upon and expanded will likely be able to effect sizable improvements in the adoption of said practices at a relatively low cost over a short period of time.

Furthermore, the barriers identified in this study are supportive of existing literature on the subject while providing additional detail concerning previously available literature regarding the impact of barriers on the ability of MSMEs to transition to a circular business model. The considerable barrier presented by high start-up capital costs is consistent with De Jesus and Mendonça's (2017) conclusion that financial barriers are the primary obstacle to small businesses transitioning to circular economy models in developing economies. Also, there was a significant percentage (62.5%) of MSME owners that reported having encountered difficulty in accessing recycling partners. This is indicative of a significant infrastructure gap, specifically a lack of well-developed industrial symbiosis networks that has not previously been emphasized in the Indian MSME literature and represents a significant avenue for policy intervention.

6. CONCLUSION

This research presented solid empirical data demonstrating both that circular entrepreneurship and the adoption of circular

business models yield significant positive results with respect to the economic performance and sustainable growth of Micro, Small and Medium Enterprises (MSMEs) in India. The principal outcome, that the word "adopted" in the context of circular entrepreneurs correlates to 67.1% (with a solid standardized beta coefficient of .412) of the variance of the MSME's economic performance, continues to be one of its strongest quantitative representations of the business case for the adoption of the circular economy within the Indian MSME population.

The results also identify innovation capability and governmental support as significant complementary enablers of the performance of circular MSMEs; while awareness serves as a critical precursor to adoption, it cannot deliver an economic benefit on its own. This highlights important considerations for policy creation; awareness campaigns alone are insufficient; they should also be combined with tangible assistance in actual implementation and innovation.

The current situation for India presents many options for the way forward. On the one hand, the country's MSME development priorities and commitments to sustainable development (as outlined in the Paris Agreement) coincide; subsequently, there is a significant worldwide demand for more sustainable types of manufacturing products. This means that MSMEs will have numerous opportunities to move forward with their operations in harmony with the environment while also producing goods for which there is a high economic and environmental value.

The CMSME-5 framework is presented as an operationalized and sequential method by which MSMEs and those that help them transition into a circular economy (i.e., policymakers, industry associations) can utilize resources to make this happen.

6.1 Policy Recommendations

- The Indian government can create a special fund for green MSME financing through the Small Industries Development Bank of India (SIDBI), giving loans to MSMEs to invest in the circular economy at a concessional interest rate (about 3-5%) for micro-enterprises and up to INR 50 lakh per Enterprise.
- The Ministry of MSME can create an accredited certification system for Circular Economies that will provide MSMEs with a preference in government contracting and assist them in accessing Export Markets.
- State governments and the District Industries Centres can create Circular MSME Industrial Parks, where MSMEs share waste streams, recycle, and provide Renewable Energy.
- Industry Associations, such as CII, FICCI and NASSCOM can create knowledge centres to provide free training and networking opportunities for the owners of MSMEs to promote innovation in the field of circular economy. Business Schools and School of Commerce should also include circular economy and circular entrepreneurship in their undergraduate and graduate business programs in order to develop a new generation of circular business leaders.

6.2 Limitations and Future Research

There are many limitations in the study presented here. First of all, we cannot determine causal relationships within the study design — future studies employing longitudinal designs to track the performance of MSMEs before and after they adopted circular practices would provide stronger causal evidence. The geographical area of Coimbatore, Tamil Nadu limits how generalizable the findings will be to other Indian industrial-MSMEs, therefore, research on a national scale across multiple cities in India is warranted. The use of self-reported economic performance data can introduce response bias. Thus, the findings from the current study should be triangulated against independently audited financial data wherever possible in future research. Additionally, future research should explore circular economy pathways in specific sectors at a greater level of detail, given the differences in circular economy opportunities and challenges found in India's three largest MSME sectors, which are textiles, food processing, and engineering goods. Furthermore, the role of digital technologies such as IoT-enabled resource monitoring, block chain-based visibility of material flows, and AI-enabled circular economy design tools will represent an important and yet under-researched area of inquiry to support resource-constrained MSMEs in their circular transitions.

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