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EMPOWERING WOMEN ENTREPRENEURS FOR SUSTAINABLE TRANSFORMATION IN THE FOOD PROCESSING INDUSTRY

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ABSTRACT

Women entrepreneurs play a vital role in promoting economic growth, employment generation, and sustainable development, particularly in the food processing industry. Despite increasing government support and expanding market opportunities, women entrepreneurs continue to encounter barriers related to financial empowerment, skill and capacity development, digital empowerment, and institutional support, which limit their ability to achieve sustainable business transformation. This study examines the influence of financial empowerment, skill and capacity development, and digital empowerment on sustainable transformation among women entrepreneurs in the food processing industry. It further investigates the mediating role of business innovation capability and the supporting role of technology adoption and government policy. A quantitative descriptive research design was adopted, and primary data were collected from 335 women entrepreneurs engaged in food processing enterprises across Tamil Nadu using a structured five-point Likert scale questionnaire. The data were analysed using percentage analysis, reliability analysis, descriptive statistics, correlation analysis, one-way ANOVA, and regression analysis. The findings reveal that financial empowerment, skill and capacity development, and digital empowerment significantly enhance business innovation capability, which subsequently improves economic, environmental, social, and operational sustainability. The study also demonstrates that technology adoption and supportive government policies strengthen sustainable transformation by enhancing innovation, productivity, and market competitiveness. The proposed integrated framework contributes to the existing literature by explaining the relationship between women entrepreneurs' empowerment dimensions and sustainable transformation through business innovation capability. The findings provide valuable implications for policy-makers, financial institutions, and entrepreneurship development agencies to formulate effective strategies that strengthen women-led food processing enterprises and support the achievement of Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure).

KEYWORDS: Women Entrepreneurs; Food Processing Industry; Financial Empowerment; Skill and Capacity Development; Digital Empowerment; Business Innovation Capability.

INTRODUCTION

Women's entrepreneurship has been considered an important source of economic growth, social change and sustainable development in the world (Hechavarria et al., 2019). Women entrepreneurs are involved in employment creation, poverty reduction, innovation and inclusive development to aid the realization of Sustainable Development Goals (SDGs) particularly gender equality and economic growth (Brush et al., 2019). Women entrepreneurs have contributed to household welfare, economic resilience and economic development of the communities in emerging economies (D'Silva & Bhat, 2022). Food processing is the sector which has immense potential for empowering women entrepreneurs, as it is the linkage between the agriculture sector and industry, adding value to agriculture, creating employment and contributing to food security (Meena, J. R. Report of FAO (2023)). The role of women entrepreneurs in inclusive economic growth, innovation and social development is an important phenomenon all over the world. Women's involvement in entrepreneurship helps to bring about achievement of Sustainable Development Goals (SDGs), especially SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities) (United Nations, 2023).

Therefore, strengthening women-led enterprises is therefore essential for promoting sustainable development, economic empowerment, and inclusive growth in both developed and developing economies. Food preparation & preservation has been the traditional work for women which ensures a good platform for food-based enterprises (Costa, V., et al., 2023). Women's involvement in the food processing activities has positively enhanced their financial independence, decision-making capacity and socio-economic status, especially self-help groups and micro-enterprises (Ghosh et al., 2024).

However, women entrepreneurs encounter difficulties including limited access to financial resources, lack of technical expertise, market pressure, gender discrimination, and lack of business networks (D'Silva & Bhat 2022; McDonagh et al. 2024). But, the Government initiatives, microfinance assistance, digital platforms, and increasing demands for processed and sustainable food products have opened up new opportunities for enterprise development (Adithya et al., 2025). Hence, a knowledge of these challenges and opportunities is necessary for sustainable development and economic empowerment of the women entrepreneurs in the food processing industry.

STATEMENT OF THE PROBLEM

The food processing industry offers significant opportunities for women entrepreneurs to contribute to economic growth, employment generation, and sustainable development. Despite various

government initiatives and increasing market demand for processed food products, women entrepreneurs continue to face challenges such as limited access to finance, inadequate entrepreneurial skills, low digital adoption, restricted market access, and insufficient institutional support. These barriers reduce their ability to innovate, expand their businesses, and achieve sustainable transformation. Therefore, it is essential to examine how different dimensions of women entrepreneurs' empowerment contribute to business innovation capability and sustainable transformation in the food processing industry.

RESEARCH GAP

Although previous studies have examined women entrepreneurship, financial inclusion, and sustainable development separately, limited research has integrated financial empowerment, skill and capacity development, digital empowerment, and market access into a single framework to explain sustainable transformation in the food processing industry. Moreover, the mediating role of business innovation capability has received limited empirical attention, particularly in the context of women entrepreneurs in India. This study addresses this gap by proposing an integrated framework that explains how empowerment dimensions influence sustainable transformation through business innovation capability.

REVIEW OF LITERATURE

The role of women entrepreneurship in economic development, innovation and social inclusion has been increasingly recognised in the recent literature. Research shows that women's entrepreneurship plays a significant role in job creation, income generation, and economic growth and is an important tool for combating poverty; yet women are still grappling with a number of structural and institutional challenges. One of the issues highlighted in the literature is financial resource limitations. According to Brush et al., (2019), one of the challenges that women entrepreneurs face is access to venture capital or business financing, which limits enterprise growth and sustainability. Likewise, Jabeen et al., (2019) highlighted the importance of access to resources, entrepreneurial orientation and institutional support for innovation and competitiveness of women entrepreneurs.

Research focusing specifically on the food processing sector reveals additional challenges. D'Silva and Bhat (2022) identified barriers such as inadequate access to finance, technological constraints, limited market information, insufficient training opportunities, and socio-cultural restrictions. The authors stressed the need for supportive policies, skill development initiatives, and institutional assistance to strengthen women's participation in food processing activities. This study examines the challenges and opportunities faced by women entrepreneurs in the Nutri-cereals industry, focusing on their contributions to sustainable agriculture, nutritional security, and economic empowerment (Anisha & Chandrasekar 2025).

Entrepreneurs can also find great opportunities in the food processing sector for business and economic growth. Meena (2023) emphasized that the sector has the potential to create value addition, job creation, export growth, and rural industrialization, which makes it a good area for employment for women entrepreneurs, especially in the rural areas and semi-urban areas. Moreover, Ghosh et al., (2024) showed that women's financial inclusion, decision-making power, income generation and empowerment are positively associated with their involvement in self-help groups (SHGs) which helps women achieve Sustainable Development Goals (SDGs). These results are confirmed by studies in international settings. McDonagh et al. (2024) identified female agri-food entrepreneurs' difficulties, including lack of financial resources, limited business networks, family responsibilities, and gender stereotypes.

Adithya, et al., (2025) underlined that sustainable food entrepreneurship is playing an increasingly vital role in addressing environmental sustainability, food security, and socio-economic development by creating value-added and innovative food products, especially by female entrepreneurs. In conclusion, the literature indicates that women entrepreneurship in the food processing industry has significant implications for economic empowerment, improving livelihoods, and sustainable development. However, certain financial, technological, skill, market access and socio-cultural challenges are still limiting entrepreneurial success. While the studies on women entrepreneurship, food processing and sustainable development are conducted separately, there has been a dearth of integrated studies that explore the linkages between the challenges and opportunities of women entrepreneurs with sustainable development and economic empowerment in the food processing sector. The present study is founded on this research gap.

In the last few years, the food processing industry has undergone a remarkable transformation in technology, with the drive to enhance food quality, safety, sustainable development, and operational efficiency. Non-thermal food processing technologies have become of significant interest as alternative technologies to traditional thermal processing. Chiozzi et al., (2022) noted that non-thermal technologies like high-pressure processing, pulsed electric fields and cold plasma offer advantages in terms of food quality, improving shelf life, reducing microbial contamination and retaining the nutritional value, colour, taste and functional properties of the food. These technologies are also energy efficient, environmentally friendly, and thus are increasingly appealing for modern food processing industries. Optimizing resources and sustainability are key issues in food processing research.

Bala et al., (2023) highlighted the significance of the valorisation of agricultural wastes by biotechnological and green approaches for bio-compounds recovery and value-added products production. They also pointed out that micro- and nano-encapsulation has become an important

method for stability and efficacy improvements of bioactive molecules in food applications. Similarly, Zhou and Zhou, X. Q., et al., (2023) discussed the application of zinc oxide nanoparticles in food and agriculture, demonstrating their potential antimicrobial properties and contributions to food preservation and safety. New technology in the packaging of food has also come into focus. According to Hamed et al., (2022), the use of edible films/coatings from food industry by-products is a sustainable alternative to conventional plastic packaging. These not only help to decrease environmental pollution but also help to enhance the functionality of packaging due to its bioactive properties.

The authors emphasized the need to carry out life-cycle and risk assessments to guarantee environmental and consumer safety in the large-scale adoption. Food safety is still a key concern in the food processing industry. Alonso et al., (2023) summarized the different types of dry sanitization technologies that have been evaluated for biofilms in low moisture food processing systems: UV radiation, pulsed light, ozone, alcohol treatments, and cold plasma. They identified technologies that have the potential to greatly enhance food safety, but more research is needed to ensure optimization of their use in the industry. In support of this, Chowdhury et al., (2023) noted that a new environmentally-friendly microbial control approach is needed in the poultry processing industry to combat contamination and foodborne illness hazards. Mu, W., Kleter, et al., (2024) identified four areas that are transformative tools for the development of real-time food safety monitoring and early warning systems, namely, artificial intelligence (AI), the Internet of Things (IoT), machine learning, and big data analytics. According to their results, while these technologies hold great promise to improve risk identification and decision-making, there are still implementation barriers to overcome in LIC, particularly in the form of infrastructure and data constraints. Corigliano et al., (2025) also pointed out that the use of Industry 5.0 technologies and IoT-based systems in food processing is becoming increasingly common, as they can contribute to greater sustainability, productivity, and resource efficiency.

Research continues to be devoted heavily to advanced processing technologies. Chavan et al., (2022) looked at ultrasound applications in food processing and found that it has great potential to enhance product quality, extraction processes, preservation and energy savings. However, there is a need for additional research to optimize the processing parameters and to design a food-grade ultrasonic system for large scale industrial application. Similarly, Corigliano et al., (2025) highlighted the technologies like the pulsed ultraviolet light, cold plasma, ionizing radiation, and high hydrostatic pressure as some of the innovative technologies key to sustainable food production systems. In recent years, studies also have focused on the role of energy efficiency and environment in food system.

Thus, implementing energy-efficient technologies, sustainable production processes and international collaboration is regarded as crucial for long-term sustainability and meeting the increasing food

demand. In addition to technological developments, the study of entrepreneurship has gained more interest in the experiences and challenges of female entrepreneurs. Women entrepreneurs have been marginalized from traditional entrepreneurship literature due to its limited focus on their embodied and gendered experiences, as stated by Oliveira et al., (2024). They examine entrepreneurs' agency in the light of feminist phenomenology that makes it important to learn about lived experiences, social context, and institutional inequality that influence the agency of entrepreneurs. Likewise, Ahmetaj et al., (2023) identified that family support and inherited resources play a crucial role in the success of women entrepreneurs, and that prevailing gender norms and gender inequalities in the labour market still restrict women's opportunities. There have been a number of research studies that have highlighted structural, social and economic challenges to women entrepreneurs. Adikaram and Razik (2023) noted issues such as access to finance, networks, skilled labour, and social support. Moral et al., (2024) established that vulnerable living conditions, increasing input costs, health-related problems and inadequate entrepreneurial and managerial skills limit the growth of women owned businesses.

Financial necessity, dissatisfaction with current job, self-efficacy and social support were also shown to have a strong influence on entrepreneurial intentions among rural women as was found by Durrah et al., (2024). Other studies have investigated the social and psychological aspects of women entrepreneurship in general. Amigot-Leache et al., (2023) investigated the emotional encounters of young women in entrepreneurship and drew attention to the idea of vulnerability, tension and resistance in the entrepreneurial field. Al-Dajani (2022) highlighted that research on women entrepreneurship, especially for refugee women, is still in its early stages and is a new research field that is associated with research on resilience, empowerment, livelihood and development. Raimi et al., (2023) also suggested that adaptive entrepreneurial strategies support women and other marginalised groups to deal with institutional uncertainty and to reach socio-economic inclusion.

An additional domain within food processing industries that has captured scholarly interest as of late is supply chain sustainability. Through their research, Uttam et al., (2025) found that small suppliers grapple with tensions across learning, belonging, organizing, and performance, thereby threatening social sustainability goals. They concluded that a multi-stakeholder and supply chain governance intervention is needed to bolster social sustainability. Finally, advances in sensor technologies have contributed to improved monitoring and quality assurance in food processing. Wawrzyniak (2023) highlighted the growing applications of metal oxide semiconductor gas sensors for detecting volatile organic compounds and monitoring food quality during processing and storage. Such innovations support more accurate quality control systems and improve consumer safety.

Women entrepreneurship has gained considerable attention as a key driver of economic development, innovation, and sustainable transformation. Previous studies have identified financial empowerment,

skill development, digital empowerment, and innovation capability as major determinants of entrepreneurial success. Al Taweel and Al Hawary (2021) examined the relationship between strategic agility, innovation capability, and organizational performance and found that innovation capability mediates the relationship between strategic agility and business performance. The study emphasized that organizations should adopt flexible resources, collaborative work practices, and innovative business models to improve competitiveness in a rapidly changing business environment. Similarly, Saunila (2020) conducted a systematic review on innovation capability in small businesses and concluded that innovation capability significantly enhances firm performance. The study also noted that there is no universal innovation strategy; instead, firms should adopt innovation practices that suit their business environment and organizational needs.

Financial empowerment has been widely recognized as an essential factor in improving women's entrepreneurial performance. Ali et al., (2021) proposed a conceptual model based on Social Cognitive Theory and demonstrated that financial literacy and financial socialization positively influence financial self-efficacy, financial management behaviour, and financial empowerment among women entrepreneurs. The study highlighted that improving financial literacy contributes to better financial decision-making and entrepreneurial success. Likewise, Ben and Yadav (2025) investigated the role of Self-Help Groups (SHGs) in empowering rural women and found that SHGs significantly improve women's financial independence, leadership skills, access to credit, financial literacy, and income generation. These findings suggest that financial inclusion and institutional support play an important role in strengthening women's entrepreneurial capabilities and socio-economic development.

Digital empowerment has become an increasingly important component of sustainable entrepreneurship. Quaicoe and Pata (2020) examined teachers' digital literacy and technology usage in Ghana and concluded that continuous digital literacy training is essential for improving technology adoption and reducing the digital divide. Similarly, Ye and Yang (2020) highlighted that government support, digital infrastructure, training programmes, and user-friendly digital platforms are crucial for promoting digital inclusion, particularly in rural communities. Extending this perspective, Sindakis and Showkat (2024) investigated digital technology adoption in rural India and found that digital literacy, education, perceived usefulness, and ease of use significantly influence digital technology adoption. These studies collectively indicate that strengthening digital capabilities is essential for improving business efficiency, market connectivity, and entrepreneurial competitiveness.

Recent studies have also established a strong relationship between digital empowerment and sustainable development. Di et al., (2024) employed Artificial Neural Network (ANN) and System Generalized Method of Moments (SYS-GMM) models to examine the relationship between digital empowerment and green industrial development. The findings revealed that digital empowerment

promotes sustainable industrial growth, enhances innovation, and provides valuable guidance for policy-makers in developing environmentally sustainable business ecosystems. These findings indicate that digital technologies not only improve operational efficiency but also contribute significantly to sustainable transformation.

Sustainable transformation within the food sector has also received increasing scholarly attention. Anderson et al., (2022) examined transformative agroecology learning and concluded that collective learning, knowledge sharing, and stakeholder collaboration are fundamental for achieving sustainable food systems and food sovereignty. The study emphasized that integrating agroecological practices with collaborative learning creates long-term environmental, economic, and social sustainability. Furthermore, Xiong et al., (2022) highlighted the importance of quality assurance, regulatory compliance, and international collaboration in expanding herbal food products into international markets. The study concluded that technological advancement, documentation, and quality control significantly enhance competitiveness and market expansion within the food processing industry.

Although previous studies have examined financial empowerment, innovation capability, digital empowerment, and sustainable development separately, limited empirical research has integrated these variables into a single framework to explain sustainable transformation among women entrepreneurs in the food processing industry. In particular, the mediating role of business innovation capability linking financial empowerment, skill and capacity development, and digital empowerment with sustainable transformation has received limited attention. Therefore, the present study addresses this research gap by proposing an integrated framework that examines how empowerment dimensions influence business innovation capability and ultimately contribute to the economic, environmental, social, and operational sustainability of women-owned food processing enterprises.

Women Entrepreneurship in the Food Processing Sector

Women entrepreneurship has emerged as one of the important factors that is driving economic growth, social development, sustainable livelihoods, especially in the developing countries (Tambunan, 2019). The Food Processing Industry offers substantial potential to women entrepreneurs in the country to add value to agricultural produce like pickles, spices, bakery products, dairy products and ready-to-eat products. Women have access to traditional knowledge and skills which help them in generating jobs, improving household income and rural economic development (Yadav & Unni, 2021). Food processing is an important sector to prevent post-harvest losses, enhance agricultural productivity and improve rural economy. Women entrepreneurs are not only responsible for providing women self-employment but also provide jobs for other women which help to promote inclusive growth and community welfare (Ouyang, R., & Zhang, X. 2020). The government, financial assistance, entrepreneurship development, self-help groups (SHGs) and microfinance institutions have also

facilitated women's involvement in this sector by providing access to training, credit, technology and markets (World Bank, 2024).

Women entrepreneurs also play a role in sustainable development with local use of resources, rural industrialization and environmentally friendly business practices like organic production, eco-friendly packaging and waste reduction. Their businesses play a crucial role in food security, poverty alleviation, and social health and well-being, with many women using their income to invest in their children's education, health care, and their families' welfare (FAO, 2023). Despite all these contributions, women entrepreneurs still suffer from a number of problems such as lack of financial resources, lack of technical expertise, competition, regulatory and socio-cultural constraints (Roomi & Parrott, 2008). Rising digitalisation, e-commerce and consumer demand for health and value-added food, however, opens new avenues for business growth (UNDP, 2023). Further, improving women's access to finance, entrepreneurship, technology and market connectivity can contribute to the success of women food processors and sustainable and inclusive development (OECD, 2025).

Major Challenges Faced by Women Entrepreneurs

Women entrepreneurs involved in food processing industry are confronted with several issues, which hinder their business growth and sustainability. The major constraint is lack of financial resources, as many women face challenges in getting credit for various reasons, including limited financial resources and inadequate collateral (Yadav & Unni, 2021). Moreover, limited access to modern technology, digital tools, and technical training diminishes their productivity as well as competitive position on the market (Breitkreuz, R., et al., 2020). Other market factors reducing business growth and profitability are the marketing, branding, distribution and customer reach problems (Tambunan, 2019). Socio-cultural factors like family duties, limited mobility and gender norms also limit women's entrepreneurial activities and the decision-making capacity of women (Roomi & Parrott, 2008). Additionally, despite the various government initiatives, enterprise development is still constrained by institutional support, regulation, and lack of access to business development services (World Bank, 2024). To overcome these challenges and boost the success and sustainability of women's businesses, it is important to implement actions to improve financial inclusion, technological support, market access, and policy interventions.

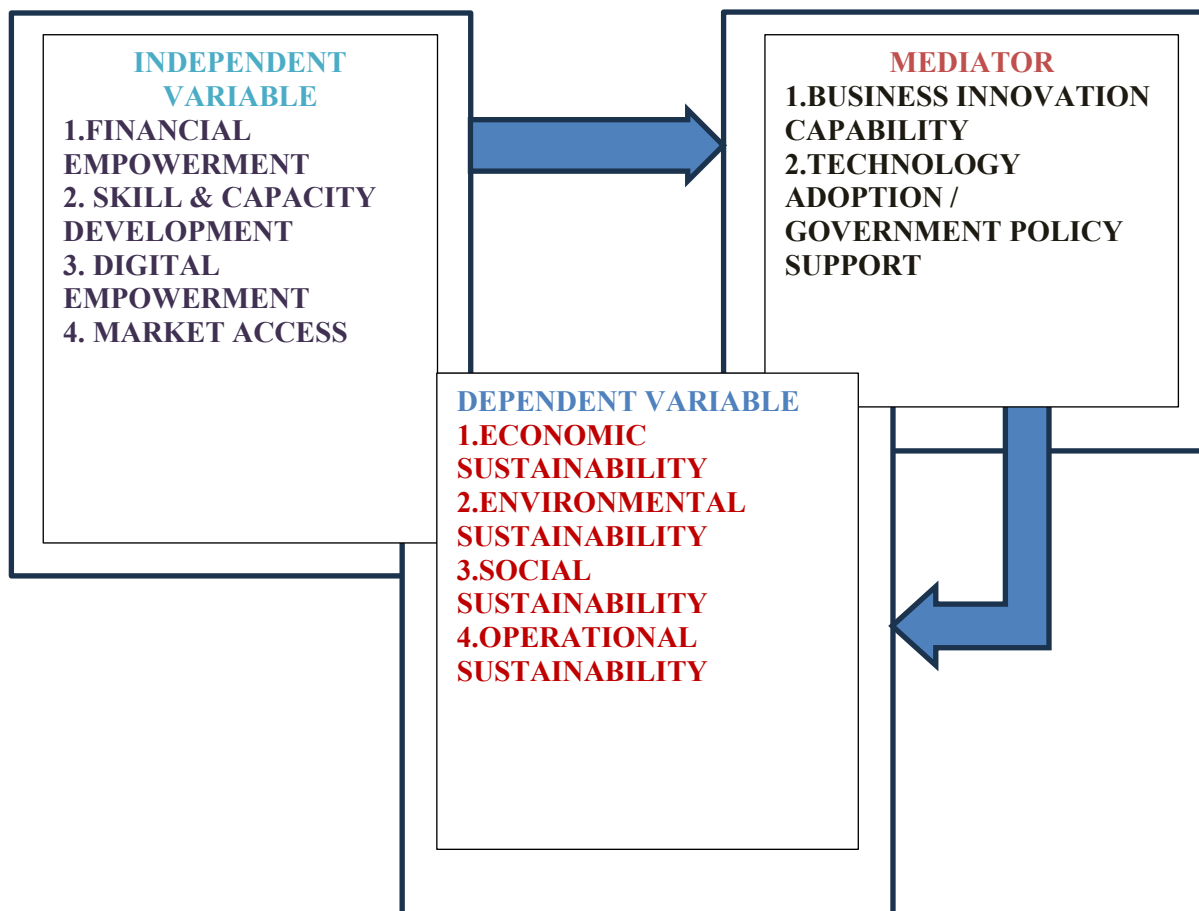
Women Entrepreneurship, Sustainable Development, and Economic Empowerment

The important factors for sustainable development namely in three aspects of employment, poverty alleviation and inclusive economic growth encompass women entrepreneurship (Tambunan, 2019). It gives women empowerment by increasing their financial autonomy, decision-making power and social status (Yadav & Unni, 2021). Women entrepreneurs are one of the groups that create employment opportunities particularly in rural areas and therefore they play a role in the economic

development of the rural areas in the food processing industry (Brixiová et al., 2020). Women entrepreneurs assist in strengthening the agricultural value chains, reduce post-harvest losses and play a role in improving food security, while contributing to sustainable management of natural resources (FAO, 2023).

They also bring earnings for their businesses, with much of it being spent on education, health and family welfare, having positive implications for the wider social sphere, social-wellbeing (Kabeer 2012). Moreover, women entrepreneurship plays an important role in the realization of SDG, in particular SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) (UNDP, 2023). Therefore, the empowerment of women entrepreneurs plays a crucial role in the economic empowerment, social inclusion and sustainable development (World Bank, 2024).

CONCEPTUAL FRAMEWORK



RESEARCH OBJECTIVE

1. To examine the major challenges faced by women entrepreneurs in the food processing industry, including financial, technological, marketing, infrastructural, socio-cultural, and institutional barriers.
2. To assess the influence of entrepreneurial capabilities and institutional support on the performance of women entrepreneurs in the food processing industry.
3. To analyze the relationship between entrepreneurial performance and sustainable transformation in the food processing industry, with reference to business growth, innovation, environmental sustainability, and employment generation.
4. To propose a strategic framework for empowering women entrepreneurs through policy interventions, capacity building, financial inclusion, and technological adoption to achieve sustainable transformation in the food processing industry.

RESEARCH QUESTIONS

R₁ How does empowering women entrepreneurs improve the sustainability of food processing businesses?

R₂ What factors help women entrepreneurs achieve sustainable business growth in the food processing industry?

HYPOTHESES

- H1:** Financial empowerment has a significant positive influence on business innovation capability among women entrepreneurs in the food processing industry.
- H2:** Skill and capacity development has a significant positive influence on business innovation capability among women entrepreneurs in the food processing industry.
- H3:** Digital empowerment has a significant positive influence on business innovation capability among women entrepreneurs in the food processing industry.
- H4:** Business innovation capability has a significant positive influence on sustainable transformation.
- H5:** Technology adoption and government policy support have a significant positive influence on sustainable transformation.
- H6:** Business innovation capability mediates the relationship between financial empowerment and sustainable transformation.
- H7:** Business innovation capability mediates the relationship between skill and capacity development and sustainable transformation.
- H8:** Business innovation capability mediates the relationship between digital empowerment and sustainable transformation.

RESEARCH METHODOLOGY

The present study adopted a quantitative and descriptive research design to examine the factors influencing the sustainable transformation of women entrepreneurs in the food processing industry. A quantitative approach was considered appropriate as it enables the collection of measurable data and facilitates statistical analysis to identify the relationships among the study variables. The descriptive research design was employed to systematically describe the characteristics, perceptions, and experiences of women entrepreneurs regarding financial empowerment, skill and capacity development, digital empowerment, market access, business innovation capability, technology adoption, government policy support, and sustainability outcomes. The study was conducted in Tamil Nadu, focusing on women entrepreneurs engaged in various food processing enterprises. The target population comprised both registered and unregistered women entrepreneurs operating micro, small, and medium-scale food processing businesses across the state. To ensure equal representation and minimize selection bias, a simple random sampling technique was adopted for selecting the respondents. A total of 335 valid questionnaires were collected and used for the final statistical analysis. Primary data were collected using a structured questionnaire developed based on an extensive review of relevant literature. The questionnaire consisted of statements measured on a five-point Likert scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. This scaling method enabled respondents to express their level of agreement with each statement related to the study variables. The collected data were subsequently analysed using appropriate statistical techniques to assess the factors contributing to the sustainable transformation of women entrepreneurs in the food processing industry.

DATA ANALYSIS

Table: 1 Demographic profile

	Particulars	Frequency	Percentage
Husband's Age	BELOW 30	52	15.5
	31–40 years	120	35.8
	41–50 years	88	26.3
	51–60 years	45	13.4
	Above 60 years	30	9.0
Husband's Occupation	Government Employee	70	20.9
	Private Employee	135	40.3
	Self-employed/Business	98	29.3
	Agriculture	32	9.6

Husband's Educational Qualification	No Formal Education	79	23.6
	Primary School	121	36.1
	Secondary School	95	28.4
	Higher Secondary	40	11.9
Husband's Monthly Income	Below 20,000	75	22.4
	20C TO 40C	110	32.8
	41 TO 61	85	25.4
	60 TO 80	65	19.4
Type of Family	NF	202	60.3
	JF	110	32.8
	EF	23	6.9

The demographic profile of the respondents indicates that the majority of the respondents' husbands (35.8%) were aged 31–40 years, followed by 41–50 years (26.3%), suggesting that most belonged to the economically active age group. In terms of occupation, 40.3% were employed in the private sector, while 29.3% were self-employed or engaged in business, indicating a stable source of household income. Regarding educational qualification, 36.1% had completed primary education, followed by 28.4% with secondary education. The monthly income analysis reveals that 32.8% of the respondents' husbands earned between ₹20,000 and ₹40,000, reflecting a predominantly middle-income background. Furthermore, 60.3% of the respondents belonged to nuclear families, followed by 32.8% from joint families and 6.9% from extended families. Overall, the findings suggest that most women entrepreneurs in the food processing sector come from households with moderate socio-economic stability, which may positively support their entrepreneurial activities and business sustainability.

Table: 2 Age and Financial Empowerment

ANOVA						
		Sum of Squares	Df	Mean Square	F	Sig.
I have adequate access to financial resources to support the business growth.	Between Groups	399.416	4	99.854	629.650	.000
	Within Groups	52.334	330	.159		
	Total	451.749	334			
I am able to obtain loans or credit when required for the business.	Between Groups	382.049	4	95.512	661.264	.000
	Within Groups	47.665	330	.144		
	Total	429.713	334			
The financial management skills help me make effective business decisions	Between Groups	391.728	4	97.932	704.784	.000
	Within Groups	45.855	330	.139		
	Total	437.582	334			
Lack of financial resources limits the expansion of a business.	Between Groups	437.123	4	109.281	639.071	.000
	Within Groups	56.430	330	.171		
	Total	493.552	334			
High borrowing costs discourage me from investing in the business.	Between Groups	438.293	4	109.573	825.617	.000
	Within Groups	43.797	330	.133		
	Total	482.090	334			

The ANOVA result indicates a statistically significant difference in respondents' perceptions regarding adequate access to financial resources to support business growth ($F = 629.650$, $p < 0.001$). Since the significance value is less than 0.05, the null hypothesis is rejected. This finding suggests that access to financial resources varies significantly among women entrepreneurs and plays an important role in supporting business growth. The collected data were coded and analysed using IBM SPSS Statistics. Percentage analysis was used to describe respondents' demographic characteristics. Reliability analysis assessed the internal consistency of the measurement scales. Descriptive statistics measured the mean and standard deviation of study variables. Pearson correlation analysis examined the relationships among the variables. One-way ANOVA was employed to identify significant differences in perceptions across respondent groups. Regression analysis was used to determine the influence of financial empowerment, skill development and digital empowerment on business innovation capability and sustainable transformation. The ANOVA results indicated statistically significant differences across respondent groups for all financial empowerment variables ($p < 0.001$),

supporting the existence of meaningful variation in respondents' perceptions.

RESULTS

The findings reveal that financial empowerment, skill and capacity development, and digital empowerment positively influence business innovation capability among women entrepreneurs in the food processing industry. Furthermore, business innovation capability significantly enhances sustainable transformation by improving economic, environmental, social, and operational sustainability. The ANOVA results showed statistically significant differences for all financial empowerment statements ($p = 0.000$), indicating that respondents differed significantly in their perceptions regarding access to finance, availability of credit, financial management skills, financial constraints, and borrowing costs.

DISCUSSION

The findings are consistent with previous studies that identified financial access, entrepreneurial skills, digital capability and innovation as critical determinants of entrepreneurial success. Women entrepreneurs with better access to finance, training and digital technologies exhibit higher levels of innovation, competitiveness and business sustainability. Government support and technology adoption further strengthen business performance by enabling efficient production, improved market access and better resource utilisation. These findings reinforce the importance of integrating financial, technological and institutional support mechanisms to promote sustainable entrepreneurship in the food processing sector.

PRACTICAL IMPLICATIONS

- Government agencies should expand subsidised credit schemes and simplify loan procedures for women entrepreneurs.
- Financial institutions should design women-focused financial products with lower collateral requirements.
- Entrepreneurship Development Institutes should provide continuous skill development and digital literacy programmes.
- MSME Development Institutes should establish innovation and technology support centres for women-owned food processing enterprises.
- Women entrepreneurs should adopt digital technologies, e-commerce platforms and innovative business practices to improve competitiveness.
- Policy-makers should strengthen public-private partnerships to promote sustainable entrepreneurship and encourage business innovation.

- Market linkage programmes and export promotion initiatives should be enhanced to improve business growth and long-term sustainability.

CONCLUSION

Women entrepreneurs are important contributors to the promotion of sustainable transformation in the food processing industry as they are significant contributors to employment creation, value addition, innovation and inclusive economic development. Yet, their entrepreneurship potential remains often limited by their lack of financial empowerment, skill and capacity development, digital empowerment and institutional support. This research illustrates how strengthening these empowerment dimensions can significantly increase business empowerment, thereby supporting a key driver of sustainable transformation – business innovation capability. Also, the adoption of technology and favourable policies enables business competitiveness and enhances economic, environmental, social and operational sustainability.

The results show that developing entrepreneurial capabilities, financial inclusion along with digital literacy, support for innovations and enabling policy interventions are crucial to enhancing the sustainability of women's food processing businesses in the longer term. The proposed framework gives a thorough understanding of how empowerment initiatives drive sustainable business results in terms of innovation capability. The study also provides practical recommendations for the government, financial institutions, entrepreneurship development agencies and MSME support organizations to develop targeted programmes to support women entrepreneurs. In summary, women entrepreneurship promotion is not only vital for improving the performance of businesses but also for inclusive economic development and sustainable development as well. Women entrepreneurs can help achieve the Sustainable Development Goals, particularly SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) by fostering innovation, increasing market competitiveness and boosting access to finance and technology. The conceptual framework proposed in this study can be tested using Structural Equation Modeling (SEM) in various regions and industries so that it can be generalized and have policy implications.

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