

Integrating Digital Transformation And Innovation For Sustainable Entrepreneurship In Small And Medium-Sized Enterprises (Smes)

¹ Dr. R. Florence Bharathi, ² Dr. D. Sasikala Devi, ³ Praveen Kumar Gandra, ⁴ Surendar Gade, ⁵ Dr. Sunita Dhote, ⁶ Dr Priya Makhija

ABSTRACT

The focus of business study has shifted to entrepreneurship because of its ability to improve economic resilience and have a transformative effect. Within Small and Medium-sized Enterprises (SMEs), innovation and digital transformation are integrated with the new paradigm of sustainable entrepreneurship. For long-term success and competitiveness, SMEs must combine these essential components as the global business landscape experiences dynamic changes. SMEs make up 90% of all enterprises and 50% of all jobs worldwide, making them an important part of the global business scene. The study investigates how innovation in sustainable entrepreneurial practices and digital transformation work together to promote smooth integration. The idea of sustainable entrepreneurship is still in its infancy, while receiving increasing support from institutions. Discussions over its definition, application, and driving forces are ongoing. A model that makes use of various estimation strategies has been developed to traverse this changing terrain. Based on a thorough literature review and quantitative analysis involving 325 entrepreneurs, the article clarifies the strategic paths that SMEs can take to attain synergy, promoting resilience and adaptability. The results highlight the need for a comprehensive strategy that combines innovation, digital transformation, and sustainable entrepreneurship to move SMEs toward a future of efficiency, growth, and sustainability.

Keywords: Digital Transformation, Innovation, Sustainable Entrepreneurship, SMEs

1. INTRODUCTION

As a dynamic force, entrepreneurship is at the forefront of promoting good developments and strengthening the resilience of the economy. Recent research has placed a strong emphasis on entrepreneurship, highlighting its critical role in promoting innovation, economic development, and social progress. A wide range of conceptual frameworks have been developed over the course of entrepreneurship's evolutionary journey. These include the resource-based view of the firm, the complexities of the entrepreneurial process, the significant influence of social

1. Associate Professor, Department of Management Studies, Vivekanandha Institute of Information and Management Studies, Tirchengode, Tamil Nadu, India.
2. Associate Professor and Head, Commerce with Information Technology, Sri Ramakrishna College of Arts & Science, Bharathiar University, Coimbatore, Tamil Nadu, India.
3. Assistant Professor, Narsee Monjee Institute of Management Studies (NMIMS) Deemed to be University, Hyderabad, Telangana, India.
4. Assistant Professor, Narsee Monjee Institute of Management Studies (NMIMS) Deemed to be University, Hyderabad, Telangana, India.
5. Assistant Professor, Department of Management Technology, Shri Ramdeobaba College of Engineering and Management, Nagpur, Maharashtra, India.
6. Associate Professor, Department of Management, Jain (Deemed to be University), Bangalore, Karnataka, India.

networks on entrepreneurial endeavors, the role of institutions in forming entrepreneurial landscapes, the investigation of psychological and cognitive aspects in entrepreneurial contexts, the dynamics of corporate entrepreneurship, the rise of social entrepreneurship, and the developing field of sustainable entrepreneurship. This comprehensive investigation underscores the diverse aspects that entrepreneurship encompasses, rendering it a fundamental component in comprehending and propelling multiple facets of economic and societal development [1]. The fusion of conventional business concepts with social and environmental concerns has given rise to the idea of sustainable entrepreneurship. This strategy gained traction less than 20 years ago and is in accordance with the triple bottom line concept, which addresses environmental, sociological, and economic problems. The UN Assembly's adoption of the "2030 Development Agenda" in 2015 further sparked institutional support for businesses pursuing sustainable entrepreneurship, creating a platform for international cooperation across industries and governmental levels.

The area of sustainable entrepreneurship is still relatively new, despite growing recognition. This has led to continuous discussions regarding its exact definition, conceptual boundaries, and the different internal and external causes that are driving its development. According to researchers like [2], a sustainable entrepreneurial orientation can be seen as a flexible competency that allows businesses to embrace a variety of strategic orientations, cultivate an entrepreneurial spirit, and incorporate sustainable practices into their overarching business plan. The investigation of this strategy is still lacking, though, which raises concerns about how businesses can support sustainability while navigating a variety of strategic orientations and how long-term viability of various business models can be ensured. Investigating how innovation, digitization, and sustainable entrepreneurship intersect in SMEs is important for bringing together the body of knowledge and real-world applications in these developing fields. The relationship between a digitization strategy and an entrepreneurial attitude may improve these companies' ability to create novel products and services [3]. Digitalization has a variety of repercussions on the innovative activities of SMEs. Additionally, improved social and environmental performance of SMEs might be a result of the beneficial relationship between innovation and these outcomes. By providing high-quality products or processes, sustainable entrepreneurs can achieve social and environmental goals by influencing markets and societies through innovation. This reduces environmental impact and enhances overall quality of life. [4]

2. CONCEPTUAL BACKGROUND

The comprehension of the driving forces and tactics utilized by environmentally conscious entrepreneurs in the initial phases of their venture is still restricted, as is the investigation of the continuous pursuit of environmental objectives over an extended period of time. Sustainable business owners frequently formulate their missions with an eye toward the long term, which makes it possible for new projects to grow. The environment for companies and organizations is changing due to three major societal developments, which are also having an impact on the direction of sustainable entrepreneurship [5]. Due to the way the corporate environment is changing as a result of these changes, staying competitive in the constantly changing global market requires a planned and integrated approach.

2.1. Small and Medium Enterprises (SMEs)

SMEs are essential to India's economy and are present in a wide range of industries, such as trade, services, and manufacturing. These businesses, which are categorized according to investment thresholds under the Micro, Small, and Medium Enterprises Development (MSMED) Act of 2006, are major contributors to the creation of jobs and act as engines of

economic growth. By establishing businesses in smaller towns and rural areas, SMEs play a significant role in fostering regional development, decentralizing industrial activity, and eliminating regional inequities. They are robust in the fast-paced business climate because of their agility, inventiveness, and capacity for swift adaptation to market changes. Additionally, SMEs frequently function as auxiliary units, offering parts and services to bigger enterprises, boosting the nation's total industrial production. Many SMEs participate in global value chains and increase India's foreign exchange revenues by exporting goods and services. Even if problems like restricted financial access still exist, the government has put in place a number of programs and regulations to deal with them. By promoting technology adoption and digitization, programs like "Make in India" and "Digital India" seek to increase the competitiveness of SMEs [6]. Another important factor is the encouragement of entrepreneurship, since SMEs are often founded by people with creative ideas and add to economic vibrancy. In conclusion, SMEs are essential for innovation, regional development, and India's engagement in the global economy. They help promote economic development by generating jobs and adding to industrial output. SMEs are positioned to continue being a vital component of India's economic growth and development as long as the government continues to support and promote this industry through focused measures.

2.2. Entrepreneurship

Driven by the application of energy and passion in the design and implementation of unique ideas and solutions, entrepreneurship is a dynamic process involving vision, change, and creation. Entrepreneurship is closely related to tackling social injustices and environmental degradation, guiding economic sectors toward sustainable growth, and producing more than just self-employment and financial gains [7]. The adoption of innovation, which is frequently made possible by digital technologies, is the foundation for the success of such initiatives. Being an active participant in the learning dynamics of organizations' inventive processes and actively interacting with risk and uncertainty are prerequisites for entrepreneurial innovation. While some claim that innovation is the key to success in entrepreneurship, others emphasize the importance of sustainability principles, technology, or the traits of successful entrepreneurs. The Way Entrepreneurs Act In the context of sustainable entrepreneurship, running a company to satisfy present demands while guaranteeing that future generations will be able to satisfy their own needs is the main goal. Instead of having a short-term profit-centric mindset, sustainable entrepreneurs demonstrate particular attributes that enable them to successfully develop and run companies with a dedication to environmental, social, and economic sustainability [8]. To put it simply, entrepreneurship is a deliberate process in which an individual creates and develops an idea to bring it to reality. There is a degree of difference between the goals and the actual establishment and development of a firm due to the influence of multiple internal and external influences on this complex process [20]. The person expresses interest in launching a business when they realize they have the required abilities, know-how, and/or capacity. Through important antecedents like individual attitudes and subjective norms, entrepreneurial skills in turn heighten entrepreneurial intents. Entrepreneurs set meaningful goals that reflect the interests of the company and are consistent with their values, beliefs, and motivations. They engage in a decision-making process that takes into account the social, environmental, and economic ramifications of their actions in both the present and the future, and they play a crucial role in translating and integrating goals toward sustainable value creation [9].

2.2.1. Sustainable Entrepreneurship

Stemming from the domains of economy, ecology, and society, sustainable entrepreneurship expands on the entrepreneurial spirit by attempting to harmonize organizational performance and corporate goals with environmental conservation and social well-being. Driven by the

desire to tackle social and environmental issues via prosperous commercial ventures, sustainable entrepreneurship aims to accomplish sustainable development via entrepreneurial pursuits, assisting in the advancement of organizations from minor to significant benchmarks [10]. The survival and expansion of new ventures are attributed to competitive advantage, legitimacy, and financial sustainability; enablers such as agility, network capabilities, long-term orientation, and institutional entrepreneurship support economic, social, and environmental goals. Driven by a desire for social value and environmental preservation, sustainable entrepreneurs set themselves apart through unique ideals and principles and reflect eco-friendly values through their entrepreneurial endeavors [11]. Performance is positively impacted by sustainability, and digitalization, sustainability, and performance are all interconnected. Through sustainable performance, sustainable investment, which is based on innovation, research, and development activities, such as circular economy contributions or the design of green products, increases profitability. In sustainable entrepreneurship, the idea of value spillover refers to the acquisition of socio-environmental value that goes beyond targeted clients. Through platforms like blogs and social media, digital technologies enable co-creation, community formation, and wider stakeholder interaction, which leads to this phenomena [19]. Value spillover turns into a tactic for facilitating the use of innovation and technology to support sustained entrepreneurial value development. Organizations may leverage a potent synergy to lessen their environmental and social footprint while promoting commercial growth and resilience by combining sustainability, innovation, and technology with ease.

2.3. Innovation Practices

Innovation spurred by technology adoption helps small businesses become more competitive and helps create value propositions that have environmental, social, and economic aspects. This innovation can play a variety of roles in entrepreneurial operations and business models, including value co-creation, impact complementarities, and scalability [12]. Through the development of digital platforms, tools, and products, digital technologies enable the integration of new initiatives and start-ups into existing business models and operations, resulting in digital entrepreneurship. As a result, digitalization serves as a catalyst for long-term change that addresses issues related to society, the environment, and government while advancing financial accessibility, opportunity, efficiency, and sustainability. Innovation, which is defined by revolutions and disruptions in technology, has a significant effect on employee and consumer expectations and behaviors in a company's environment [13]. Therefore, it is essential to comprehend how decision-makers and entrepreneurs handle digitalization. Innovative behavior, which is shaped by personal traits, risk tolerance, and outside factors like resources, talent, and technology, is a hallmark of successful entrepreneurs. Entrepreneurs are leveraging digital technologies to integrate environmental, social, and financial values, thereby expanding the availability, accessibility, and viability of sustainable activities. These technologies improve efficiency and convenience while also enhancing connectivity and supporting value creation, community building, and stakeholder integration. The technological components of their business models are recognized by entrepreneurs as useful instruments for promoting healthier lifestyles, raising awareness, and providing value through education [14]. Innovation processes involve inherent risks and uncertainties, including risk-taking, flexibility, perseverance, and the ability to accept and manage them. Proactive strategies by entrepreneurs may create new risks, but these individuals are driven by a passion for environmental and social causes, embodying empathy, ethical integrity, and a visionary outlook. Sustainable entrepreneurs combine creativity, resilience, risk-taking, and adaptability to lead with a global perspective, continuously learn, and sustain a lasting commitment to making a positive impact on the world [15].

2.4. Digital Transformation

Adoption or expanded use of digital technologies in both personal and professional situations is known as "digitalization." This metamorphosis includes new norms, structures, and ideals that impact current policies and guidelines. The competitiveness of businesses is being challenged by the way that digital transformation is eliminating conventional barriers across industries and organizations [16]. In this environment, SMEs differ from larger businesses in that they have unique traits. SMEs exhibit notable flexibility and agility in accommodating novel situations, while having restricted resources and limited capacity for specialization. These innate characteristics impact the DT procedure in SMEs. Despite the urgent need to provide structured instruments for assessing SMEs' performance in a variety of DT domains in order to guarantee their continued existence and competitiveness. The material currently in publication on this topic is still very sparse [17]. The social and environmental pillars of sustainability are strongly intersected by the DT of SMEs, in addition to their economic significance. On the one hand, DT has increased material consumption and resulted in the replacement of routine and activity-based employment jobs, both of which have negative environmental effects. The dynamic and complex process of sustainable entrepreneurship involves creating sustainable products, rethinking production techniques, or developing novel business strategies in order to take advantage of fresh economic prospects [18]. It includes outside influences on decision-making processes in addition to internal company elements. Critical elements that are partially explored in the framework of sustainable entrepreneurship are these external factors, which are impacted by human capital entrepreneurial attitudes.

In response to these challenges and based on the existing literature review, this study addresses the following questions:

- Has digital transformation and innovation behavior leading to sustainable entrepreneurship

3. OBJECTIVE

- To study the impact of digital transformation and innovation behavior on sustainable entrepreneurship

3.1. Hypothesis

Based on the Research Model, the Following Hypothesis have been Proposed

- H1. Digital Transformation and Innovation has positive impact on sustainable entrepreneurship

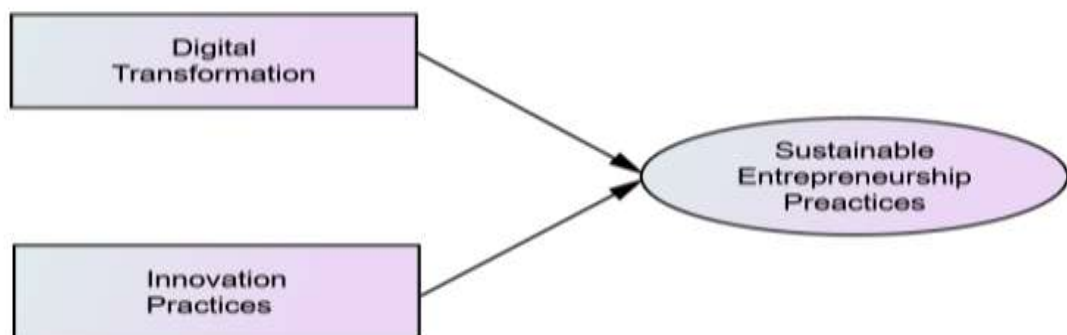


Figure 1: Authors Conceptual Model

4. RESEARCH METHODOLOGY

A sample of 325 entrepreneurs is used as respondents in a quantitative research methodology to test the hypotheses and validate the conceptual model. The survey instrument consists of questions that address demographic variables like gender, marital status, educational attainment, and length of time spent in entrepreneurial ventures. Innovation and digital transformation were independent variables, and sustainable entrepreneurship was the dependent variable. The replies were then rated on a conventional 5-point Likert scale, where 1 represented strongly disagree and 5 represented strongly agree. The SPSS program is used for both descriptive and inferential statistical analysis of data. Tests of reliability like Cronbach's alpha and Model Fit Summary.

4.1. Demographic Profile of Respondents

Table 1. Demographic statistics (n = 325)

Demographic	Category	Frequency	Percentage (%)
Gender	Male	208	64%
	Female	117	36%
Marital Status	Married	241	74%
	Single	84	26%
Educational Qualification	10th Standard	85	26%
	Graduate	188	58%
	Post Graduate	52	16%
Existence in Entrepreneurial Venture	1-3 Years	136	42%
	3-5 Years	71	22%
	Above 5 Years	118	36%

4.2. Reliability

Table 2: Reliability Analysis

Variables	Cronbach's Alpha	Number of Items
Digital Transformation	0.791	8
Innovation	0.877	12
Sustainable Entrepreneurship	0.764	6

4.3. Correlation

Table 4. Correlation between Independent and Dependent Variable

	Digital Transformation	Innovation	Sustainable Entrepreneurship
Digital Transformation	1	.764	.295
Innovation	.764	1	.81
Sustainable Entrepreneurship	.295	.81	1

4.4. Regression

Table 5: Anova Test

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	2535.258	2	1267.629	31.259	.000

Residual	6447.853	159	40.553		
Total	8983.111	161			

Table 6: Model Fit Summary

Model	R	R square	Adjusted R Square	Std Error of the Estimate
1	.576	.331	.306	.21935

The overall fit of the regression model is confirmed by the highly significant F-statistic ($F = 31.259$, $p < .001$) found in the Anova test. The regression model's significant sum of squares (2535.258) in relation to the residual (6447.853) highlights the model's ability to effectively explain variance. The reliability of the model is validated with a mean square value of 1267.629. A somewhat positive link is revealed by the correlation ($R = 0.576$) and explanatory power (R -square = 33.1%, adjusted R -square = 30.6%), which together account for a sizable amount of the variability in the data. The estimate's low standard error of 0.21935 is evidence of the model's good predictive power. Overall, the regression model shows excellent explanatory and predictive ability in addition to fitting the data significantly.

5. CONCLUSION

In summary, combining innovation, digital transformation, and sustainable entrepreneurship in small and medium-sized enterprises (SMEs) offers a tactical method for building resilience and growth in the fast-paced business environment of today. A more flexible and competitive SME sector may result from the interaction of sustainable entrepreneurship, which places a high priority on long-term environmental and social implications, innovation, and digital transformation. SMEs may improve their overall sustainability practices, customer engagement, and operational efficiency by utilizing innovation and digital technologies. By incorporating the concepts of sustainable entrepreneurship, it is ensured that these projects have a positive impact on society and the environment. In order to drive SMEs toward long-term success and beneficial societal impact, successful integration necessitates a comprehensive and cooperative approach, matching corporate strategies with sustainable practices, cultivating an innovative culture, and embracing digital solutions.

6. LIMITATIONS & FUTURE SCOPE

Although this study examines the connections between innovation, digital transformation, and sustainable entrepreneurship in SMEs, it also recognizes its limitations, which include a sample that may be too small or homogeneous, methodological issues, and the possibility of missing out on external factors and temporal dynamics. In order to better understand the complex effects of these synergies across many businesses and geographical areas, future research projects could expand the scope by using a variety of samples, taking temporal aspects into account, implementing strong techniques, and adding contextual analyses. A more thorough knowledge of the processes at play may also result from a focus on comparative studies, stakeholder viewpoints, and the obstacles associated with technology integration. The goal of this research agenda is to overcome current barriers and advance the conversation about how SMEs may incorporate innovation, digital technology, and sustainable practices to unprecedented levels. In future other variables can be added for study, along with longitudinal aspects.

REFERENCE

1. Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, 150, 119791.

2. Singh, R. K., Garg, S. K., & Deshmukh, S. G. (2010). The competitiveness of SMEs in a globalized economy: Observations from China and India. *Management Research Review*, 33, 54–65.
3. Chatterjee, S. (2021). Antecedence of Attitude Towards IoT Usage: A Proposed Unified Model for IT Professionals and Its Validation. *International Journal of Human Capital and Information Technology Professionals*, 12, 13–34.
4. G. Gokulkumari, M. Ravichand, P. Nagpal and R. Vij, "Analyze the political preference of a common man by using data mining and machine learning," 2023 International Conference on Computer Communication and Informatics (ICCCI), Coimbatore, India, 2023, pp. 1-5, doi: 10.1109/ICCCI56745.2023.10128472.
5. Welter, F., Baker, T., & Wirsching, K. (2019). Three waves and counting: The rising tide of contextualization in entrepreneurship research. *Small Business Economics*, 52, 319–330.
6. Akilandeswari, S. V., Nagpal, P., Vinotha, C., Jain, K., Chatterjee, R., & Gundavarapu, M. R. (2024). Transforming E-Commerce: Unleashing the Potential Of Dynamic Pricing Optimization Through Artificial Intelligence For Strategic Management. *Migration Letters*, 21(S3), pp. 1250-1260. ISSN: 1741-8984. ISSN: 1741-8992 (Online)
7. B. Krishna Kumari, V. Mohana Sundari, C. Praseeda, Pooja Nagpal, John E P, Shakti Awasthi. (2023). Analytics-Based Performance Influential Factors Prediction for Sustainable Growth of Organization, Employee Psychological Engagement, Work Satisfaction, Training and Development. *Journal for ReAttach Therapy and Developmental Diversities*, 6(8s), 76–82.
8. Barth, J., & Muehlfeld, K. (2022). Thinking out of the box—by thinking in other boxes: A systematic review of interventions in early entrepreneurship vs. STEM education research. *Management Review Quarterly*, 72(2), 347-383. doi: 10.1007/
9. P Nagpal. Kiran Kumar., A.C. & Ravindra., H. V. (2020). Does Training and Development Impacts – Employee Engagement? *Test Engineering and Management*, the Mattingley Publishing Co., Inc., 83. 19407 – 19411. ISSN: 0193-4120.
10. R. Bhattacharya, Kafila, S. H. Krishna, B. Haralayya, P. Nagpal and Chitsimran, "Modified Grey Wolf Optimizer with Sparse Autoencoder for Financial Crisis Prediction in Small Marginal Firms," 2023 Second International Conference on Electronics and Renewable Systems (ICEARS), Tuticorin, India, 2-4 March 2023, pp. 907-913, doi: 10.1109/ICEARS56392.2023.10085618
11. J. Divya Lakshmi, P. Nagpal., et al., (2021). Stress and Behavioral Analysis of Employees using Statistical & Correlation Methods. *International Journal of Aquatic Science* 12(01), 275-281. ISSN: 2008- 8019 2021.
12. Berger, E. S., von Briel, F., Davidsson, P., & Kuckertz, A. (2021). Digital or not – the future of entrepreneurship and innovation. *Journal of Business Research*, 125, 436-442.
13. P. Nagpal., Kiran Kumar., A. C. & Ravindra., H. V.(2020). Perceived Organizational Support and Employee Engagement. *Test Engineering and Management*, 83, the Mattingley Publishing Co., Inc., 900- 904. ISSN: 0193-4120.
14. F. A. Syed, N. Bargavi, A. Sharma, A. Mishra, P. Nagpal and A. Srivastava, "Recent Management Trends Involved With the Internet of Things in Indian Automotive Components Manufacturing Industries," 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), Uttar Pradesh, India, 27-29 April 2022, pp. 1035-1041, doi: 10.1109/IC3I56241.2022.10072565.
15. Akter, S., Michael, K., & Uddin, M. R. (2020). Transforming business using digital innovations: The application of AI, blockchain, cloud and data analytics. *Annals of Operations Research*, 308, 7–39.
16. Madhusudhan R. Urs. & Pooja Nagpal., (2019). A study on Determinants and Outcomes of Job Crafting in an Organization; *Journal of Emerging Technologies and Innovative Research*, 7,(15). 145-151. ISSN: 2349-5162.
17. R. Bhattacharya, Kafila, S. H. Krishna, B. Haralayya, P. Nagpal and Chitsimran, "Modified Grey Wolf Optimizer with Sparse Autoencoder for Financial Crisis Prediction in Small Marginal Firms," 2023 Second International Conference on Electronics and Renewable Systems (ICEARS), Tuticorin, India, from 2-4 March 2023, pp. 907-913, doi: 10.1109/ICEARS56392.2023.10085618.

18. Hsieh, Y. J., et al. (2019). Entrepreneurship through the platform strategy in the digital era: Insights and research opportunities. *Computers in Human Behavior*.
19. Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, 150.
20. George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2021). Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. *Entrepreneurship Theory and Practice*, 45(5), 999-1027. doi: 10.1177/1042258719899425