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Harnessing mobile multimedia for entrepreneurial innovation and sustainable business growth

Samreen Jafri[1], Kamal Upreti[2]*, Rishu Bhardwaj[3], Balraj Verma[3], Rituraj Jain[4]

[1]Department of Administrative Sciences, Applied College, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

[2]Department of Computer Science, School of Sciences, CHRIST University, Delhi NCR, Ghaziabad, India

[3]Chitkara Business School, Chitkara University, Rajpura, Punjab, India

[4]Department of Information Technology, Faculty of Engineering and Technology, Marwadi University, Rajkot, Gujarat, India

*Corresponding author E-mail: kamal.upreti@christuniversity.in

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Abstract

This research investigates the role of mobile multimedia platforms and artificial intelligence (AI) in driving innovation and ensuring the sustainability of entrepreneurial businesses, focusing particularly on technology acquisition, integration, and infrastructure. For data collection, the study employed a quantitative research design and surveyed 150 Indian technology firms that had adopted mobile multimedia applications. Structural equation modeling was used to analyze the data, supported by descriptive statistics, correlation, regression analysis, and mixed methods to understand the adoption and use of digital technologies for innovation activities. The results show that AI-driven applications, when combined with multimedia content and real-time analytics, significantly enhance entrepreneurial innovation by improving operational efficiency, increasing customer engagement, and facilitating expansion into new international markets. Companies utilizing mobile multimedia platforms gain a competitive advantage, translating into long-term business growth and sustainability. This research contributes to the literature on AI and entrepreneurship in the context of digital transformation, highlighting the need for startups to invest in AI-enabled mobile technologies. It equally serves policymakers by informing the regulation of an environment that promotes innovation and business sustainability through digital initiatives. This research addresses a significant gap in the literature by providing evidence on how AI acts as a driver of change and provides insight into the adoption of new technologies in the context of entrepreneurship, an area that remains largely underexplored.

Keywords: Artificial Intelligence, Digital Transformation, Innovation Management, Mobile Multimedia Systems, Sustainable Business Models

1. Introduction

Investing in technology is perhaps one of the most complicated strategic choices business owners encounter in today's highly competitive world (Ashton & Stacey, 1995; Quinn et al., 2015). Businesses seek to respond to these changes by fostering new processes and advancing the ongoing race for innovation. It is evident that companies are aware of the accelerating pace of change in modern society, which has made environmental shifts, particularly technological advancements, a major driver of innovation and transformation. Businesses that want to maintain a competitive edge in such volatile and fast-changing circumstances must remain agile (Snihur et al., 2021).

Mobile technology skills stand out as some of the most significant factors driving entrepreneurial success today, due to their profound influence on business growth. Technology, as defined by an organization, facilitates a cost-efficient approach that improves productivity, performance, and results (Lee et al., 2019; Obschonka

& Audretsch, 2020). The development of artificial intelligence (AI) and mobile multimedia technologies has transformed business activities, paving the way for creativity, productivity, and deeper interconnectivity. Entrepreneurs use these emerging technologies to innovate business processes, increase operational productivity, and enter new markets (Maoning, 2022). Multimedia communication technologies and mobile platforms enable timely interaction and improve the quality of customer service, facilitating real-time, mobile multimedia personalized communication and decision-making. These efforts highlight the significant role of mobile multimedia technology in achieving business success in a highly competitive global market (Shinde & Prasad, 2021). Moreover, together with big data, mobile networks, and multimedia technologies create limitless opportunities for entrepreneurs to understand consumers and the market, thereby making informed decisions (Slyusar et al., 2024). In addition, with the advancement of extended reality technologies, more sophisticated customer engagement and services are being offered, allowing for better business development opportunities. Entrepreneurs can leverage mobile computing along with AI to create intelligent, responsive systems that automatically meet user needs and desires, thereby improving customer satisfaction and brand loyalty (Rajesh et al., 2023).

When an organization shifts toward technology-centric approaches, strong backing from top management is important. The increasing capabilities of society are prompting corporations to recognize the need to stay ahead of the competition, which has led to an increased dependence on leadership for employee training and technology adaptation (Chege & Wang, 2020; Shah et al., 2013). This involves understanding the gap in competencies and ensuring that educators and practitioners stay current in their knowledge to meet the evolving needs of the industry (Li & Chan, 2019).

The rapid growth of information and communications technologies has greatly impacted businesses in terms of operations, required skills, organizational culture, and market trends (Leischnig et al., 2017; Martínez-Caro et al., 2020). While these regions have developed technologically, innovation is primarily driven by business needs and the adoption of new technologies by many modern businesses (Park & Mithas, 2020). In this regard, communication and information have become essential resources for entrepreneurial activity. Virtually no aspect of life today remains untouched by information technology (IT), making it crucial for business success. Entrepreneurship involves the creation of economic activity through innovation, taking financial and intellectual risks, and mobilizing resources for self-reliance (Steininger, 2019; Uhlenbruck et al., 2006). With these new features and characteristics, economic growth and job opportunities have significantly increased, and the digital form of entrepreneurship, largely driven by technology, is positively changing the economy (Jafari-Sadeghi et al. 2021).

Novel entrepreneurs substantially expand the economy, create employment opportunities, and enhance the quality of social services. The transformation from an industrial economy to an information society highlights an important aspect of economic development – entrepreneurial activity (Rehman et al., 2020; Uhlenbruck et al., 2006). Without knowledge, determining market gaps and providing innovative solutions becomes impossible. Therefore, information and skills are vital to entrepreneurial activities, just as communication is fundamental. The dissemination of information, as well as the efficiency with which it is communicated, and, in turn, the level of professional interaction embraced, have greatly increased due to technological development (Sihite & Prihandini, 2019). These inventions, in turn, have radically affected education by creating favorable conditions for launching and nurturing entrepreneurial and new venture opportunities (Kumar, et al., 2022; Kumar et al., 2022). The impact of modern technology is global, sociocultural, and economic, making it a crucial aspect of human and community life. Over the past 20 years, technology-intensive developed industrial countries have become increasingly important drivers of innovation and economic advancement.

This research investigates the effects of mobile multimedia technologies, such as AI-driven multimedia platforms, and other digital communicative tools on innovative entrepreneurship and organizational performance. The study sheds light on technology acquisition, integration, and infrastructure by examining the mobile multimedia technologies ecosystem. The results have real-world implications for companies looking to leverage mobile and multimedia technologies to achieve sustainable growth or gain a competitive edge.

The rest of the paper is organized as follows: Section 2 provides a critical review of the research on mobile multimedia technologies and their contributions to entrepreneurship. Section 3 discusses the study's methodological approach, including how the data were collected, the sample of interest, and the methods of analysis used. Section 4 presents the results related to technology acquisition, integration, and infrastructure in entrepreneurial innovation. Section 5 concludes by articulating the major findings, highlighting the practical significance of the results, and identifying areas for further research.

2. Literature Review

(i) Mobile Multimedia and Entrepreneurial Innovation

Jiao et al. (2016) researched entrepreneurial potential and its relationship to innovation,

specifically focusing on how an owning entity affects that relationship. The study, which examined 788 publicly traded firms, found that strategic management skills enhance technological innovation. In addition, the research highlighted that entrepreneurship involves the integration of technological savviness along with a variety of other skills.

Poudel et al. (2019) investigated the impact of technical expertise, client perception, and entrepreneurial initiative on business performance. Using structured modeling approaches, Poudel et al. conducted a randomized survey of selected small and medium-sized enterprises (SMEs) in a metropolitan area in the southeastern United States. The results showed that the technological capabilities of innovative, people-centered firms are a prerequisite for business expansion and economic growth.

Kheni (2017) classified successful entrepreneurship as targeting niche markets, which result from the fusion of innovation and technology. Similarly, Lin et al. (2021) and Martin-Rojas et al. (2019) examined the impact of integrating infrastructure and technology on businessmen environments, as well as how technological capabilities affect entrepreneurial activities in new ventures.

Usai et al. (2021) sought to understand the relationship between implementing digital technologies and the innovative performance of startups. The study, which focused on the adoption of information and communication technologies (ICT) in European businesses and their performance, used principal component analysis and multiparameter statistical analysis. They found that while research and development (R&D) spending is the most promising predictor of innovation, technological processes received limited attention in relation to process innovation.

(ii) AI-Driven Applications in Business Growth

Amouri et al. (2021) focused on exploring the factors that may enable or inhibit young entrepreneurs from embarking on new social business ventures. Their study emphasized that an entrepreneurial and psychosocial orientation toward technology is favorable for entrepreneurs seeking to start social business ventures. Moreover, Abubakre et al. (2022) analyzed the contribution of IT culture and individual IT creativity to the achievement of digital entrepreneurship. The results of their study indicated a significant correlation between the cultures of effective software engineering and marketing technology.

Jafari-Sadeghi et al. (2021) investigated the impact of technology on entrepreneurial activities, also considering the effects of digital transformation on value creation. Their study, based on data from 28 European countries, examined the impact of digitalization on entrepreneurship from a unique perspective. The conclusions advanced the concept of digital entrepreneurship as the combination of IT and business, which has particular and profound consequences for business ventures and entrepreneurs.

Matejun (2016) argued that the core aim of a firm's technological entrepreneurship is to increase its ability to innovate through the synergy of internal resources and external possibilities. These external possibilities are provided by R&D institutions and entities in high-technology industries. The study also highlighted the need to absorb technological and innovative outputs from academia into the commercial sector.

Oyero & Oyedele (2022) examined the relationship between techno-entrepreneurship and the sustained growth of SMEs from the perspective of intellectual property rights, R&D, and innovation. Employing linear regression analysis based on a randomly selected sample of 126 agrobusiness survey responses, the study found that techno-enterpreneurship positively and significantly affects the revenues and profits of SMEs.

Kilintzis et al. (2023) adopted employment in the high-technology sector as an indicator of technological entrepreneurship and analyzed several macroeconomic variables at the country level. This research evaluated the statistically significant region-specific quantitative variables that explain differences in technological entrepreneurship within the European Union. The analysis confirmed the importance of education, gross domestic product, and venture capital funding to the distribution of high-tech jobs in Europe. These results have significant policy implications for promoting technological entrepreneurship in the region.

(iii) Technology Integration and Organizational Performance

Sonika et al. (2023) explored how strategic and marketing planning influence the financial outcomes of manufacturing businesses. Based on a sample of 137 employees at Nestlé Foods Nigeria Plc, the study found that strategic planning, combined with the use of technology, positively impacts overall organizational performance. The researchers suggested that, to achieve greater competitiveness, the firm should focus on innovation and increase investment in employee training to enhance productivity.

Romano et al. (2016) argued that the current economic landscape reflects an entrepreneurial economy characterized by turbulence and

uncertainty. They claimed that an entrepreneurial approach, particularly one that is technology-centric, has emerged and is effectively driving business success while simultaneously promoting economic growth. Rather than being solely market-oriented, modern entrepreneurship is becoming increasingly knowledge-based and technology-oriented, as new technologies enable the conception, execution, and renewal of business models. Such technological entrepreneurs act as active learning resources who contribute to the creation, dissemination, and absorption of knowledge within a multifaceted innovation environment.

Roemintoyo et al. (2022) analyzed the use of interactive multimedia in educational processes. While students strongly supported the adoption of ICT, teachers faced challenges in its implementation. The research suggested recommended greater emphasis on output quality and highlighted the importance of interactive multimedia in education. In addition, new forms of digital entrepreneurship, such as the use of social media and smartphone apps, are being employed to engage customers, broaden public perception of artists, increase willingness to collaborate with them, and deepen both professional and audience engagement in entrepreneurship (Psomadaki et al., 2022).

2.1. Research Gap

Entrepreneurial activities, management skills, and customer attitudes have consistently been key indicators in assessing the factors that contribute to business success. The moderating role of ownership on entrepreneurial intention has been studied, along with its correlation with technological development, identified as a primary driver of business investments in new digital processes, and its overall impact on effectiveness and growth. Furthermore, aspects like infrastructure and technological investments, their acquisition, and various combinations thereof in relation to business performance have been thoroughly explored. The intricate relationship between IT investment and the electronic business operations of enterprises has also been analyzed. Other studies have focused on factors that either facilitate or hinder young entrepreneurs in launching inclusive business ventures, the impact of digital competencies on a firm's dynamic capabilities, and the role of an IT culture that fosters continuous individual learning as a foundation for successful digital businesses. Notably absent from the literature, however, is a focused analysis of the relationship between advancements in IT and their impact on entrepreneurial innovation. From this perspective, the present research aims to fill that gap by determining how various attributes of IT affect the innovation potential of entrepreneurs.

3. Technology Adoption and Its Impact on Entrepreneurial Innovation

3.1. Theoretical Foundations of Technology Adoption

Established theoretical frameworks like the Innovation Diffusion Theory (IDT) and the Technology-Organization-Environment (TOE) framework help explain the impact of technology acquisition, technology integration, and technology infrastructure in fostering entrepreneurial innovation. These frameworks provide insight into how businesses incorporate technology to gain a competitive advantage.

The IDT focuses on the spread of technological innovations within an industry and the factors that influence adoption, such as relative advantage, compatibility, complexity, trialability, and observability. In the context of this study, moderate acquisition and assimilation of new technologies support sustained innovation and aggressive market expansion strategies.

Similarly, the TOE framework posits that the adoption of new technologies is influenced by specific technological, organizational, and environmental factors. The relevance of technology acquisition, integration, and infrastructure in this study aligns with themes of digital transformation and entrepreneurship. Adopting AI-based solutions and multimedia applications is less of a challenge for companies with highly developed technological infrastructures, leading to greater operational efficiency and growth.

3.2. Key Technological Drivers of Entrepreneurial Innovation

The adoption and integration of new technologies like AI, mobile multimedia platforms, and digital automation have become key drivers for entrepreneurial innovation. A company's ability to leverage the latest technologies determines the extent of its market expansion, the efficiency of its operations, and its long-term sustainability. This study identified three key components of technology integration for innovation: acquisition, integration, and overall infrastructure.

3.2.1. Technology Acquisition as a Catalyst for Market Expansion

Technological acquisition is important for entrepreneurial innovation, as it enables the procurement and implementation of advanced digital solutions. Companies that adopt AI applications, big data analytics, and mobile multimedia technologies tend to be more responsive to market opportunities and evolving consumer demands. Companies that implement

a technology-centered acquisition strategy experience higher rates of innovation and competitive success as a result of advanced digital tool implementation.

Furthermore, the use of AI-driven multimedia platforms allows a company to automate customer service processes, thereby enhancing user satisfaction and brand loyalty. Businesses that adopt more advanced technologies gain a strategic advantage over competitors slower to undergo digital transformation, thus enabling them to distinguish themselves in the market.

3.2.2. Technology Integration for Organizational Agility

It is not enough for firms to obtain modern technologies; they need to incorporate them into their operational frameworks. This process is referred to as technology integration. This involves embedding technology into business systems to enable process automation, coordination, and real-time decision-making. Businesses that rely on AI, cloud computing, and mobile applications for core functions tend to respond more effectively to market and industry changes or disruptions.

Strategic agility, resource optimization, and prompt responses to emerging business challenges are attainable due to enhanced interdepartmental coordination and efficient workflows. For example, AI-powered analytics tools help companies track market and consumer behavioral trends, enabling them to adjust operations in real time. By fostering a culture of digital innovation, organizations can mitigate competition and seize new opportunities.

3.2.3. Strengthening Innovation through Robust Technology Infrastructure

The effective use of technology is a primary requirement for long-term entrepreneurship success. Weak IT infrastructures create scaling challenges, increase security threats, and hinder seamless business operations. Companies with strong IT foundations, especially those leveraging cloud computing, high-speed internet, and AI-powered automation, tend to maintain innovation over longer periods.

A well-established technology framework allows companies to adopt new digital technologies with minimal interference, ensuring continuous process optimization and business responsiveness to market demands. In addition, businesses with robust IT frameworks can utilize new technologies such as Extended Reality, blockchain, and Internet of Things in their product offerings, thereby creating unique customer experiences.

Moreover, a strong technology infrastructure enhances entrepreneurs' access to capital, promotes professional networking, and facilitates participation in the innovation ecosystem, contributing to more sustainable business ventures. Firms that build digital infrastructure stand a higher chance of receiving venture capital funding and forming strategic business partnerships, which drive growth and enable sustainable competition in the long run.

4. Methodology

4.1. Research Motivation and Objectives

Entrepreneurs and IT are two renowned and important aspects that currently affect the world economy. The rapid advancement of IT industries and their integration into society, as well as the correlating interaction between entrepreneurs and innovation, have highlighted the necessity of detailed research at the industrial level. Furthermore, the ever-increasing demand for both foundational and applied research, carefully crafted to produce cutting-edge results in innovation and entrepreneurship within the scope of IT, is evident.

The scope of IT-driven innovation and entrepreneurship now includes the latest research on phenomena, processes, and practices performed at an international level, focusing on the conception, proliferation, diffusion, and application of IT. Moreover, it offers modern, thoroughly researched, and practical insights into business strategy, model development, and execution, valuable for academic researchers, entrepreneurs, and business practitioners alike.

This research aims to achieve the following primary objectives:

(i) To understand how IT drives advancements in entrepreneurship led by technology.
(ii) To determine the effectiveness and success of strategic IT applications in supporting startup operations.
(iii) To examine the relationship between innovation and business enterprises in relation to their competitive edge.

4.2. Hypothesis Development

The hypotheses that accompany the set objectives and questions of this study are presented below. Fig. 1 illustrates the conceptual framework for the proposed hypotheses.

Entrepreneurs utilize previously acquired knowledge by adopting relevant technologies that allow firms to communicate effectively and exploit future market opportunities. Technology acquisition enables new market entrants to develop and promote emerging technologies. The use of technology by entrepreneurs enables them to capitalize on market trends, leading to

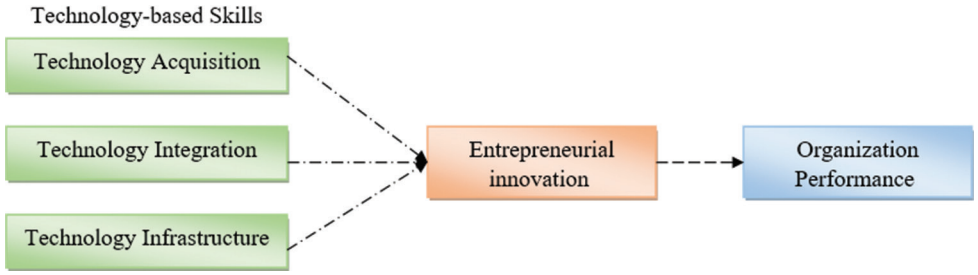

Fig. 1. Framework—research hypothesis

both technological and business growth. The process of recognizing new ideas, technologies, and concepts lies at the core of entrepreneurship. Without the ability to identify and act on opportunities, effective entrepreneurship cannot occur. While the recognition of opportunities may be distributed across a wide spectrum of individuals, productive entrepreneurs are those who can perceive market opportunities and strategically position themselves to benefit from them. Opportunities must be attractive and feasible in the context of the marketplace to be successfully exploited. Firms also benefit from entrepreneurial activities through networking, utilizing both internal and external resources to achieve competitiveness. Based on the above discussion, the following hypotheses are formulated:

- H1: Technology acquisition has a significant positive impact on organizational performance.
- H2: Technology integration mediates the relationship between technology acquisition and organizational performance.
- H3: Technology infrastructure strengthens the relationship between technology integration and organizational performance.
- H4: Mobile multimedia adoption positively influences sustainable business growth.

4.3. Research Design, Conceptual Framework, and Data Collection

This part of the project examined the core structures of influence that mobile multimedia technologies and AI-powered tools have on entrepreneurial innovation. These emerging technologies tend to alter business models by improving engagement, decision-making, and customer interactions. AI-empowered multimedia applications assist in the automation of business processes, foster more flexible approaches to the marketplace, and help devise strategies for long-term sustainability, elements that are pertinent to contemporary entrepreneurs.

This research focused on Indian technology companies that provide R&D services and utilize mobile multimedia technologies. These organizations have embraced a workplace culture grounded in socio-technological motivation, where digital integration of values enables innovation and sustainable competitiveness.

The conceptual framework for this study integrates elements from two widely accepted theoretical models: IDT and the TOE framework, to systematically explain the drivers of entrepreneurial innovation and sustainable business performance.

- "Technology Acquisition" corresponds to the "Relative Advantage" and "Compatibility" components of IDT, as organizations perceive the adoption of new technologies as beneficial and aligned with their existing processes. It also relates to the "Technological Context" of the TOE framework, capturing the extent to which firms acquire innovative mobile multimedia and AI-driven technologies.
- "Technology Integration" aligns with the "Complexity" and "Trialability" dimensions of IDT. Integration efforts may involve overcoming perceived difficulties (complexity) in embedding technologies into operations, while pilot implementations (trialability) enable firms to assess their effectiveness. Within the TOE framework, "Technology Integration" also belongs to the "Technological Context," emphasizing how internal technological capabilities facilitate innovation.
- "Technology Infrastructure" is mapped to "Observability" in IDT, reflecting how the outcomes of a strong technological foundation (such as enhanced performance and innovation) are visible to internal and external stakeholders. Within the TOE framework, it falls under the "Organizational Context," representing the internal readiness, skills, and technological resources required to support innovation and entrepreneurial growth.

Each conceptual construct is, therefore, explicitly grounded in recognized theoretical components, ensuring that the framework is well supported by established theories on innovation and technology adoption.

A standardized questionnaire was formulated and distributed to 150 entrepreneurs and managers leading

the departments in information management, business performance evaluation, and digital transformation business strategies in their respective organizations. The primary objective of this survey was to examine how mobile multimedia technologies contribute to achieving sustainability in entrepreneurship.

The survey instrument was designed based on established frameworks adapted from prior validated studies related to technology adoption, integration, infrastructure development, and organizational performance. Each construct was measured using multiple items on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Respondents evaluated statements regarding their organization's practices and capabilities. Sample items included: "The organization effectively integrates mobile multimedia technologies across its operations" (for "Technology Integration") and "The existing technological infrastructure adequately supports business activities" (for "Technology Infrastructure"). The internal consistency of each construct was verified using Cronbach's alpha, and confirmatory factor analysis was employed to validate the measurement model. Detailed survey items and reliability statistics are presented in Table 1.

To provide a clear overview of the constructs used in this study, Table 1 summarizes the number of measurement items for each construct, a sample survey statement, and the corresponding reliability coefficient (Cronbach's alpha). The strong internal consistency values indicate that the measurement instruments were both reliable and appropriate for subsequent analysis.

4.4. Data Analysis and Model Evaluation

To understand the effect of IT on entrepreneurial innovations, a statistical approach was adopted. Initially, descriptive statistics were employed to determine the mean and standard deviation of the responses, which explained the central tendency and variability of the data. Subsequently, a correlation analysis was performed to assess the relationships between key variables and entrepreneurial innovation, using the most significant associations defined in previous steps.

The study employed structural equation modeling (SEM) to evaluate the relationships between technology acquisition, integration, infrastructure, and organizational performance. The SEM procedure involved: (i) Model specification based on the hypothesized framework, (ii) confirmatory factor analysis to validate the measurement models, (iii) evaluation of model fit indices (e.g., Comprehensive Fit Index, Root Mean Square Error of Approximation, standardized root mean square residual [RMR]), and (iv) estimation of structural paths. Subsequently, multiple regression analysis was performed to validate significant predictors and assess the robustness of the SEM findings. Additional regression analysis was conducted to evaluate the hypotheses and determine the significance and magnitude of the relevant statistical coefficients. The study aimed to interpret the relationships that technology acquisition, integration, and infrastructure have with entrepreneurial innovation and organizational performance, with emphasis placed on identifying which relationships were statistically significant.

5. Result and Discussion

5.1. Profile of Demographic Respondents

The demographic profile data are summarized in Table 2, which presents the survey outcomes. The data reveal that the sample consisted of 41.9% females and 58.1% males. The respondents' ages were categorized as follows: 21.6% were between 18 and 25 years of age, 26.4% were within the 26 to 35 age range, and 31.2% in the 36 to 45 age bracket. Interestingly, there were no respondents older than 45 years.

With respect to marital status, the majority of respondents (66.5%) reported being married, while 33.5% were single. Regarding educational attainment, 33.5% had completed an undergraduate degree, while 25.2% held a postgraduate degree. High school dropouts accounted for 19.3%, and 23.3% had no formal education.

Table 1. Summary of constructs, sample items, and reliability measures

Construct	Number of items	Sample survey item	Cronbach's alpha (α)
Technology Acquisition	4	"The organization adopts the latest mobile technologies effectively."	0.82
Technology Integration	5	"Mobile multimedia technologies are integrated across business units."	0.85
Technology Infrastructure	4	"The organization's technological infrastructure supports digital growth."	0.80
Organizational Performance	5	"The organization's use of mobile technologies improves overall performance."	0.87

Table 2. Respondents' demographic analysis

Respondent characteristic	*n*	%
Gender		
Male	187	58.1
Female	135	41.9
Total	322	100.0
Age		
18–25 years	97	30.1
26–35 years	80	24.8
36–45 years	145	45.0
Total	322	100.0
Marital status		
Married	214	66.5
Unmarried	108	33.5
Total	322	100.0
Educational qualification		
Higher secondary	62	19.3
Graduate	108	33.5
Post graduate	77	23.9
Others	75	23.3
Total	322	100.0
Monthly income		
<40,000	70	21.7
40,001–70,000	84	26.1
70,001–100,000	70	21.7
Above 100,000	98	30.4
Total	322	100.0

Note: *n* denotes frequency and % indicates percentage.

Respondents were also categorized based on their monthly income: 21.7% earned below the 10,000 mark, 26.1% earned between 10,001 and 20,000, 21.7% earned between 20,001 and 30,000, and 30.4% earned above 30,000. This information helps to understand the overall income status and contributes to building a comprehensive demographic profile of the respondents in relation to their socioeconomic status.

5.2. Evaluation of Descriptive Test

The metrics for the study's variables are captured in the analysis, with a focus on their means and standard deviations, as presented in Table 3. The results show that the mean scores associated with entrepreneurial innovation range from 3.16 and 3.96. The highest mean (3.96) was observed for the item related to searching for and retrieving new information for business purposes, which had a standard deviation of 1.054.

With regard to technology acquisition, the mean scores ranged from a low of 3.19 to a high of 4.06, with developing strategic options recording the highest mean of 4.04 and a standard deviation of 0.910. Similarly, the "Technology Integration" dimension had means ranging from 3.49 to 3.55, where potential for growth had the highest mean of 3.55 with a standard deviation of 0.960.

For "Technology Infrastructure," the mean scores varied between 3.23 and 3.92. The item developing and launching solutions to the market with speed recorded

Table 3. Descriptive analysis of study variables

Description of variables	**Mean**	**SD**
Entrepreneurial innovation		
Identify business opportunities	3.44	1.096
Focus on how to take advantage of opportunities	3.61	1.075
Improve the situation as industry changes	3.96	1.054
Take the time to look for fresh knowledge and apply it to your work	3.16	1.253
Analyze developing markets and decide how to profit from them	3.51	1.195
Look for changes in the market and create strategies for utilizing such developments for financial advantage	3.50	1.097
Analyze the potential for achievement and failure carefully	3.48	1.045
Technology acquisition		
Enhance the market share	3.59	1.099
Develop strategic options	4.04	0.910
Gain efficiency improvements	3.19	1.235
Technology integration		
Successful implementation of business strategies	3.49	1.208
More effective communication	3.49	1.106
Potential for growth	3.55	0.960
Technology infrastructure		
To provide customers with a good experience, the website should be accessible without interruption	3.47	1.233
Rapidly create and introduce solutions to the market	3.92	1.082
Gather timely data to aid in decision-making	3.23	1.201
Organization performance		
Improve employee productivity	3.49	1.203
Reduce business and other risks	3.48	1.111
Increase efficiency with minimum resources	3.42	1.097
Establish innovation ideas	3.60	1.098
Assist employees to accomplish goals	3.98	1.027

the highest mean of 3.92, with a standard deviation of 1.082. Finally, the means for organizational performance ranged from 3.42 to 3.98, with the highest mean of 3.98 corresponding to assisting employees in accomplishing goals. The standard deviation for this category was 1.027.

Fig. 2 illustrates the mean scores and standard deviations of variables measuring "Entrepreneurial Innovation," "Technology Acquisition," "Technology Integration," "Technology Infrastructure," and their impact on "Organizational Performance." These metrics help to clarify the importance of various factors in business success, technological adoption, and organizational efficiency. In addition, the indices are plotted to demonstrate the goodness of fit (GIF) of the framework, thereby offering confidence in its validity and reliability.

5.3. Analysis of Structural Equation Modeling

Structural equation modeling is an advanced statistical tool used for the measurement and analysis of the relationships between measurable and unmeasurable variables. Unlike simpler approaches such as the coefficient of determination, SEM considers linear causal relationships along with estimation errors, making it more powerful than traditional methods. SEM can integrate multiple dependent and independent variables, providing deeper insight into the interactions among various factors within a dataset.

5.3.1. Indices of Fit

To evaluate measurement error and ensure the accuracy of model estimation, model fit must be confirmed before analyzing the results. This process includes an analysis of additional indices beyond factor loadings and descriptive statistics derived from experimental data. Taken collectively, all indices demonstrate that the model successfully establishes and represents the relationships among parameters, producing a robust and meaningful model fit.

The GFI and adjusted GFI (AGFI) indices tend to increase with larger sample sizes and can, in some cases, exceed the set cut-off points. However, when the number of indicators per factor or the total number of factors to be included is high, especially in studies with small sample sizes, GFI and AGFI values often decrease. The optimal cut-off points for GFI, AGFI, and RMR can vary significantly depending on sample size and model specification. Generally, GFI and AGFI are considered acceptable when their values exceed 0.

An acceptable model fit is indicated by the Normed Fit Index and the other related indices, as shown in Table 4, with the Normed Fit Index scoring 0.933. Similarly, the Suggestive Index Fulfilment Fit scored 0.666, and the Incremental Fit Index scored 0.946, suggesting a substantial fit. In addition, the model's strength is further reinforced by the Comprehensive Fit Index, scoring 0.980. The Parsimony Normed Fit Index, which scored 0.274, also supports the sufficiency of the model parameters in the economy claim.

Most of the indices listed in Table 4 fall within acceptable ranges, confirming the overall validity of the model estimation. The scope of these indices strengthens the proposed model and demonstrates its congruence with the sample data. The fit values presented reflect the degree of alignment between the proposed model and the empirical data, confirming the model's validity for more in-depth analysis.

These indices indicate how well the conceptual model aligns with the observed data. The pie chart shown in Fig. 3 categorizes them according to their fitness levels, including Acceptable, Good, and Middle.

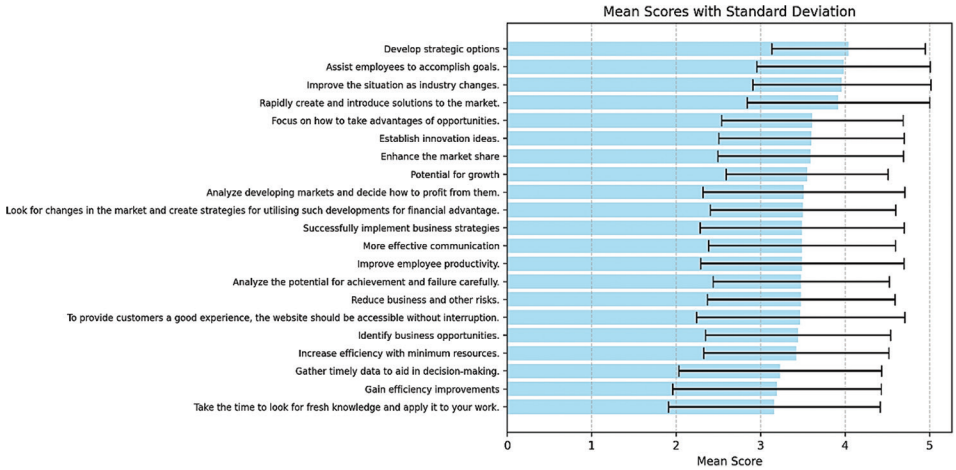

Fig. 2. Entrepreneurial innovation and technology adoption: analyzing key factors for organizational performance and strategic growth

Table 4. Summary of model fit indices and their obtained fitness values

Criteria of goodness of fit	Indices of fit	Obtained fitness value	Fitness condition
Goodness of Fit Index	GFI	0.902	Acceptable
Root Mean Square Residual	RMR	0.024	Acceptable
Adjusted Goodness of Fit Index	AGFI	0.508	-
Parsimony Goodness of Fit Index	PGFI	0.180	Middle
Normed Fit Index	NFI	0.913	Acceptable
Relative Fit Index	RFI	0.910	Acceptable
Incremental Fit Index	IFI	0.915	Acceptable
Comparative Fit Index	CFI	0.915	Acceptable
Parsimony Normed Fixed Index	PNFI	0.274	Good

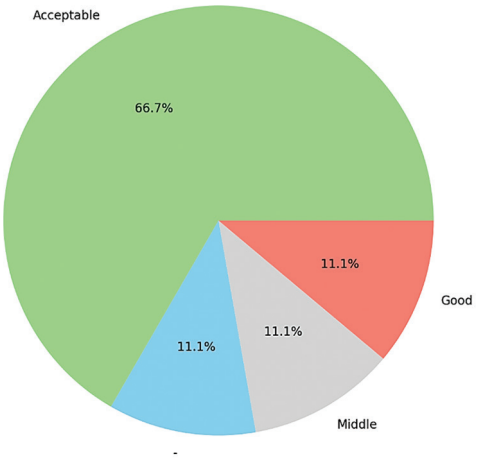

Fig. 3. Distribution of model fitness conditions

5.3.2. Hypothesis Testing

The process of hypothesis testing provides insight into the role IT systems play in enabling entrepreneurial technological development. In this context, the *p*-value defines the statistical relevance of the relationships being analyzed. The threshold for statistical significance is a $p<0.05$.

As shown in Table 5, the $p=0.001$ for technology acquisition is considerably lower than the cut-off. This suggests that technology acquisition has a significant positive effect on entrepreneurial innovation. Similarly, the *p*-value for technology integration is also 0.001, indicating that integration of technology likewise has a significant positive effect on entrepreneurial innovation.

The *p*-value for "Technology Infrastructure" is also 0.001, which supports the assumption that it has a substantial impact on entrepreneurial innovation. The final factor considered was organizational performance, which also had a $p=0.001$. Therefore, it can be concluded that organizational performance has the most significant impact on entrepreneurial innovation.

Overall, all the above-mentioned factors—"Technology Acquisition," "Technology Integration," "Technology Infrastructure," and "Organizational Performance"—make significant contributions to entrepreneurial innovation. This highlights the importance of IT systems in driving business growth and innovation.

The statistical analysis confirms that all four formulated hypotheses (H_1, H_2, H_3, and H_4) are supported and validated, based on the significant *p*-values obtained (<0.05) alongside the robust regression coefficients, which affirm the effects of technology adoption, integration, and infrastructure on entrepreneurial innovation and organizational performance.

5.4. Correlation Analysis

Table 6 presents the relationships analyzed, with an emphasis on one dependent variable, entrepreneurial innovation, measured using economic indicators, and four independent variables: "Technology Acquisition," "Technology Integration," "Technology Infrastructure," and "Organizational Performance." This table depicts the connections between technology usage and entrepreneurial innovation, showing a correlation among the dependent variables in the study. Thus, the research outcomes would remain valid if any independent factor were replaced with entrepreneurial innovation.

Moreover, the increasing correlation between "Technological Infrastructure," "Technology Integration," "Technology Acquisition," and "Organizational Performance" demonstrate their strong effects on entrepreneurial innovation. These findings support the technological ecosystem hypothesis, which suggests that an increase in innovation and business development activities is achieved by a well-developed economy.

As depicted in the heatmap in Fig. 4, the correlations between "Technology Acquisition," "Technology Integration," "Technology Infrastructure," and "Organizational Performance" are evaluated.

Table 5. Hypothesis testing of information technology and entrepreneurial innovation

Hypothesis	Relationship	*p*-value	Impact
H_1	Entrepreneurial Innovation→Technology Acquisition	0.001	Significant impact
H_2	Entrepreneurial Innovation→Technology Integration	0.001	Significant impact
H_3	Entrepreneurial Innovation→Technology Infrastructure	0.001	Significant impact
H_4	Entrepreneurial Innovation→Organizational Performance	0.001	Significant impact

Table 6. Correlation analysis between information technology and entrepreneurial innovation

Control variables	Technology Acquisition	Technology Integration	Technology Infrastructure	Organization Performance
Entrepreneurial Innovation				
Technology Acquisition	1.000	0.395	0.596	0.083
Technology Integration	0.395	1.000	0.363	0.489
Technology Infrastructure	0.596	0.363	1.000	0.008
Organization Performance	0.083	0.489	0.008	1.000

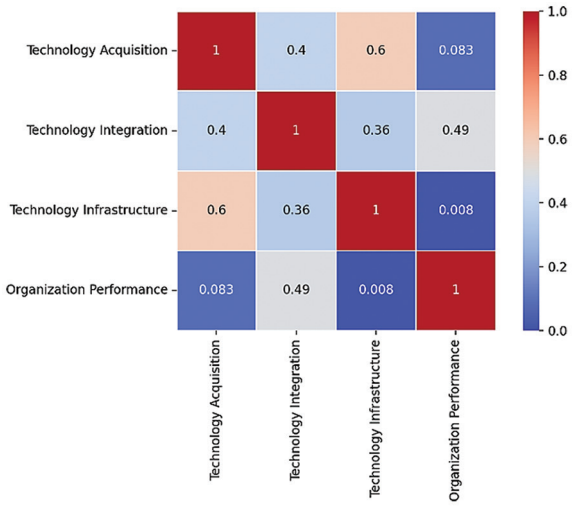

Fig. 4. Correlation heatmap of control variables

Understanding such relationships is important to assess how distinct technological elements relate to and impact organizational outcomes.

5.5. Analysis of Regression

The focus of this study on entrepreneurial innovation centers on technological systems, their acquisition, and the effects of these two aspects. The relationships between the dependent variable "Entrepreneurial Innovation" and the independent variables, e.g., "Technology Integration," "Technology Acquisition," and "Technology Infrastructure," were analyzed through regression analysis.

The findings reveal that "Technology Acquisition" has a coefficient of 1.278, with a corresponding R^2 = 0.482. This implies that 48.2% of the variation in entrepreneurial innovation is explained by "Technology Acquisition." A p=0.000 indicates a relationship that is both practically and statistically significant, suggesting that investment in technology by entrepreneurs positively affects innovation and business growth.

Likewise, "Technology Integration" recorded the second highest R^2 = 0.556, suggestive of an even greater impact on entrepreneurial innovation. Its statistical significance is supported by a p=0.000. This suggests that innovation through integrated technology is attainable, especially during business operations to improve efficiency, decision-making, and responsiveness to market competition.

For "Technology Infrastructure," the R^2 = 0.369 reflects moderate contemporary innovations affecting entrepreneurial innovation, and this relationship was found to be statistically significant, as indicated by the p=0.000. This emphasizes the need to develop sound technological infrastructure to support sustainable business growth and innovation in the long term.

To verify the reliability of these results, adjusted R^2 values were used to confirm that the regression model adequately captures the relationships between the entrepreneurial innovation and technological factors while minimizing the risk of overfitting.

Table 7 summarizes the results of the regression analysis, quantifying the association of "Technology Acquisition," "Technology Integration," and "Technology Infrastructure" with entrepreneurial innovation. The table presents essential regression parameters such as coefficient values, R^2, adjusted R^2, standard error, residual sum of squares, F-statistics, and p-values, which help assess the relevance of the model.

A technology integration coefficient of 0.632 (p=0.000) shows a strong positive relationship and

Table 7. Regression analysis between technology acquisition and entrepreneurial innovation

Model	C	R^2	Adj. R^2	Standard error	SS residual	*F*	Sign (*F*)
Technology Acquisition	1.278	0.48	0.48	0.38	46.2	298.17	0
Technology Integration	1.304	0.56	0.55	0.352	39.65	400.29	0
Technology Infrastructure	1.852	0.37	0.37	0.4195	56.31	187.18	0

Table 8. Regression analysis between entrepreneurial innovation and organizational performance

Factor	Unstandardized Coefficients (B)	Standard Error	Standardized Beta (β)	*t*-value	Significance (*p*-value)
Constant	1.482	0.108	-	13.743	0.000
Organizational Performance	0.583	0.030	0.732	19.240	0.000

is statistically significant at the 5% level. In addition, the adjusted R^2 = 0.554 suggests that 55.4% of the variance in the dependent variable is explained by the independent variables, further confirming the validity and reliability of the results.

The finding of a technology infrastructure coefficient of 0.472 (statistically significant at the 5% level, with a p=0.000) also indicates a positive correlation. The adjusted R^2 = 0.367 implies that over 36.7% of the variability in the dependent variable can be attributed to changes in the independent variables. These findings further enhance the credibility of the model used to determine the effect of technological factors on entrepreneurial innovation. Regression analysis results showed that "Technology Integration" had a significant positive effect on organizational performance ($\beta = 0.482$, $p<0.01$), while "Technology Infrastructure" demonstrated a moderate effect ($\beta = 0.315$, $p<0.05$). Detailed path coefficients and model fit indices are presented in Table 7.

Table 8 shows a sufficient positive correlation, with the Integrated Performance Coefficient standing at 0.583, significant at the 5% level with a p=0.000. From this, it can be concluded that the results demonstrate considerable strength, suggesting that 53.5% or more of the dependent variable can be explained, given the adjusted R^2 is at the aforementioned value. This further confirms the relationship between organizational performance and entrepreneurial innovation.

The findings of this study align with prior research emphasizing the critical role of technology in fostering entrepreneurial innovation and business growth. For instance, the strong positive impact of technology acquisition on organizational performance observed in this study corroborates the findings of Poudel et al. (2019), who highlighted technological capabilities as key prerequisites for business expansion and economic growth. Similarly, the importance of technology integration in driving entrepreneurial activities is consistent with the work of Lin et al. (2021) and Martin-Rojas et al. (2019), who demonstrated that technological capabilities significantly influence new venture development.

Furthermore, the results regarding the influence of AI-driven applications on business innovation align with the conclusions drawn by Jafari-Sadeghi et al. (2021), who found that digital transformation profoundly shapes entrepreneurial activities across Europe. In line with Matejun (2016), our study reinforces the view that technological entrepreneurship depends heavily on leveraging both internal resources and external technological advancements. Finally, the significance of technological infrastructure in enhancing organizational performance is supported by the findings of Sonika et al. (2023), who emphasized that strategic planning and technology usage are crucial drivers of firm competitiveness and productivity.

While it was anticipated that technology integration would have a strong and direct influence on entrepreneurial innovation, the magnitude of this effect in the present study was relatively moderate compared to expectations. This contrasts slightly with the assertions of Kheni (2017), who emphasized technology–innovation fusion as a defining trait of successful niche entrepreneurship. One potential explanation for this deviation could be the presence of organizational inertia or cultural resistance to technological change, which were not directly assessed in this study and could moderate the observed relationships.

6. Conclusion

6.1. Implications

The role of social technologies in knowledge acquisition appears to surpass their contribution to knowledge creation, indicating broader phenomena such as the use of outsourcing, the division of labor, and the increasing sophistication of technology markets. It is advisable for organizations to incorporate

such advances in social network technologies and knowledge technologies to optimize intellectual capital value added throughout the social process control system, from innovation to social knowledge utilization. This can greatly improve organizational productivity and contribute to both economic and social development.

The integration of social networks with IT for knowledge management can be improved by examining the global best practices outlined in this study. Furthermore, these findings serve as an essential source of information to inform foster policy, specifically around enhancing social capital, increasing IT literacy skills, and strategically using social networking technologies at both the national and regional levels.

6.2. Limitations

This study is limited in scope largely due to the omission of several interacting factors concerning entrepreneurial attributes and attitudes that affect business performance. Wherever innovation and entrepreneurial zeal intersect, there is tremendous potential for IT infusion, and the resulting interceding variables invite more in-depth investigation in the long run.

Furthermore, a comparative study with entrepreneurs from Rajasthan would aid in understanding the operational variations among entrepreneurs in different geographical regions with common entrepreneurial attributes. This would open new horizons in examining the role of technological innovations in entrepreneurial ingenuity and performance in the developing world.

While the present study provides valuable insights into the influence of mobile multimedia technologies and AI-driven applications on entrepreneurial innovation and sustainable business growth, its findings are based solely on data collected from technology firms operating in India. As such, caution should be exercised when generalizing the results to other geographical regions or industrial sectors, where technological adoption patterns, organizational cultures, and market conditions may differ. Future research could extend the model to diverse country contexts and sectors, enabling cross-comparative validation and broader applicability of the results.

6.3. Principal takeaways

The adoption and use of mobile multimedia technologies have transformed entrepreneurial success by automating processes, improving communication, and enabling better decision-making, thereby altering traditional business models. While these technologies present both advantages and disadvantages, their overall effect on entrepreneurial innovation and sustainable business model development is positive, especially in the areas of efficiency and growth potential.

This research confirms that all hypotheses proposed in this study were statistically supported. The results show that the processes of technology acquisition, integration, and infrastructural development significantly enhance entrepreneurial innovativeness, which results in improved organizational performance.

Mobile multimedia platforms improve business effectiveness by automating customer interactions, enhancing decision-making, and increasing labor productivity and revenue flow. Furthermore, their ability to automate processes further enhances operational efficiency and business growth. This study suggests that the use of mobile multimedia technologies facilitates entrepreneurial development through more effective technology adoption and integration, infrastructure improvements, and increased organizational performance.

Furthermore, mobile multimedia platforms support entrepreneurship by expanding job opportunities, facilitating learning, and boosting employment through remote work capabilities. Specifically, mobile multimedia communication systems and electronic marketing technologies empower entrepreneurs in the development of innovative and competitive business models within fast-evolving business and technology environments.

Future research could explore the extension of the proposed framework to non-technology sectors, such as healthcare, agriculture, and retail, to assess its broader applicability. Comparative cross-country studies involving both emerging and developed economies may provide insights into regional variations in technology adoption and entrepreneurial innovation. Moreover, incorporating moderating variables such as organizational culture, leadership dynamics, and external market turbulence could yield a more nuanced understanding of the technology–entrepreneurship relationship. Longitudinal studies would also be valuable to examine how technological impact on entrepreneurial performance evolves over time.

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AUTHOR BIOGRAPHIES

Dr. Samreen Jafri is an accomplished and multifaceted professional with an illustrious career spanning over 17 years in academia, research, and curriculum development. As an editor, she embodies intellectual rigor, meticulous attention to detail, and a passion for advancing knowledge in her field. Her career reflects a deep commitment to fostering innovation and excellence in human resource and supply chain management. Dr. Jafri's collaborative nature, coupled with her intellectual curiosity, makes her an invaluable contributor to multidisciplinary projects. Holding a Ph.D. in Supply Chain Management and backed by a robust academic foundation, Dr. Jafri has consistently pushed the boundaries of her discipline. A prolific researcher, she has published extensively in SCOPUS-indexed journals and other prestigious venues, with expertise spanning topics from cyber security to organizational behavior. Her editorial acumen is evident in her role as guest editor for SUSCOM-2024's special issue on sustainable security, when she adeptly curates influential research and upholds the highest standards of publication quality. Dr. Jafri's leadership, as an editor, researcher, and educator, is driven by her commitment to building a more sustainable and interconnected academic and professional community.

Dr. Kamal Upreti is currently serving as an Associate Professor and Research Coordinator in the Department of Computer Science, CHRIST University, Delhi-NCR, Ghaziabad, Uttar Pradesh. He completed his B. Tech (Hons) from UPTU, M. Tech (Gold Medalist), PGDM (Executive) from IMT Ghaziabad, and a PhD in Computer Science and Engineering. He also completed his postdoctoral research at the National Taipei University of Business, Taiwan, funded by the MHRD. In 2024, Dr. Upreti was recognized among the top 2% of scientists globally by Stanford University, California. He has published over 50 patents, 45 books, 32 magazine issues, and 130 research papers in reputed journals and international conferences. His areas of interest include artificial intelligence, machine learning, data analytics, cybersecurity, machine learning, healthcare, embedded systems, and cloud computing. He has authored and edited more than 45 books with renowned publishers such as CRC Press, IGI Global, Oxford Press, and Arihant Publication.

Dr. Rishu Bhardwaj has been working as an Assistant Professor at Chitkara Business School, Chitkara University, since January 2022. She has over 15 years of experience as a faculty member and trainer in International Business & Trade, Economics, and Entrepreneurship. Her expertise includes Business Economics, International Trade & Export-Import Management, and Entrepreneurship Development. She has worked with various reputed business schools, including NIILM New Delhi and DIT Business School. Notably, she has collaborated with IED-UP, where she delivered expert and dynamic sessions on Import-Export Procedures & Planning, statutory requirements to start EXIM businesses, venture capitalization, and new business strategies. Dr. Bhardwaj has contributed to the "One District One Product" scheme under the Uttar Pradesh Government. She has conducted workshops at various esteemed institutions, including MCM DAV College (Punjab University, Chandigarh), Raipur; MET Mumbai; Matrusri Engineering College, Hyderabad; Hindu College, Amritsar; Dronacharya College of Engineering, Gurgaon; KCG Chennai; BMI, Bangalore; Raja Rajeshwar College, Bangalore; Apeejay; IIITM, Gwalior; ITM University; Acropolis Engineering College, Indore; Daulat Ram College, Delhi; and Kalandi College, Delhi. She holds three published patents, two copyrights, and has authored various Scopus-indexed papers, as well as numerous UGC Care and IEEE conference papers.

Dr. Balraj Verma is an Associate Professor at the Doctoral Research Centre, Chitkara Business School, Chitkara University, Punjab. He earned his Ph.D. from Jaypee University of Information Technology (JUIT), Waknaghat, and holds an MBA with a strong foundation in business strategy and marketing. With over 17 years of combined academic and industry experience, he has developed a diverse academic portfolio characterized by scholarly rigor, practical relevance, and a commitment to educational excellence.

Dr. Verma has taught a wide range of subjects, including Marketing Management, Strategic Management, Business Statistics, and Research Methodology. He has successfully supervised multiple doctoral scholars to completion and continues to mentor Ph.D. candidates across interdisciplinary domains. His scholarly output includes numerous articles published

in high-impact journals indexed in SCI, Scopus, and ABDC, as well as edited books and book chapters with leading international publishers. His research interests are interdisciplinary and evolving, focusing primarily on E-commerce, retail and aggregator business models, technology adoption in emerging markets, blockchain for supply chains, robo-advisory services, and the behavioral aspects of digital transformation.

Rituraj Jain is currently serving in the Department of Information Technology at Marwadi University, Rajkot, India. He has an extensive academic and research background, with numerous publications in reputed international journals and conferences. Additionally, he is the author of four published books in the field of computer science and information technology. He holds professional certification as an Oracle Database SQL Certified Expert and has completed several specialized certifications through online platforms, including Hadoop Fundamentals I – Version 2, Moving Data into Hadoop, Introduction to MapReduce Programming, Big Data Fundamentals, and the Cloud U Certification. Mr. Jain is an active member of several prestigious professional bodies, such as the Indian Society for Technical Education (ISTE), Computer Science Teachers Association (CSTA), Academy & Industry Research Collaboration Center (AIRCC), International Association of Computer Science and Information Technology (IACSIT), and the International Association of Engineers (IAENG). His research interests span a wide range of emerging technologies, including cloud computing, machine learning, deep learning, fuzzy logic, Internet of Things, genetic algorithms, big data, and software engineering.