



Adoption Of Artificial Intelligent Technologies In SMEs Sector

Parul Agrawal¹ • Kamal Ahmad² • Ajay Kumar¹ • Anoop Pandey^{3*}

¹Bharati Vidyapeeth (Deemed to be University) Institute of Management & Research, New Delhi - 63

²Department of Commerce, H N B Garhwal University Chauras Campus, Srinagar, Uttarakhand

³Department of Commerce, H N B Garhwal University BGR Campus Pauri, Uttarakhand

*Corresponding Author email id: dr.anooppandey@gmail.com

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Abstract: Artificial intelligence is entering the lives of consumers with unprecedented growth and is being deployed across industries at an exponential rate. AI technology helps businesses perform complex tasks smoothly. COVID-19 has disrupted the operations of large organizations, hampering economic development and growth around the world. The adoption of artificial intelligence technology facilitates production and other management tasks by providing a competitive advantage. Since SMEs are the main contributors to the economic growth of the country, it is necessary to understand the decision-making process of SMEs adopting artificial intelligence and online resources. This study aims to explore the factors driving the use and adoption of AI technologies by SMEs in India. The increased use of AI and digitization makes it necessary to study the variables that influence AI technology decision-making, especially for SMEs. The conceptual models built to determine the impact of various factors on consumer behavior and the adoption of artificial intelligence and online resources will help to better understand how SMEs use and adopt the adoption of these technologies. Artificial intelligence will continue to influence and change consumer behavior in this digital world, where industries are more integrated, and SMEs need to adapt and grow accordingly. The findings and findings suggest that many factors, including technological, organizational, and environmental factors, influence the process of AI use and adoption by SMEs. The study contributes to a more complete picture of the adoption of AI technologies by SMEs in India. The theoretical contributions and managerial implications discussed in the study will provide valuable information for scholars, researchers, managers and policy makers.

Keywords: artificial intelligence • digitalization • SMEs • technology adoption

Introduction

Artificial Intelligence (AI) is an innovative technology which uses various advanced techniques to derive insights to promote businesses and accelerate economic growth, and has also been helpful in fighting against the COVID-19 pandemic. (Vaishya et al 2020). With Artificial Intelligence to take over the world in next few years, it becomes necessary to align the current inventions and innovations with advanced technologies to ensure smooth functioning of various purposes (Ambati et al., 2020). As per a report of PwC, Artificial Intelligence would lead to a 14% increase in global GDP by 2030 making it approximately \$15.7 trillion, which makes it one of the biggest

commercial opportunities in today's dynamic world (Rao & Verweij 2017)

With rapid digitalization and easy internet access, organizations including Small and medium enterprises (SMEs) are rapidly adopting artificial intelligent technologies and online resources to carry out their operations. Adoption of AI technologies lead to improved productivity, efficient decision making, reduced costs, economies of scale and even boost sales (Knight 2015). Studies highlight various advantages of adopting and implementing AI in organizations, yet organizations still resist or face difficulties due to foundational barriers to adopt AI technologies (Chui & Malhotra 2018) and thus,



AI is yet to shape many businesses despite its great potential (Bergstein 2019).

A rapid increase in the pace of globalization leads to enhanced competition levels for SMEs. With limited funds, lack of sophisticated IT infrastructure, low corporate work culture, undefined management strategies and other limitations, adoption of online resources and artificial intelligent technologies remains undefined. Despite of all restrictions, it is necessary for SMEs to upgrade, increase and improve their output and performance levels(Kumar et al 2021).

SMEs contribute significantly in the economic growth of any nation. In India also, SME sector inclusive of manufacturing, infrastructure, food, clothing, chemical is vital for the economy by playing an important role towards nation's growth and employment generation(Kumar & Ayedee 2019). The number of Indian Micro-small and Medium enterprises(MSMEs) rose by CAGR of 18.5% from 2019 to 2020 taking total number to approximately 6.3 crore (*MSME Industry in India – Market Share, Reports, Growth & Scope | IBEF, 2021*; Statista Research Department, 2021b)

During FY 2015, Indian MSMEs manufactured approximately 20 trillion Indian rupees output leading to a contribution in GDP close to 31% (Statista Research Department, 2021c, 2021a) while providing employment opportunities to almost 106 million people which approximately 40% of Indian workforce (BI India Bureau, 2016).

Problem Statement: With rapid increase in globalization, digitization and ill effects of COVID-19 on nation's economy, there is a lot of pressure on both developed and developing economies to revive their economies by increasing their output levels within the parameters of achieving sustainable development. Governments of nations and general public expect this improved behaviour not only from multinational firms, but also from

small enterprises (SMEs) as well (Kumar et al 2021).

Artificial Intelligence is not a new thing in market. It has gained popularity the past few years and has widely adopted by organizations worldwide. Besides providing technological edge, artificial intelligence and e-business resources also impact business and management strategies profusely. While SMEs contribute significantly in economic growth and development of nations, they at times lack resources which are readily available and accessible by bigger organizations.

Adoption of artificial technologies by SMEs usually doesn't fall on a priority list due to lack of skilled workforce, stringent regulatory compliances, economic restraints, and, technological complexities (Kumar et al 2020; Sadashiv Jadhav 2021).

Adoption of online resources and artificial technologies lead to improved productivity, efficient decision making, reduced costs and even boost sales (Knight 2015). Though, endless advantages are known; adoption, implementation and usage of such technologies are affected by various parameters and factors. There are numerous similar studies carried out for developed nations, however India's different political, economic, social, legal, cultural, technological, environmental factors make it necessary to study the variables influencing the adoption process of artificial intelligent technologies by SMEs in India.

Key Objectives: The key objective of this study is to determine the various factors influencing the adoption of online resources and artificial intelligent technologies in Indian SMEs.

Purpose of study: The purpose of this study is to identify the factors influencing adoption, implementation and use of online resources and artificial intelligent technologies by SMEs in India. The study aims at exploring the impact of different variables in the entire adoption process.



A conceptual framework would be developed which can later be validated through empirical research.

Literature Review

E-business and Artificial Intelligent technologies are crucial for the survival and success of businesses in the digital era. Consequently, understanding the factors influencing SMEs in adopting these tools is essential. Numerous studies have explored the adoption of online resources and AI technology by SMEs and other organizations. For instance, Ambati et al. (2020) examined factors affecting AI adoption from employees' perspectives, inspired by the Technology Acceptance Model, Theory of Reasoned Action, and Unified Theory of Acceptance and Use of Technology. The study found that perceived ease of use and usefulness positively influence AI adoption, with social influence being a significant motivator. However, risk and resistance were identified as hindrances.

Savola et al. (2018) investigated the factors influencing AI adoption for marketing purposes in SMEs in Finland and Sweden. The study used qualitative data from nine top management representatives, classifying them as providers, adopters, and non-adopters. Technological, organizational, and environmental (TOE) factors were found to be responsible for the adoption process.

Sombultawee (2020) identified antecedents and consequences of e-commerce adoption by SMEs in the UK, using primary data from 88 SMEs and analyzed with structural equation modeling (SEM). The findings indicated that performance expectancy, effort expectancy, and facilitating conditions impact e-commerce adoption, while social influence played the least role. Princely Ifinedo (2011) highlighted internet and e-business technologies as pillars of e-commerce, analyzing factors influencing their adoption in SMEs in Canada's Maritime region. The study, based on the Diffusion of Innovation (DIT) and TOE frameworks,

revealed that relative advantage, management support, competitive pressure, and government support positively impact adoption, with compatibility having no significant effect.

Alsheibani et al. (2018) proposed a research framework for AI adoption using TOE and DOI frameworks, categorizing factors into technological readiness, organizational readiness, and environmental readiness, leading to the intention to adopt and actual adoption.

Chatterjee et al. (2021) studied AI adoption in manufacturing and production firms using an integrated TAM-TOE model, highlighting the impact of organizational complexity, competency, and competitive advantage on perceived ease of use and usefulness, while organizational readiness, compatibility, and partner support had no significant impact. Leadership support was found to play a moderating role.

Aarstad & Saidl (2019) explored factors constraining AI adoption by SMEs in Europe, identifying 20 factors including lack of IT competence, resources, resistance to change, and compatibility issues.

Kumar et al. (2020) examined how adopting online and e-business resources can improve performance and output levels of Indian SMEs during the COVID-19 pandemic. The study emphasized the need for SMEs to adopt these technologies for sustainable growth, reduced costs, better marketing strategies, and improved customer relationships.

Scupola (2009) provided insights into factors affecting business-to-business adoption and implementation in SMEs in Australia and Denmark, identifying common factors such as customer pressure, access to ICT consulting services, top management support, and resource constraints. Australian SMEs also faced quality of service provider and government policy issues.

Rahayu & Day (2015) investigated e-commerce adoption by SMEs in developing nations, using the TOE framework and categorizing factors into technological, organizational,



environmental, and individual factors. The study surveyed 292 Indonesian SMEs, highlighting perceived benefits, technology readiness, IT ability, IT experience, and innovativeness as key factors impacting the adoption process.

Research methodology

The research methodology adopted in this study is extensive literature review on the topics artificial intelligence, e-business resources and adoption process of such advanced technology by organizations either big or small like SMEs. Google Scholar database has been selected to find out previous research papers, PhD dissertations, and, Case studies on same or similar topics commenced worldwide. To get the idea of latest trends, mostly researches carried out after 2010 were selected for developing the conceptual framework which can be later validated through empirical research.

Research Gap: The adoption of e-business resources and AI technologies has surged, especially post-COVID-19, mainly in developed countries and large organizations in developing nations. However, SMEs, particularly in India, are still in the early stages of adopting AI for business, manufacturing, and marketing. Research on the factors influencing AI adoption by Indian SMEs is sparse, with limited formal exploration of the challenges they face. Recognizing AI as a potential growth driver for Indian SMEs, this study aims to fill the gap by providing a literature review-based research to develop a conceptual framework. This framework will help analyze the variables affecting the adoption, implementation, and use of AI technologies by Indian SMEs.

Research Questions: The primary objective of this study to analyse the adoption process of e-business resources and artificial intelligent technologies by SMEs in India.

RQ1: What are the variables influencing adoption of e-business resources by SMEs in India?

RQ1: What are the factors leading to adoption of artificial intelligent technologies by SMEs in India?

RQ2: What are the factors hindering or discouraging the adoption of artificial intelligent technologies by SMEs in India?

1. Theoretical Foundation and Hypothesis development

2. Diffusion of Innovation Theory

Rogers (1995) studied how over time new ideas, products or behaviour are communicated through a culture while gaining momentum and diffusing or spreading through a specific culture, population or social system resulting in adoption of that specific idea, behaviour or product as Diffusion of Innovation (DOI) theory. The adoption of innovations are highly dependent on numerous characteristics, may it be individual, internal or external characteristics. The adoption process by an individual or firm includes stages like awareness, adoption/rejection decision, use and continued use in future.

DOI theory identifies five major factors influencing adoption of any idea, behaviour or product which are:

1. **Relative Advantage:** The degree to which an innovation or idea is perceived better than the idea, behaviour or product it replaces and the additional benefit it provides to the potential adopters.
2. **Compatibility:** The degree to which and innovation fits with the organisation's values, needs and experiences of potential adopters.
3. **Complexity:** The degree to which an innovation is difficult to understand, adopt, implement and use.
4. **Trialability:** The degree to which an innovation can be tested, tried and experimented before actual adoption/rejection decision is made.



5. Observability: The degree to which an innovation showcases tangible outputs.

3. TECHNOLOGY ACCEPTANCE MODEL

Technology Acceptance Model (TAM) was originally coined by Davis (1985)

The Technology Acceptance Model (TAM) was originally developed by Davis (1985) to improve understanding of the user acceptance process to support the design and adoption of IT systems. Information (SI). The model (see Figure 4) proposes that an individual user's overall attitude toward using a system determines whether they actually use it (Davis, 1985). Attitudes towards the use of a system are presented in the model according to two constructs, perceived usefulness and perceived ease of use (Davis 1989). Perceived usefulness is defined as "the extent to which a person thinks that using a particular system will improve their work performance", while perceived ease of use is defined as "the extent to which a person thinks that use of a particular system will unlock its work performance "Effort" (Davis 1989).The model focuses on how design features directly affect (arrows) perceived usefulness and perceived ease of use of individuals, and through these constructs indirectly affect attitudes towards system use. of the model is that it excludes external and structural factors that existed before the application of the TAM process. For this study, the use of this framework limit perceptions of barriers to adoption to individual perceptions of technology acceptance and diminish the importance of the SME environment.

The Technology-Organization-Environment (TOE) framework was developed initially by Tornatzky et al (1990) in order to describe the influence of contextual factors in adoption of an innovation. In this framework, there are three aspects of a firm's context that influence adoption of the technology innovation; these are technological context, organizational context, and external task environmental (industry) or as it more commonly called -

environmental context. Technological context relates to both the internal and external technologies that are relevant to the firm, while organizational

context pertains to the nature and the resources of the firm, which is proxies by firm size and the decentralization, formalization, and complexity of their managerial structure. Then, the environmental context refers to other parties surrounding the firm such as competitors, suppliers and government (Zhu et al 2002).

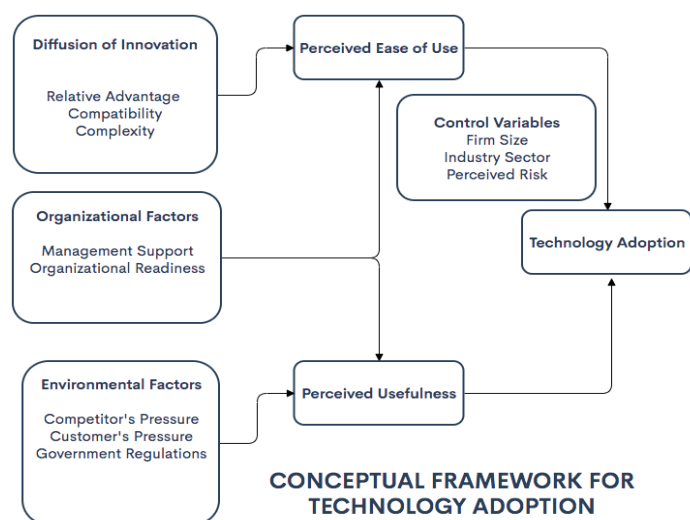
From the theories above, the TOE framework is chosen as the theoretical basis for the development of our research model. This choice is based on several considerations. Firstly, the TOE framework has been widely recognized by previous studies as a well-established framework through which to study e-commerce adoption (Morteza et al 2011; Ramdani, Chevers, & Williams, 2013; Salwani, Marthandan, Norzaidi, & Chong, 2009; Sila&Dobni, 2012; Zhu, 2004). Secondly, the TOE framework considers various contexts, not only focusing on technological contexts (such as IDT), but also considering organizational and environmental contexts. It is recognized that a model that covers many dimensions can provide better explanatory power than model that only covers one dimension (Li &Xie, 2012; Molla& Licker, 2005). Thirdly, the TOE framework is recognized as a model that employs an interactive perspective that assumes that the changes in an organization are determined not only by individuals in organization but also by the characteristics of the organization in which they operate (Hameed et al 2012). The interactive perspective allows the researcher to treat all of the factors and their interaction in one dynamic framework (Molla & Licker 2005) and it is believed that this can explain IT innovation adoption comprehensively. The Technology-Organization-Environment (TOE) framework was developed initially by



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Conceptual Framework



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Key Findings and Managerial Implications

The key findings and managerial implications of this secondary research are mentioned below.

Online resources and artificial technology are gradually becoming a necessary rather a choice for any organization to succeed and accomplish its goals. The study will raise awareness for the organizational executives and especially Small Medium Enterprises to incorporate the required modifications in their operations and formulate strategies accordingly for business expansion and daily routine tasks. Also, SME's can try to promote the factors that encourage adoption of online resources and artificial technologies while reducing negative factors.

The findings of this study will help owners, managers and executives of current and future SMEs of India to understand the use of online resources and artificial technologies in improving business. With COVID-19 disrupting the economy and business procedures worldwide, adoption of e-business resources encompassed with AI is inevitable for both small and big organizations.

Managers and owners of SMEs should take the matter of adoption of e-business resources and artificial intelligent technology seriously and rationally and not ignore potential impact of AI as there would be no AI winter again. Adoption of such resources will be very beneficial for their business, marketing, manufacturing and strategic decisions. Also, with everything going digital, organizations should work on talent management and train their employees for effective and efficient implementation and use of online resources and AI.

Conclusions

In the end, it can be concluded that AI technology adoption can change the history of SMEs and be very fruitful for their various business purposes. Artificial intelligent technology will not only help in reducing costs but also enhance customer satisfaction. With rapid globalisation, digitalization and COVID-

19, the number of internet users are increasing exponentially. SMEs should switch immediately to e-business resources and make proper efforts to adopt AI technology in their processes. Also, for SMEs which are operating in sectors currently preparing to adopt AI technologies, it is recommended to pursue proactive approach in capitalizing the opportunities to gain adequate benefits and not fall behind more fast-moving and visionary competitors.

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