Analysis of Challenges faced during Adoption of ICT by Small and Medium Enterprises in India

Naveen D. Chandavarkar [1, 2] & Nethravathi P. S. [3]

[1] Research Scholar, Institute of Computer Science and Information Science, Srinivas University, Mangalore, India

[2] Assistant Professor, Dept. of Computer Science, Smt. Padmavatibai Raghavendrarao Deshpande Pikalihal Govt. First Grade College, Mudgal, Raichur Dist. Karnataka, India

Orchid ID: 0000-0003-1650-7837;

Email: naveendchandavarkar.cet@srinivasuniversity.edu.in

[3] Professor, Institute of Computer and Information Sciences, Srinivas University, Mangalore, India

Orchid ID: 0000-0001-5447-8673; Email: nethrakumar590@gmail.com

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Naveen D. Chandavarkar [1, 2] & Nethravathi P. S. [3]

[1] Research Scholar, Institute of Computer Science and Information Science, Srinivas University, Mangalore, India,

[2] Assistant Professor, Dept. of Computer Science, Smt. Padmavatibai Raghavendrarao Deshpande Pikalihal Govt. First Grade College, Mudgal, Raichur Dist. Karnataka, India, Orchid ID: 0000-0003-1650-7837;

Email: naveendchandavarkar.cet@srinivasuniversity.edu.in

[3] Professor, Institute of Computer and Information Sciences, Srinivas University, Mangalore, India,

Orchid ID: 0000-0001-5447-8673; Email: nethrakumar590@gmail.com

ABSTRACT

***Purpose**: This review article concentrates on the issue of SMEs' slower adoption of ICT. The review begins with the nature and characteristics of SMEs and their importance, moving on to the challenges in the implementation of ICT by SMEs. The potential use and drivers of ICT in SMEs, their conceptual framework, and the reduction of a gap in ICT adoption are discussed. ICT evaluation strategies in Indian SMEs and other developed countries are analyzed. Finally, before going into the future of ICT in SMEs, the tools used for the analysis of challenges in ICT are reviewed.*

***Methodology**: This paper explores the papers and articles available on challenges to the adoption of ICT to analyze various parameters in SMEs.*

***Findings/Results:** ICT adoption can assist SMEs in reducing costs by enhancing internal procedures and strengthening their business through better consumer interaction. SMEs appear to be delayed in adopting and using ICT in comparison to other sectors, despite the aforementioned knowledge and the relevance of ICT has long been acknowledged as a sector catalyst for other industries and economic prosperity. While large corporations have increased their use of ICT to obtain a competitive advantage, SMEs, who continue to confront restricted accessibility to markets and information, have shown little interest.*

***Research Limitation:** Though the review article has reviewed more than 200 papers, the work is based on literature rather than empirical findings, limiting the current work and paving way for future empirical research on the same.*

***Originality/Value**: Based on the findings ABCD analysis and research into the barriers to SMEs adopting ICT and other aspects detailed in this review are warranted.*

***Paper Type**: Literature review paper*

***Keywords**: ICT, SMEs, Adoption, Challenges, ABCD analysis*

1. INTRODUCTION :

SMEs (small, medium, and micro businesses) contribute significantly to the economy by generating jobs and raising living standards. These businesses are engines of economic development and innovation [1]. Small- and medium-sized businesses make a significant contribution to the social objective of fair distribution of income (SMEs). Most parts of the planet's small and medium-sized enterprises (SMEs) are considered priority sectors. According to the study, SMEs account for half of the world's two-thirds of firms [2]. They have a substantial influence on the businesses' overall GDP growth [3]. Small and medium-sized businesses (SMEs) have an important contribution to the economies of most nations, but they are especially important in developing nations since they contribute to creating jobs. They contribute to the development of revenue for populations in such economies, which is extremely advantageous to emerging economies. Small and medium-sized enterprises (SMEs)

dominate the manufacturing, trading, and service sectors in emerging markets. As a result of globalization, SMEs throughout the globe have undergone substantial changes [4].

In developing countries, the role of SMEs has grown increasingly important since they are capable of enhancing income distribution, creating jobs, reducing poverty, and increasing exports [5]. The utilization of ICT by SMEs tends to reduce the gap between lenders and borrowers [6]. The SME sector's significance for India's economic growth has reached previously unheard-of levels. Over the last five decades, businesses in India's economy are extremely dynamic and competitive. Since India's independence, a small industry has been a key component of the country's economic growth strategy. Manufacturing, small and medium-sized business, employment opportunities, and export industries all significantly benefit from the micro, small, and medium-sized business sector. According to estimates from the Ministry of MSME, the sector contributes to around 45% of India's manufacturing production and 40% of its total exports [7]. However, these business types encounter a variety of difficulties including pathways. Several solutions have been proposed to mitigate the issues, utilizing ICTs to intensify output, and competitiveness [8] and switching to the new resources available [9].
Computerized information and communication technologies are named as ICTs. Personal computers, notebooks, smart applications, wired or wireless private networks, business software, storage systems, and network monitoring are some examples of these technologies. ICT is identified as a tool for implementing business development in SMEs in case-wise utilization [10]. Corporate productivity tools like editors and spreadsheets are also included. Small businesses can benefit greatly from ICT adoption and integration [11]. Young individuals between the age of 14 – 29 years are certain in using these technology peripherals to adapt themselves to using novel technology [12].
Information systems (IS) developments in SMEs cannot be viewed as a miniature replica of larger businesses. These provide SMEs with a variety of options that have mostly gone untapped [13]. The global economy is greatly influenced by revolutionary SMEs, especially in emerging nations, by encouraging economic expansion and technical advancement [14]. Because SMEs acknowledge achieving their strategic objectives, they intend to spend more money on innovative venture projects in the future. The most crucial step is the technology improvement aspect in increasing SMEs' competitiveness through capacity growth. Technology adoption necessitates increased skill levels, motivating the company to invest in training [15]. The upcoming sections discuss various aspects related to the SMEs and adoption of ICTs.

2. RESEARCH OBJECTIVES :

- To evaluate the Nature, and characteristics of SMEs.
- To analyze the usefulness of SMEs in a country's economic progress.
- To know the challenges faced in the ICT adoption process in SMEs.
- To evaluate the potential use and drivers of ICT in SMEs.
- To compare the adoption rate of ICT by SMEs in India and other developed countries.
- To evaluate strategies to reduce the gap in ICT Adoption.
- To perform ABCD analysis on ICT Adoption.

3. METHODOLOGY :

A Systematic Review is performed using the information available on the challenges for ICT adoption in SMEs, which includes related papers and articles available online about the topic. The Google Scholar was mostly used search engine to extract existing journal papers.

4. LITERATURE REVIEW :

Many analysis based on challenges in the adoption of ICT is performed to understand the reason behind the ICT adoption barriers. The available literature is collected from the articles and papers using Google scholar using the keywords like ‘Challenges’, ‘SMEs’, ‘Adoption’, and ‘Analysis’. Articles are further scrutinized considering the relevant topic. Details of the literature review are addressed in descriptive and tabular forms below.

4.1 Descriptive Focus:

The study conducted by Saurav Dixit et. al. (2021) [16] indicated possible benefits and advancements brought about by technology management. There are solutions for the numerous obstacles preventing ICT from being used to manage building projects. The study's conclusion outlines the steps that must be taken to increase the effectiveness of information and communication technologies in the administration of construction projects. At all levels, the impact of properly utilizing ICT in the Indian sector is evident, and it will surely assist the scenarios and outlook for the upcoming building. It is said that there is a lack of understanding of these technologies and that specialists in the building business find it challenging.

The goal of this study performed by Asrul Sanil et. al. (2021) [17] is to determine how IT adoption affects SMEs in Jakarta's suburbs considering the organization culture and the impacts on technology readiness. The findings show that SMEs themselves benefit greatly from the deployment and usage of information technology for their growth and sustainability. This model can be constructed with a few factors that will be covered in structural analysis, according to the high percentage of IT experience and the educational qualification in the enterprises. In order to make sure the model is examined in regards to the structural analysis, this study must continue its additional research.

The study done by Vimal Kumar et. al. (2022) [18] intends to determine how ICT became a new business strategy and how ICT adoption factors impact the gains that micro, mid, and medium-sized businesses receive. The results show that ICT use in the industry has remained stable both during and after the COVID-19 epidemic. The findings show that diverse ICT adoption parameters have an impact on how well Indian MSMEs perceive the benefits of their organizational performance, apart from the restrictions/consequences of the research- Indian MSMEs can make judgments about investing in a variety of technologies that benefit their business thanks to the findings of the recent research. In order to strengthen the company, managers and specialists help it identify the components of technology adoption that are most important. According to the report, there are a few ICT adoption variables that are very important for Indian MSMEs' organizational effectiveness. This study looked ICT as an evolving business technique that would change depending on how COVID-19 participants regarded its advantages. In addition to the five ICT adoption components that were only identified through the literature research and were only briefly explored in the study's design, there are probably other elements aw well that could have an impact on technology adoption and organisational success. In a later study, we might take into account operationalizing some necessary control factors that might affect the outcomes.

Information and Communication Technologies (ICTs) are one of the primary forces behind SMEs, whereas Small and Medium Enterprises (SMEs) are seen as the foundation of the economy. The current study carried out by Nasser Saif Al Busaidi et. al. (2019) [19] analyze empirical literature to investigate the key factors that affect the adoption's success. Different kinds of ICTs in SMEs internationally and it is implied that ICT might help firms become more effective, inventive, and competitive. It is discovered that a variety of factors, such as a lack of strategic vision, an unfavourable business environment, poor management skills, an outdated technology base, difficult bureaucratic procedures, and difficulties finding skilled workers for hire, have an impact on the adoption of ICTS in SMEs. The results will serve as important references for future research on the efficient uptake of ICTs in SMEs in the context of Oman and the Gulf.

Small and medium-sized enterprise (SMEs) have a substantial economic impact. This study's objective is to give a summary of the research on how SMEs embrace new technology. Based on research articles released between 2011 and 2021, this study conducted by Juniarti & Omar (2021) [20] compiled a list and evaluated peer-reviewed academic articles on SMEs' adoption of technology. There has been a lot of research on use of technologies by SMEs, but more is required because the findings indicate that prior studies primarily utilized ICT and quantitative methods.

However, only 15% of the companies possess a working knowledge of information and communication technology (ICTs). Other companies are reportedly unwilling to adopt and employ ICTs because they don't comprehend them, appreciate them, or accord them the respect they deserve. 179 businessmen in Metropolitan Lima took part in a survey. For this type of firm, a fresh ICT adoption framework based on the 11 recognised characteristics is developed. Information and communication technology uptake in industrial workplaces in Metropolitan Lima's final version, according to the research conducted by Edgar Fernando (2021) [21], eliminates the "environmental" aspect.

An article by Sunday Chinedu et. al. (2019) [22] adopts a grounded theory-like style of data-driven, thematic analysis to investigate issues that SMEs are facing as they embrace new ICTs from the perspectives of various actors. The research found that SME managers face difficulties related to time management and poor ICT understanding. The government is responsible for the lack of ICT assistance, restricted funds, specialized skills, and general support. Dependent and unreliable are traits associated with IT consultants, but IT specialists are connected with worldwide solutions. IT vendors have a monetary incentive. The results show that certain difficulties that SMEs go across in this process are related to both of them and external actors. These issues range from inadequate ICT expertise and time management, they also relate to government, SME management, insufficient ICT assistance, a lack of specialised expertise, a shortage of resources, and a general lack of support.

It is clear from the discussion made by Asmat Ara Shaikh et. al. (2021) [23] that SMEs are much more in need of adopting new technology, and that demand has increased significantly after COVID-19. Owners and managers of SMEs must act now; they cannot disregard the deployment of technology. According to a review of the literature from the past two decades, data protection, low technical expertise, efficiency, high maintenance costs, training expenses, adoption challenges, less government support, less organisational commitment, essential resources, regulatory challenges, complexities, attitude problems, and a number of other problems are among the obstacles that managers are experiencing in the adoption of technology. The common obstacles include high infrastructure costs, a lack of technical expertise and efficiency, insufficient government funding, adoption problems, and a lack of organisational cooperation. Businesses must build competitive advantages based on the sufficient and efficient utilisation information and communication technologies (ICTs) in a knowledge-based economy to prosper in the market of today- based society. The modern economy needs to be viewed as a global process. ICT may benefit several businesses in a wide range of ways. ICT needs to be utilized in a complementary manner with other corporate resources to gain a source of competitive advantage. The current theoretical article by Virginia Barba et. al. (2007) [24] is merely a beginning effort; to more precisely describe the function of ICT in the conception and actual application of ICT, it is important to compare the observed empirical data. It is preferable to compare the prevalence of the reported findings to company performance and the creation of competitive advantages.

Retail industry supply chain decision-makers are being pressured to use information and communication technology (ICT) to boost the efficiency and resilience of their supply chains as a result of supply chain disruptions brought on by the COVID-19 pandemic. To maximise the impact of ICT adoption on the effectiveness of the supply chain, this study performed by Kedar Shiralkar et. al. (2021) [25] used the feature engineering methods to prioritize the functional supply chain components. The study gives the decision-makers in the supply chain for the retail sector a clear picture of the quantitative advantages of adopting ICT and assists them in choosing the right functional ICT aspects to employ to improve supply chain efficiency. The results of this study points out the importance of agility, traceability, information quality, funding, and information privacy in the adoption of ICT to boost the effectiveness of the retail supply chain.

The study's implications may be useful to SME managers and owners as well as the government for ICT adoption and growth in SMEs in Rivers State, Nigeria. Some of the elements that have been identified as influencing the success of SMEs in Rivers State, Nigeria include the adoption and use of ICT, innovative product and service brands, optimistic customer experience, access to financial services, setting clear specific business objectives, and having the right employees. by Obinna et. al. (2022) [26].

Table 1: Review of general factors and their outcome

S. No	FACTORS	OUTCOME	REFERENCE
1.	Role in the Economy	Employment Creation, Income Generation	Temtime and Panisiri, et al. (2006) [27]
2.	Significance of SME's Role in any Country	Creation of Employment, Economic Progress, Improving Skill Set, Strengthen Business Capabilities, Increasing	Shaik at al. (2021). [28]

		Manufacturing Output and overall Exports.	
3.	Contribution Prior to Covid19	80 million jobs, 8% of the global economy, 45% of industrial production, and 40% of exports to other countries.	Kumar et al. (2020). [29]
4.	Hurdles in ICT Adoption	Micro Management, Shortage of Internet Points.	Touray et al. (2013). [30]
5.	Challenges in Internet-Enabled ICT Adoption	Security concerns, having insufficient funds, a lack of ICT skilled personnel.	Sin Tan et al. (2010). [31]
6.	Challenges in ICT Adoption	Insufficient Infrastructure, Security Concerns, a lack of funding, as well as a lack of experience and expertise, integration of ICT into supporting functions like marketing, Finance, and Human Resources, Poor ICT penetration by Business Partners, and Cultural Differences are recognized as major hindrances to adopting new Technology.	Trappey et al. (2016). [32]
7.	ICT Innovation	Operations strategy, a boost in brand and image, better working conditions, content customers, and job satisfaction are all benefits of innovation. On the other hand, the negative impacts were increased failure rates, employee unhappiness, and High personnel Turnover.	Laforet (2011). [33]
8.	Reasons for Adoption of ICT	To gain a Competitive Edge, Increase Profit, adapt to new Business Settings, and keep up with the pace in the Breakthroughs of the Latest Technology, allows selling goods and services worldwide.	Apulu & Latham, (2011). [34]
9.	Drivers for Embracing ICT	To save money and time, to reduce logistics, postal, storage, and human cost so that it allows for faster responses to markets, consumers, and suppliers, increased Flexibility, and faster delivery and payment processing.	Jones et al, (2003). [35]

4.2 Nature & Characteristics of SMEs:

SME definitions vary according to the context. [36]. Although the definition varies by nation, it generally depends on one or both assets, professions, or a combination of the two. As a result, several nations use different interpretations. For example, the Organization for Economic Co-operation and Development (OECD) defines SMEs as companies with not more than 500 employees [8].

SMEs are defined by their internal competency, trading relationships, financial procedures, production, and management structures. They are a varied group of firms that often operate in the service, trade, agribusiness, and manufacturing sectors [37]. They differ in terms of size, age, industry, drive, organizational style, ethnicity, location, control over resources, depth of knowledge, and creativity.

There has been substantial research on the differences in management styles between major firms and SMEs [38].
According to this research, SMEs with a small managerial team (usually one or more people) are more affected by these operators and their peculiarities, have less influence over their environment, and want to maintain their independence [39].

4.3 Importance of SMEs:

SMEs are crucial to the health of all global economies. SMEs provide jobs, generate cash and help distribute it in underdeveloped nations [27]. They foster entrepreneurship and job opportunities.
The world is currently working to build a society where there is less poverty, more employment, sustainable production [40], and more technology use SMEs are the backbone of any country's financial development and progress. Green ICT plays an important role in industrial sustainability, especially food industries are the beneficiaries [41-42]. The government must overlook the importance of SMEs and the prerequisites for success. SMEs can aid the country's manufacturing GDP growth. Government and large multinational corporations are unable to sustain an entire economy. There are some countries in the globe where the populace is less skilled, less rich, and less educated. SMEs may play a significant part in this by giving these people work and early training. SMEs, on the other hand, have a finite amount of money and other resources. Hiring top people from around the world is difficult for all SMEs with limited resources, SMEs must dramatically expand in order to advance the nation's economy. There is only a handful of major sectors in which SMEs play a significant role for any country [28]. Areas of concern are

1. Creation of employment
2. Economic Progress
3. Improving the skill set
4. Increasing manufacturing output
5. An increase in overall exports
6. Strengthen business capabilities

SMEs are essential to the expansion of the world economy that is balanced [43]. These organizations serve as the foundation for a nation's economic growth. SMEs represent the majority of governments' sources of income worldwide. Unfortunately, SMEs are expected to provide a large portion of a country's economic growth, but they are constrained by resources. SMEs must expand, develop, innovate, contribute economically, attain manufacturing economies of scale and contend with intense competition. Multiple goals cannot be accomplished with a restricted budget and supply of resources. The development of the country is significantly impacted by the proportionate increase in SMEs. Most high-income nations derive half their GDP from SMEs. SMEs in developing countries are still in their beginnings and are experimenting with different types of technology adoption. SMEs provide a substantial contribution to the countries' job growth. These make SMEs a very integral part of any economic setup of a country. Further, the success of ICT adoption in SMEs is a local trend and region dependent [44].
The COVID-19 outbreak has made things worse and wreaked havoc on all businesses, especially SMEs. SMEs are struggling tremendously, and many are shutting down as a result of increased costs and reduced financial reserves. Following the COVID-19 breakout, SMEs are already facing several problems, including personnel turnover, delayed small business growth, and firm closures. SMEs have a poor reputation worldwide [28].
For instance, Indian SMEs were in charge of almost 80 million jobs, 40% of the nation's exports to other nations, 45% of its industrial output, and 8% of its GDP before COVID-19 [29] [45]. COVID-19 has resulted in a wide range of problems for SMEs globally, including layoffs, business closures due to cash flow challenges, sales decreases, sporadic periods of business continuity, and lost business opportunities. The logical solution in such a situation is to embrace technology in particular ICT in SMEs, however, the next section discusses some of the aspects that pose a challenge in adopting ICT in SMEs.

4.4 Challenges in the Adoption of ICT in SMEs:

Many studies [46-47] have addressed ICT adoption challenges in manufacturing enterprises in recent years. Micromanagement and a shortage of internet exchange points, for example, have been recognized

as the most significant hurdles to ICT adoption [30]. Some of the main obstacles to internet-enabled ICT adoption include a lack of ICT-proficient employees, security challenges, and surplus income [31]. Harindranath et. al., [48] investigated that when SMEs in southeast England were examined for their usage of information and communication technology, it was found that they do so to fulfill their specific needs. They found that barriers to adoption include the price of ICT, a lack of managerial expertise, and uncertainty about its advantages. Cahen et. al., [49] emphasized the need for managerial skills in the globalization of emerging technology-based businesses. Nguyen et. al., [50] stressed the relevance of information technology in small businesses and urged that top management work directly to guarantee successful adoption and use both internal IT personnel and outside IT experts. FeCheng Ma et. al., [51] concluded that increasing the knowledge base of the employees by training with the adoption of Information Technology will help in the growth of the firm.

A few important challenges in ICT adoption, include insufficient infrastructure, lack of financial resources, and knowledge, and advocated integrating ICT into supporting activities such as finance, advertising, and personnel management. They have even learned that information gained via instruction and regular management courses helps to remove barriers to ICT adoption. A few significant obstacles have been noted, such as employee skills, security issues, and low ICT adoption among corporate partners. The acceptance of new technology is hampered by cultural differences [32][52].

A Grey-DEMATEL (gray-decision-making trial and evaluation laboratory) Using an integrated methodology, [53] assessed and compared the use of ICT in SMEs in countries, both developing and advanced. This research also assisted in the development of a survey-based study to identify a methodology for thoroughly compiling information on obstacles Utilization of e-commerce and information technology in Sri Lankan SMEs. They have highlighted supporting actions for SMEs in Sri Lanka in addition to identifying impediments.

A major challenge that is faced arises due to the fact, the use of technology required the employees to upgrade themselves and equip themselves to use these technologies, this makes employees feel threatened by the whole idea of adopting ICT concerning the aspect of job security [54].

A few studies on specific industries and technologies are also there which specify industry-specific challenges. Small hotels in South Africa have been used, for instance, Mpofu et al. assessed the adoption of critical ICT technologies variables and discovered that power issues were the most common adoption hurdle. A three-category answers model was created to determine the challenges for e-commerce growth in underdeveloped countries. Its conclusions emphasized the dearth of ICT and the necessary infrastructure, as well as the lack of understanding regarding effective ICT use and low interest in integrating technology. A literature review was published by certain scholars [55]so as to look into the drivers, barriers, benefits, and methods for ICT adoption in SMEs more of which are also seen in the next sections.

4.5 Potential use and Drivers of ICTs in SMEs:

Authors of recent research have focused on factors of innovation in SMEs. SME innovation is governed by a variety of business-related aspects. Laforet [33] investigated the causes and effects of innovation in SMEs from the viewpoint of the enterprises using a grounded theory approach. Innovation is fuelled by a variety of market, business, and customer-related factors, including technological advancement, intense domestic and international competition, market uncertainty, business expansion, profit margin, a desire for high-quality products, the aspirations of CEOs for success, and better working conditions. Innovation has a conflicting impact on SME operations once it has been embraced. Functionality and sustainability, improved image and reputation, enhanced working environment, content customers, and fulfilling work are some benefits of innovation. On the other hand, innovation's drawbacks include higher failure rates, discontented workers, and significant staff turnover.

Liao & Barnes [56] studied the connection between knowledge acquisition and creativity in SMEs in a more recent study. The study found that the flexibility of SME product development was significantly impacted by obtaining knowledge from outside sources, including suppliers engaging in joint problem-solving, designing the innovation, and ongoing improvement initiatives.

According to a study [34], one of the primary justifications for their ICT usage is to get a competitive edge. Profit growth has been identified as another factor in SME ICT adoption. The results show that some respondents saw ICT as being among the most recent technological advancements and as the primary reason they chose to adopt it. Respondents acknowledged that ICT should be at the top of their

respective organisations, the capacity to adapt evolving business situations and that the world is changing quickly. Additionally, some respondents asserted that it would be impossible to stay current on technological advancements without ICT.

Some of the drivers for embracing ICT have used Microsoft Excel for analysis that is been highlighted [57], including the desire to save time and money. Logistics, postal, storage, and human costs are all reduced by using ICT. It also allows for faster responses to markets, consumers, and suppliers, increased flexibility, faster delivery as well as payment processing [35].

According to several respondents in the research, having a presence online motivates people to use ICT. It allows businesses to sell their goods and services on a worldwide scale. For example, a corporation mentioned that instead of transporting documents to locations that require time, they send them via the internet. A small number of respondents also mentioned that their business's nature, particularly telecommunication companies, is a driving force behind their choice to adopt ICT [34]. Another important motive for implementing ICT was to promote their goods and services. ICT assists in informing potential clients about business services [58].

4.6 Comparison of ICT Adoption Rate by Indian SMEs and Other Countries:

This section focuses on ICT adoption in the Indian context and other countries.

Table 2: Comparison of factors for ICT Adoption and Barriers among countries.

Country	Factors for ICT Adoption	Barriers	Author
Malaysia	The five elements that influence ICT adoption: • perceived advantages, • perceived costs, • ICT knowledge base, • external pressure and government support	• Price of adoption is a significant issue. • Complex to use. • CEO or owner makes ICT judgments.	Alam, S. S., & Mohammad Noor, M. K. (2009). [59]
Nigeria	• Identifying the elements that influence EDI (Electronic Data Exchange) adoption. • Perceived benefits, system quality, and perceived pressure to predict EDI Adoption.	• Higher Maintenance Cost • Scarcity of Commercial Partners • Unawareness of EDI	Maikudi Shehu Musawa & Eta Wahab (2012). [60]
India	• Prioritize entrepreneurial attitude and adaptable human resource strategies. • Planning adoption of manufacturing flexibility	• Poor understanding of manufacturing flexibility. • SMEs are still in its infancy	Mishra, R. (2016). [61]
Saudi Arabia	• Facilitated the participation of regional SMEs in the global market.	• Advantages in relation to others, senior management's backing, culture, the regulatory regime, owner/manager inventiveness, and ICT expertise	Adnan Mustafa Albar& Md. Rakibul Hoque (2017). [62]
Oman	• SME outsourcing trends. • ICT infrastructure	• SMEs outsource their ICT work. • Lack of internal competencies.	Ashrafi and Murtaza, (2008). [11]

	• The programme used to motivate investments in ICT. • Perceptions of the gains to business.	• High ICT costs. • Lack of skills suited for IT plans and implementation	
South Africa	• Key ICT characteristics affect adoption.	• Critical differentiators for ICT deployment. • Sectoral issues (targeted training, funding, policy, and empowerment initiatives)	Gono, S., Harindranath, G., & Özcan, G. B. (2013). [63]
Somalia	• Increases productivity and facilitates information sharing. • Firms adopt new innovative technology. • Adoption of ICT is influenced by organisational, technological, and environmental variables.	• Government Investments in local communities, infrastructure, and technology. • Cost and support	Abdullahi, H. O., Hassan, A. A., Mahmud, M., & Ali, A. F. (2021). [64]
Namibia	• Entrepreneurs operating in rural areas. • Better marketing strategies.	• Lack of knowledge, skills, access to electricity, and the high cost of smart gadgets.	Kamutuezu, E. U., Winschiers-Theophilus, H., & Peters, A. (2021) [65]
Palestine	• Organizational context, the surrounding environment, perceived technology controllability, perceived technology utility, and attitude toward technology.	• Competitive advantages and governmental legislations. • Attitude of the manager who are the owners.	Alkhateeb, M. A., & Abdalla, R. A. (2021) [66]
Bangladesh	• Half of sampled SMEs have embraced e-commerce (websites). • Decision makers are young in age and educated.	• Advanced e-Commerce application usage is nearly nonexistent. • Business partner integration is absent. • Strategic planning, motivation & training and finance	Islam, M. O., Haque, A. K., & Barua, B. (2021) [67]
Northwest Ethiopia	• Owner-managers decision to adopt new technology.	• Technical education, simpler access to financing, and financial incentives from the government of Ethiopia and other organisations. • The owner-sex, manager's their	Andaregie, A., & Astatkie, T. (2021). [68]

		educational background, the source of their initial funding, and the size of their enterprise.	
Vietnam	• Policymakers in transition economies increase SMEs' adoption. • Coordinating IT policies with policies to boost the calibre of the local business environment	• Improved local business environment reduces the persistence of SMEs' IT adoption	Vu, N. H., & Nguyen, N. M. (2021). [69]
Nigeria	• Cutting-edge technologies, such as e-marketing and digital marketing, is crucial	• E-marketing utilizing the identified key elements. • Owner's level of education, availability of resources, perceived compatibility, and lack of financial resources	Abdullahi, H. O., Hassan, A. A., Mahmud, M., & Ali, A. F. (2021). [71]
Indonesia	• Ability to adopt ICT for learning, eco-innovation, and entrepreneurial orientation were found to significantly affect marketing performance	• Online green Network for eco-innovation.	Aryanto, V. D. W., Kondo, K., Wismantoro, Y., & Andono, P. N. (2021). [72]
Korea	• Cyber security dangers facing SMEs	• Security risks and breaches, but several issues, including expenses, have not been well assessed. • People's understanding of its significance.	Alkhateeb, M. A., & Abdalla, R. A. (2021). [73]
Ghana	Boost customer service and responsiveness, boost competitiveness, enhance general communication, boost sales and profits and improve information access.	• Internal capability gaps, high ICT costs, subpar infrastructure, budgetary constraints, a lack of familiarity with appropriate ICT solutions, and a lack of implementation time	Islam, M. O., Haque, A. K., & Barua, B. (2021). [74]
Germany	• Alleviate physical distance. • Significant in the long run. • Better knowledge of organisational adoption	• Bridge physical distances and support virtual events	Wendt, C., Adam, M., Benlian, A., & Kraus, S. (2021). [75]

	and crisis management strategies in SMEs facilitated by ICT		

4.7 Strategy to Reduce Gap in ICT Adoption:

In this era of globalization, SMEs must use ICTs to strategically position themselves in the environment due to both internal and external influences. SMEs can profit from incorporating ICTs into their business processes, but they encounter numerous obstacles that prevent them from doing so. Lack of infrastructure and human capital, for example, are two impediments to ICT adoption. Despite these obstacles, several researchers have proposed several techniques in the literature to help SME owners, and managers overcome barriers to ICT adoption [8]. A measurement scale should be developed for understanding the current status of ICT adoption in an SME [76].

The strategies include those related to infrastructure, the development of human capital, financing, and the judicial process. The government typically offers subsidies and encourages ICT vendors will supply SMEs with unique discounts at a lower price as part of infrastructure plans to support SMEs. Government actions frequently result in ICT policy to increase infrastructure, invest in R&D, allow technical exchanges, create science centres and provide a legal framework [77]. In addition, there are regulations governing ICTs that offer tax breaks for investing in them and fund ICT training for SMEs, promoting e-procurement and other online activities. Finally, an SME policy should be implemented, such as providing SMEs with finance and business counselling services, streamlining registration requirements, offering tax incentives, and establishing incubation centres [78].

The government could encourage SMEs to embrace ICTs by making them more affordable through subsidies, credits, leasing alternatives, and tax breaks [77-78]. Government actions to provide a legislative framework to legitimize ICT usage or adoption in SMEs will help SMEs. This legislative strategy and judicial framework would encourage SMEs to use ICTs and hence build a business-friendly environment by reducing the adoption hurdles. In addition, digital response to SMEs would cater to more seamless actions [79][101].

With more management focusing on profitability rather than sales, internal barriers will also be eliminated as a consequence of the owner's desire and experience in acquiring access to materials (money and people), allowing SMEs to create a stable financial resource [78].

4.8 Type of Analysis and Model used for Challenges on ICT Adoption by Various Authors:

ICT adoption into SMEs has a long way to go before they are incorporated into the workings of the Industry. Several authors have used different types of analysis and tools for understanding the challenges in the process of ICT adoption. Some of those are presented in this section.

Table 3: Type of analysis/Model and observations

S. No	Type of Analysis	Observation	Author
1	Regression Analysis	• Sustainability of SMEs • Determination of Institutional Capabilities	Das et al., (2020). [80]
2	Regression Analysis	• Factors Influencing ICT Adoption • Impact on Organizational Performance	Raravi et al., (2020). [57]
3	Factor Analysis and Multivariate Regression Analysis	• Analyzing the impact of facilitators and obstacles on auto-ancillary SME adoption of ICT	G Kannabiran et al., (2012). [81]
4	Multinomial Logistic Regression Analysis Using SPSS Tool	• Investigating factors at the corporate level, external factors, and ecosystem factors. • Impact of Open Innovation Approach vs Closed Innovation Approach on Adoption	Sumukh Hungund et al., (2019). [82]

5	Logistic Regression Model	• There is complexity in Adopting the Innovative Process in SMEs	Arif Anjum, (2019). [4]
6	Partial Least Squares Method (PLS), Structural Equation Model (SEM) using SmartPLS Software.	• ICT adoption was significantly correlated with the significant advantage of support from top management mindset, governing framework, proprietor/manager innovation, and ICT expertise, but not with compatibility, complexity, or a competitive environment.	Albar and Hoque (2017). [62], Ghazanfar Ali Abbasi et. al., (2022). [83], Omar Hasan Salah et. al., (2021). [84]
7	PESTEL Analysis	• Evaluation of good practices inventories. • To understand the microenvironment variables.	Ziga Turk (2021). [85]
8	TAM Model	• To study technology acceptance behavior.	Mohar Banerjee Biswas et. al., (2022). [86]

5. PRESENT STATUS :

The difficulties of adopting ICT have become the subject of numerous studies in recent years. Most of the SMEs that are ICT-enabled do not have supporting policies with the concept of working from home [87]. 60% of the SMEs led to closure due to the inability to transform from physical mode to virtual mode during COVID-19 [88]. As many SMEs' infrastructures are unplanned due to the lack of knowledge of ICT, challenges have been experienced to integrate with ICT tools [89]. Network connectivity is limited to a particular region unlike other developing countries [90], [100].

6. RESEARCH GAP AND PROPOSAL :

After such an extensive review of literature, still, there are lot of areas to be explored in challenges to adopting ICT in SMEs. There are no sufficient papers to understand the tools used to support ICT adoption in India. This review paper depicts a couple of research gaps.

a) Classifying various challenges on ICT adoption.
b) Predicting potential failure of ICT-enabled SMEs

7. RESEARCH PROPOSAL :

a) The proposed classification framework can be implemented using SPSS Software.
b) Various tools can be developed; these should be incorporated with automated prediction modules to understand the potential failure of SMEs in adopting ICT.

8. RESEARCH AGENDAS :

a) What are classification frameworks available?
b) How to develop skills for using SPSS software?
c) How efficiently implementation can be conducted?
d) Which areas in which tools are developed?
e) What is the use of understanding the potential failure of SMEs?
f) What is an automated prediction module?

9. ANALYSIS OF RESEARCH AGENDA :

Many studies have been conducted to explore the features of the presently used tools for adopting ICTs and making the system familiar to the operators or owners in SMEs, yet they tend to lead to failure. The majority of the research done in this area is considering the scenarios in other countries, where the condition is unlike India. A classification framework using SPSS software could solve a lot of problems in a statistical method. Based on this classification, a tool has to be developed to understand the potential

failure of SMEs. Further, a prediction module can be integrated into this study and implemented by collecting the data generated in SMEs.

10. ABCD ANALYSIS :

ABCD analysis is based on the advantages, benefits, challenges, and disadvantages in a structured manner that examines the effectiveness of a concept. ABCD listing of ICT adoption in SMEs is shown in the below table. The benefits involved in the ABCD analysis will effectively help to understand various factors influencing ICT adoption in SMEs [91-98].

Table 4: ABCD Listing on ICT Adoption

ADVANTAGES	BENEFITS
• Reducing Cost • Efficient and increased Output • Operational excellence • Saves time	• Economic Progression • Income Generation • Employment opportunities/Creation
CHALLENGES	**DISADVANTAGES**
• Lack of ICT-skilled personal • Shortage of internet connectivity • Security concerns • Availability of financial resources • Labour / Personal turnover	• The rate of failure is high • Lack of perceived benefits • Lack of effective subsidized schemes from the government.

Source: Author

11. SUGGESTIONS TO IMPLEMENT RESEARCH ACTIVITIES ACCORDING TO THE PROPOSAL :

Based on the study, we have these suggestions.

1. As the SME sector in India is booming, because of gradual shifts among various stakeholders' attitudes toward technology government should frame a subsidized scheme [99].
2. To uncover factors influencing IT readiness in SMEs, the constructs suggested in this study must be empirically tested.
3. Academics can use multiple frameworks or models to evaluate IT readiness in a variety of SME sizes and circumstances.
4. Empirical research or resource-based perspective on SMEs could be worth investigating further.

12. CONCLUSION :

In this era of globalization, SMEs' adoption and absorption of ICTs are crucial. SMEs are the primary drivers of an economy's growth. Competition and access to international markets are the two most important factors influencing SMEs' use of it. ICT adoption by SMEs boosts productivity where SMEs are connected to external connections more easily and affordably, whether locally or globally, increasing the effectiveness of internal business processes. Even though SME participation in the quality management economy will be made possible by ICT adoption, SMEs face several obstacles that impede them from integrating ICTs into their company operations. A lack of financial and human resources, an inability to manage the kind of business, security issues, and the dependability of ICT tools are some of these issues. The majority of SME owners and supervisors are also uninformed about the advantages of implementing ICT, as well as about the lack of a legal structure and inadequate facilities.

By highlighting the factors that influence ICT adoption and its advantages and disadvantages for owners/managers, policymakers, and other stakeholders, this literature review will advance our understanding of the subject. SMEs play a major part in the economy, notably in terms of innovation and economic growth.

REFERENCES :

[1] Wolcott, P., Kamal, M., & Qureshi, S. (2008). Meeting the challenges of ICT adoption by micro-enterprises. *Journal of Enterprise Information Management*, *21*(6), 616-632. Google Scholar↗ CrossRef /DOI↗

[2] Pandey, A. P. (2007). Indian SMEs and their uniqueness in the country. *Banaras: Department of Economics, Banaras Hindu University*, 1-13. Google Scholar↗ CrossRef /DOI↗

[3] Taylor, M., & Murphy, A. (2004). SMEs and e-business. *Journal of small business and enterprise development*, *11*(3), 280-289. Google Scholar↗ CrossRef /DOI↗

[4] Anjum, A. (2019). Information and communication technology adoption and its influencing factors: A study of indian SMEs. *Humanities & Social Sciences Reviews*, *7*(5), 1238-1253. Google Scholar↗ CrossRef /DOI↗

[5] Pandya, V. M. (2012). Comparative analysis of development of SMEs in developed and developing countries. *The 2012 International Conference on Business and Management*, *6*(7), 1-20. Phuket - Thailand : CAAL. Google Scholar↗

[6] Mushtaq, R., Gull, A. A., & Usman, M. (2022). ICT adoption, innovation, and SMEs' access to finance. *Telecommunications Policy*, *46*(3), 1-17. Google Scholar↗ CrossRef /DOI↗

[7] Ashrafi, R., & Murtaza, M. (2008). Use and impact of ICT on SMEs in Oman. *Electronic Journal of Information Systems Evaluation*, *11*(3), 171-184. Google Scholar↗

[8] Ramdani, B., Kawalek, P., & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *Journal of enterprise information management*, *22*(1/2), 10-24. Google Scholar↗ CrossRef /DOI↗

[9] Beynon, M. J., Munday, M., & Roche, N. (2021). ICT resources and use: examining differences in pathways to improved small firm performance. *International Journal of Entrepreneurial Behavior& Research*, *27*(7), 1798-1818. Google Scholar↗ CrossRef /DOI↗

[10] Ibrahim, A. M., Hassan, M. S., Gambo, D., & Yusuf, S. (2016). Influence of ICT Adoption on Agro-Enterprises: Conceptual Framework and Structural Model. *Jurnal Pengajian Media Malaysia*, *18*(2), 37-54. Google Scholar↗

[11] Ashrafi, R., & Murtaza, M. (2008). Use and impact of ICT on SMEs in Oman. *Electronic Journal of Information Systems Evaluation*, *11*(3), 171-184. Google Scholar↗

[12] Asrani, C. (2021). Spanning the digital divide in India: Barriers to ICT adoption and usage. *Journal of Public Affairs*, *22*(4), 1-16. Google Scholar↗ CrossRef /DOI↗

[13] Ramdani, B., Kawalek, P., & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *Journal of Enterprise Information Management*, *22*(1/2), 10-24. Google Scholar↗ CrossRef /DOI↗

[14] Mahemba, C. M., & Bruijn, E. j. (2003). Innovation activities by small and medium sized manufacturing, *Creativity and Innovation Management*, *12*(3), 162–173. Google Scholar↗ CrossRef /DOI↗

[15] Baldwin, J. R. (1995). Innovation: The Key to Success in Small Firm. *Canada: Canadian Institute for Advanced Research*, 1-25. Google Scholar↗ CrossRef /DOI↗

[16] Dixit, S., Stefańska, A., Musiuk, A., & Singh, P. (2021). Study of enabling factors affecting the adoption of ICT in the Indian built environment sector. *Ain Shams Engineering Journal*, *12*(2), 2313-2319. Google Scholar↗ CrossRef /DOI↗

[17] Sani, A., Rahman, T. K. A., Nawaningtyas, N., Budiyantara, A., & Wiliani, N. (2021). The effect of technology readiness in IT adoption on organizational context among SMEs in the suburbs of the capital. In *AIP Conference Proceedings,2331*(1), 1-7. AIP Publishing LLC, Google Scholar↗ CrossRef /DOI↗

[18] Kumar, V., Verma, P., Mittal, A., Panduro, J. A. T., Singh, S., Paliwal, M., & Sharma, N. K. (2022). Adoption of ICTs as an emergent business strategy during and following COVID-19 crisis: evidence from Indian MSMEs. *Benchmarking: An International Journal*, (ahead-of-print), 1-35. Google Scholar↗

[19] Al Busaidi, N. S., Bhuiyan, A. B., & Zulkifli, N. (2019). The critical review on the adoption of ICTs in the small and medium enterprises (SMEs) in the developing countries. *International Journal of Small and Medium Enterprises*, *2*(2), 33-40. Google Scholar↗ CrossRef /DOI↗

[20] Juniarti, R. P., & Omar, A. (2021). Technology Adoption in Small and Medium Enterprises (SMEs). In *BISTIC Business Innovation Sustainability and Technology International Conference*, *193*(1), 91-101. Google Scholar↗

[21] Reyes, E. F. V. (2021). Critical Factors for ICT Adoption in Industrial Sector Micro and Small Enterprises (MSEs). *Industrial Data*, *24*(2), 283-292. Google Scholar↗ CrossRef /DOI↗

[22] Eze, S. C., Chinedu-Eze, V. C., Bello, A. O., Adegun, A. A., & Alao, M. E. (2019). Challenges Facing SMEs in Emerging ICT Adoption from Diverse Actors' Perspective: A Data Driven Approach. *http://www. iaeme. com/IJMET/index. asp*, *10*(2), 636-651. Google Scholar↗

[23] Shaikh, D., Ara, A., Kumar, M., Syed, D., Ali, A., & Shaikh, M. Z. (2021). A two-decade literature review on challenges faced by SMEs in technology adoption. *Academy of Marketing Studies Journal*, *25*(3), 1-13. Google Scholar↗

[24] Barba-Sánchez, V., Martínez-Ruiz, M. D. P., & Jiménez-Zarco, A. I. (2007). Drivers, benefits and challenges of ICT adoption by small and medium sized enterprises (SMEs): a literature review. *Problems and Perspectives in Management*, *5*(1), 103-114. Google Scholar↗

[25] Shiralkar, K., Bongale, A., Kumar, S., Kotecha, K., & Prakash, C. (2021). Assessment of the benefits of information and communication technologies (ICT) adoption on downstream supply chain performance of the retail industry. *Logistics*, *5*(4), 1-13. Google Scholar↗ CrossRef /DOI↗

[26] Obinna, G. B. E. (2022). Prospects, Limitations and Challenges in the Concept and Application of ICT on SMEs in Rivers State. *International Journal of Business Systems and Economics*, *13*(5), 117-129. Google Scholar↗

[27] Temtime, Z.T. & Pansiri, J. (2006). Proactive marketing and financial management for small and medium enterprises. *Botswana Institute of Administration & Commerce Journal*, *3*(1), 53-67. Google Scholar↗ CrossRef /DOI↗

[28] Shaikh, A. A., Kumar, M., Syed, D., Ali, A., & Shaikh, M. Z. (2021). A two-decade literature review on challenges faced by SMEs in technology adoption. *Academy of Marketing Studies Journal*, *25*(3), 1-13. Google Scholar↗ CrossRef /DOI↗

[29] Kumar, A., (2020). Effective Usage of E-CRM and Social Media Tools by Akshay Kumar: Most Prolific Bollywood Actor of Last Decade. *International Journal of Management, 11*(2), 141-146. Google Scholar↗ CrossRef /DOI↗

[30] Touray, A., Salminen, A. and Mursu, A. (2013). ICT barriers and critical success factors in developing countries. *The Electronic Journal of Information Systems in Developing Countries*, 56(1), 1-17. Google Scholar↗ CrossRef /DOI↗

[31] Tan, K. S., Chong, S. C., Lin, B., & Eze, U. C. (2010). Internet-based ICT adoption among SMEs: Demographic versus benefits, barriers, and adoption intention. *Journal of enterprise information management*, *23*(1), 27-55. Google Scholar↗ CrossRef /DOI↗

[32] Trappey, C. V., Trappey, A. J., & Mulaomerovic, E. (2016). Improving the global competitiveness of retailers using a cultural analysis of in-store digital innovations. *International Journal of Technology Management*, *70*(1), 25-43. Google Scholar↗

[33] Laforet, S. (2011). A framework of organisational innovation and outcomes in SMEs. *International Journal of Entrepreneurial Behaviour & Research*, *17*(4), 380–408. Google Scholar↗ CrossRef /DOI↗

[34] Apulu, I., & Latham, A. (2011). Drivers for information and communication technology adoption: A case study of Nigerian small and medium sized enterprises. *International Journal of Business and Management*, *6*(5), 51-60. Google Scholar↗

[35] Jones, P., Beynon-Davies, P., & Muir, E. (2003). Ebusiness barriers to growth within the SME sector. *Journal of Systems and Information Technology*, 7(1/2), 1 – 25. Google Scholar↗ CrossRef /DOI↗

[36] Mutula, S. M. (2004). Making Botswana an information society: current developments. *The electronic library*, 22(2), 144-53. Google Scholar↗

[37] Lukács, E. (2005). The economic role of SMEs in world economy, especially in Europe. *European integration studies*, *4*(1), 3-12. Google Scholar↗

[38] Sharma, M. K., & Bhagwat, R. (2006). Practice of information systems: Evidence from select Indian SMEs. *Journal of manufacturing technology management*, 17(2), 199-223. Google Scholar↗ CrossRef /DOI↗

[39] Dodd, S. D., Jack, S., & Anderson, A. R. (2002). Scottish entrepreneurial networks in the international context. *International Small Business Journal*, *20*(2), 213-219. Google Scholar↗

[40] Ziemba, E. (2021). Sustainability Driven by ICT Adoption within Households, Enterprises, and Government Units. *Procedia Computer Science*, *192*(1), 2279-2290. Google Scholar↗ CrossRef /DOI↗

[41] Mustafa, M., & Abbas, A. (2021). Comparative analysis of green ict practices among palestinian and malaysian in sme food enterprises during covid-19 pandemic. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *18*(4), 254-264. Google Scholar↗

[42] Thabit, T., Aissa, S. A. H., & Jasim, Y. (2021). The impact of green ICT adoption in organizations of developing countries. *Al-riyada for Business Economics Journal*, *7*(1), 9-18. Google Scholar↗

[43] Sharma, M., Panthey, R., Kumar, R., & Kour, G. (2014). Role of SMES in India Economy And TQM, *International Journal Of Business Management*, *1*(1), 119-128. Google Scholar↗

[44] Mwavali, A. (2021). A Framework for Cloud Computing Adoption by SMEs in Kenya. *World Journal of Innovative Research*, *10*(4), 111-117. Google Scholar↗

[45] Saluja, D. (2012). Role of MSMEs in Economic Development of India, *Journal of Economics, Commerce and Research (JECR)*, *2*(1), 1-9. Google Scholar↗

[46] Mitra, A., Sharma, C. and Véganzonès-Varoudakis, M.A. (2016), Infrastructure, ICT and firms'productivity and efficiency: an application to the Indian Manufacturing.*Globalization of Indian Industries* (pp. 17-41). *Springer, Singapore*. Google Scholar↗

[47] Antlova, K. (2014). Main factors for ICT adoption in the Czech SMEs. *Information Systems for Small and Medium-Sized Enterprises* (pp. 141-156).Springer-Verlag, Berlin, Heidelberg. Google Scholar↗ CrossRef /DOI↗

[48] Harindranath, G., Dyerson, R., & Barnes, D. (2008). ICT adoption and use in UK SMEs: a failure of initiatives?. *Electronic journal of information systems evaluation*, *11*(2), 91-96. Google Scholar↗

[49] Cahen, F. R., Jr, M. D. M. O., & Borini, F. M. (2017). The internationalisation of new technology-based firms from emerging markets. *International Journal of Technology Management*, *74*(1-4), 23-44. Google Scholar↗ CrossRef /DOI↗

[50] Nguyen, T. H., Newby, M., & Macaulay, M. J. (2015). Information technology adoption in small business: Confirmation of a proposed framework. *Journal of Small Business Management*, *53*(1), 207-227. Google Scholar↗

[51] Ma, F., Khan, F., Khan, K. U., & XiangYun, S. (2021). Investigating the Impact of Information Technology, Absorptive Capacity, and Dynamic Capabilities on Firm Performance: An Empirical Study. *SAGE Open*, *11*(4), 1-18. Google Scholar↗ CrossRef /DOI↗

[52] IshaqueValasseri (2022). Tackling Top 10 Technology Challenges of Small Businesses. Retrived from https://www.infince.com/blog/top-technology-challenges-faced-by-small-businesses/ on 24/12/2022.

[53] Kapurubandara, M., & Lawson, R. (2006). Barriers to Adopting ICT and e-commerce with SMEs in developing countries: an Exploratory study in Sri Lanka. *University of Western Sydney, Australia*, *82*(1), 2005-2016. Google Scholar↗

[54] Adeyemo, T. A. (2021). *A Study of Challenges of ICT Adoption by Small and Medium Scale Enterprises (SMEs) In Ibadan Metropolis, Nigeria.* Doctoral dissertation, Dublin, National College of Ireland pp. 1-78. Retrieved from https://norma.ncirl.ie/id/eprint/5508

[55] Mpofu, K.C., Milne, D. and Watkins-Mathys, L. (2013). ICT adoption and development of e-business among SMEs in South Africa. *Proceedings of the ISBE 2009 Conference*, pp. 1-20. Google Scholar↗ CrossRef /DOI↗

[56] Liao, Y., & Barnes, J. (2015). Knowledge acquisition and product innovation flexibility in SMEs. *Business Process Management Journal*.*21*(6), 1257-1278. Google Scholar↗ CrossRef /DOI↗

[57] Raravi, D., Prabhuswamimath, S. P., & Chavan, V. (2020). Factors Influencing ICT Adoption in SME. *Institute of Scholars (InSc)*. 1092-1098. Google Scholar↗ CrossRef /DOI↗

[58] Kumar, M., & Ayedee, D. (2021). Technology Adoption: A Solution for SMEs to overcome problems during COVID-19. *Academy of Marketing Studies Journal*, *25*(1) 1-16. Google Scholar↗

[59] Alam, S. S., & Mohammad Noor, M. K. (2009). ICT adoption in small and medium enterprises: An empirical evidence of service sectors in Malaysia. *International Journal of Business and Management*, *4*(2), 112-125. Google Scholar↗

[60] Maikudi Shehu Musawa & Eta Wahab.(2012). The adoption of electronic data interchange (EDI) technology by Nigerian SMEs: A conceptual framework. *E3 Journal of Business Management and Economics*,*3*(2), 55-68. Google Scholar↗

[61] Mishra, R. (2016). A comparative evaluation of manufacturing flexibility adoption in SMEs and large firms in India. *Journal of Manufacturing Technology Management*, *27*(5), 730–762. Google Scholar↗ CrossRef /DOI↗

[62] AlBar, A. M., & Hoque, M. R. (2019). Factors affecting the adoption of information and communication technology in small and medium enterprises: A perspective from rural Saudi Arabia. *Information Technology for Development*, *25*(4), 715-738. Google Scholar↗ CrossRef /DOI↗

[63] Gono, S., Harindranath, G., & Özcan, G. B. (2013). Challenges of ICT adoption by South African SMEs: A study of manufacturing and logistics firms. *Annual Conference of the Institute for Small Business and Entrepreneurship*, 1-23. Google Scholar↗

[64] Abdullahi, H. O., Hassan, A. A., Mahmud, M., & Ali, A. F. (2021). Determinants of ICT adoption among small scale agribusiness enterprises in Somalia. *International Journal of Engineering Trends and Technology*, 69(2), 68-76. Google Scholar↗

[65] Kamutuezu, E. U., Winschiers-Theophilus, H., & Peters, A. (2021). An exploration of factors influencing the adoption of ICT enabled entrepreneurship applications in Namibian rural communities. *Proceedings of the First Virtual Conference on Implications of Information and Digital Technologies for Development, 2021*, 1-11. Google Scholar↗

[66] Alkhateeb, M. A., & Abdalla, R. A. (2021). Social Media Adoption and its Impact on SMEs Performance A Case Study of Palestine. *Studies of Applied Economics*, *39*(7), 1-18. Google Scholar↗

[67] Islam, M. O., Haque, A. K., & Barua, B. (2021). Current Status of E-Commerce Adoption by SMEs in Bangladesh: An Empirical Study. *AIUB Journal of Business and Economics*, *18*(1), 75-98. Google Scholar↗

[68] Andaregie, A., & Astatkie, T. (2021). Determinants of technology adoption by micro and small enterprises (MSEs) in Awi zone, Northwest Ethiopia. *African Journal of Science, Technology, Innovation and Development*, *14*(4), 1-10. Google Scholar↗ CrossRef /DOI↗

[69] Vu, N. H., & Nguyen, N. M. (2021). Development of small-and medium-sized enterprises through information technology adoption persistence in Vietnam. *Information Technology for Development*, *28*(3), 1-32. Google Scholar↗

[70] Nawaz, R., Bakhsh, K., Ullah, S., Rehman, S., Azeem, M., & Hayat, A. (2021). Drivers of ICT adoption in small and very small businesses in technologically least developed district of Southern Punjab. *International Transaction Journal of Engineering, Management, and Applied Sciences and Technologies*, *12*(1), 1-10. Google Scholar↗

[71] Abdullahi, H. O., Hassan, A. A., Mahmud, M., & Ali, A. F. (2021). Determinants of ICT adoption among small scale agribusiness enterprises in Somalia. *International Journal of Engineering Trends and Technology*,*69*(2), 68-76. Google Scholar↗

[72] Aryanto, V. D. W., Kondo, K., Wismantoro, Y., & Andono, P. N. (2021). Entrepreneurship orientation, eco-innovation, Information and Communication Technology (ICT) learning adoption capability: A case study of food SME's in central Java, Indonesia. *E3S Web of Conferences*, 226(1), 1-7. Google Scholar↗

[73] Alkhateeb, M. A., & Abdalla, R. A. (2021). Social Media Adoption and its Impact on SMEs Performance A Case Study of Palestine. *Studies of Applied Economics*, *39*(7), 1-18. Google Scholar↗

[74] Islam, M. O., Haque, A. K., & Barua, B. (2021). Current Status of E-Commerce Adoption by SMEs in Bangladesh: An Empirical Study. *AIUB Journal of Business and Economics*, *18*(1), 75-98. Google Scholar↗

[75] Wendt, C., Adam, M., Benlian, A., & Kraus, S. (2021). Let's connect to keep the distance: How SMEs leverage information and communication technologies to address the COVID-19 crisis. *Information Systems Frontiers*, 1061-1079. Google Scholar↗ CrossRef /DOI↗

[76] Özşahin, M., Çallı, B. A., & Coşkun, E. (2022). ICT Adoption Scale Development for SMEs. *Sustainability*, *14*(22), 1-28. Google Scholar↗ CrossRef /DOI↗

[77] UNDP (2007), Small and Medium Enterprises and ICT. *Asia Pacific Development Information Programme* (pp. 1-27).UNDP, New York, NY. Google Scholar↗

[78] Chiware, E. and Dick, A.L. (2008). The use of ICTs in Namibia's SMEs sector to access business information services. *The Electronic Library*, *26*(2), 145-57. Google Scholar↗ CrossRef /DOI↗

[79] Giotopoulos, I., Kontolaimou, A., & Tsakanikas, A. (2022). Digital responses of SMEs to the COVID-19 crisis. *International Journal of Entrepreneurial Behavior & Research*, *28*(7), 1751-1772. Google Scholar↗ CrossRef /DOI↗

[80] Das, S., Kundu, A., & Bhattacharya, A. (2020). Technology Adaptation and Survival of SMEs: A Longitudinal Study of Developing Countries, *Technology Innovation Management Review*, *10*(6), 64-72. Google Scholar↗ CrossRef /DOI↗

[81] G. Kannabiran and P.Dharmalingam (2012). Enablers and inhibitors of advanced information technologies adoption by SMEs: An empirical study of auto ancillaries in India. *Journal of Enterprise Information Management*, *25*(2), 186-209. Google Scholar↗ CrossRef /DOI↗

[82] Sumukh and Venkatesh (2019). Benchmarking of factors influencing adoption of innovation in software product SMEs: An empirical evidence from India.*Benchmarking: An International Journal*, *26*(5), 1451-1468. Google Scholar↗ CrossRef /DOI↗

[83] Ali Abbasi, G., Abdul Rahim, N. F., Wu, H., Iranmanesh, M., & Keong, B. N. C. (2022). Determinants of SME's social media marketing adoption: competitive industry as a moderator. *Sage Open*, *12*(1), 1-19. Google Scholar↗ CrossRef /DOI↗

[84] Salah, O. H., Yusof, Z. M., & Mohamed, H. (2021). The determinant factors for the adoption of CRM in the Palestinian SMEs: The moderating effect of firm size. *PloS one*, *16*(3), 1-25. Google Scholar↗ CrossRef /DOI↗

[85] Turk, Ž. (2021). Structured analysis of ICT adoption in the European construction industry. *International Journal of Construction Management*, *1*(1), *1*-7. Google Scholar↗ CrossRef /DOI↗

[86] Biswas, M. B., Mishra, S., & Biswas, J.(2022). Personality Trait and ICT Adoption in Higher Education. *21*(8), 1240-1253. Google Scholar↗

[87] Vusumuzi Maphosa (2022). Factors influencing the adoption of ICT for remote work among Zimbabwean SMEs: A case study of Bulawayo Metropolitan province. *International Journal of Advanced and Applied Sciences*, *9*(3), 150-158. Google Scholar↗ CrossRef /DOI↗

[88] Obinna & Geoffrey Bakebiokroma Enyindah (2022). Prospects, Limitations and Challenges in the Concept and Application of ICT on SMEs in Rivers State. International *Journal of Business Systems and Economics*, *13*(5), 117 – 129. Google Scholar↗

[89] Kadadevaramath, R. S., Chen, J. C. H., Sangli, M., Raj, R. K. & Harshavardhan (2014). A Study on Implementation of IT Tools in SMEs in India. *Industrial Engineering &Management*, *3*(4), 1-6. Google Scholar↗ CrossRef /DOI↗

[90] Gqoboka, H., Anakpo, G., & Mishi, S. (2022). Challenges Facing ICT Use during COVID-19 Pandemic: The Case of Small, Medium and Micro Enterprises in South Africa. *American Journal of Industrial and Business Management*, *12*(9), 1395-1401. Google Scholar↗

[91] Kumari, P., & Aithal, P. S. (2022). Stress Coping Mechanisms: A Quantitative ABCD Analysis. *International Journal of Case Studies in Business, IT, and Education (IJCSBE)*, *6*(2), 268-291. Google Scholar↗

[92] Aithal, A., Aithal, S., & Aithal, P. S. (2022). Case Study on Certara's Simcyp PBPK Simulator to Eliminate Lengthy Clinical Trials. *International Journal of Health Sciences and Pharmacy (IJHSP)*, *6*(2), 69-109. Google Scholar↗

[93] Aithal, P. S. (2021). Analysis of Systems & Technology Using ABCD Framework. *Ideal Systems, Ideal Technology, and their Realization Opportunities using ICCT & Nanotechnology*(pp.345-385). Srinivas Publication, India. Google Scholar↗ CrossRef /DOI↗

[94] Aithal, P. S. (2021). Business Excellence through the Theory of Accountability. *International Journal of Case Studies in Business, IT, and Education (IJCSBE)*, *5*(1), 88-115. Google Scholar↗

[95] Mendon, S., & Aithal, P. S. (2022). Quantitative ABCD Analysis of Organic Food Product and its Impact on Purchase Intention. *International Journal of Management, Technology, and Social Sciences (IJMTS)*, *7*(1), 254-278. Google Scholar↗ CrossRef /DOI↗

[96] Aithal, P. S., & Maiya, A. K. (2022). Holistic Integrated Student Development Model & Service Delivery Model–A Best Practice of Srinivas University, India. *International Journal of Case Studies in Business, IT, and Education (IJCSBE)*, 6(1), 590-616. Google Scholar↗

[97] Aithal, P. S., Maiya, A. K., & Aithal, S. (2022). Atomic Research Centres to Intensify Research–An Innovative Approach of Srinivas University, India. *International Journal of Applied Engineering and Management Letters (IJAEML)*, *6*(2), 13-35. Google Scholar↗ CrossRef /DOI↗

[98] Mishra, K., & Aithal, P. S. (2022). An Imperative on Green Financing in the Perspective of Nepal. *International Journal of Applied Engineering and Management Letters (IJAEML)*, *6*(2), 242-253. Google Scholar↗ CrossRef /DOI↗

[99] Lamido, A., Bogoro, P., & Ahmad, A. (2022). The Use of ICT Adoption as a Business Strategy to Increase Performance of SMES in Bauchi Local Government. *International Academic Journal of Management and Marketing*, *7*(1), 119-133. Google Scholar↗

[100] Mndzebele, N. (2018). Factors affecting ICT adoption by SMEs in Swaziland. *Proceedings of 95th The IRES International Conference*, *4*(3) 67-71. Google Scholar↗

[101] Albert Gagliardi (2015). Drivers, benefits and challenges of ICT adoption by small and medium sized enterprises (sme's): a literature review. Retrieved from https://www.linkedin.com/pulse/drivers-benefits-challenges-ict-adoption-small-medium-gagliardi on 24/12/2022.

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