Article: DOI: 10.70906/20251904001016

Digital Technology in MSMEs: Opportunities and Challenges

Sanjay Kumar Hooda*

Santpal**

Abstract

This article identifies the opportunities and challenges of digital technology adoption in MSMEs and proposes likely remedial measures by conducting a thorough review of the relevant literature and surveying the MSME sector in Haryana State, India. The study includes two components of the difficulties to adopting digital technology, such as staffing and infrastructure, as well as three aspects of the significance of doing so: market share, corporate image, and business efficiency. Using the Krejcie and Morgan (1970) table, 384 entrepreneurs in six districts within each division, Yamuna Nagar (39), Faridabad (93), Gurugram (103), Hisar (49), Sonipat (40), and Panipat (60), were asked to complete a structured questionnaire in order to collect primary data. The data were analysed using SPSS 29 and statistical methods such as frequency counts, means, t-tests, one-way ANOVA, and percentages. Inadequate infrastructure, the high cost of digital tools, a shortage of suitable equipment, a shortage of technical professionals with the requisite skills, and a lack of training are among the challenges entrepreneurs in the state face. It can increase market share or sales, reduce expenses, attract new clients, introduce new products, boost the company's reputation, and streamline monotonous tasks, depending on a variety of independent variables. Furthermore, the article recommended that, to overcome these challenges and boost significance,

Keywords: digitalisation, enterprises, MSMEs, problems, and technology

How to Cite: *Hooda, S. K., & Santpal. (2025). Digital technology in MSMEs: Opportunities and challenges. Journal of Management and Entrepreneurship, 19(4), 1–16.*

DOI: 10.70906/20251904001016

* Associate Professor, Indra Gandhi University, Meerpur, Rewari (Haryana), Mobile No: 8708755696, Email: yadavsantpal05@gmail.com

** Research Scholar, Indra Gandhi University, Meerpur, Rewari (Haryana), Contact No: 9416716033, Email: yadavsantpal05@gmail.com

1. Introduction

Digital technologies (i.e., social media, mobile technologies, analytics, cloud computing, and the internet of things) have provided myriad opportunities for businesses of all sizes (Kraus et al., 2021). Previously, only large organisations with financial resources had access to resources and the ability to invest in technology and lead innovation within their organisations (Lokuge & Sedera, 2020).

Digital transformation refers to "a process that improves an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies. Wessel et al. (2020) extend this conversation and highlight that digital technology plays a key role in digital transformation, thereby initiating the development of a new organisational identity. Digital transformation enables better decision-making, value creation, and enhanced customer service. The primary objective of investing in digital technologies in organisations is to develop new organisational capabilities and gain a competitive edge (Adikari et al., 2021; Lokuge et al., 2019; Vial, 2019). Because digital transformation is so important and small businesses are so different, it is now that we need to open the mystery of digital transformation projects in small businesses (Argüelles et al., 2021; Crupi et al., 2020; Gupta, G., & Bose, I., 2022; Kraus et al., 2021; Lokuge & Duan, 2021; Wessel et al., 2020).

Digitalisation focuses on automation, value adding, and digitalising business processes. Digital transformation focuses on digitalising business models and ensuring a positive customer and employee experience. In all these endeavours, organisations focus on positive outcomes such as increased organisational performance, increased cost efficiency, competitive advantage, and better customer service. Balakrishnan & Das, 2020; Crupi et al., 2020; Garzoni et al., 2020; Gong et al., 2020; Lokuge, et al., 2020; Pelletier & Cloutier, 2019; Sedera & Lokuge, 2019; Szopa & Cyplik, 2020). In the pre-COVID-19 era, some micro sectors digitalised, but after that, digitalisation in the micro segment grew from 11% to 55%, and in the small segment, the growth rate increased from 9% to 45%. At present, 71% of manufacturing industries operate digitally. As with the manufacturing sector, the service sector also recorded significant growth after the pandemic, ranging from 22% to 66%. The MSME sector's performance and operations have significantly improved due to digitalisation. Although MSMEs that have introduced digitalisation to existing digital platforms have shown little passion or innovation, doing so will nonetheless help entrepreneurs assess their success in the competitive digital world (Tayibnapis et al., 2021).

Challenges to Adoption of Digital Technology in the MSME Sector: The key challenges are explained below:

Knowledge Gap Regarding Tech-Enabled Services: The benefits of technology-enabled services, such as social networking platforms and e-commerce, remain unknown to many MSMEs. Businesses are unable to implement digital strategies due to a lack of knowledge about cutting-edge technology.

Lack of understanding of "The Impact of Digital Transformation": Unaware of the effects that digital transformation has on business facilitation, growth, and customer engagement and loyalty. A lack of understanding of emerging technologies prevents companies from executing effective digital strategies.

Inadequate Infrastructure and Funds: The SME sector in India experienced a financing demand deficit. Due to inadequate infrastructure and financing, this sector in India encounters significant difficulties.

Ineffective regulatory structure: Data privacy worries are exacerbated by inadequate technology. The protection of data from unauthorised access, alteration, or disclosure, and from the release of information to third parties without their permission, is known as data security. Security worries are primarily caused by malware and cyber-attacks. Despite stringent cybercrime rules and regulations in our country, SMEs are reluctant to adopt innovative DT (Vandita et al., 2023).

Significance of the Adoption of Digital Technology in the MSME Sector

Customer procurement: Using digital technologies enables us to connect with customers worldwide, increasing exposure and interaction. Customer relationships can be managed more easily, and more support options give insight into your target audience. This enables us to create advertising campaigns and market your products effectively.

Technical accomplishment: As a digitally enhanced MSME, technology can expedite core tasks, boosting your efficiency. Using resources more effectively and giving us more control over logistics will be made possible by this.

Workforce assistance: with digital technologies we can identify possibilities in the importance of overall development. This will be easy to train staff members about the new digital technology ideas, as well as to assess their performance.

Innovation: Customers can improve the data analysis of the company by applying digital technologies or innovation. Metrics such as website traffic, operational data (sales and acquisitions), customer insights, and human resources metrics (employee job satisfaction) can be utilised to quickly enhance various elements of the company.

Cost Savings: By automating key processes and optimising workflows, digitisation enables cost savings. Additionally, entrepreneurs are not required to spend money on advertising when doing business in any nation in the region.

Controlling Risk: Using security tools, you will leverage digital technology to protect the company's financial records and confidential data. Automated monitoring can also help you keep a close eye on your property's resources and improve logistics.

Boost Efficiency: Using DT allows employees to work more swiftly and effectively. Additionally, they may work around the clock and remotely to respond quickly to a company emergency.

Reduce human resource requirements: Employee use will decline as digital platforms automate the majority of commercial processes. User errors will be less likely to occur, and surveillance will be decreased (Vandita et al., 2023).

2. Review of Study

Tools/Model of Digital Technology: A study on digital technology adoption tools in MSMEs found that they use data analysis to identify patterns, trends, and client preferences, which help them modify their offerings to better satisfy consumers (Arisnawati, N.F., 2022). However, social media, business analytics, the Internet of Things, big data, advanced manufacturing, 3D printing, cyber solutions, high-performance computing, and artificial intelligence are all examples of digital technologies (Aloini et al., 2021; Lee & Trimi, 2021). MSMEs must create technologically sound management plans. Employee training, change management, and technology selection are all included. MSMEs must ensure their technology selection aligns with their company capabilities and goals and has a well-defined implementation strategy.

Additionally, technology can assist MSMEs in product development and innovation (Arisnawati, N.F., 2022). Creating a digital workplace is about transforming personal, team, and organisational performance, not simply using emails and social media or integrating digital tools (Dressler & Paunovic, 2021). Westerlund (2020), Mohamed (2020), Weber (2020), Dutta et al. (2020), and Zide & Jokonya (2022) all agree that digital technologies significantly drive enterprises toward new business models, reduce costs, and enable people to work remotely.

Significance of DT adoption: A review of a study on the significance of digital technology adoption in MSMEs highlighted that, to take advantage of these prospects, MSMEs can benefit from several opportunities through digital transformation. One of these is improving operational efficiency. Marketing, inventory control, and other business processes can be automated thanks to digital technology. This automation increases service speed and accuracy while reducing operating expenses. MSMEs can use digital technology to better satisfy customer needs, improve customer relations, and develop more customised offerings (Cajetan, M., 2018). Digitising customer services in MSMEs has several benefits,

including increased income, enhanced customer loyalty, and cost reductions (Costa et al., 2024). It was found that MSMEs may serve clients more efficiently, increasing customer satisfaction and loyalty. In addition to increasing production, digital technology allows MSMEs to enter new markets. MSMEs can promote their products both locally and worldwide by utilising e-commerce platforms, social media, and digital marketing. This opens up new opportunities for MSMEs to expand their enterprises and produce more revenue. Furthermore, digitalisation enables MSMEs to engage with customers, expand their market reach, and cultivate client relationships through social media and online platforms (Hendrawan et al., 2024). Additionally, digital technology helps MSMEs better understand their clients and customise their offerings to suit their requirements and preferences. MSMEs can better understand their customers' requirements, preferences, and behaviour by using digital technologies to gather and analyse consumer data (Hai et al., 2020). Further, it was revealed that many organisations and their employees have benefited from the increased use of digital tools, leading to several positive developments (Veldhoven, Z.V., & Vanthienen, J., 2021; Oliveira et al., 2022). As a result of advancements in digital technology, organisations are evolving into more multifaceted conglomerates (Li et al., 2021). Businesses benefit considerably from the implementation of digital technology (Marcucci et al., 2021; Wu et al., 2021; Oliveira, Kakabadse, & Khan, 2022). New technology adoption is a major factor in company success and economic growth (Delera et al., 2022). MSMEs can enhance the value of their goods and adjust to shifting market trends by utilising technologies like digitalisation and digital transformation. To guarantee that new technologies are embraced and used efficiently by all members of the firm, organisational and cultural changes are also crucial. Choosing the correct technology can assist MSMEs in increasing their market access and providing new business prospects (Setyoko, P.I., & Ranjani, 2023)

Problems of DT adoption: A large portion of the literature on the challenges of adopting digital technology in MSMEs found that they lack sufficient funds set aside for staff training or investments in new technology. Additionally, a major obstacle is the lack of digital knowledge and skills among MSME owners and staff. It could be difficult for them to comprehend how to use digital technology efficiently or to their advantage as a firm. Research shows that MSMEs' quest for corporate digitisation is hampered by a lack of funding and insufficient ICT expertise. For MSMEs, implementing digital transformation is severely hampered by a lack of people resources with digital competence. MSMEs find it challenging to accomplish the required digital transformations due to a lack of ICT expertise (Liu et al., 2021). Further, it was noted that poor information systems, low usage, and poor usability are just a few of the problems these companies regularly face (Lutf, 2022). Governments and industries across the board need to adopt digital technology quickly if they want to maintain competitiveness (Manyevere, R.M., & Rambe, P., 2022). Even though many SMEs in developing countries are unaware of the benefits of digital technology, their use has been thoroughly examined (Manyevere, R.M., & Rambe, P., 2022). Apart from their limited resources, MSMEs often face infrastructure issues. In many developing countries, it is still challenging to access digital infrastructure, such as reliable, fast internet. MSMEs struggle to adopt digital technologies effectively if they lack the necessary infrastructure, including reliable technical support, software, and hardware. Slow or inconsistent internet connections are examples of insufficient infrastructure that may hinder MSMEs' use of digital technology to increase operational efficiency and competitiveness (Nurchim N., & Santoso T.J., 2018). Furthermore, MSMEs may not have as much access to digital platforms and internet services that may increase their clientele and revenue due to a lack of infrastructure (Syahrennl N., & Tegowati T., 2022).

3. Research Gap and Contribution

Research on the impact of digital transformation on sustainability, innovation, and business performance in MSMEs is limited (Bawack & Kamdjoug, 2021; Gupta & Misra, 2020). The existing literature on digital transformation in MSMEs is limited, with several key gaps. First, there is a lack of understanding of the specific challenges that MSMEs face while

implementing digital transformation. Secondly, existing studies often focus on large enterprises, neglecting the unique needs and contexts of MSMEs (Wessel et al., 2020). According to Kumar et al. (2020), there is a shortage of research on the effects of digital transformation on MSME performance, innovation, and sustainability. Jain & Sharma (2020) revealed a shortage of research on MSME digital readiness and their ability to utilise digital technologies (Jain & Sharma, 2020).

This study fills these gaps by examining the importance of MSMEs' adoption of digital technology, its impact on enterprise performance, and the opportunities and challenges MSMEs face in the digital environment.

4. Research Methodology

The study is based on primary data to identify the problems and opportunities associated with the use of digital technology in MSMEs. 384 MSME owners/ representatives participated in a survey that collected primary data for the Krejcie and Morgan (1970) table. A stratified random sample of six Haryana districts was used in Yamuna Nagar (39), Faridabad (93), Gurugram (103), Hisar (49), Sonipat (40), and Panipat (60). These are proportionately allocated from the six districts with the highest number of enterprises across the state's six divisions, i.e., Ambala, Faridabad, Gurugram, Hissar, Rohtak, and Karnal.

Independent Variable- gender, education qualification, age of business units, age of entrepreneurs and category of enterprises

Dependent Variable- Challenges and Significance of the Adoption of Digital Technology in MSMEs

Measurement of Problems of use of Digital Technology- Problems faced while adopting digital technology in MSMEs have been analyzed with the help of seven statements, i.e., lack of quality internet/infrastructure, high cost of maintenance & installation of DT tools, absence of proper equipment, lack of skilled technical experts, high cost of use of digital technology, lack of training systems, and hesitation to adopt DT. The respondent's opinion on the statement of high cost of maintenance and installation of DT tools and high cost of use of digital technology combined as a factor in finance-related DT challenges. Lack of quality internet/ infrastructure, absence of proper equipment, and lack of training systems are termed "infrastructure-related DT challenges. Lack of skilled technical experts and hesitation to adopt DT are included in personnel-related DT problems. These statements were derived from study conducted by Kulkarni, M. (2020), Mansur, R., (2020), Oxford Economics (2017), Rajinikanth, N. (2013), Vyas, M. (2019).

Measurement of Significance of use of Digital Technology- The benefit of the adoption of digital technology in MSMEs has been analyzed with the help of eight statements. These statements have been combined into three factors, i.e., market share, corporate image, and efficiency of the firm. The statement to find new customers, suppliers & partners and introduce new products & services has been combined in factor market share. The statement to improve coordination and communication in the firm, quick feedback from the customer, and build company image has been combined in the factor of corporate image. The statement on reducing costs and simplifying routine work has been combined into the firm's factor efficiency. These statements were taken from study conducted by Kadadevaramath et al., (2014) and Rajinikanth, N. (2013).

Entrepreneurs were asked to indicate their level of acceptance or rejection with statements using a 5-point Likert scale, with 1 indicating strongly disagree and 5 indicating strongly agree. The collected data were processed through SPSS 29. One-way ANOVA (three independent variables) and t-tests (two independent variables) have been used as statistical tools for this study.

5. Analysis and Interpretation

Hypothesis on Problems of Adoption of Digital Technology

H01: There is no significant difference in digital technology adoption challenges and the gender of entrepreneurs. **H1:** There is a significant difference in the challenges of digital technology adoption by gender.

Table 1

Gender of Entrepreneurs and Digital Technology Problems

Component	Gender	N	Mean	Test Statistics	P value
Finance	Male	376	2.4269	5.836	.016
	Female	8	2.7500		
Infrastructure	Male	376	2.4858	7.097	.008
	Female	8	4.2500		
Personnel	Male	376	3.8657	.597	.440
	Female	8	4.3750		
Digital Technology Problems	Male	376	3.2688	4.240	.040
	Female	8	3.6458		

Source: Data compiled by researcher using SSPS (version 29)

The mean score for financial problems related to digital technology use in MSMEs was higher for female entrepreneurs (2.7500) than for male entrepreneurs (2.4269). A parametric test (t-test) is used to examine gender differences in components of the digital technology problem. Before applying the test, Levene's test checks the assumption of homogeneity of variances across gender categories. The results reveal variance homogeneity. The null hypothesis examines whether gender affects respondents' finances, infrastructure, and personnel. T-statistics of 5.836 (significant at the 5% level of significance) indicate that gender affects digital technology finance Problems. So, the null hypothesis is rejected. Infrastructure problems affect females 4.2500) more than males (2.4858), t value 7.097 (significance value < 5%). The null hypothesis is rejected. Similarly, Female entrepreneurs (4.3750) experience greater digital technology personnel problems than male entrepreneurs (3.8657). T =.597 (more than 5% significance level). So, the null hypothesis remains. The mean score for digital technology-related problems in firms among female entrepreneurs (3.6458) is higher than that among male entrepreneurs (3.2688). t = 4.240 (sig. at 5% level of significance). Thus, the null hypothesis is rejected.

H02: There is no significant difference in digital technology adoption challenges and the age of entrepreneurs. **H1:** There is a significant difference in digital technology adoption challenges and the age of the entrepreneur.

Table 2

Age of Entrepreneurs and Digital Technology Problems

Component	Age of Entrepreneurs	N	Mean Score	Test Statistics (F value)	P value
Finance	Up to 30	63	2.3095	7.566	.001
	30-40	182	2.6786		
	Above 40	139	2.2194		
Infrastructure	Up to 30	63	2.0053	3.946	.020
	30-40	182	2.3883		
	Above 40	139	2.2638		
Personnel	Up to 30	63	1.6746	13.756	.001
	30-40	182	2.4176		
	Above 40	139	2.4353		
Digital Technology Problems	Up to 30	63	1.9965	6.671	.001
	30-40	182	2.4948		
	Above 40	139	2.3062		

Source: Data compiled by researcher using SSPS (version 29)

Table 2 demonstrates digital technology problems and their financial, infrastructure, and personnel components. The mean score for finance-related problems is highest in the 30–40 age group (2.6786), followed by the 30–40 age group (2.3095) and the 40+ age group (2.2194). Hypotheses are tested using one-way ANOVA because the independent variable has three categories. Levene's test shows variance homogeneity. F-statistics are 7.566, P < 0.05. Thus, the null hypothesis is rejected. The mean score of the infrastructure-related digital technology use problem is greater for 30–40-year entrepreneurs (2.3883), followed by those above 40 (2.2638) and those up to 30 (2.0053). The null hypothesis was tested to determine whether the difference was significant. The F statistic is 3.946, with a P value < 0.05. Therefore, the null hypothesis is rejected. The above-40 age group has the highest mean personnel-related problems score (2.4353), followed by the 30-40 age group (2.4176) and the 30-year-old group (1.6746). F-statistics are 13.756, P < 0.05. The null

hypothesis is rejected. The mean score of the 30–40 age group is 2.4948, followed by over 40 (2.3062) and up to 30 (1.9965) years of digital technology difficulty. The F value for all three components is 6.671 (p-value < 0.05). Therefore, the null hypothesis is rejected.

H03: There is no significant difference in digital technology adoption challenges and the qualification of entrepreneurs.

H1: There is a significant difference in digital technology adoption challenges and the qualification of the entrepreneur.

Table 3

Entrepreneur Qualification and Digital Technology Problems

Component	Qualification of Entrepreneurs	N	Mean Score	Test Statistics (F value)	P value
Finance	Up to 12th	51	2.9902	11.591	.001
	Graduation	187	2.5214		
	Post-Graduation	146	2.1507		
Infrastructure	Up to 12th	51	2.3856	4.426	.013
	Graduation	187	2.3405		
	Post-Graduation	146	2.0636		
Personnel	Up to 12th	51	2.3431	2.482	.085
	Graduation	187	2.2941		
	Post-Graduation	146	2.0616		
Digital Technology Problems	Up to 12th	51	2.5730	6.715	.001
	Graduation	187	2.3853		
	Post-Graduation	146	2.0921		

Source: The researcher used SSPS 29 to compile the data.

The hypothesis-testing findings for respondent qualification are presented in Table 3. The mean score for finance-related digital technology problems is highest among up to 12th-grade entrepreneurs (2.9902), followed by graduates (2.5214) and post-graduates (2.1507). Hypotheses are tested using one-way ANOVA because the independent variable has three categories. Levene's test shows variance homogeneity. The t-statistic of 11.951 (significant at the 5% level) indicates that qualification affects digital technology financing. Infrastructure-related problem of digital technology up to 12th (23856) respondents had a higher mean score than graduates (2.3405) and post-graduation (2.0639). The t statistic of 4.426 (p=0.05) suggests that qualification affects digital technology infrastructure issues. The mean score for the digital technology personnel problem is higher for up to 12th-grade (2.3431), graduates (2.2941), and post-graduates (2.0616) entrepreneurs. T- statistic is 2.482. Thus, the null hypothesis is rejected at the 10% significance level. Overall, the mean score for the digital technology problem, by qualification, is higher for entrepreneurs with 12th (2.5730), followed by graduates (2.3853) and post-graduates (2.0921), with a t value of 6.715. The digital technology challenge differs by qualification. Therefore, the null hypothesis is rejected.

H04: There is no significance difference in digital technology adoption challenges and age of entrepreneurs. **H1:** There is a significant difference in digital technology adoption challenges and the age of the entrepreneur.

Table 4

Age of Enterprises and Digital Technology Problems

Component	Age of Enterprises	N	Mean Score	Test Statistics (F value)	P value
Finance	Less Than 5	138	2.5942	2.995	.050
	5-10	100	2.5050		
	More than 10	146	2.2808		
Infrastructure	Less Than 5	138	2.3212	.698	.498
	5-10	100	2.3300		
	More than 10	146	2.2078		
Personnel	Less Than 5	138	2.4348	2.592	.076
	5-10	100	2.3400		
	More than 10	146	2.1507		
Digital Technology Problems	Less Than 5	138	2.4501	2.338	.098
	5-10	100	2.3917		
	More than 10	146	2.2131		

Source: The researcher used SSPS 29 to compile the data.

Table 4 shows the mean score of the digital technology problem and its three components by business age. The age group of less than 5 years (2.5942) has the highest mean score for finance-related problems,

followed by the 5–10 years (2.5050) and the more than 10 years (2.2808) groups. Hypotheses are tested using a one-way ANOVA with three independent variable categories. Levene's test shows variance homogeneity. The F statistic for finance problems is 2.995, and the P value is greater than 0.05, indicating 10% importance. The null hypothesis is rejected. The mean score for infrastructure-related problems is higher for age group 5–10 (2.3300), lower for age group less than 5 (2.3212), and higher for age group 10+ (2.2078). The F statistic for infrastructure-related problems is 0.698. A P value > 0.05 (significance at 10% level). Thus, the null hypothesis remains. Personnel problem mean score is greater for less than 5 years (2.4348), 5–10 years (2.3400), and more than 10 years (2.1507). Personnel problems, F-statistic is 2.592. F- values are not significant at 5% because the P value is bigger than 0.05. So, the null hypothesis is rejected. The mean score for digital technology problems by business age is higher for businesses under 5 years (2.4501), 5–10 years (2.3917), and above 10 years (2.2131). The F statistic is 2.328, and the P value for all three components is 10% significant. The null hypothesis is rejected.

H05: There is no significant difference in digital technology adoption challenges across enterprise categories.

H1: There is a significant difference in digital technology adoption challenges across categories of entrepreneurs.

(2.4176) and the 30-year-old group (1.6746). F-statistics are 13.756, P < 0.05. The null hypothesis is rejected. The mean score of the 30–40 age group is 2.4948, followed by over 40 (2.3062) and up to 30 (1.9965) years of digital technology difficulty. The F value for all three components is 6.671 (p-value < 0.05). Therefore, the null hypothesis is rejected.

H03: There is no significant difference in digital technology adoption challenges and the qualification of entrepreneurs.

H1: There is a significant difference in digital technology adoption challenges and the qualification of the entrepreneur.

Table 3

Entrepreneur Qualification and Digital Technology Problems

Component	Qualification of Entrepreneurs	N	Mean Score	Test Statistics (F value)	P value
Finance	Up to 12th	51	2.9902	11.591	.001
	Graduation	187	2.5214		
	Post-Graduation	146	2.1507		
Infrastructure	Up to 12th	51	2.3856	4.426	.013
	Graduation	187	2.3405		
	Post-Graduation	146	2.0636		
Personnel	Up to 12th	51	2.3431	2.482	.085
	Graduation	187	2.2941		
	Post-Graduation	146	2.0616		
Digital Technology Problems	Up to 12th	51	2.5730	6.715	.001
	Graduation	187	2.3853		
	Post-Graduation	146	2.0921		

Source: The researcher used SSPS 29 to compile the data.

The hypothesis-testing findings for respondent qualification are presented in Table 3. The mean score for finance-related digital technology problems is highest among up to 12th-grade entrepreneurs (2.9902), followed by graduates (2.5214) and post-graduates (2.1507). Hypotheses are tested using one-way ANOVA because the independent variable has three categories. Levene's test shows variance homogeneity. The t-statistic of 11.951 (significant at the 5% level) indicates that qualification affects digital technology financing. Infrastructure-related problem of digital technology up to 12th (23856) respondents had a higher mean score than graduates (2.3405) and post-graduation (2.0639). The t statistic of 4.426 (p=0.05) suggests that qualification affects digital technology infrastructure issues. The mean score for the digital technology personnel problem is higher for up to 12th-grade (2.3431), graduates (2.2941), and post-graduates (2.0616) entrepreneurs. T- statistic is 2.482. Thus, the null hypothesis is rejected at the 10% significance level. Overall, the mean score for the digital technology problem, by qualification, is higher for entrepreneurs with 12th (2.5730), followed by graduates (2.3853) and post-graduates (2.0921), with

a t value of 6.715. The digital technology challenge differs by qualification. Therefore, the null hypothesis is rejected.

H04: There is no significance difference in digital technology adoption challenges and age of entrepreneurs.

H1: There is a significant difference in digital technology adoption challenges and the age of the entrepreneur.

Table 4

Age of Enterprises and Digital Technology Problems

Component	Age of Enterprises	N	Mean Score	Test Statistics (F value)	P value
Finance	Less Than 5	138	2.5942	2.995	.050
	5-10	100	2.5050		
	More than 10	146	2.2808		
Infrastructure	Less Than 5	138	2.3212	.698	.498
	5-10	100	2.3300		
	More than 10	146	2.2078		
Personnel	Less Than 5	138	2.4348	2.592	.076
	5-10	100	2.3400		
	More than 10	146	2.1507		
Digital Technology Problems	Less Than 5	138	2.4501	2.338	.098
	5-10	100	2.3917		
	More than 10	146	2.2131		

Source: The researcher used SSPS 29 to compile the data.

Table 4 shows the mean score of the digital technology problem and its three components by business age. The age group of less than 5 years (2.5942) has the highest mean score for finance-related problems, followed by the 5–10 years (2.5050) and the more than 10 years (2.2808) groups. Hypotheses are tested using a one-way ANOVA with three independent variable categories. Levene's test shows variance homogeneity. The F statistic for finance problems is 2.995, and the P value is greater than 0.05, indicating 10% importance. The null hypothesis is rejected. The mean score for infrastructure-related problems is higher for age group 5–10 (2.3300), lower for age group less than 5 (2.3212), and higher for age group 10+ (2.2078). The F statistic for infrastructure-related problems is 0.698. A P value > 0.05 (significance at 10% level). Thus, the null hypothesis remains. Personnel problem mean score is greater for less than 5 years (2.4348), 5–10 years (2.3400), and more than 10 years (2.1507). Personnel problems, F-statistic is 2.592. F- values are not significant at 5% because the P value is bigger than 0.05. So, the null hypothesis is rejected. The mean score for digital technology problems by business age is higher for businesses under 5 years (2.4501), 5–10 years (2.3917), and above 10 years (2.2131). The F statistic is 2.328, and the P value for all three components is 10% significant. The null hypothesis is rejected.

H05: There is no significant difference in digital technology adoption challenges across enterprise categories.

H1: There is a significant difference in digital technology adoption challenges across categories of entrepreneurs.

Table 5

Digital Technology Problems and the Category of Enterprises

Component	Category of Enterprises.	N	Mean Score	Test Statistics (F value)	P value
Finance	Micro	239	2.5418	2.963	.050
	Small	104	2.3798		
	Medium	41	2.1098		
Infrastructure	Micro	239	3.6987	14.367	.001
	Small	104	3.2051		
	Medium	41	3.1057		
Personnel	Micro	239	2.3389	.802	.449
	Small	104	2.2933		
	Medium	41	2.1098		
Digital Technology Problems	Micro	239	2.8598	7.709	.001
	Small	104	2.6261		
	Medium	41	2.4417		

Source: Data compiled by researcher using SSPS (version 29)

Table 5 displays the mean score of digital technology problems and their three components—finance,

infrastructure, and personnel. Micro (2.5418) enterprises had the highest mean finance-related difficulty score, followed by small (2.3798) and medium (2.1098) enterprises. The mean infrastructure problem score of micros (3.6987), small (2.2051), and medium (3.1057) firms was also 3.6987. Microenterprises have a higher mean score of human problems (2.3389) than small (2.2933) and medium (2.1098) enterprises. The null hypothesis was tested to determine whether the difference was significant. Hypotheses are tested using one-way ANOVA because the independent variable has three categories. Levene's test shows variance homogeneity. Finance problems include 2.963, infrastructure 14.367, and personnel 802. The P value for finance, the infrastructure-related component of digital technology challenges, is significant. These null hypotheses are rejected. P-values for the three digital technology problems are significant at the 5% level. Therefore, the null hypothesis is rejected.

H06: There is no significance difference in digital technology adoption challenges and nature of enterprises.

H1: There is significance difference in digital technology adoption challenges and nature of enterprises.

Table 6

Nature of Enterprises and Digital Technology Problems

Component	Gender	N	Mean	Test Statistics	P value
Finance	Manufacturing	172	2.2703	20.338	.001
	Service	212	2.5991		
Infrastructure	Manufacturing	172	2.0872	57.597	.001
	Service	212	2.4371		
Personnel	Manufacturing	172	2.0959	2.474	.117
	Service	212	2.4693		
Digital Technology Problems	Manufacturing	172	2.1512	24.168	.001
	Service	212	2.5018		

Source: Data compiled by researcher using SSPS (version 29)

A parametric test (t-test) is used to examine gender differences in components of the digital technology problem. Before using the test, Levene's test checks the assumption of variance homogeneity between manufacturing and service firms. The results reveal variance homogeneity. The results showed that service sector entrepreneurs (2.5991) had more finance-related digital technology issues than manufacturing sector entrepreneurs (2.2703). The t statistic of 20.338 (p-value = 0.05) suggests that enterprise type affects financial problems. Service sector entrepreneurs have higher infrastructural issues (2.4371) than manufacturing (2.0872). The t statistic of 57.597 (p=0.05) suggests that enterprise type affects financial knowledge. Therefore, the null hypothesis is rejected. The mean personnel problem in service sector businesses (2.4696) is higher than in manufacturing (2.0959). The t statistic of 2.474 (not significant at 5%) suggests that enterprise type does not affect financial-related problems. So, the null hypothesis is rejected. Service sector firms had a higher mean digital technology problem score (9.5018) than manufacturing enterprises (2.1512). Overall, t = 24.168, which is below the 5% significance level. Thus, entrepreneurs' digital technology problems differ significantly. Thus, the null hypothesis is rejected.

Hypothesis on the Significance of Digital Technology

H07: There is no significant difference in digital technology adoption significance and gender of entrepreneurs.

H1: There is a significant difference in digital technology adoption significance and gender of entrepreneurs.

Table 7

Gender of Entrepreneurs and Significance of Digital Technology

Component	Gender	N	Mean	Test Statistics	P value
Market Share	Male	376	4.0133	6.189	.013
	Female	8		4.5000	
Corporate Image	Male	376	2.4548	11.833	.001
	Female	8		2.3125	
Efficiency of Firm	Male	376	2.7168	11.274	.001
	Female	8		2.4375	

Significance of Digital Technology	Male	376	3.0616	7.669	.006
	Female	8		3.0833	

Source: Data compiled by researcher using SSPS (version 29)

Table 7 shows how market share and corporate image affect digital technology utilisation by entrepreneur gender. A parametric test (t-test) is used to examine gender and the importance of digital technology. Before applying the test, Leven's test checks the assumption of variance homogeneity between gender categories. The results demonstrate variable heterogeneity. The null hypothesis examines whether gender affects market share, corporate image, and efficiency of firm. Analyse this via hypothesis testing. Hypothesis testing shows that female entrepreneurs (4.5000) score higher on market share than males (4.0133). The t statistic of 6.189 (significant at 5%) suggests that gender affects digital technology's market share benefit. Males had a higher mean score for corporate image (2.4548) and efficiency of firm (2.7168) than females (2.4375).

Corporate image F-statistics are 11.833 (less than 5% significant level). Firm efficiency F-value is 11.274 (significantly). The null hypothesis is rejected. In terms of digital technological relevance, female entrepreneurs (3.0833) showed higher significance than male entrepreneurs (3.0616). The t-statistic of 7.669 (significant at 5%) suggests that gender affects digital technology benefits.

H08: There is no significance difference in digital technology adoption significance and age of entrepreneurs.

H1: There is significance difference in digital technology adoption significance and age of entrepreneurs.

Table 8

Age of Entrepreneurs and Significance of Digital Technology

Component	Age of Entrepreneurs	N	Mean Score	Test Statistics (F value)	P value
Market Share	Up to 30	63	4.0714	7.839	.001
	30-40	182	4.1484		
	Above 40	139	3.8381		
Corporate Image	Up to 30	63	4.0529	5.238	.006
	30-40	182	4.1575		
	Above 40	139	3.8897		
Efficiency of Firm	Up to 30	63	3.9206	5.753	.003
	30-40	182	4.1538		
	Above 40	139	3.8597		
Significance Of Digital Technology	Up to 30	63	4.0150	6.584	.002
	30-40	182	4.1532		
	Above 40	139	3.8625		

Source: Data compiled by researcher using SSPS (version 29)

Table 8 shows the mean digital technology and the three component significance scores. The component market mean score is the biggest share in the 30-40 age group (4.1484), followed by up to 30 (4.0714) and above 40 (3.8381). The mean corporate image score is highest among 30-40-year-olds (4.1575), followed by up to 30 (4.0529) and above 40 (3.8897). The mean business efficiency score is highest among 30-40-year (4.1538), followed by up to 30 (3.9206) and above 40 (3.8597). One-way ANOVA tests hypotheses with three independent variable categories. Levene's test shows variance homogeneity. F- value for Market share is 7.839, corporate image is 5.238, and efficiency of firm is 5.753. P values for the three components are less than 0.05, indicating 5% significance for F values. Thus, the null hypothesis is rejected.

In conclusion, the mean score of digital technology significance is highest among the age group 30-40 (4.1532), followed by up to 30 (4.0150) and above 40 (3.8625). F Statistics: 6.584. P value < 0.05 indicates 5% significance for F values. The null hypothesis is rejected.

H09: There is no significance difference in digital technology adoption significance and qualification of entrepreneurs.

H1: There is significance difference in digital technology adoption significance and qualification of entrepreneurs.

Table 9

Qualification of Entrepreneurs and Significance of Digital Technology

Component	Qualification of Entrepreneurs	N	Mean Score	Test Statistics (F value)	P value
Market Share	Up to 12th	51	2.5098	3.831	.023
	Graduation	187	2.8021		
	Post-Graduation	146	2.4726		
Corporate Image	Up to 12th	51	2.5097	4.592	.011
	Graduation	187	2.8200		
	Post-Graduation	146	2.4543		
Efficiency of Firm	Up to 12th	51	2.7451	5.689	.004
	Graduation	187	2.9118		
	Post-Graduation	146	2.4418		
Significance of Digital Technology	Up to 12th	51	2.5882	4.993	.007
	Graduation	187	2.8446		
	Post-Graduation				

Source: Data compiled by researcher using SSPS (version 29)

Table 9 shows that the graduate respondents have the highest mean score for the market share-related relevance of digital technology (2.8021), followed by the up to 12th (2.5098) and post-graduate (2.4726) groups. Graduate entrepreneurs had the highest mean for corporate image importance score (2.8200), followed by up to 12th (2.5097), and post-graduate students (2.4543). The graduate entrepreneurs' mean efficiency of firm-related significance score is highest (2.9118), followed by the up to 12th (2.7451) and post-graduate (2.4418). Hypotheses are tested using one-way ANOVA because the independent variable has three categories. Levene's test shows variance homogeneity. Market share is 3.831, corporate image is 4.592, and business efficiency is 5.689. (Significant at 5% level of significance.) The significance of the three components of digital technology varies greatly by respondent qualification. Across respondents' qualifications, graduates (2.8446) have the highest mean score for the significance of digital technology, followed by those with up to 12th (2.5882) and postgraduate (2.4562) qualifications. Lower significance level F-value 4.993. Thus, qualification greatly affects the importance of digital technology. Therefore, the null hypothesis is rejected.

H010: There is no significant difference in the significance of digital technology adoption and the age of enterprises. **H1:** There is a significant relationship between digital technology adoption and the age of enterprises.

Table 10

Age of Enterprises and Significance of Digital Technology

Component	Age of Enterprises	N	Mean Score	Test Statistics (F value)	P value
Market	Less Than 5	138	3.9444	3.198	.042
	5-10	100	4.0967		
	More than 10	146	4.1210		
Corporate Image	Less Than 5	138	3.9251	5.897	.003
	5-10	100	4.1367		
	More than 10	146	4.1712		
Efficiency of Firm	Less Than 5	138	3.8986	5.309	.005
	5-10	100	4.1050		
	More than 10	146	4.1712		
Significance of Digital Technology	Less Than 5	138	3.9227	5.257	.006
	5-10	100	4.1128		
	More than 10	146	4.1545		

Source: Data compiled by researcher using SSPS (version 29)

Table 10 presents the mean significance scores for digital technology and its three components by business age. Enterprises with more than 10 years (4.1210) have the highest mean market share, followed by 5–10 years (4.0967) and less than 5 years (3.9444). Enterprises aged more than 10 years had the highest mean corporate image score (4.1712), followed by 5–10 years (4.1367) and less than 5 years (3.9251). The mean firm efficiency score is highest for age groups 10+ (4.1711), followed by 5–10 (4.1050) and less than 5 (3.8986). Hypotheses are tested using a one-way ANOVA with three independent variable categories. Levene's test shows variance homogeneity. F Statistics for market share significance, 3.198; corporate image, 5.897; business efficiency, 5.309. A P value < 0.05 indicates 5% significance for F values. Thus, the null hypothesis is rejected. The mean score of digital technology relevance with business age is greater for businesses older than 10 years (4.1545), followed by 5–10 (4.1128) and fewer than 5 years (3.9227). F-statistics are 5.257, and P-values for all

three components are less than 0.05, indicating 5% significance. The null hypothesis is rejected.

H011: There is no significant difference in the significance of digital technology adoption and the category of enterprises.

H1: There is a significant difference in the significance of digital technology adoption and the category of enterprises.

Table 11

Category of Enterprises and Significance of Digital Technology

Component	Category of Enterprises.	N	Mean Score	Test Statistics (F value)	P value
Market Share	Micro	239	4.1276	21.246	.000
	Small	104	4.0385		
	Medium	41	3.3780		
Corporate Image	Micro	239	4.1729	19.590	.000
	Small	104	3.9872		
	Medium	41	3.4309		
Efficiency of Firm	Micro	239	4.1444	19.541	.000
	Small	104	3.9663		
	Medium	41	3.3293		
Significance of Digital Technology	Micro	239	4.1483	22.158	.000
	Small	104	3.9973		
	Medium	41	3.3794		

Source: Data compiled by researcher using SSPS (version 29)

Table 11 displays the mean score of the significance of digital technology and its three components by enterprise type. Micro enterprises (4.1276) have the highest mean score of market share-related importance components, followed by small (4.0385) and medium (3.3780) enterprises. Micro enterprises (4.1729) had the highest mean score of corporate image components, followed by small (3.9872) and medium (3.4309) enterprises. Micro enterprises have the highest component efficiency score (4.1444), followed by small (3.9663) and medium (3.3293) firms. One-way ANOVA tests hypotheses with three independent variable categories. Levene's test shows variance homogeneity. F statistics show market share at 21.246, corporate image at 19.590 and company efficiency at 19.541. P values for the three components are less than 0.05, indicating 5% significance for F values. Thus, the null hypothesis is rejected. Overall, digital significance score of micro enterprises (4.1483) has the highest score, followed by (3.9973) and medium (3.3794). The P value is less than 0.05; hence, the F values (22.158) are significant at 5%. Based on the enterprise type, the null hypothesis is rejected.

H012: There is no significant difference in the significance and nature of digital technology adoption and the nature of enterprises.

H1: There is a significant difference in the significance of digital technology adoption and the nature of enterprises.

Table 12

Nature of Enterprises and Significance of Digital Technology

Component	Gender	N	Mean	Test Statistics	P value
Market share	Manufacturing	172	2.5145	9.685	.002
	Service	212	2.7382		
Corporate Image	Manufacturing	172	2.5136	9.906	.002
	Service	212	2.7421		
Efficiency of Firm	Manufacturing	172	2.6221	4.065	.044
	Service	212	2.7820		
Significance of Digital Technology	Manufacturing	172	2.5501	9.620	.002
	Service	212	2.7545		

Source: Data compiled by researcher using SSPS (version 29)

Table 12 displays the mean significance score for digital technology and its three components for firms. Service sector firms (2.7382) have the highest mean market share score compared to manufacturing enterprises (2.5145). Service sector enterprises have a higher mean corporate image score (2.7421) than manufacturing companies (2.5136). The mean firm efficiency score for service enterprises (2.7820) is higher than that for manufacturing enterprises (2.6221). Parametric testing (t-test) is used to examine how digital technology and its

components affect enterprises. Levene's test checks the assumption of homogeneity of variance between two enterprise types before the test is executed. The results reveal variance homogeneity. The null hypothesis tests whether enterprise type affects market share, corporate image, and firm efficiency. With hypothesis testing, the market share t-statistic is 9.685 (less than the 5% significance level), corporate image is 9.906 (sign. on the 5% significance level), and firm efficiency is 4.065. Total rejection of the null hypothesis. Compared to manufacturing (2.5501), service sector businesses (2.7545) have the highest mean score for digital technology significance among enterprises. Digital technology benefits differ by enterprise type, with a t-statistic of 9.620 (significant at 5%).

6. Finding

This study finds that female entrepreneurs faced more digital technology-related challenges, including financial, infrastructure, and personnel-related challenges. Entrepreneurs aged 30-40 years faced more challenges, followed by those aged 30 and above with qualifications up to 12th, and then those aged 61-80 years. By age, enterprises less than 5 years old faced more problems, followed by those 5-10 years old, and those more than 10 years old. Microenterprises faced more problems than small and medium enterprises. Service sector enterprises faced more challenges compared to manufacturing enterprises.

The study found that female entrepreneurs placed greater significance on the adoption of digital technology and its components, i.e., market share, corporate image, and firm efficiency. Entrepreneurs' age between 30-40 years showed greater significance, followed by up to 30 and above 40 years of qualification; graduation, followed by up to 12th, and post-graduation. By age, enterprises more than 10 years old faced the most problems, followed by 5-10, and those less than 5 years old. Micro enterprises are more significant than small and medium enterprises. Service sector enterprises had more significance than manufacturing enterprises.

7. Recommendation

The various recommendations for related stakeholders, i.e., government, entrepreneurs, and financial institutions, are outlined to overcome the above challenges and enhance the significance of the adoption of digital technology in MSMEs**.**

The government should provide financial subsidies to MSMEs when they buy digital tools, software, and technology; provide tax relief to business owners who use digital technology; organise training initiatives to improve their digital literacy and digital infrastructure; and implement awareness initiatives to encourage the adoption of digital technology and its advantages.

Entrepreneurs of MSMEs should prioritise digital literacy training for their employees and adopt digital tools to enhance operations, market share, and corporate image.

Financial institutions can provide various forms of assistance to MSMEs while adopting digital technology, including the acquisition of digital technologies, such as infrastructure, software, and hardware, providing loans at low interest rates that use digital technology, and offering financial assistance to defray the cost of implementing digital technology, which is known as subsidised financing and provide workshops and training facilities on digital technologies and their utilisation to MSMEs.

References

Arisnawati, N. F. (2022). KSPPS financing, product innovation, and technology as determinants of MSME growth in Pekalongan City. Al-Falah: Journal of Islamic Economics, 7(2), 249.

Abul et al., (2020). Cloud computing adoption and its impact on SMEs' performance for cloud-supported operations: A dual-stage analytical approach. Technology in Society, 60 (101225), 1-15.

Aloini et al., (2021). The impact of digital technologies on business models: Insights from the space industry. Measuring Business Excellence, 25(1), 1-17.

Argüelles et al., (2021). Technological spotlights of digital transformation: Uses and implications under COVID-19 conditions. In Information Technology

Trends for a Global and Interdisciplinary Research Community, 01, (19-49).

Balakrishnan, R., & Das, S. (2020). How do firms reorganize to implement digital transformation? Strategic Change, 29(5), 531-541.

Bawack, R. E., & Kamdjoug, J. R. K. (2021). Digital transformation in SMEs: A systematic review. Journal of Small Business Management, 59(3), 537-557.

Bouaynaya, W. (2020). Cloud computing in SMEs: Towards delegation of the CIO role. Information & Computer Security, 28(2), 199-213.

Cajetan, M. (2018). Digital banking, customer experience and bank financial performance: UK customers' perceptions. International Journal of Bank Marketing, 36(2), 230-255.

Costa et al., 2024). Digitalization of customer service in small and medium-sized enterprises: Drivers for the development and improvement. International Journal of Entrepreneurial Behavior & Research, 30(2/3), 305-341.

Crupi et al., (2020). The digital transformation of SMEs – A new knowledge broker called the digital innovation hub. Journal of Knowledge Management, 24(6), 1263-1288.

Delera et al., (2022). Does value chain participation facilitate the adoption of Industry 4.0 technologies in developing countries? World Development, 152 (C), 105788.

Dressler, M., & Paunovic, I. (2021). Sensing technologies, roles and technology adoption strategies for digital transformation of grape harvesting in SME wineries. Journal of Open Innovation: Technology, Market, and Complexity, 7(2), 123.

Dutta, G., Kumar, R., Sindhwani, R., & Singh, R. K. (2020). Digital transformation priorities of India's discrete manufacturing SMEs – A conceptual study in perspective of Industry 4.0. Competitiveness Review: An International Business Journal, 30(3), 289-314.

Gaddefors, J., & Anderson, A. R. (2019). Romancing the rural: Reconceptualizing rural entrepreneurship as engagement with context(s). The International Journal of Entrepreneurship and Innovation, 20(3), 159-169.

Garzoni, A., De Turi, I., Secundo, G., & Del Vecchio, P., (2020). Fostering digital transformation of SMEs: a four levels approach. Management Decision, 58(8), 1543-1562.

Ghobakhloo, M., & Iranmanesh, M., (2021). Digital transformation success under Industry 4.0: A strategic guideline for manufacturing SMEs. Journal of Manufacturing Technology Management, 32(8), 1533-1556.

Gupta, G., & Bose, I., (2022). Digital transformation in entrepreneurial firms through information exchange with operating environment. Information & Management, 59(3), 103243

Gupta, S., & Misra, S. C. (2020). Digital transformation in SMEs: A review and future directions. International Journal of Information Management, 50, 102-115.

Hai et al., (2020). The digitalization and public crisis responses of small and medium enterprises: implications from a covid-19 survey," Frontiers of Business Research in China, 14(1), 2-25.

Hendrawan et al., 2024). Digital Transformation in MSMEs: Challenges and Opportunities in Technology Management. *Jurnal Informasi Dan Teknologi*, *6*(2), 141-149.

Jain, R., & Sharma, S. (2020). Digital readiness of SMEs: A review and future research directions. Journal of Enterprise Information Management, 33(2), 237-255.

Kraus et al., (2021). Digital transformation: An overview of the current state of the art of research. SAGE Open, 11(3), 1–15.

Kumar et al., (2020). Digital transformation and SME performance: A systematic review. Journal of Business Research, 112, 281-292.

Liu et al., (2021). Factors influencing organizational efficiency in a smart-logistics ecological chain under e-commerce platform leadership. International Journal of Logistics Research and Applications, 24(4), 364-391.

Liu et al., (2021). Methodology for digital transformation with internet of things and cloud computing: A practical guideline for innovation in small- and medium-sized enterprises. Sensors, 21(16), 5355.

Lokuge, S., & Duan, S. X. (2021). Towards understanding enablers of digital transformation in small and medium-sized enterprises. Australasian Conference on Information Systems.

Proceedings. 27, DOI: .https://aisel.aisnet.org/acis2021/27

Lokuge, S., & Sedera, D. (2020). Fifty shades of digital innovation: How firms innovate with digital technologies. Pacific Asia Conference on Information Systems. 1-15, available at *PACIS 2020 Proceedings*. DOI:.https://aisel.aisnet.org/pacis2020/91

Lokuge et al., (2020).The next wave of CRM innovation: Implications for research, teaching, and practice. Communications of the Association for Information Systems, 46(1), 560-583.

Lokuge, S., Sedera, D., & Perera, M. (2018). The Clash of the Leaders: The intermix of leadership styles for resource bundling. Pacific Asia Conference on Information Systems, Yokohama, Japan, 113, 15.

Lutfi, A. (2022). Factors Influencing the Continuance Intention to Use Accounting Information System in Jordanian SMEs from the Perspectives of UTAUT: Top Management Support and Self-Efficacy as Predictor Factors, Economies, 10(4), 75.

Manyevere, R.M., & Rambe, P., (2022), The Role of Fourth Industrial Revolution Technologies in Mitigating the Impacts. African Journal of Hospitality, Tourism and Leisure, 11(3), 1173-1187.

Nurchim N., & Santoso T.J., (2018), Induksi teknologi pada umkm industri kreatif: pembangunan infrastruktur jaringan internet, Khadimul Ummah, 2(1), DOI:https://doi.org/10.21111/ku.v2i1.2656.

Oliveira (2022). Board engagement with digital technologies: A resource dependence framework. Journal of Business Research, 139(C), 804-818.

Popkova et al., (2022). A theory of digital technology advancement to address the grand challenges of sustainable development. Technology in Society, 68, 101831.

Setyoko, P.I., & Ranjani (2023) Impact of digitalization for msme actors in the era of adapting new habits," Kne Social Sciences,. 56-65. DOI: https://doi.org/10.18502/kss.v8i5.12988

Singh, R. K., & Kumar, S. (2019). Digital transformation in SMEs: Challenges and opportunities. International Journal of Business Innovation and Research, 19(2), 147-162.

Syahrenny, N., & Tegowati, T. (2022). Seminar bisnis online bersama UMKM makanan dan minuman Sukolilo. Jurnal Pengabdian Masyarakat (Abdira), 2(3), 17–22.

Szopa, Ł., & Cyplik, P. (2020). The concept of building a digital transformation model for enterprises from the SME sector. LogForum, 16(4), 593–601.

Vandita, Jaiswal, A. K., & Srivastava, R. B. L. (2023). Role of digitalization in the growth of MSMEs in India: Opportunities and challenges. International Journal for Multidisciplinary Research, 5(5), 1–8.

Veldhoven, Z. V., & Vanthienen, J. (2021). Digital transformation as an interaction-driven perspective between business, society, and technology. Electronic Markets, 32(2):629-644

Verhoef et el. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 122, 889–901.

Wahid, R. A., & Zulkifli, N. A. (2021). Factors affecting the adoption of digital transformation among SMEs in Malaysia. Journal of Information Technology Management, 13(3), 126–140.

Wessel et al., (2020). Unpacking the difference between digital transformation and IT-enabled organizational transformation. Journal of the Association for Information Systems, 22(1). DOI: 10.17705/1jais.00655

Westerlund, M. (2020). Digitalization, internationalization and scaling of online SMEs. Technology Innovation Management Review, 10(4), 48–56.

Wu et al., (2021). Determinants of the intention to use cross-border mobile payments in Korea among Chinese tourists: An integrated perspective of UTAUT2 with TTF and ITM. Journal of Theoretical and Applied Electronic Commerce Research, 16(5), 1537–1556.

Zide, O., & Jokonya, O. (2022). Factors affecting the adoption of Data Management as a Service (DMaaS) in Small and Medium Enterprises (SMEs). Procedia Computer Science, 196, 340-347