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Digital transformation readiness and adoption among MSMEs: A study of Tirunelveli District

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Abstract
Digital transformation has emerged as an important factor influencing the competitiveness, efficiency and sustainability of Micro, Small and Medium Enterprises (MSMEs). The increasing use of digital payments, accounting software, e-commerce platforms, online marketing, cloud-based applications and other digital technologies has created new opportunities for MSMEs while also presenting several challenges. The present study examines the digital transformation readiness and adoption of digital technologies among MSMEs in Tirunelveli District. The study focuses on the level of digital technology adoption, the challenges encountered by MSMEs, the influence of financial constraints and digital literacy on adoption decisions, and the factors influencing their readiness to adopt digital technologies. A descriptive and analytical research design is adopted for the study. Primary data are proposed to be collected from 200 MSMEs through a structured questionnaire administered to proprietors, owners, partners, managers and employees involved in business and technology-related decisions. The study considers aspects such as digital technology usage, duration of adoption, digital payments, accounting software, digital skills and knowledge, infrastructure, cyber security, organisational challenges, training requirements, financial support and overall preparedness for digital transformation. The collected data will be analysed using appropriate statistical tools through SPSS. The study is expected to provide useful insights into the major barriers and readiness factors associated with digital technology adoption and to offer suggestions for strengthening digital capabilities, training, financial support and digital infrastructure among MSMEs.

Keywords: Digital transformation, digital readiness, technology adoption, MSMEs, digital literacy

Introduction

Micro, Small and Medium Enterprises (MSMEs) play a vital role in India's economic development through employment generation, industrial production, exports and entrepreneurship. The rapid advancement of digital technologies has transformed conventional business practices and encouraged MSMEs to adopt digital payments, accounting software, e-commerce, online marketing, cloud computing, artificial intelligence and other digital applications to improve efficiency, productivity, market access and competitiveness.

However, digital transformation depends not only on the actual adoption of technology but also on the readiness of MSMEs to embrace and effectively use it. Digital transformation readiness includes digital knowledge and skills, technological infrastructure, financial capacity, employee capability, management support, willingness to invest, cyber security preparedness and access to training. Understanding the readiness, adoption and challenges associated with digital technologies is therefore essential for assessing the digital transformation of MSMEs. Hence, the present study examines digital transformation readiness and adoption among MSMEs in Tirunelveli District.

Statement of The Problem

MSMEs are increasingly expected to adopt digital technologies such as digital payments, accounting software, online marketing, e-commerce platforms and cloud-based applications to improve business efficiency and competitiveness. However, their readiness and adoption levels may vary due to factors such as inadequate digital literacy, limited technological infrastructure, financial constraints, lack of skilled employees, cyber security concerns, insufficient training and limited support. Despite the growing importance of digital transformation, limited district-level evidence is available on the readiness, adoption and challenges of MSMEs in Tirunelveli District. Therefore, the present study aims to assess digital transformation readiness and technology adoption among MSMEs, identify the major challenges faced by them, and examine the factors influencing digital technology adoption.

Objectives of The Study

1. To assess the level of digital transformation readiness among MSMEs in Tirunelveli District.
2. To study the level of digital technology adoption among MSMEs in Tirunelveli District.
3. To identify the major challenges faced by MSMEs in adopting digital technologies.
4. To examine the influence of financial constraints on digital technology adoption among MSMEs.
5. To analyse the influence of digital literacy and other factors on the adoption of digital technologies by MSMEs.
6. To provide suggestions for improving digital transformation readiness and digital technology adoption among MSMEs.

Review of Literature

Scuotto *et al.* (2017) [1] found that digital technologies enable SMEs to acquire and share knowledge more effectively. The study highlighted that knowledge sharing through digital platforms supports better business decisions. It also improves innovation capability and organizational performance.

Nambisan (2019) [2] explained that digital technologies reshape how MSMEs innovate, collaborate, and create value. Successful digital adoption requires firms to develop digital capabilities and adapt their business models. Organizations that embrace digital transformation are better positioned to remain competitive and respond to changing market needs.

Matarazzo *et al*. (2021) [3] explained that digital transformation enables SMEs to create greater customer value, improve business models, and strengthen competitiveness through dynamic capabilities and digital technologies.

Gupta and Agarwal (2023) [4] explored the adoption of digital financial services among Indian MSMEs and found that awareness, digital literacy and access to digital financial technologies influence adoption. The study also highlighted the need for greater support to improve digital technology adoption among MSMEs.

Research Gap

Although several studies have examined digital technology adoption, ICT implementation, digital transformation and organisational readiness among SMEs and MSMEs, limited empirical research has focused specifically on the digital transformation readiness and adoption of MSMEs in Tirunelveli District, Tamil Nadu. Previous studies have also paid comparatively less attention to district-level factors such as digital literacy, technological infrastructure, financial constraints, employee capability, management support, cyber security preparedness, training and government support. Therefore, the present study attempts to fill this gap by examining the digital transformation readiness and adoption among MSMEs in Tirunelveli District and identifying the major challenges and factors influencing digital technology adoption.

Research Methodology

The study adopts a descriptive and analytical research design to examine the awareness, readiness and adoption of digital technologies among MSMEs in Tirunelveli District. The study was conducted among MSMEs located in Tirunelveli District, Tamil Nadu, with the population comprising enterprises engaged in manufacturing, trading and service activities. The enterprise was considered as the unit of analysis. The respondents comprised proprietors, owners, partners, managers and employees who were involved in business and technology-related decision-making. A sample of 200 MSMEs was considered for the study. As a complete sampling frame of MSMEs was not readily available, purposive sampling was adopted to select respondents who were relevant to the objectives of the study and accessible during the field survey.

The study used both primary and secondary sources of data. Primary data were collected through a structured questionnaire administered to MSME owners, managers and other relevant respondents. Secondary information was collected from research journals, books, government publications, policy reports, institutional publications and relevant scholarly literature. The collected primary data were coded, tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS). The statistical tools employed for data analysis included ** Cronbach's Alpha, Independent Sample t-Test, One-Way ANOVA, Chi-Square Test, Pearson's Correlation Analysis and Garrett Ranking Technique**.

Chi-Square Test: Gender and Digital Technology Adoption Level

H_0 (Null Hypothesis): There is no significant association between gender and the level of digital technology adoption among MSMEs in Tirunelveli District.

H_1 (Alternative Hypothesis): There is a significant association between gender and the level of digital technology adoption among MSMEs in Tirunelveli District.

Test	χ^2 Value	df	p-value	Significance	Decision
Gender × Digital Technology Adoption Level	3.156	2	0.206	Not Significant	Accept H_0

Interpretation: The calculated chi-square value of 3.156 with 2 degrees of freedom has a p-value of 0.206, which is greater than the 5% level of significance (0.05). Therefore, the null hypothesis is accepted.

Correlation Analysis

Hypothesis

H_0: There is no significant relationship between digital technology awareness and digital technology adoption among MSMEs in Tirunelveli District.

H_1: There is a significant relationship between digital technology awareness and digital technology adoption among MSMEs in Tirunelveli District.

Variables	N	r-value	p-value	Result
Digital Technology Awareness and Digital Technology Adoption	200	0.684	<0.001	Significant positive relationship

Interpretation: The correlation analysis reveals a significant positive relationship between digital technology awareness and digital technology adoption among MSMEs ($r = 0.684$, $p < 0.001$). This indicates that higher awareness of digital technologies is associated with greater adoption among MSMEs. Hence, the null hypothesis is rejected and the alternative hypothesis is accepted.

One-Way Anova: Qualification and Adoption Score

Hypothesis

H_0: There is no significant difference in the mean digital technology adoption score among MSME respondents with different educational qualifications.

H_1: There is a significant difference in the mean digital technology adoption score among MSME respondents with different educational qualifications.

Independent Variable	Dependent Variable	F-value	p-value	Result	Hypothesis
Educational Qualification	Digital Technology Adoption Score	27.18	<0.001	Significant	H_0 Rejected

Interpretation: The ANOVA result ($F = 27.18$, $p < 0.001$) indicates a significant difference in digital technology adoption scores across educational qualification groups. Hence, H_0 is rejected. The findings suggest that respondents with higher educational qualifications tend to report higher levels of digital technology adoption.

Garrett Ranking: Reasons for Adopting Digital Technologies

Reason	Mean Garrett Score	Final Rank
To improve operational efficiency	69.66	1
To increase sales and business growth	67.90	2
To enhance customer service and satisfaction	64.97	3
To reduce operating costs	60.52	4
To remain competitive in the market	55.69	5
Others	44.48	6

Interpretation: The Garrett Ranking analysis shows that improving operational efficiency is the most important reason for adopting digital technologies, followed by increasing sales and business growth. Customer service enhancement ranks third, while cost reduction and maintaining market competitiveness occupy the fourth and fifth positions, respectively. "Others" ranks last.

Cronbach's Alpha

S. No.	Statement	Cronbach's Alpha
A	Skill and Knowledge Challenges	
1	Lack of knowledge	0.812
2	Need for digital training	0.812
3	Difficulty in learning new software	0.812
4	Lack of technical expertise	0.812
5	Limited digital awareness	0.812
B	Infrastructure and Security Challenges	
6	Poor internet connectivity	0.784
7	Cybersecurity concerns	0.784
8	Lack of technical support	0.784
9	Frequent software issues	0.784
10	Power supply interruptions	0.784
C	Attitude and Organizational Challenges	
11	Employee resistance to change	0.826
12	Management hesitation to invest	0.826
13	Traditional business practices	0.826
14	Insufficient government support	0.826
15	Digital technologies improve business performance	0.826
	Overall	0.861

Reliability Scale	No. of Items	Respondents	Cronbach's Alpha	Interpretation
Digital Technology Adoption Challenges	15	200	0.861	Good Reliability

Interpretation: The Cronbach's Alpha value of 0.861 for the 15-item Digital Technology Adoption Challenges scale indicates a good level of internal consistency among the statements. The result confirms that the items measuring skill and knowledge, infrastructure and security, and attitude and organisational challenges are sufficiently reliable for further statistical analysis.

Findings of The Study

1. The majority of the respondents, 162 (81.0%), belong to the 21–40 years age group.
2. The majority of the respondents, 160 (80.0%), possess Post Graduate & Above qualifications.
3. The majority of the respondents, 116 (58.0%), are female.
4. The majority of the MSMEs, 86 (43.0%), are engaged in Trading activities.
5. The majority of the enterprises, 92 (46.0%), have been operating for 6–10 years.
6. The majority of the enterprises, 118 (59.0%), have below 10 employees.
7. A majority of 174 respondents (87.0%) reported that their businesses use digital technology, indicating a high level of digital technology penetration among the sampled MSMEs.
8. The largest group, 78 respondents (39.0%), have been using digital technologies for 2–4 years.
9. A substantial majority of 182 respondents (91.0%) reported that their businesses use digital payment methods.
10. Among the digital payment users, 86 respondents (47.3%) reported Google Pay as their commonly used digital payment application.
11. The majority of the respondents, 146 (73.0%), reported that they use accounting software in their businesses.
12. Among the enterprises using accounting software, 94 respondents (64.4%) reported Tally Prime as their accounting software.
13. A large majority of the enterprises, 176 (88.0%), reported that they are registered as MSMEs.
14. Among the registered enterprises, 132 respondents (75.0%) belong to the Micro Enterprise category.
15. The majority of the enterprises, 108 (54.0%), reported an annual turnover of Below ₹25 lakhs.
16. A majority of 158 respondents (79.0%) stated that their enterprises have taken steps to overcome challenges in adopting digital technologies.
17. Among the enterprises taking corrective measures, 54 respondents (34.2%) identified Employee Training as the major step taken to overcome digital adoption challenges.
18. The largest group, 72 respondents (36.0%), reported Self-learning as the main source of support for overcoming digital technology adoption challenges.
19. The largest proportion, 82 respondents (41.0%), preferred Low-interest Loans as the most useful financial support for digital technology adoption.
20. The majority, 96 respondents (48.0%), considered Regular Training as the best method for improving employee digital skills.
21. The majority of the respondents, 112 (56.0%), reported that their enterprises are Moderately Prepared for digital transformation.
22. A majority of 124 respondents (62.0%) rated the future importance of digital technologies for MSMEs as Very High.
23. The descriptive findings indicate that digital technology has already become an important part of business operations among the sampled MSMEs, particularly in digital payments, accounting and routine business activities.
24. Although digital technology usage is relatively widespread, the predominance of the Moderately Prepared category indicates that many MSMEs still require further improvement in skills, infrastructure, finance and technological capabilities to achieve full digital transformation.

Suggestions of The Study

1. Strengthen Digital Skill Development: MSMEs should conduct regular training, workshops and practical

digital-skill programmes for owners, managers and employees to reduce the difficulties associated with learning new technologies.

2. Provide Affordable Financial Support: Government agencies and financial institutions should provide subsidies, low-interest loans, grants and suitable financial incentives to help MSMEs invest in digital technologies without creating excessive financial burdens.
3. Improve Digital Infrastructure: Reliable internet connectivity, uninterrupted power supply and accessible technical support should be strengthened in areas where MSMEs face infrastructure-related barriers.
4. Enhance Cybersecurity Awareness: MSMEs should be provided with simple and practical guidance on cybersecurity, data protection, privacy and secure digital transactions to increase confidence in digital technology adoption.
5. Encourage Gradual Digital Transformation: MSMEs should adopt digital technologies progressively, beginning with affordable and business-relevant applications such as digital payments, accounting, online marketing, e-commerce and customer management before moving towards more advanced technologies.
6. Increase Government and Institutional Support: Government agencies, financial institutions and educational institutions should work together to provide awareness programmes, technology consultancy, training and implementation support to MSMEs, particularly those with limited technical expertise.

Conclusion

The study concludes that digital transformation has become increasingly important for the growth and competitiveness of MSMEs. The findings show that although MSMEs recognise the benefits and future importance of digital technologies, their adoption is influenced by financial constraints, digital literacy, infrastructure limitations, cybersecurity concerns, technical difficulties and organizational resistance. The statistical analyses further provide evidence regarding the factors associated with digital technology adoption and the major challenges faced by MSMEs.

Therefore, strengthening digital skills, improving infrastructure, providing affordable financial assistance, enhancing cybersecurity awareness and increasing government and institutional support are essential for accelerating digital transformation among MSMEs. A gradual and need-based approach to technology adoption can help MSMEs overcome existing barriers and improve their efficiency, competitiveness and long-term sustainability.

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