

A COMPARATIVE STUDY ON DIGITAL TRANSFORMATION OF MICRO ENTERPRISES IN KOLKATA AND HOWRAH BEFORE AND AFTER COVID-19 SITUATION

*Sumedha Majumder**

Abstract: Context of the Study: Digital transformation has emerged as a vital driver of competitiveness and sustainability among Micro, Small and Medium Enterprises (MSMEs), especially in the post-COVID-19 era.

Aim of the Study: This study evaluates the impact of digital transformation on the business activities of micro enterprises in the selected districts of West Bengal and compares the extent of digital adoption between the pre-COVID-19 as well as post-COVID-19 eras.

Data and Tools: The study is based on primary data collected from 409 micro enterprises in Kolkata and Howrah using a structured questionnaire and employs a descriptive research frame. Multinomial logistic regression was used to analyse the relationship and association between digital transformation variables—online funding, digital payment, and online taxation—and the age of micro enterprises.

Outcome of the Study: The regression results confirmed that the model was statistically significant and free from multicollinearity. The study exhibit that enterprises running for less than one (1) year are significantly more likely to adopt online funding, digital payment, and online taxation than enterprises operating for more than five (5) years. Among enterprises aged one (1) to five (5) years, only online taxation depicts a statistically significant association.

Concluding Remark & Policy Suggestion: The study infers that younger micro enterprises have embraced digital technologies more extensively than older enterprises, showing the accelerated digital transformation following the COVID-19 situation. It recommends fostering digital awareness, modifying digital infrastructure, and widening access to digital financial services and training programmes to encourage wider digital adoption and strengthen the long-term sustainability and competitiveness of micro enterprises.

Keywords: Digital transformation, Micro enterprises, MSMEs, Multinomial logistic regression, Digital payment, Online funding, Online taxation, West Bengal

* Assistant Professor, Department of Commerce, Kabi Sukanta Mahavidyalaya,
E-mail: Sumedhamajumder1987@gmail.com

Introduction

Background of the Study

Micro, Small and Medium Enterprises (MSMEs) constitute one of the most vibrant and vital sectors of the Indian economy. The sector plays a significant role in fostering industrial growth, employment creation, export promotion, entrepreneurship development, and inclusive economic growth. Due to their labour-intensive nature and relatively lower capital requirements, MSMEs provide large-scale employment opportunities and assist balanced regional development by promoting industrialisation in semi-urban and rural areas. In India, the MSME sector contributes approximately 30 per cent (%) to the Gross Value Added (GVA) (The MSME Revolution, 2024). The sector also plays a crucial role in the livelihood of millions of people and operates as a bridge between traditional industries and modern economic activities (Yadav, 2025).

Acknowledging the growing significance of the sector, the Government of India (GOI) enacted the Micro, Small and Medium Enterprises Development Act, 2006, which constructed a formal legal and institutional framework for MSMEs. Over time, the definition and classification of MSMEs have reshaped in response to changing economic realities. The revised compact definition was introduced in 2020 to replace the earlier investment-based classification and further widened the threshold limits for investment & turnover under the Union Budget 2025. This reform focused on promoting

enterprise growth, encouraging competitiveness, and mitigating firms' fear of losing MSME status upon expansion.

Motivation of the Study

The present study primarily focuses on the digital transformation of MSMEs, with particular highlights on micro enterprises, as they hold the largest segment of the MSME sector (Ministry of MSME, Government of India). It assesses the extent of digital adoption among micro enterprises in the post-COVID-19 era and differentiates their level of digital adaptation before and after the pandemic. The study also aims to measure how the COVID-19 disruptions endorsed the adoption of digital technologies and rebuild business operations, financial transactions, as well as overall enterprise performance.

Literature Review

Studies conducted by OECD (2021), IMF (2021), Gupta et al. (2022), Roy (2024), and Sinha (2023) observed that Digital tools like fintech, e-commerce, and online payments foster MSME growth, inclusion, and efficiency, but adoption is restricted by digital illiteracy, infrastructure gaps, and resistance to change. Faruque, et. Al. (2024) revealed that technology adoption by small scale businesses has far-reaching impacts on the expansion of their businesses because of inadequate tech-based infrastructure, lack of digital literacy, limited capital availability and so on. The research work also suggested about the transparent legal framework on digital activities of the small-scale

businesses. Kumar et. al. (2023) Commented that Indian MSME sector is a very diversified economic area of our nation based on several national and international policy implication especially on technological upgradation. Now MSMEs are also able to realize the benefit of use of internet, e-commerce integration, online payment facilities etc. Vandita et. Al. (2023) inferred that Indian MSME sector is very much accept the need of digital transformation for their sustainability in economy. The study also acknowledges the importance of digital infrastructure to move towards technologies.

Research Gap

Although a substantial body of literature has evaluated the digital transformation of MSMEs in recent years, most studies majorly focus on digital adoption, technological innovations, and their influence on business performance. Comparatively, restricted research has systematically observed how digital transformation evolved in **micro enterprises** across the **pre-COVID-19, during COVID-19, and post-COVID-19** era. The COVID-19 pandemic played as a major catalyst, compelling micro enterprises to adopt digital technologies for business survival, yet empirical evidence comparing the extent and pattern of this transformation across these phases remains limited, particularly in regional level. Therefore, the present study seeks to bridge this gap by measuring the evolution of digital transformation in micro enterprises before and after the COVID-19 situation.

Research Objective

The study has the following objective

To assess the influence of digital transformation on the business activity of micro enterprises in the selected districts of West Bengal and compare the extent of digital transformation between the pre-COVID-19 and post-COVID-19 phase.

Research Hypotheses

H₀: There is no impact of digital transformation on the business activity of micro enterprises;

H₁: There is an impact of digital transformation on the business activity of micro enterprises;

Research Methodology

Nature of the Study

The present study is descriptive in nature, as it describes the current situations of digital transformation and the use of digital tools in the business activities of micro enterprises. At the same time, the study is empirical in nature as it is used primary data which collected from micro enterprises, depicting real-world experiences and practices.

Types and Sources of Data

The study is based on both primary as well as secondary data. Primary data were collected through a structured questionnaire from micro enterprise entrepreneurs and managers. Secondary data were obtained from renowned journals, government reports, MSME annual reports, books, and other relevant published sources.

Study Period

The present study considers two distinct time frames to assess the digital transformation of micro enterprises: the pre-COVID-19 period and the COVID-19/post-COVID-19 era. Micro enterprises that commenced their business operations before **2019** are considered representative of the **pre-COVID-19 period**, as they were operating before the outbreak of the COVID-19 pandemic. In contrast, enterprises started and operated between **2020 and 2024** represent the **COVID-19 and post-COVID-19 era**, exhibiting business practices during and after the pandemic. The overall study period spans **2019 to 2024**, providing a basis of a comparative analysis of digital transformation across the two periods.

Area of the Study

The present study concentrates on micro enterprises located in the districts of Kolkata and Howrah, West Bengal. As per the recent NABARD report, these two districts together account for approximately **27.03%** of the total Udyam-registered MSMEs in the state. Owing to their vital concentration of MSMEs and their economic and industrial importance, Kolkata and Howrah were selected as the study area for evaluating the digital transformation of micro enterprises.

Sampling Technique

The study employed the **convenience sampling technique** because a comprehensive and readily accessible district-wise database of micro enterprises

in West Bengal was not easily available. Therefore, primary data were collected from willing micro enterprise entrepreneurs and managers who were reachable during the survey period. This sampling method facilitated the collection of relevant and adequate data within the constraints of time and resource availability.

Sample Size

It was determined employing Cochran's formula. At a 95% confidence level and 5% margin of error, the required sample size is 384. The final sample of 409 micro enterprises exceeds this threshold, confirming adequate representation for statistical analysis.

Category of the Firm

The total number of respondents micro enterprises considered for the present study is 409. Out of which, 32 units represent the manufacturing sector (7.82%), 325 units belong to the trading sector (79.46%), and 52 units belong to the service sector (12.71%). Based on the latest available official registration data from the Ministry of MSME the distribution of MSMEs by India Manufacturing: 17.67 million (20.33%), Services: 32.40 million (37.29%) and Trading: 36.82 million (42.38%).

Multinomial Logistic Regression

Multinomial logistic regression is applied to assess how independent variables (online funding, digital payment, online taxation) influence a categorical dependent variable (MSME age groups).

Table-1: Descriptive Statistics

Variables	Minimum	Maximum	Mean
Age of MSME business (in terms of year) [Dependent Variable]	1	3	2.05
Online Funding (Independent Variable)	1	2	1.17
Digital Payment (Independent Variable)	1	2	1.11
Online Taxation (Independent Variable)	1	2	1.19
N= 409			

(Author's own calculation based on survey data)

The mean value (2.05) indicates that most businesses belong to the 1–5 years category.

Data Analysis and Findings

Data Analysis

Table-2: Multicollinearity Test Result

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Online Funding	.519	1.928
Digital Payment	.616	1.622
Online taxation	.911	1.098
Average VIF (Variance Inflation Factor)	1.549	

(Author's own calculation based on primary data)

The collinearity diagnostics reveal that all independent variables are suitable for regression analysis. Online Funding (Tolerance = 0.519, VIF = 1.928), Digital

Payment (Tolerance = 0.616, VIF = 1.622), and Online Taxation (Tolerance = 0.911, VIF = 1.098) all reach the required thresholds (Tolerance > 0.10 and VIF <

2). The average VIF value of 1.549 further confirms the absence of multicollinearity among the predictors, suggesting that

each variable contributes independently to the model.

Table-3: Model Summary - Goodness of Fit

	Chi-Square	df	Sig
Pearson	28.112	22	.172
Deviance	29.463	22	.132

(Authors' computation based on the primary data)

Pearson Chi-square value is 28.112 with a significant level of .172, and the Deviance Chi-Square value is 29.463 with a significant level of .132. It indicates that

there is no difference between observed and expected values. So, the model is a good fit for the regression analysis.

Table-4: Model Fitting Information

MODEL	Model Fitting Criteria-2 log Likelihood	Likelihood Ratio Tests		
		Chi-Square	df	Sig
Intercept Only	128.173			
Final	68.395	59.778	8	< .001

(Author's own calculation from the primary data)

The result shows that the final model provides a better fit than the intercept-only model. It means that predictor variables can efficiently explain the

dependent variable. Here, Chi-Square is derived as $128.173 - 68.395 = 59.778$. The p-value is less than .001, indicating that the final model is a significant fit.

Table-5: Pseudo R-Square

Cox and Snell	.136
Nagelkerke	.176
McFadden	.098

(Author's own computation based on survey data)

The model fits significantly well according to the likelihood ratio test. The pseudo-R-

squared value primarily reflects the model's explanatory power. All these

values of Pseudo R-Square (Cox and Snell = .136; Nagelkerke = .176; McFadden = .098) indicate that the model has sufficient

explanatory power, which means it is a good fit for logistic regression.

Table-6: Parameter Estimates (1)

Category: Age of the business < 1 year Reference Category: > 5 Years age of businesses

Criteria	Online Funding	Digital Payment	Online Taxation
B	2.563	15.921	1.903
Std. Error	1.056	.572	.745
Wald	5.892	774.691	6.519
df.	1	1	1
Sig	.015	< .001	.011
Exp(B)	12.971	8212035.900	6.707

(Author's own calculation from the primary data)

Online funding has a prominent positive impact on MSME survival. New businesses (<1 year) with access to online funding are 12.971 times more likely to stay in business than those without it, compared to firms older than 5 years ($p = 0.015$), reflecting stronger dependence of new firms on digital finance.

Digital payment has a highly significant positive effect on MSME longevity. New firms (<1 year) are far more likely to adopt digital payment systems than firms older than 5 years ($B = 15.921$, $p < 0.001$), with an extremely high odds ratio ($\text{Exp}(B) = 8,212,035.9$), indicating almost universal adoption among new enterprises. The high Wald statistic (774.691) ensures strong significance. Overall, digital payments, especially UPI, are widely accessed by MSMEs for smooth, transparent, and efficient financial

transactions, showing a broader post-COVID digitalisation trend.

Online taxation has a significant positive effect on MSME longevity. New firms (<1 year) are 6.707 times more likely to use online taxation than firms older than 5 years, and the result is statistically significant at the 5% level ($B = 1.903$, $p = 0.011$). This suggests that younger enterprises are more interested in digital compliance mechanisms, though many MSMEs still rely on tax preparers, which increases compliance costs.

Overall, the results reflect that all three digital variables significantly influence MSME performance. Digital payments have the strongest impact, followed by online funding and online taxation, underscoring the vital role of digital adoption in supporting business continuity for newer MSMEs.

Table-7: Parameter Estimates (2)

Category: Age of the business > 1 year < 5 years

Reference Category: > 5 Years age of businesses

Criteria	Online Funding	Digital Payment	Online Taxation
B	.947	.592	1.298
Std. Error	.963	.430	.629
Wald	.968	1.897	4.260
df.	1	1	1
Sig	.325	.168	.039
Exp(B)	2.579	1.808	3.661

(Author's own calculation from the primary data)

Online funding shows a positive but statistically insignificant effect on MSME longevity. Firms aged 1–5 years are 2.579 times more likely to access online funding compared to firms older than 5 years ($B = 0.947$), but the result is not statistically significant ($p = 0.325$), so it cannot be concluded that online funding has a meaningful impact on business longevity. Although the coefficient is positive, suggesting greater adoption among post-2019 firms due to the COVID-19-driven digital shift, it does not provide strong evidence of an influence on longevity.

Digital payment reflects a positive but statistically insignificant impact on MSME longevity ($B = 0.592$, $\text{Exp}(B) = 1.808$, $p = 0.168$). Younger firms are more likely to adopt digital payments. However, global reports, such as the World Bank's Global Findex (2021), highlight a major post-COVID rise in digital payment adoption in India.

Online taxation has a significant positive

impact on MSME longevity. Firms aged 1–5 years are 3.661 times more likely to sustain their business when they adopt online taxation compared to firms older than 5 years ($B = 1.298$, $p = 0.039$), indicating that newer enterprises benefit more from digital compliance systems.

Findings of the Study

The study has the following findings

- Newer micro enterprises (less than one year old) exhibit higher levels of digital adoption as compare to older enterprises;
- Many older enterprises exhibit limited use of digital technologies because of insufficient awareness, lack of digital skills, and trust-related issues;
- Digital transformation contributes positively to the sustainability and long-term performance of newer micro enterprises;
- The adequate utilization of digital tools may fosters business efficiency,

competitiveness, as well as operational resilience;

- The success of digital transformation varies on improving entrepreneurs' awareness, digital capabilities, and confidence in adopting digital platforms.

Conclusion

The study concludes that digital transformation has become a significant characteristic of micro enterprises in the post-COVID-19 business environment. The Multinomial logistic regression results show that newer enterprises, specifically those operating for less than one (1) year, are significantly (statistically) more likely to adopt online funding, digital payment, and online taxation than enterprises operating for more than five (5) years. Among enterprises aged one (1) to five (5) years, online taxation remains a significant digital practice, while online funding and digital payment do not reflect statistically significant differences. Overall, the findings of the study depict that recent digital platforms are more widely embraced by newly established micro enterprises showing a shift towards digital financial services and compliance practices. These outcomes highlight the booming role of digital transformation in shaping the operational procedures of micro enterprises and denote that business age influences the extent of digital adoption.

Suggestion

The study suggest that policymakers should augment digital awareness and capacity-building initiatives to promote

greater adoption of digital technologies, specifically among comparatively older micro enterprises that lag behind newer firms. Government agencies, financial organisations, and MSME support institutions should extend reach to digital financing platforms, simplify online taxation mechanisms, and offer regular training on digital payment systems and financial management. Modifying digital infrastructure, boosting cybersecurity, and providing technical assistance can further boost entrepreneurs' confidence in using digital platforms. Such steps would facilitate wider digital inclusion, strengthen operational efficiency, minimize compliance costs, and contribute to the long-term competitiveness and sustainability of micro enterprises in West Bengal.

Conflict of Interests

The author declares that there is no conflict of interests that are directly or indirectly related to this research work.

Funding

The author declares that she did not received any financial support from any organization to undertake this study.

References

- Faruque Md. Oman, Chowdhury Saddam Nasir, Rabbani Md. Golam and Khan Dr. Nure Alam (2024). "*Technology Adoption and Digital Transformation in Small Businesses: Trends, Challenges, and Opportunities*". International journal for multidisciplinary research (IJFMR), E-ISSN: 2582-2160, volume 6, issue 5
- https://www.researchgate.net/publication/385247341_Technology

Adoption and Digital Transformation in Small Businesses Trends Challenges and Opportunities

- Gupta Upasana, Agarwal Bhawna and Nautiyal Neeraj (2022). " *Financial technology adoption- a case of Indian MSMEs.*" *Financial Theory and Practice* 26(6): 192-211
https://www.researchgate.net/publication/366736520_Financial_Technology_Adoption_-_A_Case_of_Indian_MSMEs
- IMF Annual Report, 2021
<https://www.imf.org/external/pubs/ft/ar/2021/eng/>
<https://cmrindia.com/67-of-msmes-demonstrate-digital-readiness-across-core-and-advanced-technologies-finds-cmr-study/>
<https://digitalteamcoach.com/blog/digital-readiness-why-digital-transformation-matters/>
<https://www.nabard.org/auth/writereaddata/careernotices/0905222747msme.pdf?>
- Meier Andrea, Eller Robert and Peters Mike (2025). " *Creating Competitiveness in*

incumbent small and medium sized enterprises: a revised perspective on digital transformation". *Journal of Business Research*, volume 186

<https://www.sciencedirect.com/science/article/pii/S0148296324005320>

- Nanda Pooja and Kumar Vikas (2023). " *Development of MSMEs in India: challenges vs. Govt. Policies.*" *International journal of Technology Policy and Management* 23(3): 245-267
https://www.researchgate.net/publication/372844715_Development_of_MSMEs_in_India_challenges_vs_Govt_policies
- OECD Economic Outlook, volume 2021, Issue1
https://www.oecd.org/en/publications/oecd-economic-outlook/volume-2021/issue-1_edfbca02-en.html
- Vandita, Jaiswal Arun Kumar and Srivastava Dr. R. B. L (2023). " *Role of Digitalization in the Growth of MSMEs in India: Opportunities and Challenges.*" *International journal for multidisciplinary research*, E-ISSN: 2582-2160, Impact Factor: 9.24, volume 8, issue 4
<https://www.ijfmr.com/research-paper.php?id=7500>

