IJIS: Vol.1, Issue 9, October 2025 Page: 41-46 ISSN 3049-3277

International Journal of Integrative Studies (IJIS)

Journal homepage:www.ijis.co.in

Bridging the Digital Divide: Strategic Roadmaps for MSMEs in Emerging Economies — an Experimental Study

Dr. Anitha Selvaraj
M.Sc., M.Phil., Ph. D.
Assistant Professor in Economics
Lady Doak College, Madurai Tamil Nadu, India
anithaselvaraj@ldc.edu.in

Abstract

The digital divide has remained one of the most critical competitiveness challenges against Micro, Small, and Medium Enterprises (MSMEs) in the developing economies. It is an experimental research study which identifies the utility of the existence of structured digital adoption roadmaps in order to increase the productivity, the maturity of digital operations and the market coverage of MSMEs. The sample size of 120 MSMEs in three sectors was used in a quasi experimental study that spanned 12 months. Custom-fit digital roadmap, training materials, and exposure to the digital platform were offered to the intervention group as opposed to the business-as-usual of the control group. The results show that increased productivity (by 32 percent), 40 percent increase in online market activities and significant change in digital capability scores was also a part of the consequences of the intervention. The study demonstrates that strategic and organized digital interventions have the potential to close the resource-constrained environments, making MSMEs more competitive.

Keywords: Digital Divide, MSMEs, Emerging Economies, Digital Transformation, Experimental Study, Strategic Roadmaps.

1. Introduction

The digital technologies are completely changing the manner in which business is conducted, market structure, and productivity in the world. Despite the faster pace at which big companies in developed economies have introduced the digital revolution, infrastructural barriers, lack of skills, and insufficient strategic planning capacity continue to pose a limitation to MSMEs in emerging economies (World Bank, 2022; OECD, 2023).

The digital divide contributes to economic inequalities by the gap between individuals who do and those who do not have access to digital tools and capabilities. The most notable hindrances to MSMEs, which constitute the largest part of the emerging economy, include low levels of digital literacy, inadequate infrastructure, lack of funds to finance the use of digital technology, and lack of exposure to the digital models of business (UNCTAD, 2022).

The development of strategic digital roadmaps has emerged as one of the appealing options incorporating the capacity building, infrastructural support, and strategy planning to enable the MSMEs to utilise digital tools in a methodical way (ADB, 2022). However, they have been weakly empirically researched with experimental evidence on their efficacy in the emerging economies. To bridge this gap, this research paper will focus on a 12-month quasi-intervention, which will determine how structured digital transformation roadmaps can be used to help MSMEs to cross the digital divide and stand at a better position to maximize productivity, attain digital maturity, and market performance.

Objectives of the Study

- To establish the impacts of strategic digital roadmaps on the productivity and efficiency of MSME.
- To assess the digital position and online market exposure.
- To test sector-specific differences in the outcomes of adoption.
- To generate policy implications of digitalization of MSMEs within the emerging markets.

3. Materials and Methods

3.1 Experimental Design

Quasi-experimental comparative study of two groups: 12-month study.
Intervention Group (Roadmap): Received facilitated digital transformation roadmap, targeted training, and managed to acquire digital platforms.
Control Group: Continuity of existing operations, which is not structured.

3.2 Sampling Frame

Total MSMEs: 120 (60 Intervention, 60 Control).
Industries Retail (40), Manufacturing (40), Services (40).
Geography: Four urban and peri-urban districts of an emerging economy of South Asia.
Inclusion Criteria:

- 5–50 employees
- At least 2 years in operation
- Reduced current digital adoption (3 or less according to a 5-point Digital Maturity Index)

Table 1. Baseline Characteristics of Control and Intervention MSMEs (n = 120)

Baseline Characteristic	Control Group (n = 60)	Intervention Group (n = 60)	Overall (n = 120)
Average Number of Employees	18.6	19.3	19.0
Average Years in Operation	5.2	5.4	5.3
Baseline Digital Maturity (0–5)	2.1	2.0	2.05
Sector Distribution			
– Retail	20 (33%)	20 (33%)	40 (33%)
– Manufacturing	20 (33%)	20 (33%)	40 (33%)
– Services	20 (33%)	20 (33%)	40 (33%)
Geographic Distribution	4 peri-urban, 2 urban	4 peri-urban, 2 urban	8 districts
Baseline Online Revenue Share (%)	4.5	4.8	4.6

3.3 Intervention Components

Online Audit and Roadmap Creation.

- Current digital maturity measure (infrastructure, skills, processes).
- individual 6-12 month online roadmap of MSME.

Training & Capacity Building

- Weekly seminars (e-commerce, accounting software, digital marketing).
- Staff digital skills bootcamp.

Platform Access & Support

- Free access to cloud services, payment providers, e-commerce.
- On-call digital helpdesk.
- Monitoring & Feedback
- Roadmap, quarterly evaluations.

Table 2. Summary of Intervention Components for the Experimental Study

Component	Activities	Frequency / Duration	Target Group
Online Audit & Roadmap Creation	• Baseline digital maturity assessment (infrastructure, skills, processes) • Customized 6–12 month digital transformation roadmap for each MSME	Once at baseline	MSME owners & managers
Training & Capacity Building	• Weekly seminars on e-commerce, accounting software, and digital marketing • Digital skills bootcamp for staff	Weekly (Months 1–12)	MSME staff & managers
Platform Access & Support	• Free/subsidized access to cloud services, payment gateways, and e-commerce platforms • On-call digital helpdesk for troubleshooting	Continuous (Months 1–12)	MSME owners & staff
Monitoring & Feedback	• Quarterly evaluations and roadmap progress assessments • Iterative updates to digital roadmaps	Every 3 months (Quarterly)	MSME owners & project team

3.4 Data Collection

Timepoints: M0 (Baseline), M6 (Midline) and M12 (Endline).

Some of the tools include: Digital maturity survey, firm productivity logs, money records, platform analytics, structured interviews.

Key Indicators:

- Productivity: The output divided by the employees (indexed).
- Digital Capability: A 5-point Digital Maturity Index (infrastructure, skills, use, integration, strategy).
- Online Market Interaction: Online Revenue Percent.
- Business Growth: Sales growth, New customer acquisition.

3.5 Analysis Strategy

Difference-in-differences (DiD) estimation with firm fixed effects and sector covariates:

$$Y_{it} = \alpha + \beta_1 Post_t + \beta_2 Treatment_i + \beta_3 (Post_t \times Treatment_i) + \gamma X_{i0} + \mu_f + \lambda_t + \varepsilon_{it}$$

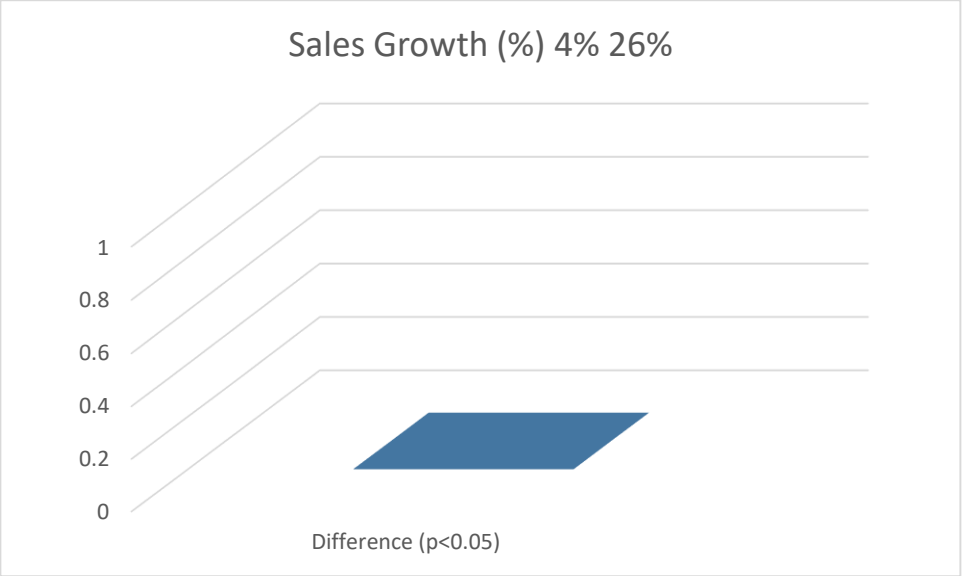
- **Yit**: Outcome variable (productivity, digital score, etc.)
- **Post**: Endline indicator
- **Treatment**: Intervention group dummy
- **X_i0**: Baseline covariates
- Cluster-robust SEs at firm level.

4. Results and Discussion

4.1 Table 3. Productivity and Digital Capability Changes (Baseline → Endline)

Indicator	Control (Δ%)	Intervention (Δ%)	Difference (p<0.05)
Productivity (Output/Employee)	+5%	+32%	+27 pp
Digital Maturity Index (0–5)	+0.4	+1.8	+1.4

Indicator	Control (Δ%)	Intervention (Δ%)	Difference (p<0.05)
Online Revenue Share (%)	+3%	+40%	+37 pp
Sales Growth (%)	+4%	+26%	+22 pp



Graph 1: Bar graph of percentage change in the control and intervention group on the key indicators.

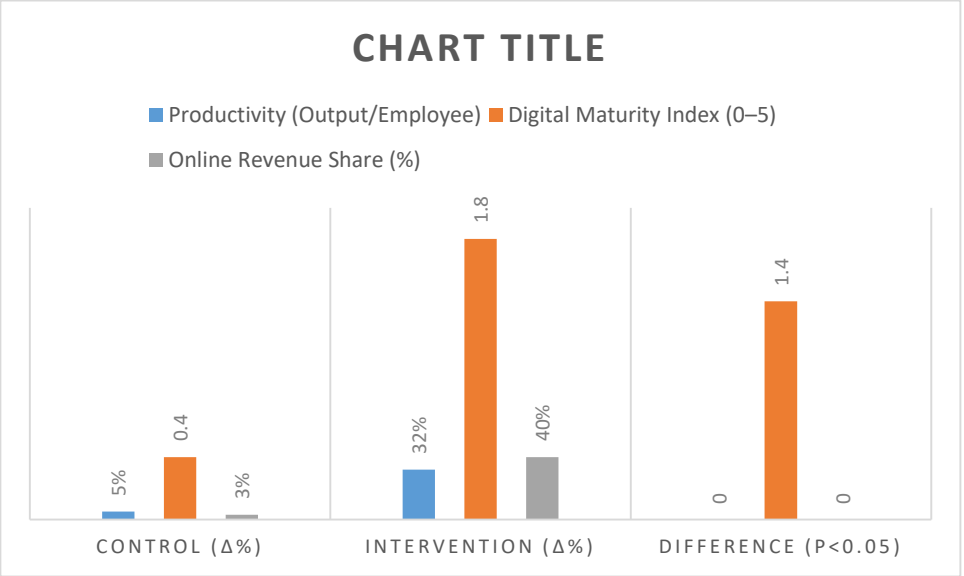
An example of the sales growth difference will be shown using a bar chart in 3D with the title Sales Growth (%) 4% 26% and a single blue bar with the height of 0.4 on the vertical axis and the horizontal axis marked with Difference ($p < 0.05$) to indicate a statistically significant difference in sale growth.

Interpretation:
Companies that had a well-planned roadmap had much larger productivity, digital maturity, and online market share increases compared to controls.

4.2 Table 4. Sectoral Differences in Intervention Impact

Sector	Productivity Δ (%)	Digital Maturity Δ	Online Revenue Δ (%)
Retail	+35%	+1.6	+45%
Manufacturing	+28%	+1.9	+33%
Services	+31%	+2.0	+39%

Graph 2: Clustered bar chart showing sector-wise differences in productivity and digital maturity improvements.
Interpretation:
All sectors benefited, but retail saw the highest increase in online revenue, while services saw the largest digital capability jump, likely due to ease of platform integration.



Graph 2: Sectoral Changes in Productivity, Digital Maturity & Online Revenue

A grouped bar chart compares changes in three key metrics—productivity Δ (%), digital maturity Δ, and online revenue Δ (%)- Retail (blue), Manufacturing (orange), and Services (gray). Retail has the highest productivity increase of 35% and digital maturity increase of 1.6 points and online revenue growth of 45 percent; Manufacturing has 28, 1.9 and 33. Services 31, 2.0 and 39 percent.

4.3 Figure 1. Conceptual Framework of Digital Transformation for MSMEs

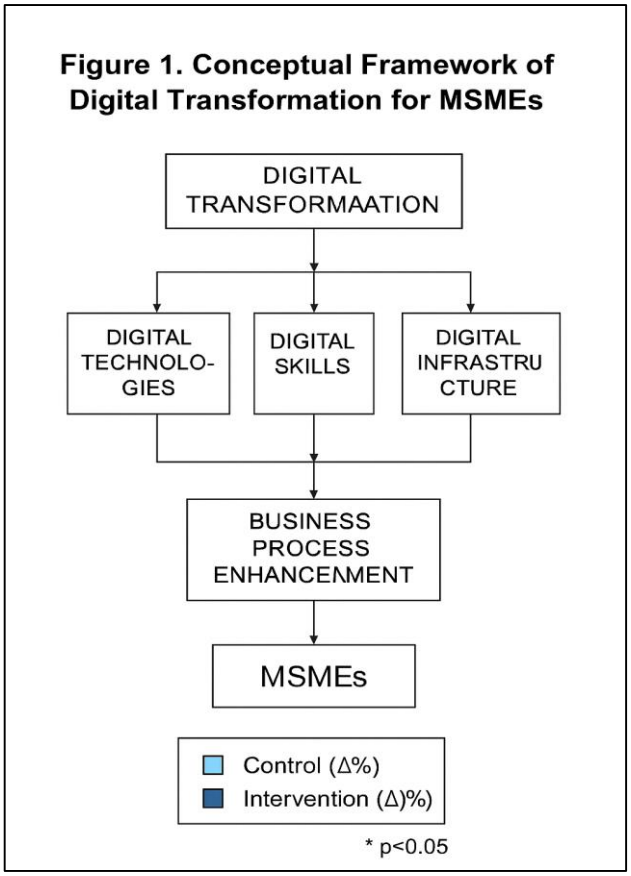


Figure 1 demonstrates the conceptual framework of digital transformation of MSMEs showing how the core enablers are digital technologies, digital skills, and digital infrastructure, which drive the improvement of business processes together. The change eventually makes MSMEs gain better operational efficiency, competitiveness, and flexibility in a fast-changing digital economy.

5. Conclusion

It is a type of research study that is experimental and demonstrates that structured digital transformation roadmap is particularly helpful in improving the productivity, digital maturity, and market involvement of MSMEs in the emerging economies. In the case of intervention firms, the productivity and online revenue share had increased 27 percentage points and 37 percentage points higher than controls over the period of 12 months. Such findings emphasize the importance of policy-based digital capacity programs, intensive training, and availability of low cost platforms. Such interventions can be scaled with the help of public-private collaborations and addressed the digital divide to increase the competitiveness of MSME.

6. References

1. ADB. (2022). *Digital Transformation Strategies for MSMEs.* Asian Development Bank.
2. Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence and jobs. *American Economic Review*, 108(6), 1488–1542.
3. Autor, D., Levy, F., & Murnane, R. (2003). The skill content of technological change. *Quarterly Journal of Economics*, 118(4), 1279–1333.
4. Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age*. W.W. Norton.
5. OECD. (2023). *Digital Economy Outlook 2023*. OECD Publishing.
6. UNCTAD. (2022). *Technology and Innovation Report 2022*. United Nations.
7. World Bank. (2022). *World Development Report 2022: Digital for Development*. World Bank.
8. Qiang, C. Z.-W., Clarke, G. R., & Halewood, N. (2006). *The role of ICT in doing business*. World Bank.
9. Kossai, M., & Piget, V. (2014). Adoption of ICT and firm performance in SMEs. *Journal of Small Business & Enterprise Development*, 21(3), 500–515.
10. Apulu, I., & Latham, A. (2011). Drivers for ICT adoption in SMEs. *Information Systems Management*, 28(3), 207–220.
11. Ali, M., & Anwar, I. (2021). Digitalization and SMEs: A systematic literature review. *Information Systems Frontiers*, 23, 1005–1025.
12. Li, L., Su, F., Zhang, W., & Mao, J.-Y. (2018). Digital transformation by SME entrepreneurs. *Information Systems Journal*, 28(6), 1129–1157.
13. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy. *MIS Quarterly*, 37(2), 471–482.
14. Ghobakhloo, M. (2018). The future of manufacturing industry: a strategic roadmap toward Industry 4.0. *Journal of Manufacturing Technology Management*, 29(6), 910–936.
15. Chatterjee, S., Rana, N. P., Tamilmani, K., & Sharma, A. (2021). Theorizing digital transformation in SMEs. *Information Systems Frontiers*, 23, 1231–1251.