

The Digital Paradox: Why ICT Adoption Isn't Paying Off for India's Unorganized Sector

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Introduction

Within India, the unorganized sector comprises small and informal firms that account for a huge proportion of employment and production. Over 865,000 firms make up India's unorganized sector, which is undergoing a slow and uneven digital transformation. Only 72,753 firms (8.4%) had computers, according to an analysis undertaken using the data from the Annual Survey of Unorganized Sector Enterprises (ASUSE, 2021–24). Computer adoption was concentrated in urban areas (53%) and male-owned firms (92%). There is a clear digital divide between urban and rural areas, as evidenced by the fact that only 7.2% of rural firms reported using ICT.

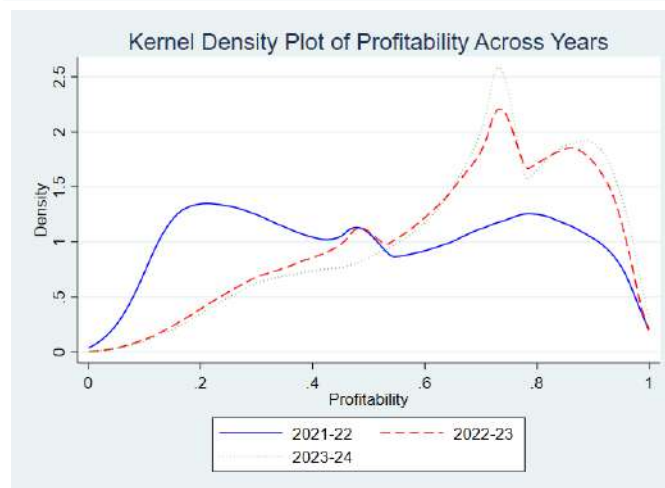
In our analysis, we have studied a firm's performance through its profitability. The empirical analysis drew unit-level data from three consecutive rounds (2021–22, 2022–23, 2023–24) of the Annual Survey of Unorganized Sector Enterprises (ASUSE), which is published by the NSO, Ministry of Statistics and Programmed Implementation (MoSPI). We undertake non-parametric methodologies to address the impact of computer adoption across different sectors and states. Our results reveal that firms that have adopted computers are generally urban-based, male-owned, and capital-intensive, with higher literacy levels among their workforces.

It's interesting to note that even though ICT-adopting firms have much higher capital intensity (fixed assets: 27.7 vs. 24.1) and higher literacy levels (2.82 vs. 2.24 on average), the profitability advantage is still very small—0.60 for ICT firms vs. 0.62 for non-ICT firms. This paradox highlights an important question for policymakers: What structural barriers keep the unorganized sector from fully benefiting from digital dividends, and why do digitally equipped firms not convert ICT adoption into higher returns?

How has Firms' Profitability changed?

A clear shift in profitability trends in India's unorganized sector can be witnessed. In below figure, the profitability distribution peak shifted to the right, particularly between 2021–2022 and 2023–2024. This suggests that a larger number of unorganized sector firms have seen increased profitability overall over time. The impact of post-pandemic disruptions is reflected in the 2021–2022 distribution, which is flatter and shows greater spread in the lower profitability values. On the other hand, the 2023–2024 right tail's sharper peak and higher density indicate a potential recovery and greater profitability concentration.

Figure 1. Kernel Density Plots of Profitability for the years 2021–22, 2022–23, and 2023–24.



Source: Author's calculations using ASUSE 21-22, ASUSE 22-23, and ASUSE 23-24

However, the persistence of multimodal curves suggests that firm performance is heterogeneous, which could be caused by variations in market access, ICT adoption,

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sectoral characteristics, or other structural factors. This emphasizes how crucial it is to place ICT's impact on profitability within the context of larger temporal changes.

Uneven Sectoral Returns

Our findings show significant differences in the sector-specific ICT adoption. Food & Beverages (FnB) lags far behind, with an average of less than 0.5 computers per firm, while the ICT, Health, Travel, and Education sectors exhibit high levels of computer usage (averaging nearly 2 computers per firm). ICT adoption in manufacturing and trading is moderate but stagnant. Significant sectoral disparities are revealed by the causal estimates (ATET). We aim to find what is the effect on profitability of firms adopting ICT if they had not adopted. ICT sector (+0.05 ATET) indicated increased profitability gains due to digital integration and outsourcing. Manufacturing (-0.06), Trading (-0.06), FnB (-0.03), Education (-0.02), and Health (-0.01) are among the adversely affected with decline in margins. These findings are a result of weak absorptive capacity, competitive pressures, and regulatory costs. For instance, rather than increasing productivity, ICT adoption in trading is frequently motivated by GST compliance, which lowers profitability in the short term.

Table 1. Sector-wise Average Treatment Effect on Treated (ATET) results

Sector	ATET (nn match except for ICT)	Observations
Educational	-0.02*** (0.01)	26,256
FnB	-0.03*** (0.01)	74,696
Health	-0.01** (0.01)	13,686
ICT	0.05*** (0.01)	4,598
Manufacturing	-0.06*** (0.06)	214,365
Trading	-0.06* (0.03)	152,192
Travel	-0.03 (0.02)	19,753

Source: Author's calculations using ASUSE 21-22, ASUSE 22-23, and ASUSE 23-24. Note: Standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01.

Similarly, despite increased use of technology, fierce competition and the expense of digital platforms reduce

profit margins in the education and food and beverage industries. The negative returns on manufacturing indicate structural barriers, such as inadequate infrastructure, a shortage of skilled labor, and a lack of digital readiness. The ICT industry, on the other hand, serves as an example of how digitalization can boost profitability when backed by qualified human resources and auxiliary infrastructure.

Regional Inequalities in Digital Payoffs

The way firms experience ICT adoption in different states reflects India's far from homogeneous digitalization trajectory. A distinct pattern shows up when we divide states into three tiers with reference to the State of India's Digital Economy Report (2024). We saw a clear pattern that ICT-related profits are not distributed fairly and occasionally even go against the general trend.

Table 2. Tier-wise ATET result

Tier	ATET	Observations
Tier 1	-0.01*** (0.00)	213,397
Tier 2	-0.01** (0.00)	244,359
Tier 3	-0.02** (0.01)	200,500

Source: Author's calculations using ASUSE 21-22, ASUSE 22-23, and ASUSE 23-24. Note: Standard errors in parentheses; *p<0.10, **p<0.05, ***p<0.01.

Table 2 shows varying results. ICT penetration is almost universal, and digital infrastructure is already robust in Tier 1 states, which include Tamil Nadu, Maharashtra, and Karnataka. The ATET score in this case is marginally negative (-0.01), indicating that ICT loses its competitive advantage as adoption becomes saturated. Digital tools are now standard, and their ability to increase profitability begins to diminish in the absence of innovation or organizational change.

The narrative shifts to Tier 2 states like Rajasthan and West Bengal. Although these states have made improvements in terms of connectivity, they continue to lag behind in terms of advanced innovation, affordability, and trust. This "halfway house" is reflected in the results, which show that although firms are starting to integrate ICT (ATET of -0.01), they are unable to fully translate adoption into profitability due to structural bottlenecks, including fragmented ecosystems, skill shortages, and patchy infrastructure. In Tier 3 states with the least amount of digital capacity, such as Bihar, Madhya Pradesh, and Odisha, the difficulties are

most severe. Due to a combination of low female digital participation, rural isolation, and inadequate broadband access, firms in this region record the steepest negative returns (-0.02). ICT adoption runs the risk of becoming more of a financial burden than a growth engine for many of these businesses.

When combined, these results demonstrate that the impact of ICT varies by tier: in states with less levels of digitalization, the benefits are stifled by structural barriers before they can be realized, while in states with highly developed digital infrastructure, marginal returns are decreasing as a result of saturation.

Policy Perspectives: Towards Inclusive Digital Futures

Policies must strive to transform access into impact going forward. A tier-sensitive approach to digitalization is essential. In Tier 3 states, where digital readiness is weakest, the priority must be infrastructure-first strategies, including reliable broadband, electricity, and affordable devices. In Tier 2 states, where adoption has begun but ecosystems remain fragmented, the focus should be on building supportive conditions—digital finance, skilling, supply-chain integration, and trust-building institutions. For Tier 1 states, where adoption is already near universal, the task is to push firms beyond basic access towards innovation-led use of ICT, such as deploying AI, data-driven logistics, and process reorganisation to sustain competitiveness.

Equally important is moving beyond symbolic adoption. Too often, firms adopt ICT for compliance purposes, such as GST filing, which adds costs without enhancing profitability. To generate real benefits, ICT must be applied in productivity-enhancing areas like marketing, logistics, and procurement. Developing sector-specific digitalisation pathways can accelerate this process—digital logistics solutions in food processing, e-commerce integration for trading firms, or health-tech platforms for small clinics are examples of how ICT can be tailored to sectoral realities. Demonstration projects that improve profitability gains from integrated ICT adoption would help build trust and accelerate uptake.

Finally, strengthening inclusion is central to ensuring digitalisation contributes to broad-based growth. Although national programs like PLI and Digital India have gained traction, their advantages tend to be concentrated among larger and more prepared businesses. Digital skilling must be expanded through livelihood-linked and gender-sensitive training programmes, while affordable finance and technology access should be prioritised for women-led and rural firms. Investment in last-mile connectivity and digital public infrastructure will be critical

to narrowing the rural-urban divide and ensuring that smaller, less-resourced enterprises are not left behind.

The analysis underscores a central paradox: ICT adoption is expanding, but its dividends remain uneven. Many firms adopt digital tools without realising productivity gains, resulting in disillusionment or even financial strain. The lesson is that technology access by itself is not enough and what matters is the enabling ecosystem skills, infrastructure, sectoral demand, and organisational adaptation that allows firms to leverage ICT effectively. Policy must therefore recognise regional and sectoral heterogeneity, address structural barriers to profitability, and place inclusion and resilience at the core of digitalisation strategies. The stakes for India's growth trajectory are high. If designed and implemented well, ICT adoption can strengthen competitiveness, enhance small firm profitability, and expand livelihoods. If neglected, however, it risks exacerbating divides between urban and rural areas, male and female owned enterprises, and large and small firms. Thus, challenge and opportunity for policymakers, development partners, and industry leaders alike is to ensure that ICT adoption becomes a genuine driver of inclusive and sustainable growth, rather than a symbolic marker of modernisation.

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