Beyond Platform Integration

Unpacking the True Promise of Digital Inclusion for MSMEs in India

Acknowledgments

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1. Introduction

1.1 Background and context for the study

Micro, small, and medium enterprises (MSMEs) represent an important segment of the Indian economy. Made up of over 13 million firms, employing about 41 million workers, Indian SMEs contribute over 8% to the national Gross Domestic Product (GDP) and 45% to industrial production, and account for the second-largest share of employment after agriculture. The Indian SME community is also a meaningful contributor to the country's export success, accounting for 40% of total exports, including in important sectors such as textiles and garments, leather products, sporting goods, gems and jewelry, and handicrafts (Basha, 2013). Data from the Ministry of Micro, Small & Medium Enterprises (2024), accessed from the Udyam Registration portal, puts the total number of registered MSMEs in the country at 4,70,80,424. Registered micro-enterprises stood at 4,63,02,334, followed by small enterprises at 7,10,497 and midsized enterprises at 67,593.

The revival of this sector is a key priority of economic policy in India, and in this context, the adoption of digital technologies by MSMEs has received considerable attention. While the percentage of MSMEs adopting digital solutions has increased from 10% before Covid-19 to 50% in 2020, such adoption has been highly uneven and fragmented, with MSMEs continuing to perceive digital technologies as a 'cost' to their business (MSME Desk, 2022). The question of MSMEs and their ability to reap the benefits of a fast-growing digital landscape continues to have immense policy significance for India.

1.2 MSMEs in the agri-digitalization landscape: The state of play

In our study, we focused on MSMEs in agriculture and allied sectors such as agro-processing, fisheries, animal husbandry, and food. Digital technologies have emerged as a significant configuration in the development of these industries, particularly in developing countries (Kumar & Basu, 2022). There are two primary ways in which digitalization has been seen as a pathway to boost MSME development in the agriculture sector. The first is linked to encouraging and supporting MSMEs in the adoption and use of digital technologies such as e-commerce platforms, digital payment systems, online storefronts, online digital marketing tools, etc. These enterprises are not 'born digital,' rather they are enterprises that 'use' digital technologies to support some or many parts of their business. For example, businesses making and/or selling agro and agro-food-based products ranging from curry powders, grains, and pickles, to organic soaps, candles, and artisanal products, or enterprises manufacturing pesticides, farm equipment, tractors, etc., may be using technologies to connect with suppliers, automate their logistics

systems, increase access and scale, or offer convenient payment options to their clients. The set of digital interventions and policy responses applicable to this category of MSMEs are largely related to e-commerce; public procurement and marketplace access; connectivity and logistics support; digital literacy and skilling programs; etc. For example, in 2016, the Indian government established the Government e-Marketplace (GeM), an online procurement platform designed to make the market more accessible to smaller sellers. It requires every central ministry, department, and Public Sector Undertaking (PSU) to set an annual target of procuring 25% of their supplies from the MSME sector (Ministry of Micro, Small and Medium Enterprises, 2018). Within this annual target, the government has set up a quota of 3% procurement from women-owned businesses (SEWA Cooperative Federation & Centre for Internet Society, 2022). Another important shift affected by the Digital India agenda has been the launch of the Unified Payments Interface (UPI), an instant real-time payment system developed by the National Payments Corporation of India facilitating inter-bank transactions, which has greatly improved the ability and efficiency of smaller sellers in receiving customer payments online (NeoGrowth, 2020). Furthermore, in 2022, the launch of the Open Network for Development Commerce (ONDC) was seen as an important route to democratize commerce, particularly for smaller sellers for whom large digital platforms are seen as unaffordable (Jain, 2022).

The second way in which digitalization is expected to provide a boost to MSMEs in the agriculture sector is through a focus on 'innovation,' i.e., interventions and policy responses that enable MSMEs to provide digital solutions to address specific issues on the agriculture value chain. These include both upstream innovations such as smart farming apps, farming as service platforms, drone-based farm censors, etc., primarily catering to farmers and small producers in the agriculture value chain; as well as food-tech innovations such as e-grocery solutions, Internet of Things (IoT)- based smart vending machines for snacks and beverages, etc., primarily catering to end users/consumers. MSMEs that provide such technological innovations are generally 'born digital'/'digital-first' enterprises, usually falling under the category of AgTech or food tech, and digital technologies form the core of their business value proposition.

Additionally, the Indian Government has launched a series of competitions with the aim of harnessing innovation from MSMEs and startups. For example, the Atal Innovation Mission (AIM) of the NITI Aayog (2019) awards grants up to INR 10 million (USD 150,000) for applicants showing capability, intent, and potential to productize technologies, in addition to providing mentoring support, go-to-market strategy support, technical support, and any other kind of support as needed at various stages of commercialization. Agriculture is the second highest-ranking sector when it comes to investment in startup incubation and support, both government- and private-led (Sharma & Vohra, 2020). Agri-digitalization is also becoming a central instrument for agriculture policy and a critical focus area of the Ministry of Agriculture and Farmers' Welfare (MoAFW). NITI Aayog's National Strategy on AI (2019) recognizes the potential for smartification of every aspect of the agricultural value chain: from personalized agri-extension inputs to targeted farm credit, price discovery, real-time yield forecasting, and market linkage (Kumar & Basu, 2022). In line with this vision, the Union government launched an agri-data exchange called the India Digital Ecosystem of Agriculture (IDEA), which aims to create an agricultural data marketplace

for the integrated development of public and private farm services that are simultaneously personalized, privacy-preserving, and competitive. State governments are also making their independent forays into the data space to support the emergence of new agricultural economies (Agriculture & Cooperation Department, 2022).

The trends highlighted above foreground our study, as we attempt to unpack the experience of digitalization of MSMEs in the agriculture space in India. What do the on-ground realities of MSMEs tell us about how these shifts and transformations are being experienced? What scope exists for autonomy and agency over digital integration choices, and what avenues do these choices bring? What kind of dependencies exist for MSMEs with respect to market access and digital integration pathways? With these questions in mind, we designed the objectives and the methods of the study, which we elaborate on in the next section.

1.3 Overview of the study

1.3.1 Objectives

The primary objectives of our study were as follows:

a. Understand the extent to which the current modes and pathways for digital integration can support the equitable development of MSMEs in the Global South.

b. Study the gendered impact of these developments, with a specific focus on how women-led enterprises may be responding to the emerging landscape.

For the purpose of our study, we defined digital integration more broadly as digital-led engagement of MSMEs with other businesses in local/global networks or consumers for economic growth. This included a range of digital tools and infrastructures—from social media, messaging services, and e-commerce platforms, to frontier technologies driven by machine learning and artificial intelligence (AI). Likewise, we also took a comprehensive view of equitable development, understanding it as spanning various facets, including autonomy and agency with respect to digital integration choices; dependence on large private players/platforms for scale and market access; capacity for competing with large players (on factors such as scale, skill, infrastructure, data mining capabilities, etc.); and pathways to access to various forms of support (including capital, incubation, training, and mentoring).

1.3. 2 Methodology

Our research was designed using an interpretive framework (Yanow & Schwartz-Shea, 2014). For a more detailed description of this framework and its key highlights as well as limitations, please refer to the note in Appendix A.

Data Collection: We primarily deployed two methods of data collection: i. a review of secondary sources such as reports, media pieces, and academic papers, and ii. in-depth semi-structured interviews with the head(s) of MSMEs. In order to support our literature review and landscape mapping, we also interviewed three stakeholders who were working directly with MSMEs to provide institutional support through capacity building, digitalization support, and financing-related initiatives. The literature review, together with these interviews, informed the design of the interview guides. We developed two semi-structured interview guides: one for MSMEs classified as 'digital users' and another for MSMEs classified as 'digital suppliers.'

Sampling: A total of 30 MSMEs in the agriculture and food sectors were included in the study. MSMEs were identified through internet and social media searches, and in a few cases through known contacts, and were subsequently contacted either through a phone call or an email. We used purposive sampling to identify the category that the MSMEs belonged to (i.e., 'users' or 'suppliers'). To the extent that MSMEs had to meet one of these criteria to be included in our study, the results of our study are not representative of MSMEs that remain excluded from the digital economy due to little capacity to access, use, or engage with digital tools. We also purposively sampled MSMEs on their ownership structure in order to ensure that our sample included at least 30% of firms that were women-led (criteria attached in Appendix C). Therefore, the ownership composition in our study is not representative of the actual gender composition in MSME ownership in India. Additionally, while most of the MSMEs in our study had an MSME registration as per the Udayam portal, this was not a prerequisite for inclusion in our study, as long as they met the MSME criteria (attached in Appendix C). Interviews were mostly conducted remotely on video calls, with a few of them being done in person. In all cases barring two, the interviews were with the founders/co-founders of the company. The interviews lasted between 45-60 minutes and were mostly conducted in English or Hindi (only one interview was conducted in Malayalam).

Data Analysis: Data was analyzed using thematic analysis methods. All interviews were transcribed, and where applicable, were translated into English. Once translated, the responses were sorted question-wise and distributed between a team of three researchers who did the first level of coding based on emergent themes for the set of questions assigned to them. The first-level coding was then validated through a process of inter-coder checking and confirmation in order to arrive at the second set of themes. This process helped us establish a consensus on the meanings ascribed by the participant in their responses and the salience of the responses (both explicit and tacit) to our research.

1.3.3 Demographic profile

Gender-based ownership: Of the 30 MSMEs sampled for this study, seven were male-led or owned and 23 were women-led or owned (as gender was a specific focus of this study, the sample disproportionately represents women-led MSMEs). Within this, the breakup of the MSMEs studied was as follows (see Figure 1).

Fgure 1. Gender-based ownership of MSMEs
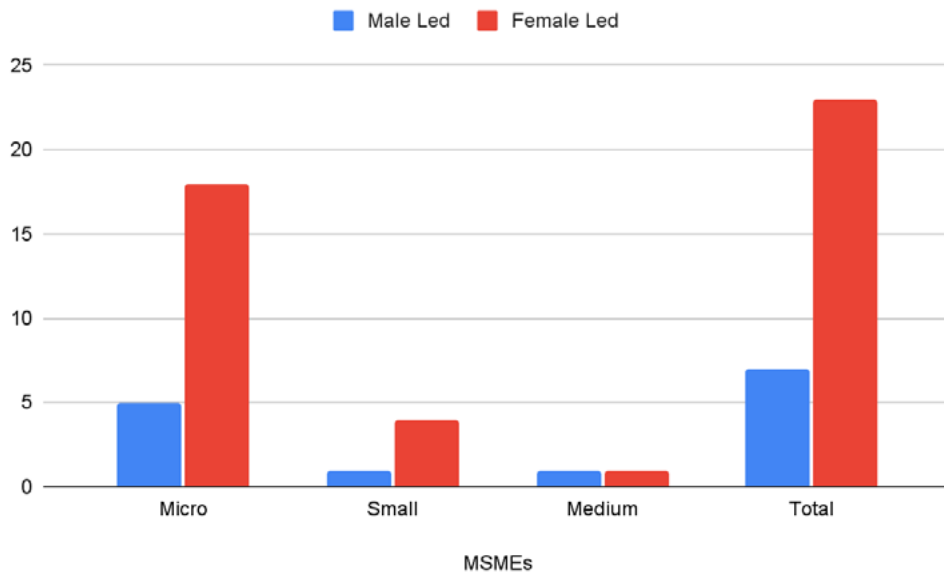
Team size: About 73% of the firms studied had less than 20 permanent staff on the team with only one firm with a staff size above 40 people (see Figure 2).

Figure 2. Team size of MSMEs
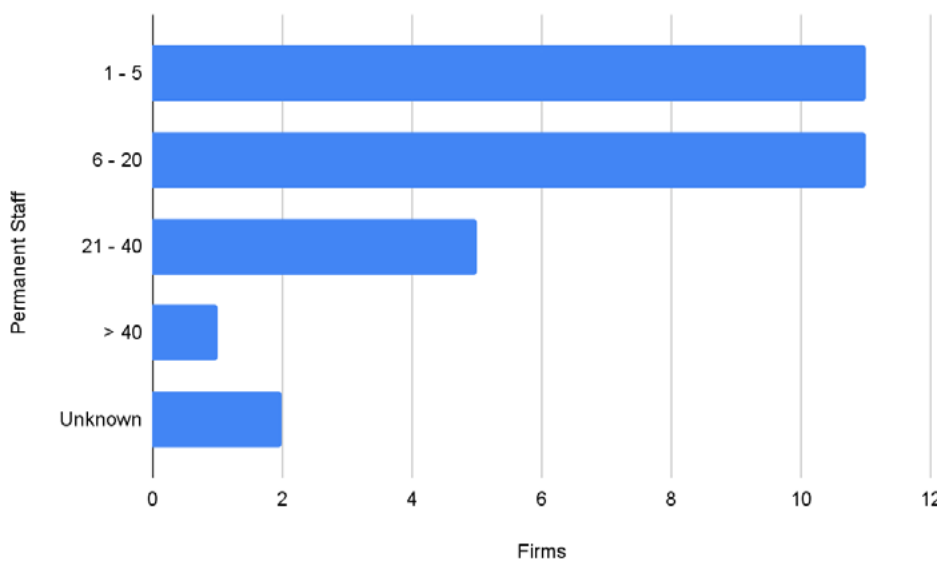
Location on the value chain: All of the digital users were primarily providing downstream linkages, while digital suppliers tended to cover multiple parts of the value chain (see Figure 3).

Figure 3. Location on value chain
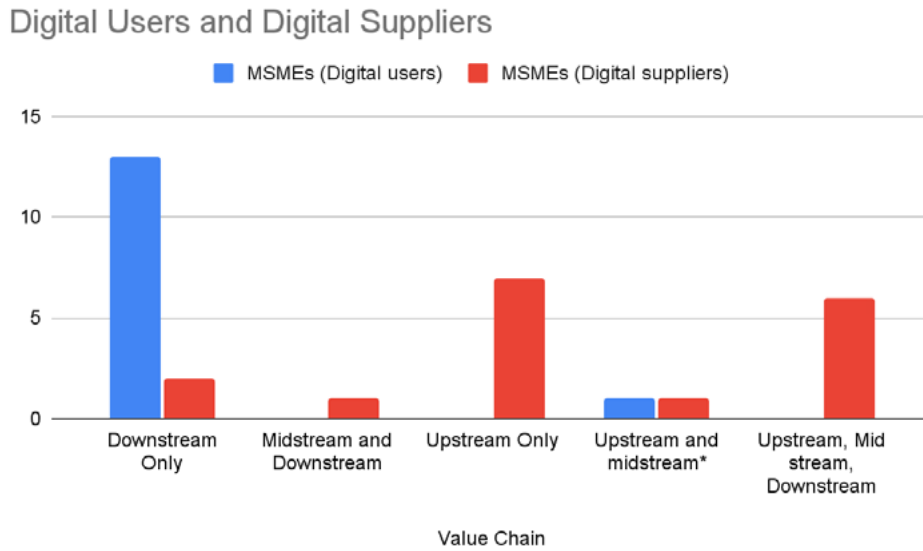
In the above figure, one company qualified as both user and supplier.

Starting year of operations: Close to half of the MSMEs that were studied began operations between 2018 and 2019.

Figure 4. Business start year of MSMEs
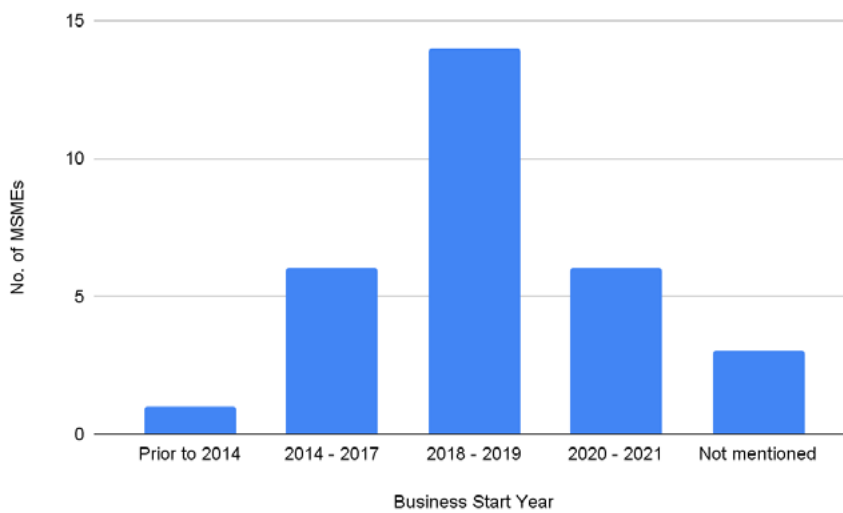
2. Emerging Digital Integration Models and Value Creation Pathways

Across MSMEs as digital users and suppliers, we found three primary digital integration pathways:

2.1 MSMEs as platform users (14)

Fourteen MSMEs in our study reported using platform-based pathways (social media, e-commerce, and messaging) as the primary mode of digital integration. Of these 14, 13 were digital users, and one was a user and supplier. The most commonly used social media platforms were Facebook, YouTube, and Instagram; and the most commonly used messaging platform was WhatsApp. In Business-to-Consumer (B2C) e-commerce, Amazon and Shopify were the most commonly used international platforms, and Flipkart, Big Basket, and Nature's Basket were commonly-used domestic platforms. In Business-to-Business (B2B) e-commerce, India Mart, another domestic platform, was reported as the most commonly used. The MSMEs in this category were mostly B2C companies and they were using platform-based integration primarily to support downstream market linkages (please refer to Appendix C for a description of these businesses). With the share of online retail sales increasing markedly in 2019 and 2020 due to the Covid-19 pandemic, digital e-commerce platforms have presented themselves as opportunities for MSMEs for customer acquisition, export opportunities, shipping and logistics support, integrated e-payment options, etc., and our study evidenced support for this trend (Asia Development Bank, et al., 2021). For women-led enterprises in our study in particular, this was found to be the most common digital integration pathway, again reinforcing links between e-commerce affordances and gendered norms of workforce participation (UNCTAD, 2022b). Apart from these platforms, many of these companies also had their own websites which they relied on for customer traction.

The primary mode of value creation in this pathway was discoverability, with 100% of the enterprises reporting that they relied on platforms to be found by consumers. The presence and use of digital platforms was viewed as both necessary and inevitable for the survival of the business (See Figure 5). One respondent, for whom 80% of the revenue came from digital channels, explained it this way, "You cannot afford to not be on Amazon, even if it may end up killing you." Most of our respondents were using multi-homing strategies (i.e., listing on multiple platforms at the same time) in order to maximize what they saw as differential value propositions that each platform offered. One respondent explained how they do this: "If we want people to understand the benefits of a particular type of Sahyadri black rice, we use Instagram to tell its story. But for sales, we use our own website." Another respondent shared their strategy: "If you are not seen everywhere, people don't remember you. So, we are on Nature's Basket, Amazon, Big Basket, and Dunzo, but our focus will always be to get more traction from our own website."

Figure 5. Different types of platforms

2.2 MSMEs as platform intermediaries (9)

Nine MSMEs in our study were delivering platform-based services across two broad categories: i. agriculture-related information, communication, and advisory services, and ii. market mediation services, including input supply, demand aggregation, and market linkages. These were provided using a range of digital tools such as text messaging, social media messaging, video streaming, farming apps, community radios, online storefronts, and farm-to-table platforms. The services in this category are commonly understood as "disembodied innovations," i.e., digital technologies such as advisory apps, farm management software, and information exchange platforms, that are not embodied in specific crop or livestock farming equipment, and can be usually accessed and operated on smartphones, tablets, laptops, and computers (Briner et al., 2021). Many enterprises in this category were functioning as last-mile platforms, supplementing their digital overlay with a physical intermediary layer constituted by village entrepreneurs or extension agents who played an important role in making sure their services reached the final beneficiary, which made their models both 'asset-heavy,' and 'geographically tethered' (Friederici et al., 2020).

The primary mode of value creation in this pathway was the **ability to re-intermediate both information and advisory services and market linkages, particularly for the small and marginal producers** in the agriculture value chain.

One respondent explained it this way:

> What happens is that the produce goes from local mandis [local markets] to bigger markets such as Delhi, Bombay, Indore, etc., from where it then gets sold to global manufacturing companies, and there is a fair bit of margin between these local importers, exporters, and aggregators. Our platform tries to bypass one or two levels by connecting farmers directly with bigger markets.

Apart from market mediation, many of these enterprises were also mediating information and communication services through tools such as WhatsApp and YouTube. As one respondent mentioned, "We post relevant videos regarding crops and diseases on our YouTube channel, Facebook pages, and WhatsApp groups. We then work with our field extension agents who travel to the villages and add farmers to these channels."

As this response highlights, the investment in physical outreach structures, such as training and customer contact centers, local community resource persons, and village extension agents, was viewed as necessary by enterprises in this category, many of whom believed that mainstream innovations did not reach small producers because of their 'digital-first' approach. As a result, we observed a tendency for enterprises in this category to position themselves as alternatives to mainstream digital platforms, tending to describe their models as the 'Meesho of the agriculture space,' or 'Flipkart for farmers.'*

2.3 MSMEs using frontier technologies (10)

As many as 10 MSMEs in our study were using frontier technologies (UNCATD, 2021) such as AI, IoT, Big Data, 3D printing, robotics, and drones, of which seven of them were using them predominantly for upstream activities such as soil testing, targeted farm advice, disease protection, weather advisory, etc. In the context of agriculture, frontier technologies have heralded what is commonly referred to as Agriculture 4.0., primarily driven by the computational advantage and the transformative potential of managing vast amounts of data and converting it into actionable insights.

The primary mode of value creation in this pathway was the **ability to drive supply chain efficiencies through the data intelligence generated by these technologies.** Data was viewed as having significant potential for raising the income of small producers who were seen as being riddled with high operating costs and low profit margins. "We deliver high-resolution hyper-local weather and satellite data port by port to the fishing community to help them meet their rising costs of fishing operations," said one of our respondents whose enterprise was building a sustainable seafood supply chain.

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* Mesho and Flipkart are among the leading B2C digital platforms in India.

A similar objective was echoed by another respondent whose enterprise was manufacturing wearable plant phenomic devices for the pre-detection of pests, diseases, and deficiencies in plants. "Most small and marginal farmers are scammed by high-margin inputs. By giving targeted advice to the farmers based on what problems currently exist on the farm, we are able to reduce input use by a minimum of 25%," the respondent said. Data intelligence was also viewed as particularly disruptive because of its ability to circumvent more traditional time-consuming methods in areas such as soil testing and food grading. "Soil and food testing is both expensive and time-consuming. Our intervention can be highly disruptive because people can make quick decisions regarding the quality of the produce, which can then be plugged into pricing," said one respondent whose enterprise was building an AI-based device for soil and food grading proxies.

Table 1. Models of digital integration mapped to stages of the agriculture value chain

| Models of digital integration across the value chain	MSMEs as platform users (digital users)	MSMEs as platform intermediaries (digital suppliers)	MSMEs using frontier tech (digital suppliers)	Total
Downstream only	13	2		**15**
Midstream and downstream	1	1		**2**
Upstream only			7	**7**
Upstream and midstream			1	**1**
Upstream, midstream, and downstream		6	2	**8**
Total	**14**	**9**	**10**	**33**[*]

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* The total is higher than 30 because some enterprises were using two modes of integration.

3. Modes of Accessing Support for Digital Integration

In this section, we examine the means of access as well as the forms of support availed by MSMEs in order to upgrade/scale their enterprises.

Types of support: About 19 of the 30 MSMEs in our study had availed support for scaling their business. This included either/both financial support in the form of grants, loans, and subsidies from the government, public sector banks, private sector companies, and multilateral organizations; as well as non-financial support through incubator, accelerator, and intermediary support programs for infrastructure support, training, mentoring, and networking. The most commonly accessed form of financial support was grants, with fewer MSMEs being able to access loans and subsidies (See Figure 6).

Figure 6. Types of financial support received by MSMEs*
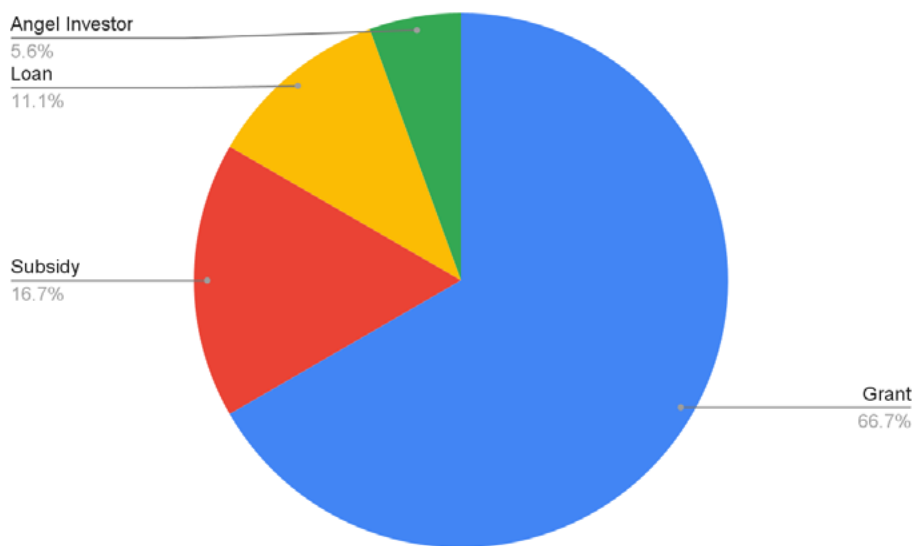
Access to finance: Specifically in terms of financial support, our study found that MSMEs using frontier technologies were more likely to be able to access some form of financial support and MSMEs using platform-based integration were least likely to have such access (see Table 2).

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* Some firms have availed of more than one form of financial support, so this is not a unique number.

Table 2. Financial support utilization and firm types in the MSME sector

Type	Number of firms that accessed financial support	Total number of firms	Percentage
MSMEs as platform users	3	13	23%
MSMEs as platform intermediaries	3	9	33%
MSMEs using frontier tech	9	10	90%

4. Digital Integration: Pathways of Impact

4.1 MSMEs as platform users

Geographical reach and scale: For MSMEs using platform-based pathways, digital integration primarily helped them expand their reach and connect with customers across geographies, both domestically as well as internationally. A B2C enterprise owner based out of Marottichal in Kerala highlighted this: "We don't have much local demand for some of our products. So our Facebook page and WhatsApp groups have helped us reach customers in North India and in international markets." Another respondent explained how digital technologies were enabling their business to circumvent traditional marketing and distribution costs typically incurred during the set-up phase. "Traditional marketing routes require deep pockets. Although, yes, digital tools also have costs, but it's only till such time that the customer is acquainted with your product, after that you will likely get repeat buyers."

Infrastructures of trust: The second impact pathway was the ability to generate and sustain brand value by using platforms as 'trust infrastructures' (Gurumurthy et al., 2019). Here, we found a clear distinction being made between 'being' on the platform versus 'selling,' with the former emerging as essential (and inevitable), independent of whether it actually translated into revenue. Most enterprises regarded the high platform margins as a premium that they had to pay in order to gain customer trust. "Amazon commissions are high, but it leads to trust building because customer perception changes when you are listed on Amazon," said one respondent. Another respondent who was part of the Walmart Flipkart MSME onboarding program, shared their expectations from platform integration: "Being integrated on a platform like Walmart is a marketing tool by itself. I don't have to incur additional costs for marketing. I can expect many orders now, including exports. Additionally, Walmart's brand name will give me good rates."
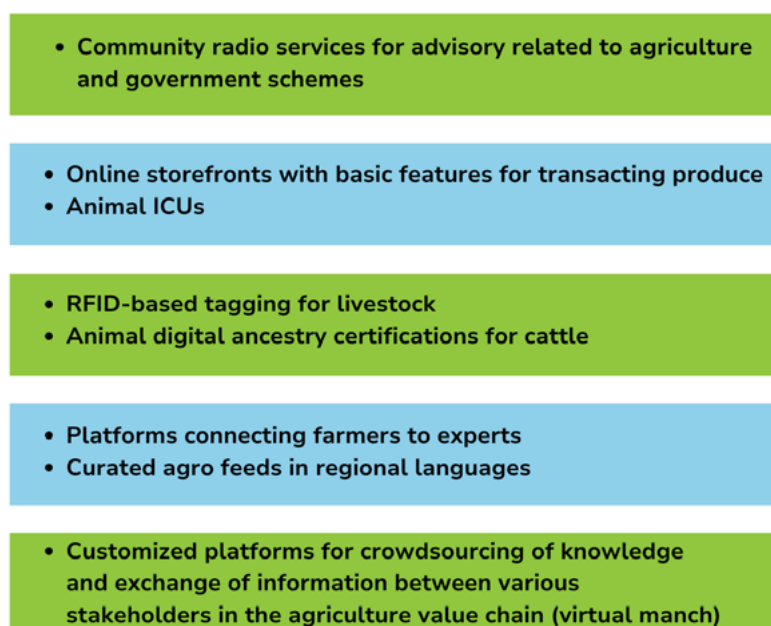
4.2 MSMEs as platform intermediaries

Scaling hyper-local innovations: For MSMEs serving as platform intermediaries, digital technologies provided the infrastructure to innovate at scale. One respondent, who was running an animal husbandry service network for cattle farmers, explained this. "We first started connecting with farmers through WhatsApp video calls, then moved to in-app video calls, and now Zoom sessions. In just two years, we built a network of over 4 crore farmers."

Another respondent explained how their platform achieves scale along with meaningful engagement.

> We have created a free app that hosts information for farmers across 35 categories and 510 sub-categories. Basically, we post videos and lectures on Facebook and YouTube and funnel them to this app, where users view the content, and discuss problems and solutions. We have around 12 crore subscribers, with a monthly engagement of over 4 crore. This engagement is not 'reach' or 'view,' but about someone asking for clarification or forwarding our content to another person.

Figure 7. Innovations provided by MSMEs as platform intermediaries

- Community radio services for advisory related to agriculture and government schemes

- Online storefronts with basic features for transacting produce
- Animal ICUs

- RFID-based tagging for livestock
- Animal digital ancestry certifications for cattle

- Platforms connecting farmers to experts
- Curated agro feeds in regional languages

- Customized platforms for crowdsourcing of knowledge and exchange of information between various stakeholders in the agriculture value chain (virtual manch)

4.3 MSMEs using frontier technologies

Opportunities for upgrade and diversification: MSMEs that were using frontier technologies were able to mine data to upgrade and diversify into different segments of the value chain. One respondent, whose enterprise was primarily providing AI-based disease detection and crop protection advisory (upstream), shared how they are also used to support traceability and exports (downstream).

Whenever you try to export any produce, the exporters will first ask you for pictures of the farm, details of the inputs used, etc. We have all this data in our database. So when we connect farmers to exporters, with the press of a button, the exporter has all of the information. Soon we also plan to do food grading and that will give us traceability.

Another respondent explained how their enterprise was trying to use the data they had gathered so far to make the fishing community more bankable. "There is no mainstream financial instrument for this community because the risk assessment is missing. So, we're collecting demographic data and underwriting it in order to de-risk the segment, and give them some financial instruments such as group loans."

5. Digital Integration: Challenges

5.1 Digital users (MSMEs as platform users)

1. Invisibilization by the algorithm: For MSMEs in this category, the promise of discoverability went hand-in-hand with the challenge of invisibilization, brought on by a continuous battle with platform algorithms that could not 'see' them. Platform algorithms had mystified the selling processes, pushing MSMEs into a virtual bottom shelf that was hidden from customer view. Explaining how it was not a level-playing field, one respondent noted: "Customers don't scroll beyond the top five brands that come up on Amazon search, and big brands have the money to place themselves in those five slots. We cannot afford it."

Another respondent explained their need for visibility by sharing their experiences of product placement with offline stores, observing, "stores like Dorabjees place our products at premium spots, and that is very valuable for our brand." One respondent shared how, after an initial period of trial and error, they finally hired a digital agency to find that 'sweet spot' on Amazon.

In the initial two months, I was spending more money than I was making on Amazon. I finally hired two external agencies: one that manages my own website, and through that Google, etc., and one for Amazon. Each of these digital tools are universities by themselves.

**Figure 8. Diminishing returns for small businesses
in an algorithmified attention economy**

Expecting customers on Instagram to spend even 20 to 25 seconds is out of the question. You get just a millisecond, or maximum, one second to hold someone's attention.

"I put up my product on Flipkart and assumed that I would start getting sales from the next day. For the first two months, there was not even one enquiry. Then I learnt that I need to hire digital marketing specialists who would work on generating more traffic for my product.

Initially, 90% of our business came from social media platforms. Then Instagram changed its algorithms, forcing us to reduce our dependence on social media. We have now moved on to email databases and more word-of-mouth sales. We're also trying to make our products available through on-ground partners in bigger cities.

"Facebook and Instagram are very crowded spaces, with posts/promotions appearing every hour. I can't post regularly, so I can never get sales from there. I got some responses after nearly 1.5 years of posting, so I don't find it very useful to post there. Also, if you search for 'natural' or 'organic,' lakhs of results come up, so I can never be found. On the other hand, when a local newspaper covers me, my sales go up.

If we talk about any platform, its relevance is quite low for India. Even if people are interested in your product range or product, they are actually not your target clients. At most, out of hundreds, you can see one who can be considered as your actual client.

2. Structural misfits: Several structural challenges relating to size, geography, and resources made platforms like Amazon and Flipkart inaccessible, particularly for micro enterprises in Tier 2-3 towns. "We prefer to make use of Kudumbashree home shops and local stores to market our products (rather than platforms like Phygicart, Amazon, or Flipkart) because t[his way] the commissions go directly to the women," said one respondent whose business was located in a village named Marottichal, in Thrissur, Kerala. "If you are not near the hub, then Amazon doesn't work for you," said another respondent who operates from Kalap valley in Uttarakhand. A respondent from Guntur, Andhra Pradesh shared their challenges with onboarding on Amazon, observing, "I don't have a GST registration, and my packaging is also very basic. If I move to more expensive packaging, my costs will go up."

Overall, the study found that traditional channels such as physical exhibitions and displays in local supermarkets, as well as regional media channels such as Lallantop, local newspapers, etc., continued to be important for MSME presence and sales, particularly because it allowed them to showcase their business in ways that were meaningful to them, something that they believed mainstream platforms were failing them on.

Image 1. An MSME product display at a physical exhibition

Figure 9. How MSMEs are doing the math on platform ad spends

Digital advertising is unviable for micro enterprises like ours. In the last two years, we have spent about INR 3-3.5 lakhs (approx. USD 3600-4200) in ad spend, and we have not seen a return of even one rupee.

" I mean, if you're spending about INR 20,000 on paid promotions, you get about 15 to 20 leads every day. Which is nothing when you want to scale. So, if you really want to reap the benefits of performance marketing, you have to spend nothing less than iNR 3 lakhs per month, because only then you can have that kind of traction, only then will you be able to reach every house in the town. Most of the Direct-to-Consumer (D2C) brands in this space are spending somewhere close to about INR 5-6 lakhs per month only on performance marketing, which is unaffordable for new or small enterprises.

At the end of the day, on Instagram, people are spending INR 1 lakh per month to generate a sale of INR 75,000 and I don't believe in that. You know, ultimately successful businesses are businesses that are profitable, and if I have to burn money on Instagram, which is already overcrowded and with the customer not having beyond even a millisecond, at maximum a second or two for my brand, it is just not worth it.

YouTube approached me saying they can advertise my product by using a celebrity influencer and they were charging me INR 60,000 (approx. USD 700) for one video. Now if I spend INR 60,000 on one YouTube video, I need business of more than INR 1 lakh (approx. USD 1200) and that will never happen, because I may get one, or maximum, two customers.

Google is like an ocean. It is the worst. You have to spend loads of money and time to be described as discoverable by Google.

Almost 99% of the startups I know spend 70% of their seed money on Google and Facebook ads.

We don't spend on Amazon ads, because it sucks us out. For marketing on Amazon, we spend on other platforms, which push clients to buy on Amazon. You have to find that sweet spot where if you are spending INR 100, you should get returns worth INR 250.

What we have seen is that our conversion through digital marketing is somewhere around 3%. But if we do a flea market, or if we go to the societies, if we talk to people, it goes up to about 10 to 15%.

3. Increased dependence on third-party support: Most MSMEs reported facing significant challenges navigating through complex technical backends, with many relying on third-party support for developing and maintaining their digital presence. One enterprise owner explained how they relied on family member support for running the digital part of the business, "I take the help of my cousin brother for uploading videos, etc. For the rest of the website management, say for example, wallet integration, my son and daughter help me." Another respondent shared their experience of using Shopify: "Not everything on Shopify is easy. For example, we face challenges when we try to integrate discounts, etc. Thankfully we have a person to do all this." Respondents also reported needing specialized services with respect to integrating customer insights."About 60% of my business comes from WhatsApp, and my biggest challenge here is re-marketing. So

if X has bought twice, and the third time X didn't buy, I need to be able to auto-target X in some way to come to the website. I can't be texting 4000 people," explained one respondent.

5.2 Digital suppliers (MSMEs as platform intermediaries and MSMEs using frontier technologies)

1. Inadequate connectivity and capacity infrastructure: Challenges in terms of lack of internet connectivity, inadequate internet bandwidth, low levels of smartphone ownership, high costs of data, digital literacy, and lack of capacity infrastructure emerged as key barriers for MSMEs in this category, particularly because many were serving under-connected communities. One respondent framed this as an issue of the urban-rural digital divide: "So you see, there is India and then there is Bharat. In Bharat, affordability, awareness, linguistic barriers, all of these are common barriers when it comes to introducing these technologies to the real people on the ground."

Another respondent, whose enterprise is building a tech-enabled food chain for women in self-help groups (SHGs) in rural India, pointed to the capacity deficits in the rural e-commerce infrastructure.

> When we first launched, we provided women with an app that allowed them to market their products by uploading product pictures through their mobile phones onto a website. However, we realized this was not working, because there is no infrastructure to support procurement, manufacturing, and logistics.

2. High costs of scaling: For MSMEs serving as platform intermediaries, the heavy reliance on physical outreach structures coupled with the zero fee structures that they were offering meant that they faced huge cost and resource constraints to scaling. "Everything boils down to money and manpower because ours is an extensive physical contact. Nobody downloads an app just by seeing my video," said one respondent. Another respondent explained how hyper-local innovations are geographically tethered: "If I want to expand to more states, it's not just about changing the language and content. I have to reach out to the ecosystem partners, bring them onboard and educate them on the benefits—it's a complex challenge."

A respondent whose enterprise dealt with using robotics to automate the coconut sap tapping process explained that in order to make their product affordable for the farmers, they had to go into mass production and that required heavy capital investments which they found challenging to secure. "My product costs INR 25,000 (USD 300) today, and this is not affordable for a farmer in India."

3. Inadequate access to data infrastructure: Inability to access publicly available datasets was shared as another challenge. "Often, for specific plants, we need a full crop season data from the satellite which exists with government entities. We don't get access to such data, even on a paid-for basis, " said one respondent. A related problem was the availability of good-quality datasets. "We cannot always rely on third-party datasets, so we have to generate our own data," said another enterprise owner. One enterprise owner shared their experience of generating datasets for fishing communities.

> Ocean data sources are sparse and hard to get. Additionally, fishing communities are reluctant to share their knowledge because they are afraid someone will use it to rob them of their livelihoods, so we have to spend a lot of time with them building their trust.

The lack of data stewardship models in the space that are sensitive to community practices and concerns regarding local/collective knowledge and collective ownership and rules of use make it difficult to broker trust among businesses and their target communities.

4. Navigating sectoral disembeddedness: Most MSMEs were aspiring to be more deeply embedded into their sectoral domains so that they could have better access to its knowledge, networks, and capital circuits. Identifying primarily as technologists who lacked the 'domain expertise' in either agriculture or manufacturing, they frequently spoke to the challenges they faced in securing such access. "I cannot be providing advice on cattle health. I need experts from agriculture universities or government institutes for this, and that is not easy to get," explained one respondent. Another respondent highlighted how belonging to an industry like fishing led to disembeddedness at multiple institutional levels, creating a vacuum in knowledge building.

> Be it for state funding, or private sector-led incubation support, the ecosystem is very farming-focused. But devising a fishery app is not the same as devising a farming app, the supply chain is very different. We need to be connected with domain experts with a background in the marine field.

Disembeddedness also meant that many MSMEs had to rely on their own networks to build connections with a variety of actors, including private agri-business firms, apex bodies, and Farmer Producer Organizations (FPOs) in order to gain access to markets for PoC (Proof of Concept) testing or training end users on their solutions.

5.3 Funding

Across all the MSMEs in the study, access to funds continued to feature as a key challenge, falling under three broad categories as below:

1. High barriers to long-term funding: Most of the MSMEs who received funding support reported that their inability to access long-term funding options, including credit or investor funding, was a challenge. While many acknowledged the leg-up support that the various grants/ challenges/awards had provided them, they believed it did not replace the need for sustainable long-term funding options that was necessary for scaling.

2. Specialized needs of deep-tech enterprises: Deep-tech enterprises have high Research and Development (R&D) costs, long gestation periods, and highly specialized production requirements, particularly at early stages (Nasscom, 2021), and our study validated the need for differentiated support for them in areas such as import subsidies, hardware support for mass manufacturing, and subsidized internet protocol (IP) costs. One respondent shared how the current patent reimbursement process is inadequate for deep-tech startups.

> To date, I have spent almost INR 25 lakhs for IPs, because we have applied for patents in 28 countries of which only three have been awarded so far. While the application costs were reimbursed, we also need support on ongoing costs incurred during the application process and then in the maintenance of the patent.

3. Procedural issues with accessing funds: MSMEs, both those that had received funding and those that had not, shared that they faced procedural/operational bottlenecks while applying to/ accessing funds. One key procedural issue related to cumbersome documentation requirements, as shared by a respondent is as follows: "I spent six months putting together an application for a National Bank of Agriculture and Rural Development (NABARD) subsidy. Finally, when we applied, we were told that the funds were over." Another respondent shared their experience of the timeline taken for scrutinizing their grant application. "If you spend one year scrutinizing ideas and then give me money in installments, how would it effectively help a small enterprise like mine?"

Table 3. Digital integration: A snapshot

Type of digital integration	Mode of value creation	Benefits/ Pathways of impact	Challenges	
MSMEs as platform users	Discoverability	–Geographic reach and scale –Infrastructures of 'trust'	–Invisibilization by the algorithm –Structural misfits –Increased dependence on third-party support	Funding
MSMEs as platform intermediaries	Dis-intermediation/ reintermediation opportunities for small producers	Scaling hyper-local innovation models	–Inadequate connectivity and capacity infrastructure	
MSMEs using frontier technologies	Data intelligence for supply chain efficiencies	Upgrading and diversification	–High costs of scaling –Inadequate access to data infrastructure –Navigating sectoral embeddedness	

6. Digital Integration: A Gendered Lens

About 23 of the enterprises that participated in our study could be classified as women-led MSMEs, either with women as the sole founders or as co-founders along with male counterparts. Of these 23 enterprises, 10 firms were solely founded/owned by women, and the remaining 13 were co-founded/co-owned by men and women.

Additionally, even though our study included 23 women-led enterprises, we were only able to speak to women founders in 15 enterprises (10 sole founders and five co-founders). The remaining eight were unable to/unavailable to participate in the study due to conflicting time

schedules. In this section, we present a mix of qualitative insights from these 15 interviews, interspersed with quantitative comparisons on firm-level parameters such as size of firm, type of digital integration, and access to funds.

1. Gender intersects with size and type of digital integration, with implications for access to financial support.

Almost 90% of solely female-owned firms belonged to the micro category, as compared to 71% of solely male-owned firms (see Figure 9) Solely female-owned firms were most likely to belong to the category of MSMEs as platform users (58%) and solely male-owned firms were more likely to belong to the category of MSMEs using frontier technologies (57%) (see Figure 10). Only 30% of solely female-led firms received financial support, as compared to 57% of solely male-led firms (see Figure 11).

These findings point to structural differences between solely male- and solely women-led firms, with the latter more likely to fall in the micro category, more likely to be 'platform users,' least likely to be using frontier technologies as a pathway to digital integration, and least likely to get financial support. Most of the solely women-led firms in our study were bootstrapped, a finding that corresponds with many studies of women-owned enterprises, both globally and in South Asia (UNCTAD, 2022b).
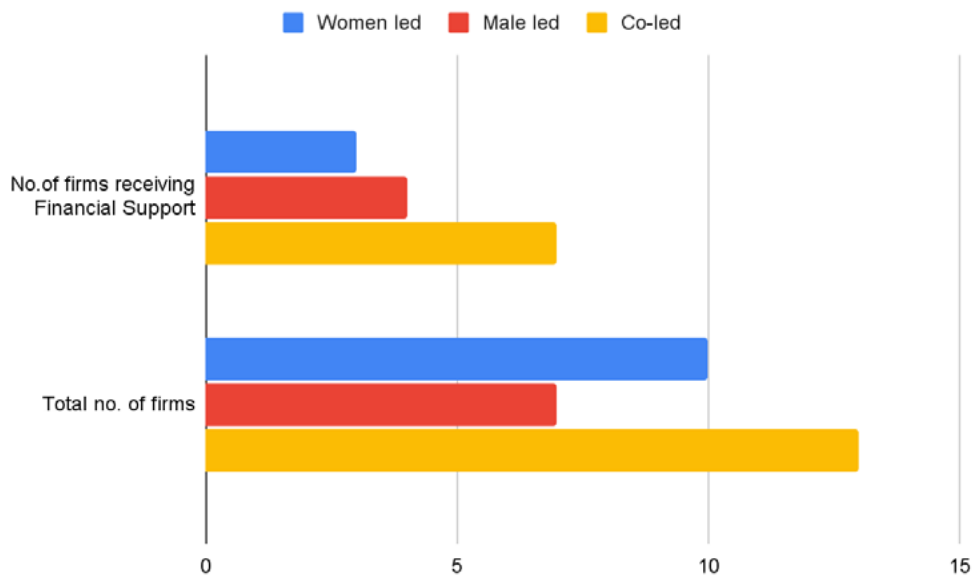
Figure 10. Gender-based ownership of MSMEs based on size of firm
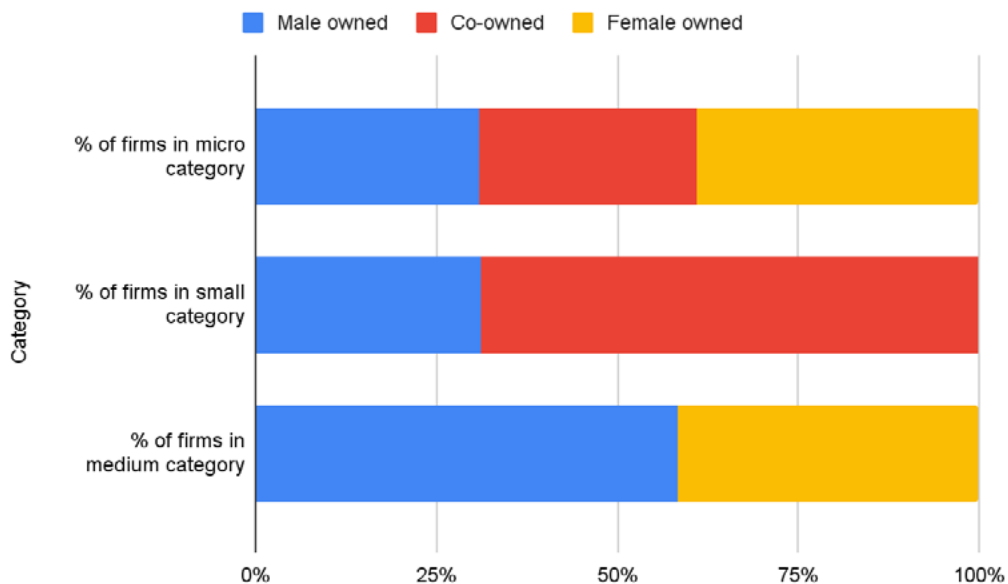
Figure 11. Gender-based variance in digital integration of MSMEs
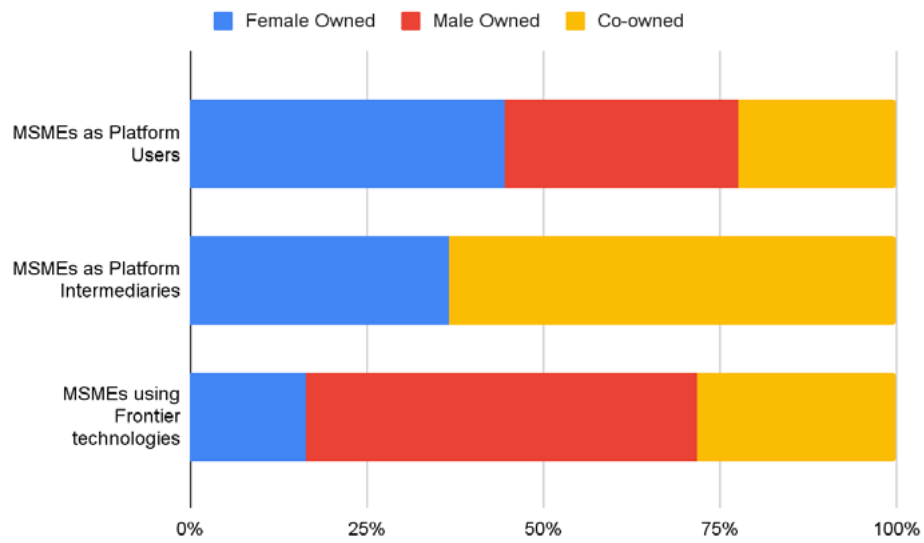
Figure 12. Gender-based variance in digital integration of MSMEs (Part 2)

2. For women entrepreneurs, autonomy and control over decision-making went hand-in-hand with the experience of structural exclusions and gendered discriminations.

All the women we interviewed reported high levels of autonomy and control in making decisions relating to their enterprise, even as they actively deployed strategies to reduce frictions or manage conflicts emerging from gender biases. One respondent explained it this way, "When it comes to decision-making, I know that I can stand my ground and make decisions on my own. But in areas where I don't have the knowledge, I consult others."

The same respondent also explained her experience of discrimination.

> There is a difference between how people speak to my male colleague as opposed to me. At times they judge me, even though I may have the knowledge, especially when decisions have to be made on technical aspects such as server integration. In such cases, I ask my male colleague to interact with them so that we get the best output.

Another woman founder reported that her loan application was rejected because she was unable to produce the PAN card (tax identification) of a male applicant, either a husband or a father. Overall, nine women reported experiencing various forms of discrimination during their entrepreneurship journey, from implicit biases to structural exclusions. (See Figure 12). The six women who reported that they did not face any discrimination or bias suggested that the social capital they acquired, either through their previous jobs, education, or socioeconomic class shielded them from the experience of discrimination, as compared to women who were less privileged than them. Additionally, three respondents (two female and one male) reported that their business benefited from the presence of a woman founder, making them eligible for specific loans/subsidies that they could avail.

Figure 13. How women entrepreneurs experience male-dominated spaces

> ❝ The venture capital (VC) industry is a very male-dominated space, most of them carry with them the perception that women cannot do technical stuff, or hard-core operations, or that we may not be able to grow the business fast enough. Of course, this is not direct, but often comes across in very indirect ways.

> ❝ For one of our business meetings, an investor/client, who is a big name in the industry, actually came dressed in boxers, just because we were young women that he was meeting.

> " I will say that people are largely respectful of women now, and it's a gender equal kind of environment. But yes, there is always a feeling you know, that your organization is a women-led organization, particularly among men. People have less acceptance, and you need to build their confidence slowly and gradually. You need to show your skills and you need to prove yourself, and then slowly they accept you.

> " So honestly, I have been very oblivious to gender bias in the last 15 years of my career, because I don't go in thinking that I'm a woman and I'll be discriminated against. I don't see whether it's a panel of only men, or a mixed panel or not. Or whether they are asking me pointed questions, because I'm a woman and stuff. I just go in with my best game. And also, I think when I talk, because of the way I talk and the confidence that I have and stuff that, I think that initial inhibition that they also have probably goes away and then they just see me as an entrepreneur who's doing their stuff. And if after that, they don't like it, I usually assume it is because my stuff was not good enough, and not because I'm a woman.

> " Yes, there are times when people don't want to answer you because you're a woman. But there are also times when there are people who are willing to help because you're a woman. So it's both ways. Even today, I asked somebody to invest, they will be like, 'What will you do with this business? What will happen if you get married and go? Or what will you do with these stocks?' They don't have the actual questions around how you would use that investment.

> " I don't think it's more challenging to be a woman entrepreneur or anything like that. Maybe it also depends on the class or the background that you come from. I mean, I grew up in South Delhi, and I went to the best college, I did my MBA, and I have no loans. I don't have any baggage. If anything, people have actually been a lot more supportive, whether it's my ex-colleagues, family, or friends.

> " It is indeed a great challenge for women to run an enterprise. But there are positives also. For example, when we approach banks for marketing, they are more welcoming when a woman brings her products and explains it, rather than a man. Banks display confidence that women will make 100% repayment of the amount. In the government sector, they promote and support women a lot.

Figure 14. (Not so) gendered division of labor

> " Obviously when it comes to certain things like the supply chain part of it, my husband has been a great help, because he knows the region very well, and also speaks the language. He's helped me to travel to those places. So, he has always been there and being from a finance background when it comes to the pricing of products, and some things like that, he has been a great support.

> " So I have focused on women and understanding how they cook the stuff and understanding what they grow, how they grow, and why they grow something. But when it comes to dealing with the bigger stuff like cash crops, it is largely my partner—like talking to the apple farmers, buying, sorting, procurement, packaging, shipping—it is entirely his thing. I have never participated in that aspect at all. So yeah, it has just automatically happened that I handle what is easier for me to handle as a woman and he handles what is easier for him to handle as a man.

> " So actually, my husband supports me a lot and he is the finance person and the IT person. He has developed the website and he is taking care of all the digital aspects.

3. Women entrepreneurs face significantly higher challenges in setting up upstream linkages for their businesses.

These include challenges related to sourcing, procurement, logistics, and transportation. One respondent explained her supply chain:

> We get our honey from Cherrapunjee, and turmeric and ginger powder from Lakadong. To reach Cherrapunjee, I have to first reach Guwahati airport, then travel to Shillong by road, which takes approximately four hours. And then from Shillong to Cherrapunjee takes another three and a half hours. Similarly, Lakadong is again another three and a half hours from Shillong. So this is the big challenge. We have had a couple of talks with the government authorities and agencies there on how the logistics infrastructure can be improved.

Online procurement was also a challenge, as another respondent explained, "I still struggle a lot with raw materials. India Mart has many fake vendors who take advance payments for raw materials and then don't send the materials. I have lost a lot of money this way."

For many women, the gendered nature of these spaces compounded the challenge, as one respondent put it.

> The main challenge that I face as a woman is in procurement and transportation of raw materials. Because of women's dependence on others for these tasks, they face issues like people charging high prices and not delivering the raw materials on time. Women also lack the knowledge required to get licenses and certificates, and are often exploited by consultants who take high fees for these tasks.

4. Women-led firms are more likely than solely male-led firms to receive any kind of support.

About 40% of solely women-led firms in our study received no support as compared to 29% of solely male-led firms. However, when it came to private sector-led skilling, onboarding, and mentoring initiatives (such as Cisco Launchpad, Level up 91Springboard, Google for Startups, Goldman Sachs' 10 K women, Walmart Vriddhi program, etc.), solely women-led firms were found to be better represented. Women who participated in these programs reported benefiting from them, as one respondent shared with us, "Very often, it's not funding alone. We need help in making pitches, etc. The accelerator programs helped us greatly by connecting us to VCs and also giving us more opportunities to pitch."

This finding reflects the wider economy-wide focus to support and enhance entrepreneurship amongst women through a multi-pronged approach, including capital, acceleration, mentorship, and customer and market access support (Radhakrishnan & Vashistha, 2022). However, when juxtaposed with the previous finding that women-led firms are still less likely to receive financial support, or more likely to adopt digitally 'thin' ways, it still raises important questions on the extent to which a higher focus on skilling and mentoring ends up skimming over the more fundamental structural challenges of credit, market access, and gendered labor divisions.

7. Analysis

When we embarked on this study, one of the first respondents we interviewed told us, "the internet is fundamentally broken, it's not a place for small players any more." Months into the study, and over 40 conversations later, we certainly found evidence to support this claim. In summarizing what we think is the single most important finding of our study, we would re-phrase our respondent to say: the digital economy, as it stands today, is not a place for small enterprises.

In coming to this conclusion, our study both validates and invalidates earlier claims in this regard. For example, when it comes to MSMEs using e-commerce-based platform integration, we found little support for univocal claims of the value of informal e-commerce for women's economic empowerment (WEF & UNCTAD, 2023). What emerged instead was the presence of a rather flimsy value proposition with no economic returns, but one that had to be held on to because

of the sheer lack of alternate market access pathways. Evidently, there is a real danger in even conflating the highly ad-driven persuasion models of Big Tech with sustainable market access pathways for smaller enterprises, especially given that they are only incentivized to amplify user time spent on the platform (Hill, 2021).

On the other hand, our findings certainly evidence both, increasing 'infrastructuralization of platforms,' i.e., private e-commerce platforms operating as essential public infrastructure, and 'platformization of infrastructure,' i.e., new and existing infrastructures being organized on a platform logic (Vipra & Vats, 2020). Not only were digital platforms like Amazon and Flipkart gatekeepers of e-commerce markets, but they were also found to be systematically steering the algorithm towards maximizing their own profits (Gurumurthy & Chami, 2019). Therefore, although the numbers are unofficial, it does seem plausible that out of a total of 10 million sellers on Amazon, only 5,000 to 10,000 sellers are able to generate enough sales to keep things going on the platform (Bhat, 2022). In a way, this also renders the logic of low-entry barriers as futile, or even mythical, because low-entry barriers mean little in the face of asymmetric algorithmic power or anti-competitive practices (Pearson, 2024). In fact, we believe that another key takeaway from this study is that valorizing 'low code entrepreneurship' (Dushnitsky & Stroube, 2021) as a market access pathway for smaller businesses takes attention away from the high costs of staying on these so-called 'low-code' platforms, the exit barriers they create, and the associated risks this entails for small enterprises.

A second important thread emerging from this study relates to the innovation ecosystem for small and medium born digital enterprises, whom we referred to as digital suppliers. With many of these enterprises connected to knowledge and capital circuits within the digital economy, we do find evidence of a thriving agri-digitalization startup landscape, hinged on the smartification of agriculture value chains (Maschewski & Nosthoff, 2021). However, the question of how/to what extent these enterprises can stand up to Big Tech incursions in agriculture is key, and here again, we find the odds stacked against these players as they navigate challenges of capital, scale, costs, and market and data access. The financial sustainability of many of the enterprises that offer digital products and services depend in large parts, on their data mining capacities, capital investments in mass production, as well as their ability to access large markets (Briner et al., 2021). In particular, those using disembodied innovations, while impressive in the way they straddle scale with hyper-localization, tend to grow in more slow and linear ways, often remaining confined to local economies, as noted by Graham et al. in their study of digital enterprises in Africa (Friederici et al., 2020). Here too, the reliance on Big Tech infrastructure for scaling, whether it is the use of Amazon web services, YouTube, or WhatsApp is unmissable. Indeed the irony of positioning oneself as an alternative to Google or Amazon, while continuing to rely on its infrastructure was not lost on the respondents themselves, as revealed by this insight that one of them shared with us: "If you go into the rural areas, there is limited connectivity and little literacy. But even there, the only usable digital tools are Google, WhatsApp, and YouTube." This dependency reinforces the hierarchical nature of the platform economy, as one or two meta structures control the work of smaller businesses, and, if not regulated properly, will inevitably lead to the reproduction of 'data colonialism' (Maschewski & Nosthoff, 2021).

The third and final thread relates to the gender scorecard on the innovation and entrepreneurship paradigm. We found many positive stories, and indeed for all the women who participated in our study, the journey of seeding and building an enterprise was a huge source of fulfillment and empowerment, something that we do not wish to underplay or invisibilize. But the fact that women-led enterprises continue to be structurally excluded from market and credit access, they are less represented in digital enterprises in the fields of data mining and AI, and continue to confront and negotiate with discriminatory gendered structures means that we cannot rely on individual heroisms or corporatized narratives of women entrepreneurship to produce gender-transformative outcomes at scale. And here, our study evidences several well-established structural exclusions, from fields of data science and AI being overwhelmingly male, to the unmet financing needs of women-owned small and medium enterprises worldwide, to the continued gendered divisions of labor and care work (UNCTAD, 2022b; Kevane et al., 2021).

These three threads paint a distinct picture of institutional and structural deficits going hand-in-hand with the monopolistic capture of several key levers of the e-commerce and innovation ecosystem, which, put together, can adversely impact the development and sustainability of small enterprises. Countering this would imply taking head-on several questions that have fundamental policy implications: How do you democratize e-commerce market access pathways and make them more equitable for small businesses? What kind of policy frameworks will make for an inclusive innovation system? What kind of regulation do we need to make the digital economy a level playing field? With the digital economy increasingly shaping entrepreneurship pathways and outcomes, how do you shift power to those actors that are disadvantaged by traditional power systems?

Answering these questions begins with the recognition that we need substantive shifts in the way the digital economy is governed, and local-to-global innovations are scaffolded. Worldwide there are a plethora of approaches to emulate. The EU Digital Markets Act is an example of a legislative approach that seeks to curb monopolistic platform practices by introducing tighter rules for 'gatekeeper' platforms, including mandating data sharing with enterprises on the platform and greater transparency on the advertisements hosted by the platforms (EU Commission, n.d.). China's approach to counter digital power has hinged on developing a digital industrialization policy with a focus on building network infrastructure, accelerating deep integration of the internet with the real economy, enhancing information technology capabilities, and implementing data governance policies (UNCTAD, 2022a). On the other hand, India's approach to regulate the digital economy has been through its investments in developing 'digital public goods,' i.e., digital infrastructure built as public goods (Vishnav, 2022). Under this, a public protocol and infrastructure for interoperability of digital payment services has been developed. This concept has now been extended to e-commerce with ONDC that is currently piloting in five cities in India, a development that could potentially have important positive ramifications for smaller enterprises, subject to the right legislative scaffolding, which we cover in our recommendations section (Singh, 2022). There are also some significant convergences emerging in terms of the important role of data infrastructures, and connected data laws, as a key element that is needed to underpin digital capacities in latecomer economies. Such data infrastructures

can provision a competitive set of digital services, and provide support to enterprises in the domestic industry (Singh, 2017).

Ultimately, each of these approaches speak to a fundamental shift in how we construct the core infrastructure that shapes the digital economy, underwritten with values of public interest and democratic participation. Towards this, we propose a set of recommendations in the final section.

8. Case Study: Farm Didi - Strengthening E-commerce and Entrepreneurship Capacities for Women in Rural India

Farm Didi is a food-tech enterprise founded in 2021 by two women, Manjari Sharma and Asmita Khobragade. It was set up with the vision of empowering 1 million rural women belonging to SHGs in India by providing them with sustainable pathways for e-commerce. The idea was first born in 2016, when Manjari Sharma, who worked with the Bihar state government to understand the state of women's empowerment for her Master's project, found that women in SHGs were looking for avenues to increase their earning potential. She felt food would be the area to startup in, as 80% of rural women understand the food business—they are already in the agricultural value chain and armed with traditional knowledge and wisdom in this area.

When Farm Didi first launched in 2021, they provided women with an app that allowed them to market their products (primarily pickles and powders) by uploading product pictures through their mobile phones onto a personal website. However, they found that provisioning a technology interface was not adequate when it came to securing income and livelihoods for women entrepreneurs. What women needed, and what the rural ecosystem lacked, was a supply chain that responded well to local needs and challenges, support for skill upgradation and marketing, and a trusted buyer network through which women could sell their produce. With these larger objectives in mind, Farm Didi moved their focus away from the digital-only elements, towards strengthening capability and capacity in rural entrepreneurship as a larger focus area.

The Making of a 'Didi' (See Images 2-6)

Every woman who works with or in Farm Didi is referred to as Didi (meaning 'elder sister' in Hindi). The below visual describes how Didis from the SHGs are identified, onboarded, and skilled through the Farm Didi ecosystem.

Level 0
- Identify SHGs and engage informally in order to understand their interests, aspirations, and capacities
- Offer training for capacity building

- Establish initial interest of Didi
- Assist in obtaining certifications

Level 1
- Introduce and train Didis on the product's Standard Operating Procedures (SOPs)
- Give them small batches of material (10 kg or so) to produce
- Test manufacturing capacities as well as consistency of taste, produce, etc.

Level 2
- Increase the number of orders to a 50-100 kg range

Level 3
- Scale up to manufacture for locations outside Pune
- Tie-ups for setting up community kitchens, large-scale cutting and grading equipment, etc.

Level 4
- Scale up to export

From the Kitchen to the Customer - The Farm Didi Workflow (See Images 2-6)

Step 1: Farm Didi aggregates demand based on customer orders (either online or offline).

Step 2: They generate a purchase order through Zoho containing details of product quantity, pricing, and estimated delivery time.

Step 3: They send the purchase order on WhatsApp to the Didi(s).

Step 4: Didis to accept the order on WhatsApp and confirm the start of the manufacturing process.

Step 5: Didis to provide step-by-step updates on the preparation process by updating Google Forms.

Step 6: Ongoing monitoring and support through online channels as well as onground field support is provided.

Step 7: Once the batch is ready, Didis upload the final product pictures on Google Forms.

Step 8: Farm Didi's on-ground team does the final quality assessment.

Step 9: Packaging containers are provided to the Didis for storage.

Step 10: Post completion of the applicable fermentation time, Didis load the containers into the tempos which are then shipped to the Farm Didi warehouse in Pune.

Step 11: Final product testing is done at the warehouse and the product is packed for customer shipment.

Step 12: Didis receive payment and the purchase order is closed.

A whole-of-ecosystem approach to strengthen rural e-commerce and entrepreneurship capacity.

1. **Assuring a buyer network.** The Farm Didi platform serves as an assured buyer network for women SHG members, many of whom have inadequate market access options. With Farm Didi investing in the grading and certification process and taking on the role of demand aggregation, inventory management, and sale of produce, women face fewer risks of having to deal with unsold produce/inventory.

2. **Minimizing supply chain disruptions.** The Farm Didi team works with the SHGs as well as the larger community across several key nodes in the supply chain in order to develop strategies for managing locally emerging disruptions. For example, the teams may play a role in ensuring the stability of raw materials, especially during the off-season period by identifying additional sellers from different geographies who can fill in for the deficit. Similarly, the team has stepped in to assist the SHGs in securing affordable transportation for their produce by speaking to on-ground transport vendors and identifying pooling options.

3. **Enhancing capacities for marketing.** The Farm Didi team found that while the SHG women demonstrate high levels of knowledge and skills when it came to cooking, they needed support in thinking about their cooking as a business. The team developed an engagement model with the SHGs starting from identifying SHGs to developing their capacities to manufacture at scale. They provide training and capacity-building support for various aspects of the food chain, from product pricing, hygiene standards, food grading, etc., and have also developed product-wise SOPs. Additionally, they offer training in Food Safety and Standards Authority of India (FSSAI) certification, and enable women to get this certificate (charging a nominal fee for the service).

4. **Embedding entrepreneurship within the collectivistic framework.** In the Farm Didi model, orders can be processed at the level of the collective, apart from the individual SHG members. The collective can accept the order and ensure subsequent work allocation and earnings distribution. Additionally, by creating roles such as 'Monitor Didi,' 'Quality Didi,' and 'Accounting Didi,' the Farm Didi model encourages many of the collective members themselves to build skills in areas such as process monitoring, quality control, budgeting and accounting, etc. The institutional framework thus becomes an important enabler of entrepreneurship outcomes.

5. **Facilitating support for credit and working capital.** Didis often require working capital support especially when it comes to servicing large orders (e.g., 100 kg and above). To the extent possible, the Farm Didi team assists SHGs who they work with in applying for government loans and schemes, for which they have a Memorandum of Understanding (MoU) with the Government of Maharashtra.
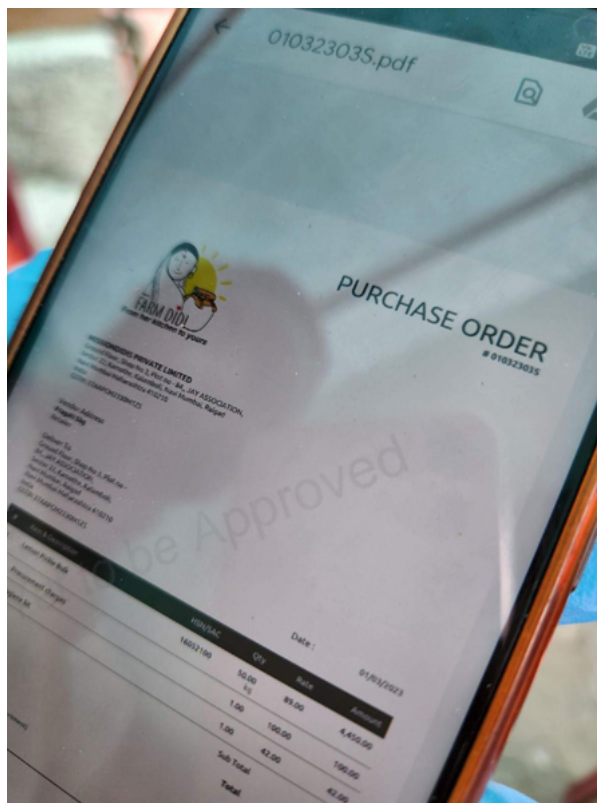
Image 2. Farm Didi cover image

Image 3. Farm Didi warehouse in Pune

Image 4. Jyoti Didi's manufacturing unit in Walhe, Maharashtra

Image 5. Sample purchase order

Image 6. Jyoti Didi displays the equipment she uses to grind spices to make pickle

9. Policy Recommendations

What can be done?	Who can drive change?
Securing e-commerce access for small businesses through platform regulation. This needs to include the following: • Banning anti-competitive conduct such as self-preferencing, deep discounting, and developing competing products (using data generated on a given platform) • Mandatory provisions on algorithmic disclosures and data sharing with business users on the platform	Governments
Differentiated support for deep tech enterprises in the MSME category, which includes: • Increased allocations for early-stage funding • Differentiated IP support regime • Programs for market access for PoC testing of their products/services.	Governments, multilateral organizations, public and private agri-business companies, accelerators, and private financers
Targeted policies for investing in public R&D. Foundational innovation infrastructure for developing digital tools such as datasets, subsided cloud, 3D printing services, etc., should be made available to a broader set of digital entrepreneurs in order to prevent market concentration or market capture by a few big players.	Government bodies and public universities
Building a semi-commons data architecture. Data infrastructures need to be provisioned as 'meta-utilities' (similar to other urban infrastructure such as water, roads, and electricity), providing support to MSMEs for generating public value from collective data through open and shared services, backed by appropriate licensing conditionalities and public funding (Gurumurthy & Chami, 2022).	Government bodies

What can be done?	Who can drive change?
Public investments in communication infrastructure. Public funding and policy intervention for universal access, through initiatives such as K-Fon (Sarkar, 2022), as well as policy instruments such as Universal Service and Access Funds (USAFS), need to be put in place in order to expand high internet connectivity and provide an enabling environment for underserved communities/low-income users.	Government bodies
Building sustainable market access pathways. Keeping in mind the hyper-local nature of MSME businesses, investments need to be made to increase marketing avenues through initiatives such as Kudumabsree home shop projects (The Hindu, 2021). Programs such as making districts export hubs (Director General of Foreign Trade, n.d.) need to particularly focus on women-led MSMEs through schemes that can validate and certify their products for a global market and boost their exporting capabilities.	Government bodies, women's SHGs, FPOs, and cooperatives
Strengthening public e-commerce infrastructure for MSMEs. Programs such as Womaniya offered under the GeM policy (Government eMarketplace, n.d.) must also provide support for upstream value chain activities, including warehouse set-up and access, procurement services, logistics, and transport support. On the downstream side, e-commerce extension services such as product cataloging, website creation, payment integrations, etc., must be provisioned for MSMEs to access at subsidized rates.	Government bodies and private or state-run accelerators/innovation hubs

What can be done?	Who can drive change?
Increase industry/academia/government collaborations in agriculture. The sectoral embeddedness of digital startups in agriculture needs to be enhanced through targeted knowledge collaborations and partnerships between the public sector and the private sector across both industry and academia, in order to facilitate more equitable access to knowledge, networks, markets, and capital in the agriculture ecosystem.	Governments, academia, private sector organizations, and non-profit trade and commerce associations/federations
Taking an intersectional lens to policy and support. Beyond making schemes/capital available to 'women,' targeted financing and working capital options need to be made available at the level of micro/informal enterprises, which is the category that dominates most women-led enterprises. This could also include interventions to reduce the burden of GST compliance for micro enterprises wishing to sell online (Nasscom, 2021).	Government bodies and accelerators/banks/funding organizations/lenders
Targeted policies to increase the presence of women in policymaking and STEM.	Educational institutes, governments, and private sector companies

Glossary

Agriculture and Farmers' Welfare (MoAFW)

Artificial intelligence (AI)

Atal Innovation Mission (AIM)

Business-to-Business (B2B)

Business-to-Consumer (B2C)

Direct-to-Consumer (D2C)

Farmer Producer Organizations (FPOs)

Food Safety and Standards Authority of India (FSSAI)

Government e-Marketplace (GeM)

Gross Domestic Product (GDP)

India Digital Ecosystem of Agriculture (IDEA)

Internet protocol (IP)

Memorandum of Understanding (MoU)

Micro, small, and medium enterprises (MSMEs)

Open Network for Development Commerce (ONDC)

Proof of Concept (PoC)

Public Sector Undertaking (PSU)

Research and Development (R&D)

Standard Operating Procedure (SOP)

Self-help groups (SHGs)

Unified Payments Interface (UPI)

Universal Service and Access Funds (USAFS)

Venture capital (VC)

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Appendix A - Interpretive Research Framework: A Note on Our Approach

Framework: Our research tools and methods are of an interpretive nature. We are interested in understanding the conditions that were making digital integration more or less equitable, as experienced by the MSMEs themselves, particularly in a two-fold post-Covid context, where digitalization was being seen as a disruptive force that had to be embraced, and where it was increasingly playing out within a Big Tech ecosystem. This, to us, was a tension that could only be unpacked by understanding the various ways in which MSMEs were 'making sense' of their experience of digital integration. The interpretive nature of our research makes our knowledge claims of an 'epistemological nature,' where we give primacy to the 'subjective' experience (or) of equitable integration, over objectively verifiable sales figures and revenue that may have been generated through such integration. This does not mean that we reject all quantitative data per se, in fact, as you may have noticed, we took an interpretive perspective on numbers (Yanow & Schwartz-Shea, 2014). What it does mean however, is that we cannot make causal claims about which factors lead to (in) equitable integration (what is often referred to as mechanistic causality), rather we want to develop explanations about 'why' MSMEs make specific choices with respect to digital integration, which makes the experience of equity possible or not (which is a form of 'constitutive causality') (Yanow & Schwartz-Shea, 2014). In this framework, context is crucial, and we have sought to understand these choices within specific settings and social contexts that make experiences possible. Our explanation of MSMEs using e-commerce platforms irrespective of whether they were deriving value from them or not, can, for instance, be understood in this constitutive fashion as stemming from their need for a 'trust infrastructure' which no other institution is able to provide them. Similarly, sectoral disembeddedness as a key challenge can only be understood within the specific context of technologists who see themselves as 'outsiders' to the agriculture ecosystem. These are examples of constitutive causality that seek to explain events in terms of actors' understandings of their own contexts. Interpretive methods have also allowed us to provide sufficiently thick descriptions for the claims we have made, and readers would have noticed a generous use of respondent quotes throughout the analysis. This was important to us both from the perspective of making MSME voices visible, and also to allow other researchers to make assessments about how plausible it is to transfer insights from our research to another setting.

Appendix B - List of MSMEs Sampled

S. No.	Company descriptor	Location	Business start date (Year)	Category	Women-led MSME	Type
1	Manufacture and sale of sandalwood	Pratapghar, Uttar Pradesh	2019	Micro	No	Digital User
2	Marketplace that aggregates and sells products	Kalap Valley, Uttarakhand	2019	Micro	Yes	Digital User
3	Manufacture and sale of dry foods	Marottichal, Kerala	2018	Micro	Yes	Digital User
4	Manufacture and sale of dairy and organic foods	Pune	2018	Small	Yes	Digital User
5	Manufacturer of organic skin, hair, and health care products	Guntur	2014	Micro	Yes	Digital User
6	Manufacturer and supplier of handmade products and artisanal delicacies	Mumbai	2021	Micro	Yes	Digital User
7	Manufacturer and supplier of eco-friendly bamboo, hotel amenities, restaurant amenities, and straws	Pune	2019	Micro	Yes	Digital User
8	Farm-to-door supplier of organic food	Noida	2020	Micro	Yes	Digital User
9	A social enterprise that works with farmers to safeguard Indigenous farming practices, native seeds, and communal culture	Rajkot	2017	Micro	Yes	Digital User
10	Manufacturer and supplier of affordable organic hemp products	Bengaluru	2019	Micro	No	Digital User

S. No.	Company descriptor	Location	Business start date (Year)	Category	Women-led MSME	Type
11	Manufacturer and supplier of organic products	Bengaluru	2019	Micro	Yes	Digital User
12	Manufacturer and supplier of ready-to-eat food products	Kolhapur	2002	Micro	Yes	Digital User
13	Healthy and sustainable grocery store startup	Bengaluru	2021	Micro	Yes	Digital Supplier
14	Trader/exporter of fruits	Pune	Not mentioned	Small	No	Digital User
15	Agri-tech startup using AI and robotics	Kochi	2016	Micro	No	Digital Supplier
16	Agri-tech startup specializing in the manufacture of customized UAVs/drones	Kochi	2020	Micro	Yes	Digital Supplier
17	Supply of organic food products	Coimbatore	2016	Small	Yes	Digital Supplier
18	E-commerce platform for agriculture and allied services sector	Rohtak, Narwana	2021	Micro	Yes	Digital Supplier
19	Agriculture firm that provides soil data-based crop and fertilizer advice to farmers and also sells seeds and pesticides	Jaipur	2016	Small	Yes	Digital Supplier
20	Provider of animal husbandry and fishery solutions through tech-driven value chain services	Patna	2019	Small	Yes	Digital Supplier
21	Food tech enterprise providing market linkages to rural SHG women	Pune	2019	Micro	Yes	Digital Supplier

S. No.	Company descriptor	Location	Business start date (Year)	Category	Women-led MSME	Type
22	Technology startup helping players in the food supply chain to make informed decisions about food safety	Bengaluru	2019	Micro	Yes	Digital Supplier
23	Developer of wearable plant phenomics device intended for the pre-detection of pests, diseases, and deficiencies in plants	Mumbai	2018	Medium	No	Digital Supplier
24	Applying data science to build an end-to-end seafood ecosystem addressing livelihoods, sustainability, and traceability	Mumbai	2018	Medium	Yes	Digital Supplier
25	Digital platform that focuses on the needs of dairy farmers by providing free access to knowledge related to dairy farming, best practices, and a network of experts and fellow farmers	Pune	2019	Micro	Yes	Digital Supplier
26	Developers of IoT and AI-enabled devices for beekeeping solutions	Vellore	2020	Micro	No	Digital Supplier
27	Provider of sensing and data solutions to agriculture	Pune	2017	Micro	Yes	Digital Supplier
28	Offers AI-based pest management and sustainable farming solutions	Mumbai	2019	Micro	Yes	Digital Supplier

S. No.	Company descriptor	Location	Business start date (Year)	Category	Women-led MSME	Type
29	A full stack animal husbandry platform that provides farmers with backward and forward linkage for the purchase and sales of livestock	Jaipur	Not mentioned	Micro	No	Digital Supplier
30	Using technology to provide sustainable farming solutions	Bengaluru	Not mentioned	Micro	No	Digital Supplier

Appendix C - Criteria for Classification of MSMEs

Criteria for classification of MSMEs as per the 2020 notification issued by the Government of India:

1. A micro enterprise, where the investment in plant and machinery or equipment does not exceed INR 1 crore and turnover does not exceed INR 5 crores;
2. A small enterprise, where the investment in plant and machinery or equipment does not exceed INR 10 crores and turnover does not exceed INR 50 crores;
3. A medium enterprise, where the investment in plant and machinery or equipment does not exceed INR 50 crores and turnover does not exceed INR 250 crores.

Criteria for classification of an MSME as 'woman-led':

For the purpose of this study, an MSME qualified as woman-led if it met the following criteria:

1. **Leadership:** The decision-making positions and leadership positions should be filled by women. (President, CEO, CTO, CFO, CXO, etc.)
2. **Membership:** At least 51% of the staff should be women
3. **Ownership/Financial Interest:** At least 51% of the board of directors/shareholders should be women

Here, the first two criteria were mandatory for selection, while the third criterion was optional.