Digital Economic Integration of MSEs in the Global South Kenya Report- Agriculture

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Contents

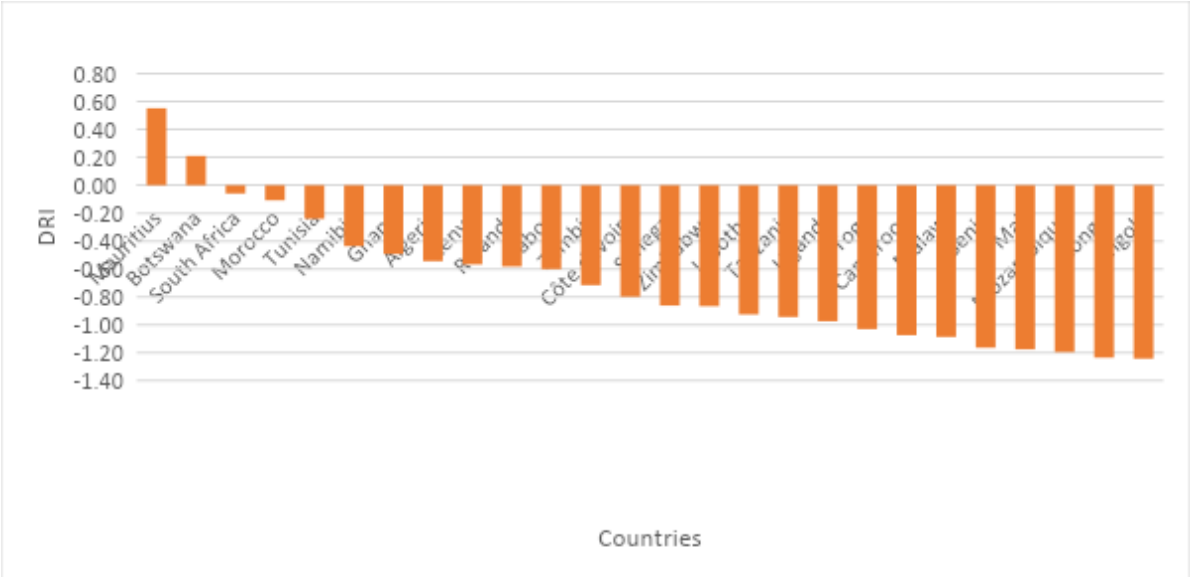
1. Introduction

The report is structured as follows, section 2 and 3 lay the ground for a brief review of digital readiness in Kenya and the regulatory landscape. Section 4 explains the data collection and methodology, followed by section 5 which elucidates the digital integration continuum. Section 6 then details the motivations, benefits and challenges experienced by users (farmer cooperatives/groups; processors, retailers/wholesalers; restaurants) of digital tools, and section 7 details the same for suppliers (platforms, frontier tech MSEs) of digital tech. section 8 provides a brief summary. Section 9 deep dives into gendered dynamics and section 10 gives policy recommendations.

2. Digitalisation of the sector in country

Kenya is one of the more advanced countries in relation to digital readiness. Figure 1, illustrates CISCO's digital readiness index in 2021, along the lines of tech infrastructure, adoption, human capital, ease of doing business, business and government investment and start-up environment. Kenya ranks the ninth across Africa and highest within the EAC.

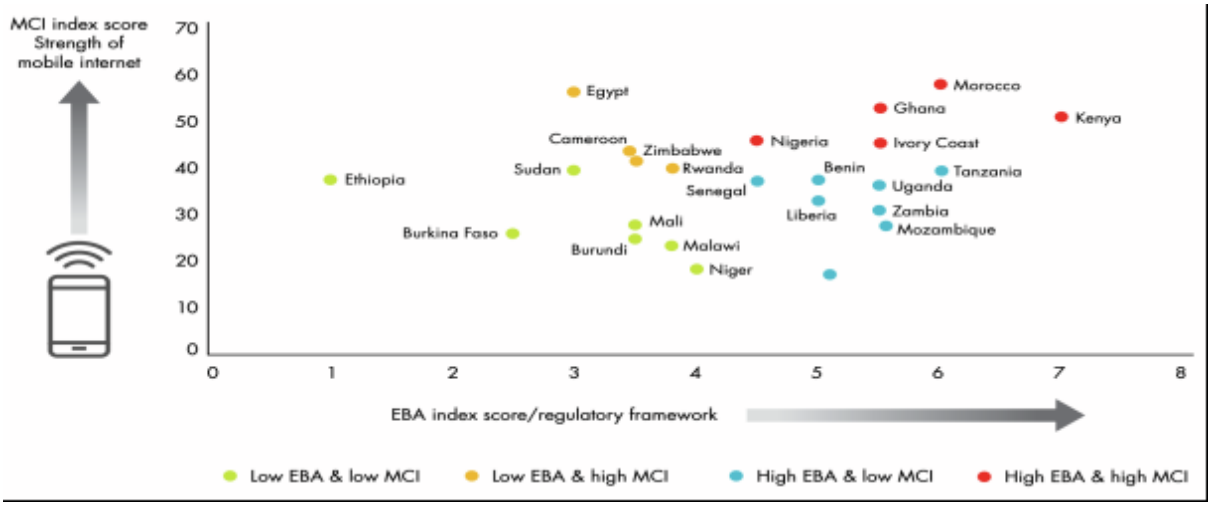
Figure 1: CISCO digital readiness index (DRI)



Source: Cisco Digital Readiness Index

Tsan et al. (2019) compare countries on the basis of use of technology in the agriculture sector (see Figure 3). Digital readiness in agriculture is mapped using data on overall mobile connectivity (GSMA's MCI) in the country and on Enabling the Business in Agriculture (EBA) (World Bank). Kenya ranks the highest on digital readiness in agriculture.

Figure 3: Digital readiness in agriculture



Source: Tsan et al 2019

3. Policy context: interventions to boost digitalisation in the sector

3.1 Existing digital and agriculture regulation

Kenya's Agricultural Sector Transformation and Growth Strategy (ASTGS) seeks to create a vibrant, commercial, and modern agricultural sector that supports 100% food security in the context of devolution. Data and digital technologies take an important enabling role in this transformation.

To strengthen farmers' trust and give them greater control over who uses the data that is produced on their farms and for what purposes, the Ministry of Agriculture, Livestock, Fisheries, and Cooperatives (MoALFC), developed the Data Governance Framework for farmers registration data.

Kenya also has various e-commerce related regulation in place: some that are relevant for the agro sector are discussed in this section.

- The Data Protection (Compliance & Enforcement) Regulation, 2021: this act has data sharing codes but primarily with the government rather than farmers and other digital users. Furthermore, it does not have a clearly defined data localisation clause.
- Kenya Information and Communications Act (KICA), 2012, which aims to support the growth of MSEs by providing e-government services. However, it does not specifically regulate larger platforms.

3.2 Existing MSME Regulation

Currently there is a Micro and Small Enterprises Act, 2012 which governs regulation on micro enterprises. These are organisations which make less than Sh500,000 annually and employ less than 10 members. However, there is a legislative gap in SMEs that earn between Sh500,000 to Sh100 million, yet this represents a fair percentage of all SME[1].

One of the key institutional reforms emerging from the Micro and Small Enterprise Act 2012 was the establishment of the Micro and Small Enterprise Authority (MSEA) within the Ministry of Industrialization and Enterprise Development (MoIED). The core functions of the MSEA are to support MSMEs to grow, by providing conducive work environments and market access, setting out proper management and mobilisation of financial resources, coordinating sector players and facilitating integration of programmes and activities relating to MSEs (MSEA, n.d.), facilitating formalisation and upgrading of informal MSEs, promoting information communication technology (ICT) in all sectors, and improving entrepreneurial and technical skills in the MSE sector. There are several 'governance deficits' within the MSEA, however, specifically relating to its inability to create cohesion between various MSME clusters (agro, leather, textile, motorcycles (boda-boda)), which has prevented MSMEs from forming associations. This failure to form associations or cohesive groups has inhibited the ability of MSEs to interact with national government or to garner any bargaining power.

There are several policies, plans and structures in place in Kenya to support MSMEs, some of which will help integration into value chains and economic zones:

• Vision 2030. This is the government's development blue print which aims at transforming Kenya into a newly industrialising, middle-income country able to provide a high quality of life to all its citizens by 2030 in a clean and secure environment. The role of the manufacturing sector in Vision 2030 is to create employment and wealth. A number of interventions are proposed that will enable Kenya to be globally competitive and prosperous (MoITC, n.d.b). The objectives to be pursued are: - strengthening the capacity and local content of domestically manufactured goods - increasing the generation and utilisation of research and development results - raising the share of products in the regional market from 7% to 15% - developing niche products for existing and new markets.

• Kenya Industrial Transformation Programme (KITP). The KITP programme is anchored to the Vision 2030 (MoIED, 2015), and focuses on the following objectives

: - to launch sector-specific flagship projects in agro-processing, and information technology related sectors that build on comparative advantages

- to create an enabling environment to accelerate industrial development through industrial parks/zones along infrastructure corridors, technical skills, supporting infrastructure and ease of doing business

- to create an industrial development fund.

MSE Act and MSEA. The MSE Act17 provides clear definitions on what constitutes an MSE. Housed under the Ministry of Industry, MSEA is the government body responsible for the development of the MSE sector

[1] Kenya, MSMEs are variously defined in different contexts. They are defined as enterprises that have 1-99 employees. Micro enterprises have less than 10 employees; small enterprises have 10-49 employees while medium sized enterprises have 50-99 employees.

Upcoming Biashara Bank. This will have the potential to direct government funding to MSMEs. It should also be said that several development finance institutions such as the Dutch development bank (FMO), the International Finance Corporation (IFC) and the African Development Bank (AfDB) have made available credit lines for local banks for lending to SMEs

4. Methodology and data

4.1 Data collection, sampling strategy and method of analysis

The data was collected using a value chain mapping process. Value-chain mapping is defined as a process that determines the input-output structure of each 'node' and the different value-chain actors involved (Fernandez-Stark and Gereffi, 2019). Each node was identified in terms of the key functions performed, and the main actors involved in the digitally driven agriculture value chain. Furthermore, key digital services around smart farming, agri e-commerce, digital ag-related procurement and digital ag-advisory was captured in this process.

A node the stage of the value chain where the value of a product is created and can be classified as being upstream in the value chain, midstream or downstream. Upstream nodes include the input and production stage. The input stage involves pre-production activities, such as sourcing seeds, chemicals, fertilizers and agricultural machinery, as well as labour and finance. The production node involves the process of growing a crop, extension support and the sale of crops to intermediaries (Apps, brokers and agents, for example) and the processing of the product. Midstream nodes involve logistics related to the intermediary processors and apps supporting them. Downstream nodes are retail/sale either business-to-business (B2B) or business-to-customer (B2C) (Reardon et al., 2019). Retail consumers can be local people, supermarkets, other processors, wholesalers or restaurants.

Sampling value chain respondents in a representative manner is complex as no census based datasets on digital players exist, nor do these firms need to officially be registered with the Kenyan Revenue Authority. To overcome this, a value chain mapping was performed through secondary data analysis, and interviews/primary data collected from the Ministry of Agriculture on farmer cooperatives, lists of retailers/wholesalers, processors and restaurants collected from Micro and Small Enterprise Association (MSEA). From these lists actors were stratified based on density in specific locations. Then a ransom selection was performed to call actors on each of these lists to develop the sample. A value chain mapping was then conducted to trace the key apps these organizations used/knew to gain a sample of the apps involved.

4.2 Distribution and Profile of respondents interviewed

A total of 24 MSEs were interviewed ranging from demand side actors include (see table xx):

- members of farmer cooperatives/groups: the treasurer or head of the farmer group was interviewed wherever possible to voice the opinion of the cooperative/group. These cooperatives/groups are located in high agro-potential zones of Meru and Murang'a. Three off the 5 cooperatives/groups, had between 40-50% women members, as well as women treasures.
- Retailers and wholesalers: owners of wholesalers and retailers, which predominantly fall into the micro enterprise category. These actors use digital means (e.g. from email to platforms) to fulfil their stocks of products (e.g. agro-chemicals, pesticide protection equipment, animal feed), agro-commodities or to utilize app based matching services to connect with final buyers. According to the MSME survey (2016) over 60% of small, mostly informal retailers/wholesalers in agriculture are women. Restaurants and ag-processing firms are also interviewed, who are predominantly small enterprises.

- Owners of agro-processing firms and restaurants, are also interviewed, these are predominantly small enterprises.

From the supply side actors which included owners of MSEs who have developed apps. The table below provides further details on the distribution of respondents (see Appendix 1 for further details). On an average apps selected operated for 5 years. None of the apps[2] selected operated for less than 3 years as this would enable understanding business-as-usual performance of the app accounting for exogenous shocks such as COVID-19. Most of these apps are small scale enterprises and a few micro, operating predominantly locally and to some extent regionally. Only two apps were dedicated to exports. Off the 10 apps interviewed, 4 specialised in frontier technologies which involved precision ag support through drones, robotics, IoT and AI. The remaining apps did use some frontier technologies such as AI, however these were mostly outsourced. All enterprise owners Only 2 apps were run by women catering to the local market.

Along with these MSEs, 7 other value chain stakeholders were interviewed, including the Ministry of Agriculture; Ministry of ICT; Ministry of Industry; Kenya Institute for Public Policy Research and Analysis; Micro and Small Enterprise Authority (MSEA), Kenya Agricultural and Livestock Research Organization and Alliance for Green Revolution in Africa (AGRA).

Table x: Distribution of key respondents by demand and supply side

Demand /Supply Side	**Actor Type**	**Average Size (no. of employee/ members)**	**Enterprise classification**	**Years of operation**	**No. interviewed**	**Women's participation (% interviewed in each actor category)**
Demand	Members of Farmer cooperatives/ groups	190 members	Groups: 60% Co-op: 40%	14	5	60%
Demand	Retailers/Wholesalers	7	Micro: 75% Small: 25%	6	4	50%
Demand	Restaurants	12	Micro: 50% Small: 50%	8	2	50%
Demand	Ag-processing	28	Small: 100%	12	3	0
Supply	Apps	12	Small: 70% Micro: 30%	5	10	20%

Table x highlights that actors have been sampled from across the value chain, and are predominantly formal (i.e. registered firms/cooperatives). Approximately 37.5% of the sample export produce and the remaining sell locally. Most of the respondents are formally registered. Only restaurants and 3 farmer groups are informal.

In the next section (5) we first explore the demand side, and then the supply side in section 6.

[2] Enterprises who own apps. In this report they are referred to as apps. The enterprise owners were interviewed.

Table xx: Distribution by value chain and product/services

Actor Type	**Part of VC**	**Formal/ Informal**	**Major markets/Export Status**	**Types of products and services**	**Modus operand**
Farmer cooperatives/ farmers	Upstream	Informal: 60%; Formal: 40%	Formal co-ops export to UK, EU, Middle East and China; Informal: local and regional sales	Exports: predominantly green beans, avocados, peas, mangoes, nuts, potatoes, onions Local: Maize, beans, tomatoes, soybeans	B2C: 60%; B2B: 40% (formal coops)
Retailers/Wholesalers	Downstream/ Midstream	Formal: 75% Informal: 25%	Local	Wholesalers primarily purchase agro-commodities to sell further to other offtakers such as retailers, supermarkets or other traders Retailers: purchase some agro-commodities, as well as ag-chemicals and personal protective equipment	B2B: 75% B2C: 25%
Restaurants	Downstream	All informal	Local	Purchase raw food items for catering delivery and sit-in dining	B2C: 100%
Ag-processing	Mid-stream	All formal	Mostly sell to retailers for export markets	Purchase raw commodities, especially fruits to convert to juices, dehydrated and frozen products.	B2B: 67% B2C: 33%
Apps	Upstream/Across*	100% formal	2 apps focus predominantly on exports to the global North (and China, Middle East); while the remaining platform-type apps focus on local and some regional	Upstream apps: provide services such as information on good agricultural practices/prices, input supplies, machinery leasing, as well as credit and insurance.** Apps operating across also provide matching services, and logistics (boda boda drivers to	B2C: 60% B2B:40%

			markets (within EAC). Apps using frontier tech are mostly B2B providing services for both exports and local markets.	pick up collection); as well as grading of products Apps with frontier tech support upstream, with robotics and drone services for precision ag. Services include: pest/disease detection, early warning systems.	

*Across: the operate across the value chain i.e. perform upstream and downstream functions.

** each service is a separate in-app purchase, these services can be bought separately or as input bundles

5. Demand side analysis

All respondents used basic infrastructure: this includes ownership or leasing of hard infrastructure: internet and telecom connectivity, computers, and tablets; and use of soft infrastructure: internet-website, email.

Therefore, this report develops four categories for the demand side that include:

- Platform (basic): social e-commerce (digital advertising/marketing)- facebook, whatsapp, twitter (less used), linkedin, youtube, Instagram; mobile payment platform, online payment platforms. This is a less complex use of platforms.
- Platforms (integrated): combined services such as inputs, information- practices, standards, diseases detection; buyer-supplier matching; grading; value-add support; user connection/network building and feedback sharing, credit monitoring/lending. This is a slightly more complex form of using platforms.
- Using both simultaneously - platform (basic) and platform (integrated): this means that some actors used social e-commerce, along with operating their own websites/payment platforms
- Frontier tech: drones for use for precision Ag

Table xx: digital tools used

Actor	Platform (basic)	Platform (integrated)	Platform (basic+ integrated)	Frontier
Farmer Cooperative/Groups	1	2	1	1
Processors	0	0	3	0
Restaurants	0	2	0	0
Retailers/Wholesalers	0	2	2	0
Total	1	6	6	1

The results in table xx below indicate that all firms fall under the micro and small category, approximately 21% of the data are cooperatives/farmer groups; 29% are micro enterprises and 50% are small enterprises.

Table xx: Enterprise classification and digital tools used

Enterprise Classification	Platform (basic)	Platform (integrated)	Platform (basic+ integrated)	Frontier	Total
Co-op (large)	0	1	1	0	2
Co-op/group	1	1	0	1	3
Micro	2	4	1	0	7
Small	4	4	4	0	12
Total	7	11	6	0	24

5.1 Motivation factors to use digital technology

Motivations are understood in terms of perceived benefits and opportunities; perceived threats averted and pressures experienced by users to uptake technologies. These factors were developed inductively from interviews that were performed with actors. Overarchingly, across actor categories the perceived opportunities related to seeking alternate markets and creating new networks, followed by possibility of higher income/savings; while the only perceived threat was losing customers and input suppliers.

The threats were eloquently elucidated by a agro-vet wholesaler using platforms(integrated): " I need XX (name anonymized) platform because my friends told me that it is very good will help me get both new customers as well as better suppliers... I always have difficulty with suppliers as they are rude and many times do not deliver my items" (Interview) A similar sentiment was alluded to by restaurants and other retailers in using platforms (integrated), suggesting that there was some level of 'ascribed trust' (e.g. a notion popularized by Schmitz 1999) given to a digital product even before using the same, because of pre-existing trusted networks deeming its worth.

Only farmer cooperatives in platform (integrated) claimed they needed to comply with buyer standards, which was a motivating factors to join platforms . In one case, because the buyer (lead firms) had developed its own apps, which required farmer cooperatives to subscribe to, and within that standard related information was codified..

for instance interviews with a farmer cooperative claimed: " the company (lead firm) man (representative) came one day and told us we has to start using the app immediately... it was very confusing to follow... but we had no choice, or else they (lead firm) told us we could sell to someone else"(Interview). Another member articulated the importance of standards adherence, " We need to use GlobalGAP or Organic, if we don't then they will reject the produce, the app gives us the types of seeds, pesticides and fertilizers we have to use....we do not have access to many of these varieties in the local shop"(Interview).

Interview data also highlighted that almost all actors using platform (I) and platform (B+I) suggested that job security, cost reductions and income growth were seen as potentially lucrative opportunities to join a platform, as one processor using platform (B+I) said " getting all services in a one stop shop makes it much easier for us to improve our efficiency..... and reduce costs, which can boost our incomes". In the same vein a restaurant owner (platform-I) said, "joining a platform increased our chances to get constant inflow of good inputs, and new customers....". However, actors using only Platform(B) did not allude to income/job security as important perceived opportunities. This is interesting, as it suggests that using more integrated digital services creates a sense of more opportunities, that using digital services more independently. In relation to frontier tech, the farmer co-op interviewed suggested that crop quality and higher incomes were key.

Table xx: motivating factors (% each actor by digital tool)

		Platform (B)	Platform (I)			Platform (B+I)			Frontier
Motivating factors		**Farmer Cooperative/ Groups N=1**	**Farmer Cooperative/ Groups N=2**	**Restaurants N=2**	**Retailers/ Wholesalers N=2**	**Farmer Cooperative /Groups N=1**	**Processors N=3**	**Retailers / Whole salers N=2**	**Farmer Coop**
Opportunities	Cost Reductions*		50	100	100	100	67		
	increases job security/ contract security		50			100	33		
	Alternate markets or customers/ creation of new networks	100	100	100	100		100	100	
	facilitates exchange of information and new knowledge		50		50	100	33	50	
	Higher income/ savings	100	50	50	50	100	33	50	100
	Ensures quality inputs/timely inputs		100	50	100		100	100	100
Threats mitigation	no other options for		50						

	customer acquisition available								
	only entry point for supply chain								
	fear of losing customers, input suppliers	100	50	100	100	100	67	100	
Pressures	Final buyer pressure: pulling out contracts		50			100			
	Standards/quality adherence for sale		50			100			

*costs of inputs, logistics etc and other transactions such as financing

5.2 Modes of support in accessing and using digital platforms

Table xx: Modes of support

	Platforms (Basic)	**Platforms(I)**	**Platform (B+I)**	**Frontier**
Farmer cooperatives /groups	purchased with savings most have basic digital skills acquired through support from family and friends, no grants or trainings provided	Registration on the app was free, with support from representatives of the app, or friends already using the app. No government support was provided to join the app There was training support from app representatives in the way of demonstration days. Incase of farmer groups/coops- there was also informal training conducted within the group by farmers who were proficient in using the app. co-operative members.	Registration on the app was free, with support from lead firm representatives/ platform representatives For farmers/cooperatives: farmers joining exported produce to high income countries. Thus, there was trainings provided from sub-county government offices . Use: training is conducted on a monthly basis by the sub-county government extension officers; and one-on-one support given to appointed village champions (by the lead firm in conjunction with extension officers) who could provide support on a one on one basis.	Subsidy given by the supplier (company providing frontier services) to farmer coops to use the app. Trainings were conducted on training days set by the supplier, these were free.
Processors	Some training was provided through online course material to use payment platforms, and manuals/online tutorials were provided to use social-media platforms and whatsapp	NA	Registering on the app was free, but paid to access services once joining the platform. The platform worked with NGOS (such as Technoserve) that provided training to use the app. However this was not done frequently. Often Processors were able to call/use app to get in touch with app representative whenever required, to help with support.	
Restaurants	Some training was provided through online course material to use payment	Registering on the platform was free (due to grants the platform received from donors), payment required for different services. Online short video material was provided, as well as written support on how to use platforms.		

	platforms, and manuals/online tutorials were provided to use social-media platforms	However, these were often not very clearly explained. No government support was given for trainings, however, there was ad-hoc training days organized by the platform.	
Retailers/ Wholesalers	Some training was provided through online course material to use payment platforms, and manuals/online tutorials were provided to use social-media platforms	Registering on the app was free, but paid to access services once joining the app.. No specific training provided, but trainings days could be organized when retailers/wholesalers called/connected with platform representatives.	

5.3 The centrality of data

Data collection, collation, analysis and feedback are critical to the functioning of digitally driven value chains (Foster et 2018). The table below highlights the key data flows, the control, transparency and agency of data.

Incase of platform (B), using social e-commerce such as facebook and Instagram (and whatasapp) was seen was 'non-invasive' or normal by the farmer cooperative . Other actors who also used Platform (B) – as an addendum to using the integrated platform, did not particularly find the terms of use on social e-commerce as a significant cause for concern, as they believed they had control over the type of data they wished to put online. However, actors using online mobile payment systems, and those who stored their financial details online, questioned whether their data was being 'packaged and sold' to third parties. As one retailer said, " it is hard to understand the cookie policy...we just accept....but I worry if we don't accept... then maybe we won't get a full range of services".

With relation to those using platform (integrated), data collection and control seems to occur at three stages by the platform- at the point of registration, transaction and outputs (which is collected in an ad-hoc manner either in person through app representatives or through surveys sent via the platform). It is critical to note that most of the information is uploaded directly by the actor, thus it is a self-reported. There is significant evidence on biases accruing due to self-reported data but there are also benefits that help gain insightful information (e.g. Stone et al 1999). In relation to farmer cooperatives, data was collected at the point of registration, which includes demographic data, personal and sensitive data about social identification numbers, data on land, yields, income brackets;

Farmer data was also collected at the transaction level, when services were demanded online;

Finally data was collected ad-hoc through agricultural seasons on output variables such as yields, quality of service. Overarchingly, data was controlled and stored either by the platform or the lead firm. Some of the platforms suggested they shared data with banks, input providers (normally large

firms such as Monsanto) or intermediary firms (e.g. Cargill) for a price. In some cases, data was shared with sub-county agricultural offices, but this was not in full. Analysed data that was collected by lead firm owned platforms, was shared with the head office/other subsidiaries.

Some of the platforms were able to use sophisticated AI techniques to clean and analyse farmer data to enhance services, improve targeting; however, many of the platforms interviewed in this study did not have in-house AI services and thus either 'did nothing' with the data or sold part of the raw data to banks/creditors; or some paid hefty price tags to get data analysed.

Farmer data was not shared with the farmer cooperatives in full. At times, overarching estimates were shared, which showed average yields or credit worthiness data. Farmer groups had little agency in terms of gaining access to data. One farmer group member mentioned: " if we ask for our particulars... what is stored on the app.... We are told nothing.....it makes us not trust what the app will do with our information" . Interviews with farmers suggested that it would be easier to not declare all information to the app, as there was limited transparency. Another farmer said: " I started getting calls from a bank asking me to take out a new loan.....they knew all my bank details.... this made me feel nervous, how could they know... it must be through the app"

With regard to restaurants/retailers on platform (integrated), data is collected at the time of joining, including specifics on the types of products required by the processors, quality considerations, price considerations (for demand management); and sensitive information including banking details and company particulars. Data is then collected at the point of transactions. At the point of transaction data on the matched supplier/farmer and their produce is published. This allows restaurants/retailers to connect through the app. Finally, a short survey regarding quality of the app and the net benefits accrued is usually deployed. Retailers/restaurants have a higher degree of power in the relationships with SME apps as compared to farmers. While raw data is not shared with processors, they are easily able to reach the app and ask for details on what has been collected and how it is stored if they choose. However, information regarding suppliers/farmers is often not shared, as this will reduce the power and leverage the app has on processors. Interviews with processors (using integrated apps) all echoed that the app would now allow for follow-up conversations with suppliers, or would often edit conversations, to prevent identification of the supplier.

Many of the processors/retailers using platforms(B+I) echoed that they felt a clear tension in relation to how integrated platforms were using their data, while were less concerned about how social e-commerce platforms were using their data. Essentially, it appears to be an 'active' versus 'passive' relationship, wherein for integrated platform personal data is actively shared and collected on a real time basis, which is often analysed, and results are reported back. It is ambiguous to these actors how data is used, and unclear how to gain access to it. However, data collected by mobile platforms, social e-commerce is considered passive, in the sense that, while they also collect real-time data, this data is very specific i.e. to what processors/retailers wish to publicize or specific financial/buying or selling information. Processors believe sharing such data with different actors in different parts, is less of a concern compared to integrated apps who can collect much more detialed data on all activities of the actor.

5.4 Pathways of impact

Economic upgrading is defined in terms of improvement in value-add opportunities for actors in value chains; while social upgrading uses decent work principles to account for measurable and im-measurable improvements (Barrientos et al 2011). The economic and social upgrades explicated are shown in the table below, with retrospective data collected from 2019 to indicate whether there has been a change over time. Important to note that all actors were affiliated to the same apps through this time. This helps gauge if participating on apps was beneficial or not. Data in table xx was captured between 2019 to 2022, to gauge whether there was any value creation or enhancement that took place in terms of economic or social upgrading.

Overarchingly, the results in table x indicate for farmer cooperatives, economic downgrading occurred in terms of revenue, where prices per ton either did not change or fell under all cases. The primary reason cited in interviews was the lack low prices in contracts, and low bargaining power of farmers/farmer groups, rather than anything specific related to use of digital tools. Almost all farmer groups/coops experienced upgrading in terms of product diversification. This was elaborated by a farmer in one of the groups (platform-I): "the app is a one stop shop so we can buy all what we need, along with the information they provide on weather and prices, we can plant seeds and harvest with more certainty.. this gives us confidence to grow other crops as well" (Interview). While farmer groups/coops using platform(basic) seemed to suggest that social e-commerce, especially joining the right Facebook groups, posting photos on Instagram, and having a strong LinkedIn profile was seen as ways to increase customer bases, while simultaneously marketing new products. Interestingly the results elucidate that farmer groups using platform (B+I) did not seem to have very different results to those using platform (b) or platform (I). For the farmer group using frontier technologies' the results suggested that there was a significant improvement in crop yields, which was as expected with drones providing a method of 'scouting' i.e. early detection of pests/diseases through ariel means; and precision sprayers enabling targeted pest removal.

In case of restaurants, processors and retailers/wholesalers, almost all respondents reported upgrading in terms of new markets and suppliers, Most also reported product diversification, as explicated by a wholesaler using platform (integrated): "I need XX (name anonymized) platform because I can use the matching service to find new customers in Nakuru and Meru, my current customers are reducing because they can buy online with others..... but now I can also make new relations with my suppliers and find better ones" (Interview: S2). Similarly, for farmers using platform (b) the results indicate that self-promotion of marketable produce, through photos, was seen as a meaningful way to market new produce. Albeit the costs related to marketing (e.g. hiring a professional photographer etc) were seen as high. Downgrading was experienced in revenues, similar to that of farmer cooperatives, again reasons cited overall prices of products, non-existent base support prices and lack of existing commodity markets as key reasons for lower prices received.

In relation to social upgrading, farmer cooperatives generally experienced no change or downgrading in terms of contracts, working hours and bargaining potential (exception for those using platform B+I). For instance, a member explained (Platform-I): "we need to work longer to make sure we are reporting data in the app etc, and comply with all the good practices, because the buyer may reject our produce if the quality is not as good, then we usually have to give the rejected produce to the cows and chickens" (Interview). On the other hand, farmer groups using platform (B+I) suggested that being able to have a side business of side selling (and own marketing) provided an alternate place to sell produce, and also gave them more legitimacy and reputational capital to be able to sell to multiple buyers, and bargain more better prices. Despite this, the better prices often were lower the living incomes.

In relation to processors and retailers/wholesalers many mentioned being part of micro and small enterprise associations, however they did not experience any benefits by being part of them. Some (those using platforms (B+I) explicate a bit more bargaining potential to keep prices of procured products down, however, in general there is no clear social upgrading that has taken place (See appendix 3 for table).

5.5 Challenges to digital integration

The high cost of financing/credit was mentioned as a key challenge by all actors interviewed regardless of the digital tools used. For instance, farmer coops/groups mentioned that high cost of credit, lack of support through banks; and the loans provided by the app were small with high interest rates (which are not capped).

Furthermore, the credit history data collected was only allowed to be used for commercial purposes, and not non-commercial (e.g. supporting a sick child). Restaurants/retailers mentioned that mentioned banks had high interest rates and apps did not provide any support in accessing finance; or giving delayed payments.

Users of Platforms (B+I) particularly mentioned the high costs of running, especially internet costs, as they were using the internet for an average of more than 11 hours/day actively, compared to less than 6 hours by platforms (B) and about 8 hours by platform(I). Poor quality of infrastructure was cited as an issue across all actors.

Interestingly, given the discussion around digital divides (in terms of use of digital tools) issues around digital literacy were not considered of high importance. That is, None of the actors specifically complained about lack of digital literacy as they were all able to have access and use mobile phones and various apps or have social networks who would support the process.

One of the most common issues brought up by users of Platform(I) was the costs of using platforms. For instance, farmer/farmer groups all complained of the high costs, specifically in-app purchases and premiums to pay for purchasing input bundles. Many felt they could not pick and choose what they needed, but rather had to invest in the bundle of services provided. This left very low margins. Those specifically linked to lead firm platforms said that, while the lead firm would subsidise the cost of the app, but the high costs of in-app purchases, and the expensive products that needed ot be used as inputs negated any benefits. While restaurants/processors complained of the continuously increasing costs of products on the app for no specific change in the quality.

Another issue that was uniformly suggested as important, across all respondents using platforms (I) was some form of dispute management system. For instance, farmer groups/coops suggested that No dispute settlement protocols in place for farmer's to gain more information around rejections, delays in inputs, wrong inputs received or no show by buyers. All restaurants mentioned: While there was no dispute settlement mechanism, the app could be contacted by restaurant. Although it was mentioned the quality of interactions were not very good, and that usually issues around poor product quality, late arrival of produce or problems with suppliers were not resolved.

An important issue of users of platform(B) was hiring specialists. Farmers coops/groups mentioned difficulty in hiring advertising, and data management specialists with experience in the sector. And those who were qualified were very expensive. While, processors using platforms (B+I) stated that IT specialists, and data management/analysis (especially inventory demand-supply management) skills lacking.

In terms of algorithmic transparency, farmer groups using platform (b) mentioned that in Facebook or Instagram general searches, despite having a large number of followers/likes their account hardly ranked very high. Their website also has less traffic because of inability to rank high in SEO. While farmer groups/coops using (platform B+I and platform I), complained about not being able to understand how matching services worked. One farmer explained: "we tell the app that we are ready to sell, and sometimes it takes almost 6 weeks to find a seller, we cannot store our produce, so we have to find alternate ways to sell... and if we do that.... Then we get blacklisted as a supplier... it is a catch 22". Other farmer groups interviewed echoed similar experiences. Farmer groups using Platform (I) complained they had difficulty "reading the small print of the app". For instance, one member complained that "they (app) rejected 20% of my produce, and stated quality reasons, I saw nothing wrong with the quality.... When I tried to question them, no one answered my calls and I was not able to get in touch with anyone" (Interview). Similar to farmer groups, retailers/wholesalers (using platform I) failed to understand how search algorithms work, especially when it came to seeking specific products (often wrong matches were created); and there were very limited ways in which buyers for products could be contacted on the app.

6. Supply side analysis

On the supply side, the MSEs who serve farmers/farmer groups/coops as platforms are segregated into (see table xx below):

- MSEs that have developed apps that farmers use which offer integrated services, this includes frontier services (8). That is 80% of the sample served retailers/processors and restaurants, farmers/cooperatives. From this only 20% of the firms are owned by Kenyans and the remaining by foreigners (British, American or Dutch). The services include: good agricultural practice information, inputs (agro-chemicals, seeds), loans/credit, crop insurance; as well as satellite imagery and mapping, precision Ag services (which uses AI, Machine learning).
- MSEs specialising only in frontier tech service. One enterprise provides drone services to farmers for tracking crop progress, land mapping, and for broader land use purposes. The second company, provides autonomous chemical sprayers which are attached to tractors or combines which have installed GPS for precision spraying. They use IoT tech. This makes up 20% of the sample, all serves farmers/cooperatives. These are all B2C.

Actor	Integration	Export/ Regional and local	E-commerce operation	ownership	Gender	Formal/ informal	Position in Value chain	Location	no. registered	no. of frequent users (% of registered) *	Mode of use
Firms 1	All services	regional	B2C	kenyan	male	Formal	Upstream	Nairobi	160000	5%	USSD and andr oid
Firms 2	all services	regional	B2C	kenyan	male	Formal	Across	Nairobi	35000	3%	USSD and andr oid
Firms 3	All services	regional	B2C	kenyan	female	Formal	Across	Nairobi	2000	10%	USSD and andr oid
Firms 4	All services	regional	B2C	foreign	female	Formal	Upstream	Nakuru	60000	10%	SMS, USSD, andr oid
Firms 5	All services	export	B2C	foreign	male	Formal	Across	Murang'a	7500	5%	andr oid
Firms 6	All services	export	B2B	foreign	male	Formal	Across	Nairobi	800	10%	andr oid

Firms 7	All services	export/regional	B2B	foreign	male	Formal	Upstream	Nairobi	250	-	android
Firms 8	All services	export/regional	B2B	foreign	male	Formal	Upstream	Nairobi	700	_	android
Firms 9	Only frontier	regional	B2C	foreign	male	Formal	Upstream	Nairobi	450	-	android
Firms 10	Only Frontier	regional	B2C	foreign	male	Formal	Across	Nairobi	450	-	android

Tabe x: Sampled MSM

6.1 Challenges to app development and expansion

Inductively through interviews, an array of challenges have been unpacked. Suppliers include, (a) service providers such as Data processing centres/web service providers/mobile money, food advisory services, local computing services, Application programming interface (API) developers; (b) service partners telecom providers- Safaricom, Airtel; (c) capital providers- banks, donors, DFIs, (d)other firms they deal with to develop services; (e) outsourced companies providing AI services, drones specifically for MSMEs providing all digital services, etc . As well as customers, (a) final buyers of their products (e.g. farmers, restaurants, ag-processors), and (b) government/other intermediaries hired to help diffusion and uptake of the app.

ease/difficulty of supply-side MSEs to negotiate with suppliers about input and service costs and offerings: 6 of the 8 all-service MSMEs reported difficulties in negotiating with suppliers: Issues of high dependency specific suppliers such as Safaricom for telecom support, and high costs associated with this. Furthermore, most of the input suppliers such as Monsanto and Amiran, in Kenya are large incumbents, thus there is a need for MSE platforms to negotiate with these large firms, as well as with large banks and insurance providers to develop competitive input bundles to sell on their app. This posed a significant issue to all MSEs interviewed, who said that they were not able to gain competitive prices, reduce premiums or interest rates on credit that farmers and app users would need to pay. This was explained by one MSE " we are a small company, we started this initiative hoping to help farmers, but how can we help when we ourselves cannot sustain ourselves if we cannot get good deals". Additionally, it many platforms were not able to get much premiums from the sale of input bundles to their own customers. While the Frontier only MSEs, mentioned dealing with the Kenyan government difficult especially because there was no obvious support provided to them.

Technology transfer and skilled professionals: 60% of the all-service MSEs complained that they had difficulty maintaining and updating software systems, because of lack of skilled professionals available with coding and data analytics skills. While the remaining 40% due to having higher amount of funding were able to develop more sophisticated systems.

Financing: All respondents complained about difficulties with funding. At present most of the firms have Seed or early funding (Series A), with only one group having Series B funding. This funding came predominantly from venture capital investments, donor and philanthropy support. None of the respondents were able to get loans from local banks or lines of credit. An important aspect to highlight here is that both Kenyan owned firms had substantially less funding and were also unable to join several accelerator programmes, unlike foreign owners.

Lack of government support/subsidies: The results echoed by all respondents was the minimal/no government support in terms of subsidies or making business easier on the ground. 40% of the firms though did mention some support from extension officers when diffusing training. However, this was not quite enough and occurred infrequently. Furthermore, as mentioned in section 3, there are no special support given to MSEs in the digital economy

Trust with own suppliers: There is mixed evidence of trust with suppliers, specially related to all-service MSEs. 60% of the respondents mentioned relationships with telecom providers are poor, with low levels of trust. Primarily because of heavy charges, lack of ability to negotiate for better terms.

Furthermore, during times of shocks like COVID-19 most of the service providers did not offer ant support/or accept delayed payments, which further worsened relationships.

Customers:

Loyalty to the app and frequency of use: In almost all cases special support was given to customers/users of these apps from the MSEs , as the android based apps require knowledge transfer support to use. For instance, the use all the features of the app fully, especially frontier tech such as satellite data for remote sensing, drones for aerial views of land and crop progress. Th MSEs interviewed suggested that loyalty and giving a good customer experience was critical to them, as they were providing very niche services of drones, precision chemical sprayers; and early warning AI data on diseases/pests. Thus, all the apps hired local professionals or teamed up with extension officers to offer support on the ground to processors, retailers/wholesalers; and other apps.

Dispute mechanisms and complaint handling: There were no formal dispute handling systems in place, only specific types of users such as processors or slightly larger firms were able to reach the all-service MSEs. The MSEs hired extension workers, sometimes acted as middlemen to avert complaints. The poor dispute settlement situations often ed to de-registration or reduced use.

None of the frontier tech MSEs claimed to have dispute handling systems in place, where customer complaints were reviewed frequently through the app or through phone calls. However, interviews with customers suggested that the response or support was mixed and not always delivered in a timely manner.

6.2 Models of accessing support

The ecosystem for digital integration in Kenya is thin on the supply side as well. There are som einitatives directed to support MSMEs more boradly rather than specifically digitally integrating. One example for supporting MSME digital integration is the - MbeleNaBiz Business Plan Competition ("MbeleNaBiz") is an initiative of the Government of Kenya, under the Kenya Youth Employment and Opportunities Project (KYEOP). MbeleNaBiz is implemented by the Micro and Small Enterprises Authority (MSEA) and the Ministry of ICT, Innovation and Youth Affairs (MIIYA), with support from the World Bank. 'MbeleNaBiz' aims to create new and expand existing youth-led enterprises by providing them with grant financing and/or business training in ICT related skills[3]. This schemes ran between 2019-2021, and has 741 beneficiaries across Kenya.

In December 2022, The Centre for International Private Enterprise (CIPE) in partnership with The Kenya National Chamber of Commerce & Industry (KNCCI) and the Micro and Small Enterprise Authority (MSEA) have begun discussions on a PPP driven MSME digital support. The aim iso build key strategic partnerships. The key areas:

- **Digital skills training and development/awareness**: Use a Public Private Partnership (PPP) approach; and Strengthen linkages between MSEs and other industry players through Business Associations (BA)
- **Internet and equipment access costs:** the government plans to use taxation and subsidies to reduce overall costs.
- **Cyber Security:** push for the development of user-only security technology.

Thus far, none of the partnerships have come to fruition. Most MSMEs continue to be dependent on donor or venture capital driven funding.

[3] https://msea.go.ke/mbelenabiz-programme/

6.3 Centrality of data

Not very different findings from section above on data.

6.4 Pathways to impact

The table below unpacks economic and social upgrading

	Value Creation Indicators	**All-services (average change % between 2019 to 2022)**	**Frontier only (average change % between 2019 to 2022)**	**Value creation (+) or lost (-)**
Economic	Annual revenue/sales value	+ 15% (primarily due to increase in use)	+10% increase due to higher demand	+
	Annual profit margins	-10% (due to higher costs of inputs)	No change	-
	Product diversification	All respondents interviewed alluded to stating they diversified products introducing new services such as insurance and sustainable intensification through support from educational institutes such as KARLO, CSOs such as Technoserve and international philanthropic institutions,	NA	+
	Productivity (Outputs/Inputs)	Only 50% of the MSEs suggested an increase in productivity averaging at about 10%, while most others suggested no real change.	None of the firms suggested any productivity gains,	-
	Investment in new assets	All MSEs interviewed mentioned they invested in new assets. Mostly in the form of new laptops, new office spaces, faster internet and some specialised assets specific to the needs of the company.		+
Social	Current Employees	On an average there was a +20% increase in staff numbers, to meet the expansion of new products/services	MSEs reported a fall of 30% in number of employees post-COVID due to dwindling demand.	-
	Employees on permanent /part time contracts	Off the new hires, none were employed on permanent contracts, they were all on precarious short-term contracts of less than 1 year		-

7. Analysis

Demand side analysis:

Perception holes

The results from the upgrading (table xx) when compared to the motivations (table xx) leads to the existence of 'perception holes' i.e. these are when motivations to join/ perceived opportunities are not in line with actualised economic or social upgrading on the ground. Interviews across actors suggested that this led to an erosion of trust that was ascribed to the app at the start of the relationship. The data shows that the biggest perception holes, occurred in actors using platforms (I) and platforms (B+I) forms of digital integration in relation to revenue earned. None of the respondents suggested an increase. In contrast, there was a perception that was 'met' in relation to new markets/customers and suppliers reached. However, this as suggested did not translate into better incomes.

Equitable development

This report will unpack equitable development in terms of, access to productive inputs/markets, economic opportunities – job security, income; and agency and trust. In relation to equity in access, MSEs/farmer groups using platform (Basic) broadly highlight that while access to digital tools such as social -e-commerce is relatively simple, the costs of hiring professionals for digital marketing/advertising are relatively high and not always feasible for MSEs. Furthermore, trust erosion is common with the prevalence of algorithmic opacity of lower SEO rankings despite the likes on Facebook/Instagram. Furthermore, economic opportunities in terms of increased income/savings were pretty low, as was bargaining potential. In general data use by social e-commerce platforms/WhatsApp was not seen as a serious threat, and MSEs/farmer groups did not feel 'devalued' in the sense of data loss/theft.

Platform (Integrated) users were seen as those that all had access to join the platform as registration was free, but in-app services were expensive. Furthermore, the lack of data sharing, along with limited training provided, often led to asymmetric data sharing, and poor network relationships. These tensions, often led to economic and social downgrading with less bargaining potential, lower incomes and poor working conditions. But it did support product diversification, increasing market bases. The lack of sharing data often led to lower levels of trust, and reproduced the lack of agency for actors to negotiate with platforms.

Summary table

Level of digital integration	Information and exchange linkages	Production linkages	Market Linkages
Platform Basic (MSMEs using only whatsapp etc)	Do not get curated and real time information, but many believe that they have autonomy in how they market/interact with customers and suppliers	Small productivity gains	Limited market access, with limited diversification.
Platform Integrated	More information available, although there is limited autonomy and trust with the platform	Limited productivity gains	Increase in market access

Supply side analysis

Equitable Outcomes

Broadly, the results show that digital integration occurred mostly as a choice, but sometimes based on peer pressure. MSEs who provided all digital services, predominantly entered the market because they saw financial opportunities or for filling in gaps in services. However, none of the MSEs interviewed, claimed they were financially stable i.e. none of them had business revenues that led to breakeven. All were dependent on donor or venture capital funding for their day to day activities. Many branched out by diversifying through putting ads on their products to farmers/cooperatives/restaurants; or sharing data with banks/insurance providers/ input suppliers, to generate alternate streams of revenue. In-app purchases of farmers were not enough to cover day to day expenses.

MSEs providing digital services were dependent on large supply side players e.g. Telecom providers, fintech companies and banks to help create both legitimacy as well as safer payment gateways on their platforms. There are limited alternatives in the Kenyan market making it rather difficult for MSEs to operate without these large players.

All MSEs reported there was considerable autonomy in designing the platform (is they left out telecom providers). They had freedom to design what the input bundle looked like (e.g mix of different chemicals, credit facilities, real-time information, etc). However, when trying to provide some frontier services such as AI, IoT this was expensive, and usually not performed in house. When performed in-house then specialists who were internationally based (in the USA/UK/Netherlands/China) were hired. This was expensive and often not viable.

The broader ecosystem as mentioned is not conducive, with almost no support from the government to gain better quality digital infrastructure to operate. When digital skills training is provided, these often do not cover frontier services such as AI, and more focused on less complex ICT skills.

Overarchingly, MSEs owning platforms fill an important governance gap- by providing farmers etc with digital services, however, this does not seem to have led to significant gains as explicated in section 6.4

8. Gender

In terms of users, the results in table x indicate that women used predominantly platform (I), compared to men who using both platform B and I.. Thus, men seem to have higher level of digital integration than women. From the sample women led MSEs included retailers and restaurants, and were mostly informal and micro enterprises, downstream in the value chain. However, 3 off the 5 farmer groups/cooperatives interviewed were run by women. [4]

[4] The MSME Survey (2016) established that distribution of MSMEs by gender of business owners was as follows: 47.9 per cent of the licensed establishments were owned by males; 31.4 per cent owned by females; and 20.7 per cent were jointly owned. Further, 60.7 per cent of unlicensed establishments were solely owned by females.

Table xx: Users distribution (demand side)

	Male	**Female**
Digital tools	Platform (B): 1 Platform (I): 2 Platform (B+I): 5	Platform (B): 0 Platform (I): 5 Platform (B+I): 1
Farmer Cooperative (% of FC)[5]	40%	60%
Retailer/Wholesaler(% of RW)	50%	50%
Restaurant (%)	50%	50%
B2C (% of total) *	57%	43%
Exports (%)**	65%	35%
Formal Enterprise (%) ***	57%	43%
Size of enterprise (Micro/Small) %	Micro: 21% Coops: 21%	Micro: 7% Small:35% Coops:14%
VC position (% total)	Upstream: 14% Midstream: 7% Downstream: 21%	Upstream: 14% Midstream: 29% Downstream:14%

*remaining are B2B **remaining local markets *** remaining informal

In terms of suppliers/providers, the table below illustrates that all women run platforms were running all service platforms, and all catered to B2C and local markets. They were all formal enterprises operating both upstream and across the VC. Overall, they had lower number of registered farmers, but a higher rate of frequency of use.

Table xx: Suppliers distribution

	Male (N=8)	**Female (N=2)**
Digital (%)	Platforms: 67% Frontier spec: 100%	Platforms: 33%
B2C (%) *	50%	100%
Exports (%)**	25%	0
Formal Enterprise (%) ***	100%	100%
Size of enterprise (Micro/Small) %	Micro: 25% Small: 75%	Micro: 50% Small:50%
VC position	Upstream: 50% Across: 50%	Upstream: 50% Across:50%
No. of users registered (average)	42950	4000
Average % of frequent users	6%	10%

*remaining are B2B **remaining local markets *** remaining informal

8.1 Motivations and modes of access to digitally integrate

Interviews with respondents on motivating factors are depicted in table x below. The results show that for female users perceived opportunities for joining were related to creation of new networks and alternate markets, ensuring quality of inputs and job flexibility; as well as ensuring quality supply as a key pressure. This was quite different to that of men, who were motivated by increase in job security, possibility of higher income and savings.

[5] The cooperative/group is said to be female driven, when women were treasurers

This was elucidated by a women owned retailer "I used to go to multiple warehouses to look for products (chemicals, fertilizers, etc) but now by ordering online I can save that time to spend with my children or run family errands... I am not sure I get the best deal but my time matters more" (Interview). While a female run co-op member said "I want to put my name next to a good product that I can be proud of... that my children can be proud off. I will sell the quality I want my family to eat...customers will notice". (Interview). In sum, it implies that women were more driven by optimizing products, rather than by perceiving higher remuneration. The results for suppliers/providers suggested that both male and female run apps were keen on alternate markets and creating new networks; as well as higher savings; but where they differed was again on job flexibility, with women emphatically stating being self-employed running an app gave them more chance to spend with family and the ability to organize tasks in sequences that worked for them.

In terms of modes of access, Women users echoed that basic training was provided by the app when registering but after that the response from the MSEs was mixed, as one women retailer explicated, " when the app hangs or my request does not go through, I try and get in touch with the app representative, but they say they will get back to me and then don't for many days....." (Interview). Another woman member from a co-op explained "at the point of registration, they spin great stories of how this will change our lives....but how can it change our life when they (app) don't show us how to use it" (Interview).

While interviews showed that the response rate and the frequency of training given to men run MSEs was more than that of women. Two factors were inductively gleaned from the analysis, first because apps felt more threatened/ intimidated by men and would often cater to their needs faster than that of women; and second social networks of men were larger and often in more powerful positions than women, which enabled them to get better access to digital services.

Table xx: gender dynamics: motivating factors to digitally integrate

		USERS				**SUPPLIERS**	
	Digital Integration	**Platform(I)**		**Platform (B+I)**		**MSE Platforms**	
	Motivation factors	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
Perceived opportunities		(N=5) %	(N=2) %	(N=1) %	(N=5) %	(N=2) %	(N=4) %
	Transaction cost reductions	20	100	0	40		
	increases job security/ contract security	40	100	0	40	50	100
	Alternate markets or customers/ creation of new networks	100	100	100	100	100	100
	facilitates exchange of information and new knowledge	80	50	100	40	0	0
	Higher income/ savings	40	100	0	100	50	75
	Ensures quality inputs/timely inputs	100	50	100	20		
	Job flexibility (to spend with family, ability to organize tasks at own time)	100	0	100	20	100	25
Perceived Threats							
	fear of losing customers, input suppliers	100	100	100	80	NA	NA
Pressures	Supplier/ buyer pressure: pulling out contracts/deals	80	100	100	40	NA	NA
	Standards/quality adherence for sale	100	50	100	20	NA	NA

8.2 Challenges faced when digitally integrating

In order to nuance the differ ways in which men and women led MSEs experience challenges, a grid was created ranging from:

- Low: the challenge is not serious and easily surmountable.

- Moderate: the challenge is considerably difficult to surmount, but can be overcome within the existing systems

- High: the challenge is extreme and needs more systemic change- there needs to be considerable change in regulation and support for different stakeholders (e.g. the app, government, CSOs) to support this

The table below highlights the gendered challenges faced. The number in each column refers to the number of men or women who mentioned they faced the challenge. The green colour indicates that men/women gave the challenge a 'low' rating, orange is a moderate rating and red is a high rating.

Overall, in table x, the results suggest that both men and women find that the lack of finance in terms of credit lines, availability of loans, good quality-low premium insurance products, and the landscape of investments in Kenya for MSEs in quite risk averse, therefore almost all these organizations have invested own savings/SACCOs or sought funding through donors, philanthropy, family/friends or venture capitalists. This was highlighted as an issue of 'high' challenge, wherein considerable change needs to take place in hard law to alter the situation. At present, within the MSME Act there is no guarantee or support of funds to MSEs, nor is there any special fund that can be disbursed through banks with low interest rates that can be used by MSEs. Furthermore, IT parks and EPZs joining criteria requires firms to be of a mediums scale size with a turnover threshold, and all these firms do not make the criteria, and are therefore locked out of tax benefits as well.

Furthermore with many female led MSEs being informal, there is even less chance of formal financing Another issue the lack of skill availability, especially skilled professionals who can code across softwares to update the platform, perform machine learning to develop algorithms, and have good experience in digital sales/marketing. With many of young graduates getting jobs outside the country, there is a significant dearth of skills within. This challenge is moderate, in the sense, that with the right incentives from the job market, and the government it would be possible to ameliorate. The lack of government subsidies is another moderate challenge, plans have been made to lobby the government through MSEA with support from KAM. The three stark differences across women and men led MSEs are in terms of dispute management and bargaining potential, which are moderate to high challenges for women but relatively low for men. Interviews explicated that women felt they were unable to negotiate good terms of contract with suppliers. These contracts were almost never written and kept changing depending on what the supplier wanted/ expected. Furthermore, there were no dispute management protocols in place which meant often women were not able to resolve complaints/issues. For e.g. women retailer stated, "the app xxx does not listen to me, I wrote complaining about wrong inventory delivered, and there was no response for 4 days, that is a huge loss to me, who will bear the costs?"(Interview). Another important issue faced was harassment and violence, women across the board claimed they faced mental and sexual harassment from male clients/colleagues at various times. Since these companies are micro and small enterprises they do not have functioning HR codes, and there is very little recourse available at a national level (see section 10). **Thus, there is clear digital disparity that prevails with biases towards supporting men over women.**

Table xx: gender dynamics: challenges

	USERS				**SUPPLIERS**	
Digital Integration	**Platforms (integrated)**		**Platforms (Basic+integrated)**		**MSE Platforms**	
Challenges	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
	(N=5) %	**(N=2) %**	**(N=1) %**	**(N=5) %**	**(N=2) %**	**(N=4) %**
High costs of capital investments and running/participation costs	100	100	100	80	100	75
Difficulty getting finance (credit/loans)	100	100	100	100	100	75
Lack of digital literacy (advanced)	60	50	0	20	0	0
Poor quality of location infrastructure	80	50	100	80	100	100
Hiring specialists and trainers (marketing/advertising/ coding/IT/ data management and analysis)	80	100	100	80	100	75
Difficulty in bargaining and negotiation	100	50	100	40	100	50
Lack of Accountability: dispute management	100	50	100	60	100	50
Lack of government support/subsidies	80	100	100	100	100	100
Low trust with customers/suppliers	40	100	0	80	50	75
Lack of Algorithmic transparency	100	0	100	40	NA	NA
Complex Platform rules and use	80	50	100	40	NA	NA
Harassment and Violence faced on the job	100	0	100	0	100	0

It is critical to mention the issues **around digital trust** in the study, interviews found that women in general tend to spend more time building relationships and therefore try to create 'earned trust' before they make commitments of participation, unlike men who move quickly into new relationships even with distrust.

8.3 Upgrading and digital parity for women led MSEs

Given that women face uneven opportunities to use and access digital products, the upgrading potential also shows some variation. The results suggest two spaces where deep inequalities exist within economic upgrading i.e. annual profits which have fallen more women than men across all forms of digital integration, as well as product diversification, which is generally lower for women than for men. Interviews with women suggested that they preferred to produce good quality products/services that they thought would work rather than spread themselves too thin.

In relation to social aspects predominantly women experienced greater levels of downgrading than men, especially due to increased working hours. As a women led restaurant MSE stated " I thought joining an app meant most of the running around would be taken care off for me... but no... instead I run behind the app to make sure I get the quality I need... I might as well run around myself... it will take less time" (Interview). The other issue that was blatantly obvious was the worries around harassment and violence with suppliers/buyers.

Table xx: Gendered upgrading

	2019 to 2022	**USERS**				**SUPPLIERS**	
		Platform (I)		**Platform (I+B)**		**MSE Platforms (all services)**	
	Upgrading	**Women (N=5)**	**Men (N=2)**	**Women (N=1)**	**Men (N=5)**	**Women (N=2)**	**Men (N=4)**
Economic	Annual revenue/sales value(average % change)	+5%	+5%	+10%	+20%	-5%	0
	Annual profit margins (average % change)	-5%	+5%	0	+5%	-20%	-5%
	Product Sophistication (avg ch. no. of products value added)	+20%	0	0	+20%	+10%	+15%
	Product diversification (avg ch. ln no. of products)	0	+10%	0	+20%	+5%	+20%
	Avg change Productivity (Outputs/Inputs*)	Marginal decrease	Marginal increase	Marginal increase	Marginal increase	Marginal decrease	Marginal increase
	Investment in new assets	None	Cold Store	Packaging	None	New office premises, new hardware	New hardware

Social	New digital capabilities acquired (knowledge transfer)	No	No	No	Yes	Yes	Yes
	Working hours	Increase	Decrease	Increase	Decrease	Increase	Increase
	Unionization /associations	No	Yes	Yes	Yes	No	No
	Harassment and Violence/ fear	Yes	No	Yes	No	Yes	No

*not accounting for labour time

8.4 How are consciousness, capabilities and social norms shaping digital integration

Overarchingly, the results suggest in terms of capabilities, resource control and broader social norms, women users face very similar issues. Across the board women users and suppliers, societal norms prevailed. For instance, women echoed that they has some control over intra-household decisions, such as how much time they could spend working or how they could spend savings, but often they had to compromise depending on what was expected by older members in the family or the husband (table xx below). Women owned apps were generally more educated, stated that their family structure was more supportive, and they many a times did not need to make hard choices or compromise. However, women generally echoed the importance of family, which was less common in conversations with men in the sample, thus women would always make decisions keeping family well-being in mind, as stated by an women run app owner, " I can't always do as well as my male counterpart because he spends 24 hours at work... talking to the UK and USA...looking for funds and support..... but I do not want to spend all my life working... I have 3 children under 8 who need my time and energy... I am a mother first and a CEO second" (Interview). Thus, women were not only expected to have greater responsibility at home, but many women also felt it was their duty.

In terms of resources, interviews with women users and suppliers echoed that even though they ran the MSE, they did not feel they always had freedom to make decisions over how to use various productive resources (such as decisions on buying new machinery, other investments, ways to mobilize savings, introduce new products, make strategic choices for the company), while their male counterparts gave emphatic 'yes' responses to such questions during the interview. Deeper discussions alluded to the fact that women often doubted their decisions and deferred to colleagues and other experts they deemed suitable before making a final decision. This hesitancy also affected their position within the MSE and with their suppliers/buyers.

Finally, in terms of consciousness and capabilities, in the sample the men and women surveyed had very similar levels of education, digital skills, work experience and types of work, suggesting they are good benchmarks to compare. This suggests that despite having similar capabilities, yet the outcomes of upgrading diverged, this can partly be explicated by broader social norms, resource asymmetry they face.

Table xx: Comparison of characteristics of men and women sampled

		USERS				**SUPPLIERS**	
		Platform (integrated)		**Platform (basic+integrated)**			
	Framework	Women (N=5)	Men (N=2)	Women (N=1)	Men (N=5)	Women (N=2)	Men (N=4)
Capabilities and consciousness	Years of education	12	10	13	12	16	15
	Digital skill level (High, medium, low)*	Low-Medium	Low-Medium	\Medium	Low-Medium	Medium-High	Medium-High
	Years of work experience	18	24	16	14	12	12
	Type of work experience before starting business (Industry/Self-employed)	Self Employed (farmer); some industry - trader	Self employed	Industry	Self Employed (farmer); some industry - trader	Industry	Self-employed and Industry
Resources	Access to mobile phone and internet	yes	yes	yes	yes	yes	yes
	Access to computers/tablet/ laptop	somewhat	yes	yes	yes	yes	yes
	Access to local information networks	yes	yes	yes	yes	yes	somewhat
	Access to business networks (apps)	no	no	no	somewhat	somewhat	Yes
	Decision making over productive resource use	Somewhat	yes	somewhat	yes	somewhat	yes
Social Norms	No. of dependents (under 18 years and over 65 years) (avg)	6	4	5	5	5	4
	Age (avg)	42	48	39	45	38	40
	Decision making within the family (division of labour, savings mobilization)	Somewhat, but mostly need to defer to family elders and husband, especially in relation to funds use	Usually do not discuss with family	Somewhat, but mostly need to defer to family elders and husband, especially in relation to funds use	Some discussion but skewed in favour of man	Supportive family structure generally, can make independent decisions	Some discussion but skewed in favour of man

8.5 Existing gender related regulation and key gaps

There are no explicit gender parity approaches for women working in the digital economy by the government. Some of the key laws in relation to women in agriculture and industry are:

- **Gender based discrimination and Equity**: In 2011, the national gender and equality commission Act was passed. This act specifically aims to 'mainstream gender' by ensuring that gender is featured and budgeted for under all laws and policies the government undertakes to ensure equality. The aim is to promote equality and freedom from discrimination in accordance with Article 27 of the Constitution. The implementation of the Act is yet to show any change, thus is a matter of absence of legislative legal will.
- **No social protection Insurance/social protections**: currently because women predominantly work in informal enterprises and often part-time due to family pressures, many do not fall into the remit to provision social protection. This includes no paid leave of any kind (e.g. sick, holidays), no insurance of any kind, and no longer-term contributions to pension or unemployment funds. Women generally have no or little recourse to maternity benefits as companies have minimal mandatory requirements to comply with, especially MSEs and start-ups. . Additionally, the care infrastructure provided by the government is almost non-existent, for instance there is no law that provides for maternity leave pay (of upto 14 weeks), there is no paid parental leave, or periods of leave due to caring responsibilities remain unaccounted for in pension benefits.
- **No collective bargaining/ freedom of association/women's representation**: There is only one organization that officially lobbies for informal enterprises and MSEs- this is MSEA. This was formed after the MSME ACT in 2012. significant research has pointed to the poor functioning of this authority (Krishnan et al 2018). However, many respondents interviewed were also part of their specialised CSOs such as Fresh Produce Exporters Association Of Kenya, Kenya Flower Association, East African Grain Council, and specific farmer cooperatives and SACCOs. However, so far there is no formal body that represents women.
- **Gender based violence/harassment:** the country has policies and strategies to prevent and respond to gender-based violence. It launched the National Policy on Prevention and Response to Gender-based Violence in 2014. The Kenyan constitution has provisions for the protection of all individuals from any form of violence. Kenya also ratified the convention on the Elimination of All Forms of Discrimination against Women. In June 2021, Kenya adopted a gender-based violence indicator in the government's performance monitoring framework. This will ensure that the enforcement and implementation of gender-based violence laws and policies are tracked. With this commitment, the government has also allocated additional resources to prevention and response. Gender-based violence recovery centres are being established in all major hospitals in the country. Moreover, gender desks in police stations have been established alongside civil society organisations, such as the Coalition on Violence against Women and the Federation of Women Lawyers in Kenya. However, there is mixed evidence about implementation of these acts.

- **Access to and ownership of, productive resources:** a milestone was achieved in 2012, with the 2012—Passage of the Land Act and the Land Registration Act, increasing women's rights over marital property. This meant that women were allowed to inherit property and had more control over immovable property (e.g. house, land rights).

- Government funds: Uwezo Fund is a flagship programme for vision 2030 aimed at enabling women, youth and persons with disabilities access finances to promote businesses and enterprises at the constituency level. Since the fund launched in 2014, it has disbursed more than Kshs 7.2 billion and directly supported 1,124,221 beneficiaries of which 69% are Female and 31% Male through provision of affordable and accessible credit, capacity building on entrepreneurship skills, basics on bookkeeping and market linkages and networking. It is unclear how much has been disbursed specifically targeting women in agriculture running/using digital tools.

8.6 Case studies

Two specific case studies were conducted one with an app run by a women entrepreneur of Kenyan origin to unpack how she developed and expanded her small enterprise; and the second run by a women agro-vet (small retailer selling agro-products). Following ethics, the names of all companies and persons have been anonymized.

Case 1: App 3

Kaya, was a hardworking girl from a very young age, living with her grandparents and 3 brothers in Nakuru. Her parents were away in Nairobi and came to visit every weekend. She always did well in school. She was wonderful at english and history. When she was 15 in 1998, her school began to introduce computer languages, however there was only 4 computers to share across the whole school, so she never got to use an actual computer... but instead was able to learn some basic coding on paper. She begged her grandparents buy a computer at home, but it was too expensive. By the age of 17, she had left computers behind with an aim to pursue law instead. She would quote her grandmothers words: " don't be a hustler... when you can be a lawyer instead... it's a hustle that will pay you much more". She was lucky that her family could afford to send her for a degree in law at the University of Nairobi- many of her friends from school did not go to university.

She completed her degree and started looking for jobs- despite being one of the top in her class- it was tough to find a job in litigation. She spent about 8 months job hunting and was forced to move back home to Nakuru. Here she began side hustling as a tuition teacher, a transcriber and volunteered at a local farm of her uncle as a general helper during harvest time. She quite enjoyed her jobs of teaching and transcribing- both of which were online; as well as helping out on the farm. However, she always felt that she could do each of these jobs better with more efficiency, and that way she could spend more time looking for a job in the law industry. For example, if she could create online quizzes and create short animations to explain different concepts- young children would enjoy it and learn better. Similarly, if we could develop ways in which voice recognition could work better, she could simplify her transcribing tasks. But most of all, if she could get better information on the weather, prices, she could help her uncle earn more... and maybe then he would pay her for her work!

After 8 months of searching, she got a job at a litigators office, but most of the work was secretarial, her male boss was usually rude to her and some of the male clients would pass leering comments towards her making her feel uncomfortable. Within a year, she felt she had enough, but kept remembering her grandmothers words, and did not quit. She felt the pressure to stay in a job even though she felt mentally harassed, to support her grandparents (who were now in their 80s) and her younger brothers who were still not settled in jobs. She would manage to get by every day, by reliving some of her old memories on the farm. That was when she realized she could achieve many of her dreams by learning how to code and maybe she could start a website or a service that could help her uncle's farm.

She started hunting for online courses in coding, there were very few that was accessible, and most were out of her pay range. She finally decided to do a free online course in R, which was an open-source programme. She taught herself the programme, every night for 2 years. It felt like an escape. Almost 3 years later, she was up for promotion at her litigation job, but it was given to her male counterpart instead who was younger and less experienced than her. That was it. She decided it was time to quit and start her own company.

That was when 'App 3' was born, a very rough version, that needed finessing. She applied for grant from AGRA, which gave her funds to develop the app further. The app was to support farmers upstream in the value chain, connect them with input suppliers, and provide real time data. It would be a platform that allowed farmers to share stories with each other about crop conditions and other issues. She piloted this on her uncle's farm inn 2016, it was a success, crop yields went up by 30%. She continued to grow the app, develop more networks to add new services onto the app, she hired 4 others to join her including a coding specialist/IT, marketing/sales, an accountant and a fundraiser. Her family were not very happy with her decision to quit a well-paying job, for something that was risky, and forced her not to have a constant income. She again felt pressure to make this work, but the market was ruthless, with very little scope to scale. The app was a great idea but not one that could bring in huge funds and be self-sustaining without financial support. With her savings drying up she went to a bank, but the bank was not interested in investing in a risky business, especially run by a woman... they we willing to give her a loan at 14%, that was more than a mortgage! She attempted to speak to people in various government ministries, but there was no support. CSOs such as KARLO, Technoserve were happy to provide some support, but none of this was enough to keep the app afloat. She tried switching her business model from a free service, to in app purchases, but then the number of transactions began reducing considerably, while her costs kept escalating. She applied to several accelerator programmes but had less success getting in as compared to male counterparts. At times she would approach various local money lenders for funding, and they would often ask her for sexual favours in return for lower interest rates. This would be a cause of significant worry. App-3 still remains in business- although it is hanging by a thread.

Overall, Kaya's story suggests that societal pressures and norms affected how she could run her business, and she was also faced with lack of equity of opportunity to get finance and into various accelerator programmes that could support the expansion of her app.

Story 2: Retailer/Wholesaler (S3)

Beatrice, was 12 when she first began working with her father at their agro-vet shop in the outskirts of Nairobi. It was not the most exciting thing to do, but she had to help out. She had 2 other siblings who would often help as well. Her job was to make a list of all the inventory at the end of each day, write up the main inventory required to be ordered and clean up in the evening. She remembers one day, coming into the shop and witnessing a massive argument between her father and one of his suppliers regarding a fertilizer. They had delivered 20 packs of the wrong fertilizer, and her father was asking him to take it back. The supplier refused to take the stock back until my father paid him the cost of transport and delivery. That did not seem fair, when it was not her father's mistake. She checked the books to make sure she had written the fertilizer order down correctly, she luckily she had. But that day scarred her, she was always afraid of making a mistake and kept doubting her work. She came across various services that could be used instead, apps, that would enable them to choose inventory online. She suggested this to her father- who was not at all happy with the suggestion. He said that they would be given bad inventory ,he had worked hard to develop relationships and would not want to change.

After she finished school, she started looking for jobs, and began working at a restaurant as a chef. It was close by, and she was able to help her family out at the shop when needed. She married early and had 2 children by the age of 25. Unexpectedly her father passed away, which was a source of great sadness to the family. A huge loan was taken against to shop for his funeral, which was going to the talk of the village.

After that, when Alina took a look at the books she realized unless big changes were made the shop would go under. None of her siblings knew the networks her father had created, and there was a need to keep the business going. Alina decided that she would register on a platform, to get access to inventory without needing to form several new relationships. She registered on a few apps and tried to look for different deals. She realized soon, that many of the deals were non-negotiable, and the app could not be reached when she wanted to make complaints about the quality or for a late delivery...however it was a quick and easy process that took up less of her time.

However, despite having inventory she found that the footfalls in her shop were low, she tried to hire someone to make a website for ordering produce, but the website was slow and crashed often. She did not have the funds to hire someone on a regular basis to update and check for glitches on the website. Given the situation, she decided there was a need to diversify beyond just an agro-vet. She decided to use the app she was signed onto to get a loan, the loan was for expansion of business. But rather than expanding her agri-business, she decided the shop could be used as a hub for social events various social events such asl local music and dancing. She began printing flyers and sending texts, SMSs, and improved her facebook profile, increased whatsapp messaging, to potential customers in the village about this, and over the next few months, more and more people came to the shop for such events. As time went on, she decided to extend her product range to catering, using local produce. She catered for events in the shop using her previous restaurant chef experience. Overall, this meant that even though the footfalls were less in the agrovet business, it enabled her to functionally upgrade to other businesses. The platform she was signed up to even though it created trade-offs also gave her the time to diversify to new activities.

9. Policy recommendations

Evidence-based derivation of challenges	**Policy priorities (key actions)**
1. SUPPLIERS: Network relationship building -accountability , flexibility and support	Create a government/ quasi-governmental taskforce (coordinated strategy) to deal with cooperatives and MSE issues in relation to network building, start-ups, market entry. This taskforce can draw on experience from large private firms and civil society through public-private partnerships and can link up with the ongoing development of the Agriculture and Agro-processing through KITP. Contracts between MSEs and suppliers (e.g. telecom operators and other service providers) should include clauses related to support during shocks. Furthermore, the government can support MSE platforms through creating a 'shock support fund' wherein all parties put in small amount of funds over time, so as to create a buffer during times of shock.
2. SUPPLIERS: Setting up accelerators and PPPs	Strengthen accelerators to allow more MSEs to participate, and to provide a space to experiment. Partnerships with business and extended networks to work out preferential agreements on interest rates, loans, credit lines and grants should be developed.
3. USERS: Trust building and transparency	Creating more transparent chains with published lists or databases of suppliers in food systems so that these are publicly available. Lack of cohesive and direct relationships prevents forming strong networks, which in turn reduces additional training, information and technical support that could be transferred to users. Creating 'open and shared systems can enhance cooperation and trust building.

4. USERS: Improve traceability infrastructure and institutional oversight	Support the diffusion of technology to enable traceability of certification, adherence to standards,) for MSEs. Link this to the Agricultural marketing strategy 2023, and national phytosanitary policy to ensure minimum rejections of produce
5. USERS and SUPPLIERS: Tax breaks, subsidies,	Providing various tax breaks to smaller processors, retailers or subsidies for investing in new efficient technology, or upgrading ICT systems. Furthermore, subsidies should be provided to users to uptake apps in order to reduce overall costs.
6. USERS and SUPPLIERS: Data use and privacy	Farmer data needs to be collected and shared in line with the new data governance framework in agriculture. This largely follows data protection guidelines that provide privacy to the farmer. Thus, limiting the ability of apps to sell data for increased profits. A monitoring system needs to be in place to audit such apps, through the MSEA or performed by an independent taskforce/auditor Farmers/farmer cooperatives should be accorded primary ownership of data at a collective level. This should be available to farmers under an RTI like scheme.
7. USERS and SUPPIERS: Working capital	One of the key issues facing the expansion of apps, and users is the lack of working capital. Cheaper lines of credit are key to this, along with insurance coverage at low premiums to ensure security of work
8. USERS and SUPPLIERS: Technical and managerial capabilities building (STEM investment) support	Policy actions can reduce the digital inequalities in relation to differences in skills, education, access rights and costs, wealth and income, and location. The lack of available and affordable skilled workforce (e.g. marketing managers and social media analysts) inhibits expansion of MSEs. Creating specialized STEM education, as part of vacation and general education skills at school level, or even as short-term diploma programmes for professionals. Furthermore, upskilling and enhancing technical capabilities will allow to enhance their productivity.
9. USERS and Suppliers: MSE representation	Development of an MSME private sector body (KEPSA of MSMEs). This would be a single key institution to represent the interests of MSMEs, particularly those in the informal economy. There are currently numerous associations that represent MSE clusters, but no single overarching and united body. It is important that consultations are conducted with leaders of the MSME sector and firm plans made either to strengthen an existing body or to create a body that represents and pursues the development of MSMEs from an enterprise perspective
10. Gender: supporting gender equity	Policies to support women on the job: subsidies should be given to women run organizations to continue to participate on digital can enable creating higher quality produce, thus a special women-related digital fund should be set up. Bargaining and negotiation skills: providing TVET training around effective bargaining and negotiation skills, which through the research was identified as a key area of digital disparity. Create an open roster of apps available and the costs involved: to increase transparency for women to join apps

	Public-Private Support, beyond accelerators: to make new investments in cloud infrastructure to incentivize local digital start-ups and online marketplaces that promote women producers. Similar to the government run SMME accelerator in South Africa.
11. Need for more CSO involvement	While these laws are important, they do not explicitly mention women in the digital economy, especially focusing at women run-organizations. However, to fill some of the public governance deficits, there are civil society organizations such as African Women Agribusiness Network Afrika (AWAN-Afrika), which has launched VALUE4HERConnect platform. The aim of the platform is to better organize and give women confidence to move them out of just production of agro products to agro-processing and value addition, and take advantage of the AFCFTA
12. Algo transparency	

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Appendices

Appendix 1: Respondent List and details

Demand side

code	Actor	Export/Regional and local	E-commerce operation	ownership	Gender	Formal /informal	Position in Value chain	Location	no. of employees /members	Enterprise Classification
F1	farmer cooperative/group 1	regional	B2C	kenyan	male	Informal	Upstream	Murang'a	150	Co-op/group
F2	farmer cooperative/group 2	regional	B2C	kenyan	female	Informal	Upstream	Murang'a	60	Co-op/group
F3	farmer cooperative/group 3	regional	B2C	kenyan	female	Informal	Upstream	Meru	180	Co-op/group
F4	farmer cooperative 4	export	B2B	kenyan	female	Formal	Upstream	Meru	350	Co-op (large)
F5	farmer cooperative 5	export	B2B	kenyan	male	Formal	Upstream	Machakos	210	Co-op (large)
S1	small retialer/wholesaler 1	local B2B	B2B	kenyan	male	Formal	Midstream	Nairobi	6	Micro
S2	small retialer/wholesaler 2	local B2B	B2B	kenyan	female	Formal	Midstream	Nairobi	8	Micro
S3	small retialer 3	local	B2C	kenyan	female	Informal	Downstream	Nairobi	5	Micro
S4	small retialer 4	local	B2B	kenyan	male	Formal	Downstream	Nairobi	11	Small
R1	restaurant 1	local	B2C	kenyan	female	informal	Downstream	Nairobi	10	Micro

R2	restaurant 2	local	B2C	kenyan	male	Informa l	Downstrea m	Nairobi	14	Small
P1	processing SME 1	export	B2B	kenyan	male	Formal	Midstream	Murang'a	35	Small
P2	processing SME 2	Local	B2C	kenyan	male	Formal	Midstream	Murang'a	22	Small
P3	processing SME 2	export	B2C	kenyan	male	Formal	Midstream	Murang'a	28	Small

Appendix 3: Uprgading demand side
Table xx: Upgrading by actor category

		Platform(B)	**Platform (I)**			**Platform (B+I)**		
		Farmer Cooperative/Groups (average % change 2019 to 2022)	**Farmer Cooperative /Groups**	**Restaurants**	**Retailers /Wholesalers**	**Farmer Cooperative/ Groups**	**Processors**	**Retailers/Wholesalers**
Economic Upgrading	Product Value-add/ Sophistication	No Change	100% (value add in terms of improved sorting and weighting facility)	67%: Increased number of items on menu	50% improved quality of purchased products (organic and certified)	100%, improved product quality by adhering to international product standard	33%: purchased new machinery and better quality produce	50% purchased better quality produce, and packaged items under own brand
	Product Diversification	100% (diversified into 2 new crops)	67% diversified into new crops 33% downgraded by reducing overall number of crops	33% started new catering businesses	100% diversified to new products on sold	No change	100% product diversification: new freeze drying and packaging	50% diversified to purchasing new products such as chemicals and new fertilizer; some also began machinima leasing services
	Crop Yields	Decrease in crop yields overall by 15%	67%: Marginal increase in crop yields by 5% 33%: No increase	NA	NA	100% Increase in crop yields by 25%	NA	NA
	New markets and suppliers	100% new customers reached in different parts of Kenya	100%: new customers in Kenya, Uganda, Tanzania, South Africa and China	100%: new customers	100% reported new customers and suppliers	100%: new customers: especially the middle east emerging as a new market	67% reported new customers; while 33% reported they dropped all old suppliers for new suppliers on the app	100% reported new customers and suppliers

	Profits Change	No change	No Change	Marginal Increase	No change	Reported fall in profits (lower prices per ton)	Average 5% increase experienced across the respondents	No real change experienced when considering the cost of inputs
Social upgrading	Contract formalisation	No Change	All reported precarious contracts with no long-term potential	No change	No change	One-year contracts provided, usually oral	No Change	No Change
	Capability enhancement (new networks)	No Change	New networks were formed with other app users, that helped with knowledge sharing; good agricultural practices shared, but not always considered useful by farmers	No change	No change	Specific trainings provided in chemical handling, water management, through the app for adherence to standards that was helpful for improving crop quality	No change	No change
	Working hours	Increase with time spent on advertising and networking	Increase in working hours	No change	Increase in working hours	Increase in working hours	No change	No change
	Unionization /associations	NA	NA	Not unionized	Part of MSEA, but no benefit seen	NA	Part of MSEA, , but no benefit seen	Part of MSEA, , but no benefit seen
	Bargaining potential	No change	33%: Limited ability to bargain for cheaper input bundles	None	Limited potential to negotiate with the app for reduced prices	100%: No ability to bargain for better prices through the app	67% : possible to bargain for better prices on products	50% able to bargain for better prices