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Small goes digital

How digitalization can bring about productive growth for micro and small enterprises

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▶ Preface

Over the past decades, the dissemination of technology and digital infrastructures has opened up new and seemingly unparalleled opportunities for sustained growth and innovation. Markets have become more interconnected, digital products and services have mushroomed around the world, and digital innovations have helped to improve productivity and competitiveness.

However, a significant yet often overlooked segment of the global economy has remained largely excluded from the benefits of the "digital revolution": micro and small enterprises (MSEs) tend to be under-digitalized and may therefore struggle to exploit fully the opportunities afforded by digitalization. This is an especially alarming problem given that MSEs play a critical role in economies and societies as creators of jobs and as drivers of growth and poverty alleviation. In short, MSEs are key to attaining the Sustainable Development Goals, which were launched by the United Nations in 2015 as "a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity".[1]

An important objective is therefore to create an environment in which MSEs are enabled to harness digitalization for productivity growth and for the creation of more and better jobs. To that end, we first need to understand why some MSEs find digitalization to be a challenge, keeping in mind the heterogeneous nature of the enterprises subsumed under the MSE category. Digital divides run not only along geographical borders but also between enterprise types. Informal enterprises and own-account workers, for instance, may face distinctive constraints that prevent them from digitalizing to the same extent as small formal businesses. This report takes into account such diversity and, drawing on the available evidence, paints a nuanced picture of the barriers as well as the opportunities involved in the digitalization of MSEs and its contribution to productivity growth and job creation.

Finally, this report and its policy recommendations should be regarded as a call to action in its own right. The COVID-19 crisis has put tremendous strain on MSEs and slowed down progress towards the Sustainable Development Goals. Competitive MSEs that provide decent work can be engines of recovery and prosperity for the societies in which they are based. Supporting MSEs in the use of digitalization to improve their resilience and competitiveness is paramount to achieving this.

1 United Nations Development Programme, "Sustainable Development Goals"

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Acknowledgments

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Dr Nicolas Friederici, Senior Researcher and Project Lead at the Alexander von Humboldt Institute for Internet and Society, was the lead author of the report. Additional inputs as well as technical comments were provided by the following staff members of the ILO's SME Unit: Marlen de la Chaux, Marco Marchese, Judith Van Doorn and Séverine Deboos. Ms Deboos also coordinated the development of the report. Technical comments were also provided by Uma Rani from the ILO's RESEARCH department.

Technical contributions were made by Matthias Thorns (IOE); Andrea Ostheimer de Sosa and Sebastian Borchmeyer (KAS); and Torbjörn Fredriksson (United Nations Conference on Trade and Development). Luis Sundkvist conducted the editorial review of the report.

Executive summary

Addressing the economic realities of micro and small enterprises (MSEs) has never been more important. MSEs – defined as enterprises with 2 to 49 employees – contribute close to 40 per cent of jobs worldwide and play a crucial role in efforts to implement the 2030 Agenda for Sustainable Development and achieve the Sustainable Development Goals, yet they often remain trapped at low levels of performance and growth. Many MSEs are informal, making them particularly vulnerable to economic shocks such as that caused by the COVID 19 pandemic.

The present report deals with an urgent knowledge gap concerning such enterprises, specifically their ability to use digital technologies (email, mobile applications, cloud computing and so on) to increase productivity. It seeks to clarify why only exceptional MSEs have managed to fully exploit the opportunities offered by digital technologies, and it explores the specific benefits and barriers that the digital revolution has created for the average MSE. The report bridges between hitherto siloed policy debates on the global digital revolution and on informal enterprises and MSEs. Drawing on a broad review of empirical evidence, it puts forward two models of how digitalization affects MSE performance, with a focus on productivity as the central outcome of interest.

The analysis conducted for this report builds on the notion of capabilities to capture the intangible assets within an MSE that influence its susceptibility to, and ability to benefit from, digitalization – notably the collective skills, attitudes and expertise of the enterprise's owner and staff. Five types of MSE with different overall capability levels are distinguished: (a) microenterprises, such as traders and subsistence farmers; (b) locally oriented small enterprises, such as shops and restaurants; (c) export oriented small enterprises, such as those in the agroprocessing sector; (d) knowledge-based small enterprises, such as health clinics and media agencies; and (e) start ups, such as delivery apps and biotechnology ventures. Environmental factors that affect MSE digitalization are also taken into account, such as the strength of local digital ecosystems or an MSE's position in the supply chain.

The report condenses the results of a wide range of studies from diverse contexts into two chapters dealing, respectively, with digitalization opportunities and barriers for MSEs. The opportunities discussed are: (a) increased access to information and an improved ability to communicate; (b) the ability to trade and to access markets more easily and over greater distances; (c) access to a variety of financial services with low barriers to entry; (d) new pathways to enterprise formalization; (e) digital transformation and entrepreneurship as fundamental shifts in value creation; and (f) synergies with the development and diffusion of green businesses and technologies. As for the digitalization barriers faced by MSEs, the report covers: (a) digital divides and locally incomplete digital infrastructures; (b) multifaceted digital skill shortages among MSEs; (c) low adoption readiness, risk averse cultures and gender barriers; (d) MSEs' often marginal positions in value chains and platform markets; and (e) challenges in implementing appropriate cybersecurity and data protection measures. For both opportunities and barriers, the report takes into account established knowledge about the role of supply chains but also newer studies on the emergence of digital platforms as increasingly important market

intermediaries for MSEs. From a detailed discussion of opportunities and barriers, four key observations are distilled:

1. MSEs do not digitalize "automatically" and by default; instead, digitalization is driven by deliberate decision-making on the part of MSEs, which may be hampered by incomplete information and risk-averse attitudes.
2. The extent to which MSEs are able to increase their productivity through digitalization is determined by their internal capabilities: depth of digital adoption, digital skills, innovation orientation and flexible management.
3. The potential depth of digitalization and the associated capability levels depend on an MSE's size, degree of formalization, export orientation and the information intensity of the sector in which it operates.
4. MSE digitalization is affected by three sets of external influences: the local digital ecosystem, an MSE's business network, and its broader social and policy environment. Microenterprises are more directly dependent on their environment than other types of MSE.

As a major novel contribution, the report puts forward two models of how digitalization can lead to productivity gains in MSEs: one based on an enterprise's internal capabilities, the other on external (environmental) influences. The capability model emphasizes that moving from a simple to a sophisticated digital adoption strategy has virtually no impact unless this shift is complemented by improvements in other capabilities. Beyond digital adoption, MSEs need to have a minimum level of digital skills, innovation orientation and (in the case of more advanced enterprises) flexible management if they are to achieve significant productivity gains. The environmental model outlines how the local digital ecosystem, an MSE's business network, and societal and policy influences affect such enterprises in various ways.

Finally, the report offers recommendations for policy and support approaches that can help to promote MSE digitalization. Measures to bridge digital divides, to enhance digitally enabled formalization programmes, and to assist MSEs in improving their positions in supply chains and platform markets are discussed. The overall conclusion is that policymakers and support organizations should not overestimate the immediate benefits that digital technologies can bring to MSEs; rather, they should facilitate investment in assets that are relevant to specific types of MSE and are complementary to digital adoption, such as skills, mindsets and managerial abilities. The approaches recommended in this report should be seen as key tools not only for strengthening MSEs, but thereby also for paving the way towards implementation of the 2030 Agenda for Sustainable Development.

▶ Abbreviations

2/3/4/5G	second/third/fourth/fifth generation [mobile technology]
3D	three-dimensional
DFS	digital financial services
ERP	enterprise resource planning
ESE	export-oriented small enterprise
ICTs	information and communication technologies
KSE	knowledge-based small enterprise
LSE	locally oriented small enterprise
MSEs	micro and small enterprises
MSMEs	micro-, small and medium-sized enterprises
POS	point-of-sale
SDG	Sustainable Development Goal
SMEs	small and medium-sized enterprises
UNCTAD	United Nations Conference on Trade and Development
USSD	Unstructured Supplementary Service Data

Chapter 1. Background: Digitalization and productivity in micro and small enterprises

1.1 Small matters, also in the digital age

Addressing the economic realities of micro and small enterprises (MSEs) has never been more important. Clearly, the principle that "small matters" is valid as far as global employment is concerned, and this will continue to be so in the foreseeable future (**Box 1**). Specifically, MSEs provide employment to the majority of the labour force and therefore also play a key role in achieving the Sustainable Development Goals (SDGs), particularly Goal 1, "End poverty in all its forms everywhere"; Goal 8, "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"; and Goal 10, "Reduce inequality within and among countries" (**Box 2**).

In most parts of the world, though, MSEs are far more likely than medium-sized and large firms to belong to the informal sector, rendering them more vulnerable to economic shocks such as that caused by the COVID 19 pandemic (OECD and ILO 2019; Schwettmann 2020). As the first studies on the pandemic's economic impact begin to appear, a clear trend is that small enterprises have experienced greater losses than larger ones (Apedo-Amah et al. 2020). In the aftermath of the COVID 19 crisis and beyond, understanding MSEs and identifying the best ways of supporting them should therefore be a key priority for policymakers.

This report is concerned with one urgent knowledge gap – regarding how MSEs can use digital technologies to increase their productivity – and with the ways in which policymakers can help to unlock that potential for jobs, growth and development and thereby bring countries back on track in implementing the 2030 Agenda for Sustainable Development. The knowledge gap is due to the siloed nature of policy and academic debates. The importance of micro, small and informal enterprises for employment and conditions of work has long been emphasized in studies by organizations such as the ILO and the World Bank and by development economists (Bruhn and McKenzie 2014; ILO 2013; ILO 2015a; La Porta and Shleifer 2014). However, these studies have not focused on the impact of digital technologies – for example, text messaging, email, mobile applications (apps), artificial intelligence, and blockchain systems – on the operations of such enterprises. Conversely, studies looking at the digital revolution as a global phenomenon have not typically considered firm-level impacts on MSEs separately from broader developments or from impacts on medium-sized and large firms (Brynjolfsson and McAfee 2012; Malecki and Moriset 2007). Other work on digitalization has focused on particular types of digital technologies, on particular subgroups of MSEs or on particular geographical contexts (as Chapters **3** and **4** will show). Several recent reports have called for more research on whether and how micro, small and medium-sized enterprises are able to exploit the opportunities of the digital age (World Bank 2016; UNCTAD 2017; UNCTAD 2019). Indeed, the first policy resources are being developed (Bianchini 2019), but an enterprise-level integrative framework with global applicability and policy relevance has yet to be proposed.

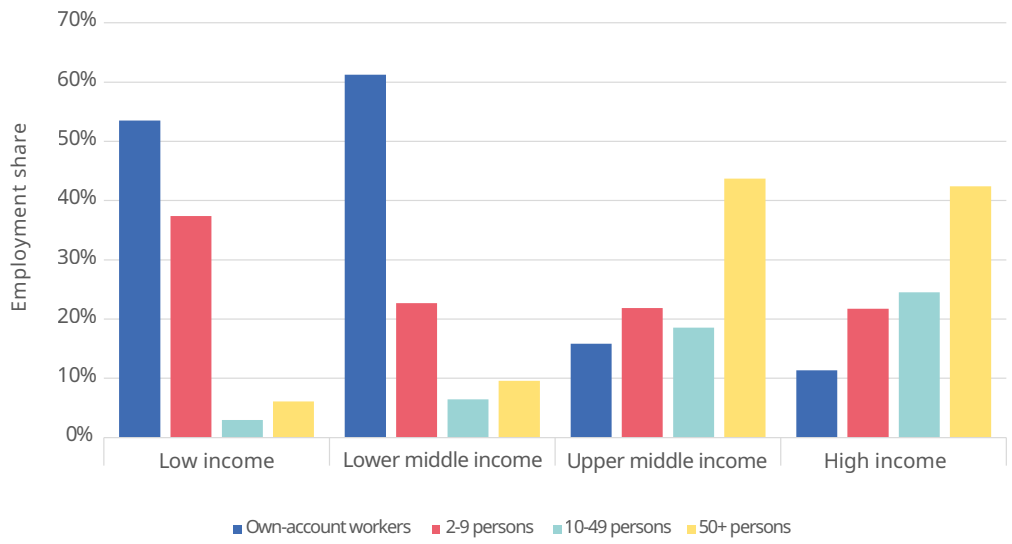
▶ Box 1. Small matters

The contribution of small and informal enterprises to global employment is notoriously difficult to quantify. Drawing on a new database, the ILO's recent Small Matters report provided a more up-to-date and realistic picture than earlier studies, which had tended to underestimate the role of small economic units – that is, of the self employed, microenterprises and small enterprises. According to the report (ILO 2019a), the contribution of micro and small enterprises (2–49 employees) to overall employment is close to 40 per cent across country income groups, while microenterprises (2–9 employees) considered separately play a much more significant role in low-income and lower-middle income countries (37 per cent and 23 per cent, respectively) than in upper-middle income and high-income countries (22 per cent in both cases). When the self-employed are included, the employment contribution of small economic units is as high as 94 per cent in low-income countries, followed by 90 per cent in lower-middle income and 56 per cent in upper-middle-income countries (**Figure 1**).

Closely connected to the distribution of a country's enterprises by number of employees, and to the national income level, is the size of the informal economy. While the informal sector has slowly shrunk across the world (Alexander 2019), its total contribution to global employment, at 62 per cent, remains vastly larger than that of the formal sector. Again, the difference between the relative contributions of the informal and formal sectors to employment is starkest in low-income countries (85 per cent versus 15 per cent), with lower-middle income countries showing a slightly less skewed ratio (78 per cent versus 22 per cent). Next to own-account workers, who make up the largest share of the informal sector, informal microenterprises are dominant employment contributors in low-income and lower-middle income countries (33.5 per cent and 17.6 per cent). Even in upper-middle-income countries, the informal sector's share in total employment is significant (45.2 per cent) (**Figure 2**). Given the COVID 19 pandemic's adverse effects on jobs in the services industry in particular, and the informal sector's limited ability to access government support, it is likely that conditions will worsen in many countries, resulting in a further increase in informality there once the pandemic itself is over (ILO 2020a; 2020b).

The present report brings together all these separate lines of debate by offering a broad review of empirical evidence on the impacts of digitalization on MSE productivity. It seeks to clarify why MSEs as a whole have not exploited fully the potential of digital technologies, and to identify the specific benefits and barriers that the digital revolution has brought for them, focusing on productivity as the main enterprise-level outcome variable. The report thereby explores the tensions between the considerable potentials of digitalization and the limited firm-level outcomes achieved so far. For one, intuition suggests that digital technologies ought to benefit MSEs greatly (among other things, because of low entry barriers), yet in practice this seems to happen only in exceptional cases. While digitalization is evidently responsible for the exponential growth of some small enterprises (namely start ups and certain innovative firms), the majority of MSEs with traditional business models appear to have remained on the sidelines.

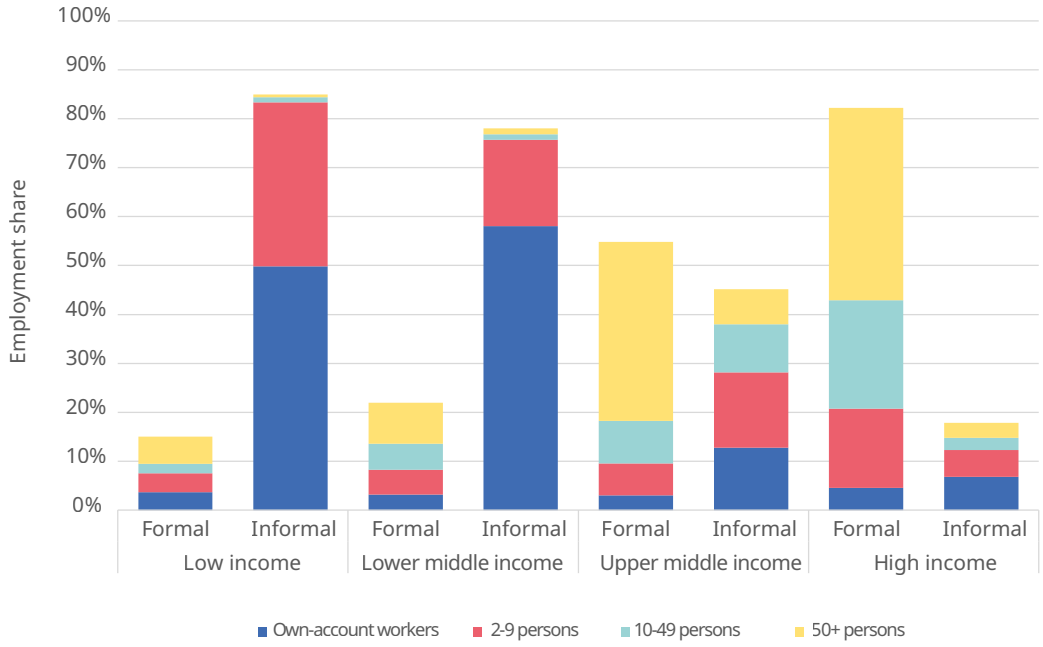
▸ Figure 1. Employment share of the self-employed and different firm size classes, by country income group (%)



Note: In constructing the data set for each country in the sample, data from the latest available year between 2009 and 2018 were used.

Source: ILO (2019a)

▸ Figure 2. Distribution of employment by sector (formal versus informal and economic unit size, across country income groups (%)



Source: ILO (2019a)

1.2 The global digital revolution: Potentials and risks

As mentioned above, this report seeks to determine why the average MSE does not seem to have been able to harness digital technologies fully, even though the digital revolution is under way and is affecting economic activity in virtually all sectors and locations. Since digital technologies became widely available to firms and consumers in the 1980s, they have evolved significantly, from second generation (2G) mobile telephony to contemporary applications of artificial intelligence. Digital

▶ Box 2. How the digitalization of micro and small enterprises is key to the implementation of the 2030 Agenda for Sustainable Development

Micro and small enterprises (MSEs) play a critical role in countries across the world by creating employment (in particular for vulnerable population groups), contributing to economic growth and addressing societal needs. It is widely acknowledged that they are of crucial importance for achieving the 17 Sustainable Development Goals (SDGs). The contribution of MSEs is especially relevant to Goal 1 ("End poverty in all its forms everywhere"), Goal 8 ("Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all") and Goal 10 ("Reduce inequality within and among countries"). Moreover, by providing goods and services in sectors such as sanitation, water, health, education, manufacturing and agriculture, they help directly to meet people's basic needs, which are at the heart of all of the SDGs.

Some SDGs refer explicitly to MSEs. Target 8.3, for instance, calls on Member States to "promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and [to] encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services". Similarly, SDG target 9.3 highlights the need to "increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets".

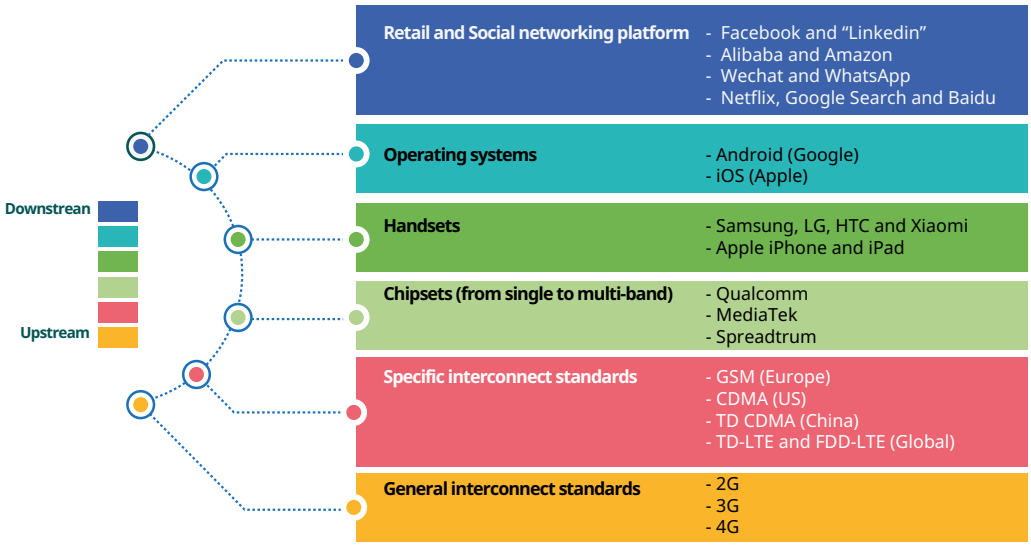
Indeed, a major obstacle faced by MSEs is the lack of finance. Although studies have concluded that investing in small businesses is key to achieving the SDGs (see, for example, ITC 2019), access to finance remains challenging for such enterprises. However, closing the financing gap is only one part of a broader endeavour to strengthen SMEs and untap their potential to contribute to the SDGs. The Organisation for Economic Cooperation and Development (OECD) stresses that "digital technologies allow SMEs [small and medium-sized enterprises] to improve market intelligence, reach scale without mass and access global markets and knowledge networks at relatively low cost." (OECD 2017, para. 33). In fact, digitalization also opens up opportunities for facilitating access to finance and thereby expediting implementation of the 2030 Agenda (Task Force on Digital Financing of the Sustainable Development Goals 2020).

As they become increasingly aware of the potential for digitalization to improve business sustainability, enterprises are developing more comprehensive digital strategies (Accenture 2020). Supporting MSE in their efforts to adopt digital strategies so that they can become more resilient and productive, expand their business in a sustainable manner and access finance is key to reviving the global economy after the COVID 19 crisis, promoting sustainable growth and advancing towards the SDGs.

technologies combine the processing of large amounts of information (computing) with efficient transfer of information across space (connectivity) – hence they are often referred to as information and communication technologies (ICTs). The expansion in the use of digital technologies has been exponential: whereas the volume of data exchanged over the internet in 1992 was 100 gigabytes per day, the same volume was transferred in 2002 per second. By 2017, a staggering 46,600 gigabytes were being transferred every second (UNCTAD 2019).

Over time, new generations of digital technologies with increasing computational and connectivity capacities were developed and integrated with one another, leading to an ever denser digital infrastructure. Driven mostly by the internet's consolidation as a global, open, standardized and interoperable network, user hardware (mobile devices, computers) evolved together with physical network infrastructure (mobile broadband towers, last-mile cable and digital subscriber line connections, switching stations, internet exchange points, fibre-optic cables) and software infrastructure (operating systems, email clients, app stores, open code repositories, software development kits, browsers) (**Figure 3**). Stand alone digital products and applications (websites and web services, smartphone apps, payment services and so on) can plug into digital infrastructure so that they can be accessed by end users.

▸ Figure 3. Platforms and interoperable systems in mobile telecommunications



Source: UNCTAD 2017, based on Thun & Sturgeon, 2017

While MSEs may not always be aware of the complexity of digital infrastructure, they cannot avoid being subject to the structural conditions resulting from it. For instance, digital infrastructure may be incomplete or poorly integrated in a given MSE's location, leading to reduced bandwidth or limited availability of digital payment systems. Large firms may also have superior abilities and better "use cases" (usage scenarios) that enable them to maximally exploit digital technologies. All this gives rise to considerable differences in the depth of technology adoption across enterprises, with a small number of "superstar" firms accumulating a large share of total productivity gains (Cirera et al. 2020; Tambe et al. 2020). Furthermore, the relevance of digital applications to a given MSE depends on the extent to which they are used by those whom the enterprise wishes to connect to – a phenomenon referred to as "network effects". The presence of a local digital sector may therefore determine the richness and relevance of digital applications available to MSEs (UNCTAD 2017; 2019).

Ultimately, all these factors mean that internet access does not automatically result in deep and productive use of digital technologies. MSEs can tap into various bundles of digital infrastructure and products, and engage in different kinds and levels of technology use in different contexts. The fastest smartphone is not very useful without a 4G network nearby, relevant software and apps to download, or peers who have similarly fast smartphones.

The bottom line of the digital revolution is that, while the internet has spread into all countries and industries, the adoption of digital technologies and the benefits of these are unevenly distributed (World Bank 2016). The concept of digital divides refers to the way in which individuals and firms, because of their geographical location or social position, have vastly disparate levels of access to digital opportunities. Thanks to their spending power, users in high-income countries find themselves at an ever-advancing digital frontier. In addition to digital products from previous generations, consumers at the frontier can access relatively affordable cutting-edge devices (such as wearables), sensor-based information systems (such as smart homes) and products based on artificial intelligence (such as self-driving cars). Firms at the frontier make use of robotics, the "industrial internet of things", additive manufacturing or three dimensional (3D) printing, machine learning and artificial intelligence-based automation (such as bots for customer support), thereby achieving greater efficiency in their business processes and creating value in new ways.

Meanwhile, just under half of the world's population – and four in five people in the least developed countries – do not use the internet at all, with gender gaps and affordability issues related to internet access being most pronounced in the poorest economies (Alliance for Affordable Internet 2020; UNCTAD 2019; World Bank n.d.). Firm-level disparities in technology adoption are even wider than regional ones (Cirera et al. 2020), suggesting inequalities in multiple dimensions. While standardized, complete and current statistics on digital adoption by MSEs are not available at the global level, examples from the World Bank's Enterprise Surveys[2] indicate that the same general disparities are to be found among MSEs. In Liberia and Chad, only 7 per cent of small businesses had their own website in 2017/18; this share was 20 per cent in Mongolia, 47 per cent in Kazakhstan, 54 per cent in the Russian Federation and 57 per cent in Turkey in 2019. Applying the same indicator, the largest uptake was found in countries such as Argentina (61 per cent in 2017), Belarus (68 per cent in 2018), Colombia (75 per cent 2017) and the Czech Republic (87 per cent in 2019). Moreover, even in sectors like manufacturing, where productivity potentials are highest, the depth and pace of adoption are lower than expected, with small and medium-sized enterprises often missing out (World Economic Forum 2020).

2 See https://www.enterprisesurveys.org/en/enterprisesurveys. For the purposes of the Enterprise Surveys, small businesses are defined as those having between 5 and 19 workers. Date on gender gaps are not available for small enterprises. The surveys were not conducted in most high-income countries; moreover, only outdated data are available for a number of countries, including populous ones such as China (2012) and Brazil (2009).

1.3 Digitalization in micro- and small enterprises: Key concepts

Grappling with the empirically observed phenomenon of digital divides, this report seeks to understand both the real opportunities that digitalization has opened up for MSEs across the world to increase their productivity and the barriers that have prevented them from doing so. It attempts to maintain an enterprise-based perspective to the extent that this is possible for an analysis with a global scope. The analysis covers MSEs, that is, economic units with at least two and at the most 49 employees (ILO 2019a). The use of digital technologies by purely self-employed workers (such as freelancers, platform workers and digital nomads) is beyond the report's scope, because these economic actors face different kinds of opportunities and challenges and have received a relatively large amount of attention in earlier studies on digital labour and the "gig economy" (ILO 2019b; Lehdonvirta et al. 2019; ILO 2021; Scholz 2016; Wood et al. 2019). Medium-sized and large enterprises (50 or more employees) are not a focus of the analysis either, even though they were indirectly considered when reviewing those studies that discuss small and medium-sized enterprises (SMEs) without explicitly differentiating results for small enterprises. Similarly, self-employed workers were sometimes included implicitly in the analysis, as some studies did not explicitly define microenterprises and may well have included sole-proprietor enterprises.

The report provides a review of empirical evidence. As such, it does not discuss the potential or theoretical impacts that digital technologies might have on MSEs in the future. This is an important difference vis à vis many existing reports on the global impacts of digitalization, which often discuss macro-level possibilities of disruption (see, for example, Deloitte 2019) or present long-term estimates (as in World Economic Forum 2020) while focusing on cutting edge technologies such as human-like artificial intelligence, blockchain systems, drones, self driving cars, robotics, 3D printing, and so on (see, for example, UNCTAD 2017). These digital technologies may indeed have vast disruptive impacts in the long run – not least for MSEs – but this report focuses on already observable and widespread effects that are pertinent to a large number of small businesses.

To sharpen the analysis of digitalization impacts, the report focuses on increase in productivity as an outcome variable.[3] Productivity is of central relevance to MSEs, since low productivity is one of the characteristic weaknesses of small and informal firms (La Porta and Shleifer 2014; OECD 2019). Digital technologies have long been associated with efficiency and productivity-induced economic growth, even if the precise mechanisms involved and the magnitude of effects are disputed (Hernandez et al. 2016). The MSE-specific evidence reviewed for this report supports the hypothesis that digital adoption is related to productivity gains in firms, even though its effects take time to materialize, are less significant for smaller firms than for larger ones, and are weaker where digital infrastructure is lacking (Bollou and Ngwenyama 2008; Cataldo, Pino and McQueen 2020; Colombo, Croce and Grilli 2013; Commander, Harrison and Menezes-Filho 2011; Tambe et al. 2020; UNCTAD 2015). Productivity gains in MSEs are also related to formalization and the promotion of decent working conditions (ILO 2015a).

However, the exact nature of the interrelation between MSE digitalization and decent work has yet to be explored properly. Three types of study have explicitly focused on the link between digitalization and job quality – namely, studies on platform and online labour (Anwar and Graham 2020; ILO 2021; Scholz 2016; Wood et al. 2019); "future of work" studies dealing with artificial intelligence and automation (Brynjolfsson and McAfee 2012; Frey and Osborne 2017; Larsson and Teigland 2020); and studies of work in large formal organizations in high income countries (Harteis 2018; Vuori, Helander and Okkonen 2019). None of these studies, however, deals with MSEs. For such enterprises, neither

3 The report adopts a broad understanding of productivity as the ratio of an enterprise's aggregate economic output to its aggregate input. The studies reviewed for this report do not use consistent definitions of productivity, although labour productivity is more commonly used (see the **Appendix**).

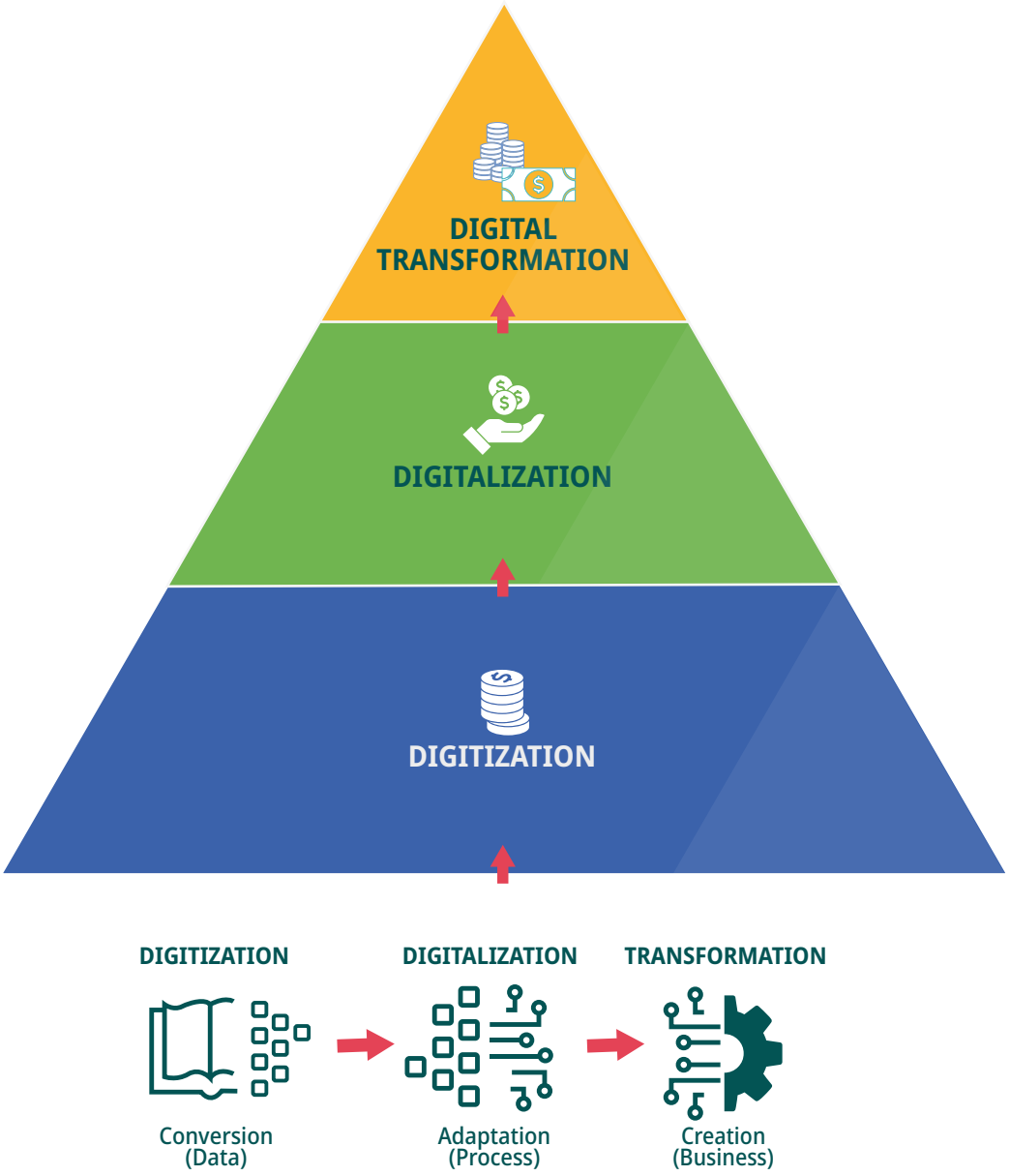
direct nor derivative effects of digitalization on job quality appear to have been investigated. Given the lack of empirical evidence, the present report is silent on whether digitalization-induced productivity has a negative or positive effect on working conditions in MSEs.[4]

At the enterprise level, the introduction of digital technology has led to various degrees of productivity-related change in MSEs (**Figure 4**):

1. **Digitization:** this refers to the most basic function of digital technology, namely to convert analogue information into a machine-readable and transferable format (as in the zeros and ones of machine code).
    - **a.** Example: Customer information is now stored in a PDF file and not on paper.
2. **Digitalization:** previously analogue processes, practices and interactions are enhanced through digital technologies, resulting in efficiency gains and cost savings.
    - **a.** Example of basic MSE digitalization: a hairdresser setting up a website with a scheduling function that allows customers to see available slots and make or change appointments.
    - **b.** Example of advanced MSE digitalization involving multiple organizations: a farmer who has begun to document and track deliveries of produce in a cloud based database that is accessible via a dashboard, allowing the logistics company and distributors to verify and monitor stocks quickly and conveniently.
3. **Digital transformation:** one could describe this as "digitalization on steroids", as it were, for it refers to the integration and coordination of several parallel internal and external digitalization processes, using multiple digital technologies. Newly collected information is systematically analysed and acted upon, the ultimate result being to alter modes of production and ways of doing business. New roles are created and/or the nature of existing roles changes fundamentally.
    - **a.** Example of basic MSE digital transformation (no changes in physical production or major changes in management): a creative design agency reacting to new customer demands (through web content, websites, dashboards, data analytics, and so on), learning a range of new tools (design software, web development), establishing new workflows (such as distributed teams) and flexibly outsourcing some tasks to freelancers without meeting them face to face.
    - **b.** Example of more advanced MSE digital transformation: a small private clinic in a rural setting decides to specialize in telemedicine by using a combination of body function and chronic disease tracking devices, text message reminders, teleconferencing and patient-administered and -reported diagnosis (that is, where patients send in photos and updates via WhatsApp). Information sources are integrated into a standardized electronic health record system, which exchanges patient data with a central diagnostic database. Nurses and doctors regularly consult the system to monitor patients and improve diagnoses.

4 Anecdotal and qualitative evidence points to conflicting and context-dependent dynamics (Anwar and Graham 2020; Barley and Kunda 2004; Friederici, Wahome and Graham 2020; Sandeep and Ravishankar 2018; Schiff, Nagula and Donner 2019). The effects on job quality may be positive, especially where digitalization promotes employment formalization, transitions from repetitive physical work to knowledge work, and improved career development prospects for employees. On the other hand, the effects can be neutral or negative where workers find themselves under pressure to be constantly available, to invest in the acquisition of demanding new skills, or to share risks. Employees may also judge the same job requirements very differently depending on the availability of alternatives in local labour markets.

▸ **Figure 4. Digitization, digitalization and digital transformation**



Source: Bouza (2018); Maltaverne (2017).

1.4 An MSE-centric approach

The present report approaches digitalization from the angle of an enterprise, seeking to understand opportunities and barriers as they are experienced by MSEs. To capture the MSE internal process whereby digital technologies lead to productivity increases, it explores the *digitalization capabilities* of such enterprises. The academic literature on management uses the notion of "capabilities" to refer to the intangible assets of an organization that enable it to be more innovative, learn faster

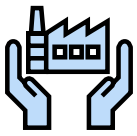
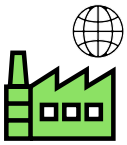
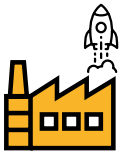
and develop better products than its competitors (Smallwood and Ulrich 2004). A firm's capabilities are made up of the collective skills, attitudes and expertise of its staff, and of the ways in which the firm coordinates and activates these resources to achieve its goals. Capabilities are the invisible foundations of competitiveness: they take time to build, are difficult for competitors to imitate, and require sustained investment, especially in human resources. This report sets out to identify MSE capabilities that are key to effective digitalization, that is, those internal factors that determine why some enterprises are able to apply digital technologies productively, while others are not.

Although the report highlights digitalization capabilities that are important for all MSEs in any context, it should be noted that some types of MSE start from quite different base levels, resulting in diverging requirements and challenges. For example, the digitalization process in a biotechnology start up (where several engineers decide, say, to adopt specialized collaborative software) has very little in common with the digitalization of an informal street vendor (for instance, the vendor beginning to use mobile money to log and share earnings). **Table 1** presents a *typology of MSEs* that draws on existing categorizations (Albaz et al. 2020; Gaarder and van Doorn 2021) while foreshadowing the MSE features that, as discussed in detail in later chapters, influence the digitalization process (for example, export orientation or the information intensity of a firm's sector). The report seeks not only to identify digitalization capabilities that are relevant to all MSEs, as already mentioned, but also to take into account variations in the relative importance of capabilities for different MSE types.

The report's emphasis on capabilities as MSE-internal factors does not mean that external factors[5] have been ignored. External factors such as the strength of the local digital ecosystem, whether an MSE is located in a rural or urban area, and its position in the supply chain are bound to affect its susceptibility to, and ability to benefit from, digitalization. Such influences are therefore discussed extensively further down; however, they are prioritized and modelled not in general terms, but in relation to the specific ways in which MSEs experience them (**Chapter 4**).

5 The terms "environmental", "external" and "contextual" are used interchangeably in the text of the report

Table 1. Five types of micro and small enterprises (MSEs) with different overall digitalization capabilities

	MSE type	Examples	Digital uptake	Features
	Microenterprise	Vendors and traders (parts, furniture, groceries, vegetables), services (tailoring, laundry, repair, selling airtime vouchers, etc.), subsistence farmers	No or basic mobile connectivity (2G feature phone / smartphone), WhatsApp/WeChat, Facebook	Informal, necessity (survival), ad hoc or older for lack of alternatives Value proposition: providing a labour-intensive, low-skilled service Staff (1–5): motivated by ad hoc and immediate salary, low retention, replaceable (no contract, specialization or training) Management: no hierarchies or processes, informal and bespoke division of labour
	Locally oriented small enterprise	Shops, kiosks, stationary vendors and traders with stock, restaurants and cafes, services (driving, tutoring, builders, event and recruiting agencies, cleaning, etc.), farms	Range from not connected to broadband, tablets or point-of-sale (POS) devices with basic stock management, WhatsApp, Facebook, platforms	In general, informal, necessity (subsistence), older Value proposition: providing a commodified service in a given location Staff (5–25): motivated by regular salary, limited career within enterprise, some retention, somewhat replaceable (no contracts or only short-term ones, limited training but dependability, service orientation, routine) Management: hierarchical, often family-owned, owner-managed
	Export-oriented small enterprise	Tourism (hotels, hostels, travel agencies), larger farms and agroprocessors, manufacturing and production (furniture, custom clothing, basic chemical products such as fertilizer, personal care, jewellery and handicrafts)	Range from basic to broadband, smartphones, laptops, desk computers, basic productivity software (Microsoft Word, Gmail), POS devices, enterprise resource planning (ERP) systems, platform profiles, accounting	Mostly formal, necessity (subsistence) or opportunity, older Value proposition: local assets (building, factory, commodity access, networks) that appeal to foreign supply chain partners or customers Staff (5–49): motivated by regular salary and job stability, some career progression within enterprise, good retention, difficult to replace (contracts, technical and various soft skills) Management: hierarchical, often family-owned, some professional managers, some autonomy for staff who have proved themselves
	Knowledge-based small enterprise	Specialized and engineering-based manufacturers (machine parts, chemicals, unregulated drugs), clinics, architects, legal practices, consultancies, business analytics, design and media agencies, outsourcing (e.g. translation and data entry)	Broadband, smartphones, laptops, desk computers, advanced productivity tools (Google Suite, Slack, Miro), specialized software packages (design and analysis), platforms, accounting	Informal or formal, opportunity, age varies by sector Value proposition: specialized expertise, tools and networks Staff (5–49): motivated by above-average salary, career within enterprise possible (project manager, etc.), good and flexible retention (contracts and ad hoc project-based work, specialized education and training in tools, soft skills if customer-facing) Management: depends on owner personality, project teams, high autonomy for staff, staff are expected to work independently
	Start up	Digital start ups (software development, agricultural information systems, ride sharing and delivery, fintechs, ERP systems), other technology start ups (e.g. agritech, biotech), social enterprises	Same as knowledge-based small enterprises plus: software development kits, code repositories, cloud servers, occasionally hardware (Raspberry Pi, 3D printing, sensors)	Informal / formal, opportunity and growth, young Value proposition: new product, digital technologies create value Staff (3–49): motivated by above-average salary and challenging tasks, some career progression if start up grows, low retention (too demanding work / employee leaves for more stable job) Management: flat hierarchies though founders may be looked up to as visionaries, product teams, autonomy and independent work

1.5 Methodology and outline of the report's structure

This report uses a broad-based integrative review of empirical evidence to develop two models of how digital technologies lead to productivity gains in MSEs, Drawing on this analysis, it puts forward recommendations for policy and support measures that can strengthen MSE digitalization. The report condenses the results of a wide range of studies from extremely diverse contexts, giving greater emphasis to those findings that have been observed to apply consistently across different settings. Moreover, it disregards interesting but idiosyncratic results – for instance, on interaction effects or different effect magnitudes.

The literature was surveyed through iterative keyword searches in academic and general search engines. A number of keyword combinations were used for MSEs (referred to in the literature variously as informal enterprises; microenterprises; micro-, small and medium-sized enterprises; and SMEs, among other labels), digitalization (referred to as "digital adoption", "ICT adoption", "digital transformation" and other variants) and productivity. From the review it soon became clear that while some studies considered productivity explicitly, the majority analysed various other enterprise performance variables (such as growth or revenue) or looked at different facets of digital adoption as an outcome variable. This broad search was then complemented through additional searches on specific topics of interest, such as digital financial services, gender, greening, digital security and value chains.

Any study that had empirical evidence to offer on the link between digitalization and productivity in MSEs was included in the review, regardless of methodology, source and publication date. During the analysis, peer-reviewed scientific studies with original empirical evidence were prioritized whenever such studies were available. The second highest priority was accorded to reviews of empirical studies contained in reports by international organizations. Studies dealing with the potentials of digitalization in abstract terms were sometimes included to fill conceptual gaps in the empirical evidence base. The source material was selected to be as geographically diverse as possible, with an emphasis on low income and lower-middle income countries as the settings with the highest prevalence of MSEs. Studies of high income countries were included when they were particularly rigorous or offered unique and well-developed arguments. In total, findings and arguments from 129 sources have been included in this report, with 87 sources presenting unique empirical evidence and 42 sources being reviews, reports and policy resources related to MSE digitalization (covering, for example, digital financial services). The appendix provides an overview of the 40 most important empirical studies.

Through a comprehensive analysis of digitalization opportunities (**Chapter 2**) and barriers (**Chapter 3**), this report identifies four distinct types of digitalization capabilities: digital adoption, digital skills, innovation orientation and flexible management. A major contribution of the report is the two models that it puts forward of how digitalization leads to productivity gains in MSEs: one based on capabilities, the other on environmental influences (**Chapter 4**). The capability model shows that moving from simple to sophisticated digital adoption does not practically lead to any gains unless this shift is complemented by advances in other capabilities. The environmental model illustrates how the local digital ecosystem, a firm's business network, and societal and policy influences affect MSEs to differing degrees. Drawing on all its findings, the report derives recommendations for policy and support measures that can help to bridge digital divides, enhance digitally enabled formalization programmes and assist MSEs in improving their positions in supply chains and platform markets (**Chapter 5**). The report concludes that policymakers and support organizations should not overestimate the immediate benefits of digital technologies for MSEs as a whole. They should, rather, facilitate investment in assets that are relevant to specific types of MSE and are complementary to digital adoption, such as skills, mindsets, and managerial abilities (**Chapter 6**).

Chapter 2. Opportunities

This chapter deals with the opportunities that digitalization can open up for MSEs in terms of increasing productivity. While some of the studies reviewed here focused directly on productivity, most looked at digital adoption as an outcome variable or at other enterprise performance variables, such as growth, revenue, profit, investments or exports (see the **Appendix** for details). The analysis in this chapter assumes that these variables are positively correlated, and that they all play a part in digitalization processes. Moreover, it is taken for granted that the adoption of digital technologies leads, on aggregate, to (moderate) productivity gains in MSEs; the aim is to establish the mechanisms whereby this happens and under which conditions. This chapter focuses entirely on opportunities and the positive effects of digital adoption, while **Chapter 3** counterbalances some of these findings by highlighting barriers and risks.

2.1 Communication and information access

An immediate positive outcome of digital connectivity for MSEs is increased access to information and an improved ability to communicate (UNCTAD 2010). MSEs obtain information through various technological channels. However, on account of their wide availability, affordability and low skill barriers, mobile phones and low-bandwidth applications such as WhatsApp or Facebook Basics (or Tencent QQ and WeChat in China) remain the technologies of choice for informal MSEs across the world and for any MSE in a low income country (Deen-Swarray, Moyo and Stork 2013; Ilavarasan 2019; X. Li, He, and Zhang 2020; Mothobi, Gillwald and Aguera 2020; Schiff, Nagula and Donner 2019). MSEs have been found to use mobile phones for a variety of informational purposes – for instance, to receive information about market prices, new products and services, and customer enquiries and feedback. The breadth of purposes is positively associated with MSEs' capabilities and their use of broadband-based applications (Ilavarasan and Otieno 2018; Y. K. Tang and Konde 2020; ITC 2017). MSE capabilities are often linked to their managers' characteristics: for example, a study conducted in Zambia found that MSEs with younger owners were more likely to access information online (Y. K. Tang and Konde 2020).

Business-relevant information can be divided into three major categories: information from direct communications between MSE staff and external parties, market information, and policy and support information (Ilavarasan and Otieno 2018). ICT-enabled contact with customers and partners has been found to have a positive impact on labour productivity and profitability (Esselaar et al. 2007), customer acquisition (Donner 2006) and business growth (Chew, Levy and Ilavarasan 2011). Access to market information – especially information about prices along agricultural supply chains – has also been shown to increase the success of MSEs along with overall market efficiencies in certain contexts (Aker 2010; Jensen 2007; Uduji, Okolo-Obasi and Asongu 2019). One recent study highlights the positive impact of having access to information about government support policies and programmes on the performance of MSEs in China (X. Li, He and Zhang 2020).

Which information sources and content are accessed depends on an MSE's attributes and the setting in which it operates (Boateng et al. 2014; Chatterjee, Dutta Gupta and Upadhyay 2020; Y. K. Tang and Konde 2020). In contrast, for MSEs in knowledge intensive industries and those seeking to expand internationally, the internet has become an essential information and communication channel (Pergelova et al. 2019; Saridakis et al. 2018). Agricultural MSEs were found to use ICTs mainly to monitor financial transactions and consult with agricultural extension agents or other farming experts (Martin and Abbott 2011). Ethnographic studies showed that market efficiency is not necessarily the main outcome of digital adoption; MSEs in fact access a wide range of contextual and social information through ICTs (Burrell and Oreglia 2015; Srinivasan and Burrell 2015). More recent studies have found that digital platforms

can become important sources of information for micro entrepreneurs, especially in connection with self-administered training (Schiff, Nagula and Donner 2019).

2.2 Market access, platforms and e-commerce

The second key benefit of digital connectivity for MSEs is the ensuing ability to trade more easily and across greater distances, with both customers and supply chain partners (UNCTAD 2010). While initial hopes that digital technologies could help MSEs to directly acquire new customers and supply chain partners via the internet have rarely come true, digital transaction platforms have emerged as powerful and transformative market intermediaries for MSEs in recent years (Bonina et al. 2021; Evans and Gawer 2016).[6] Essentially, such platforms reduce transaction costs and information asymmetries by aggregating demand and supply in a virtual interface. E-commerce platforms and online marketplaces, such as Alibaba, Amazon, Wish, Jumia, Flipkart, Gojek or Mercado Libre, are the most common type of transaction platform with direct relevance for MSEs. However, a wide range of other types of MSE-oriented platforms have emerged at the regional, national and local level, including platforms for financial services (see **section 2.3** for details), enterprise resource planning (ERP), food delivery and courier services, logistics and transport, agricultural supply chain coordination and information exchange, and equipment sharing.

Platforms not only give existing MSEs access to more customers, but also enable new or vastly expanded markets for certain types of service-oriented MSEs, such as hostels and homestay hosts in tourist destinations, sales affiliates or e-commerce logistics suppliers (such as riders' and drivers' collectives) (Ng'weno and Porteous 2018; S4YE 2018; UNCTAD 2017). Platforms have been found to provide small enterprises with international market access, even though they do not always appear to replace the need for local staff and customer service (Jin and Hurd 2018). Where platform-mediated demand is sufficiently large, entire clusters of informal MSEs can come together to service it: for instance, networks of informal MSEs have sprung up in Nairobi, where high-profile users of online labour platforms like UpWork re-outsource writing, translation and data entry services that they provide to customers in the United States of America and other high-income countries (Melia 2020). Exploratory qualitative studies have identified informal digital trade unions that organize via WhatsApp groups (Schiff, Nagula and Donner 2019).

Platforms have proved to be more scalable than one-to-one trade by MSEs, not just because they increase sales volumes, but also because they take on market-enabling support functions that are difficult for MSEs to provide on their own. Especially for informal MSEs, platforms provide credibility and trust in the eyes of buyers – through intangibles such as a platform's brand recognition and through tangible services such as escrow accounts (Schiff, Nagula and Donner 2019). Digital payment channels have been essential enablers of online trade, and platforms can efficiently integrate these channels, ensuring security and convenience for buyers and sellers alike. E-commerce platforms also often build up warehouses, logistics operations and customer support centres (David-West and Evans 2016). Similarly, food delivery platforms offer hands-on support to restaurants, for instance, by training staff on how to use the platform interface or by deploying professional photographers to take high-quality pictures of their dishes. As these examples illustrate, platform-sponsored support structures tend to be of an analogue nature, complementing digital access on the "last mile" between platform and MSE or between platform and consumer (Friederici, Wahome and Graham 2020). However, establishing analogue

6 See UNCTAD (2019) for a recent discussion of digital platforms in an international development context, including an overview of common taxonomies of such platforms. This section focuses entirely on opportunities associated with digital platforms; potential challenges will be discussed in the next chapter as barriers.

structures takes time, knowledge and resources, which is why platforms have only recently begun to develop into a significant channel for MSEs in low-income settings (UNCTAD 2019).

While MSEs can rely on platforms to take on marketing functions, they must build up new skills if they are to participate effectively in platform-mediated markets (Banerjee and Ma 2012; Schiff, Nagula and Donner 2019; UNCTAD 2017). Thus, MSEs need to set up accounts on their chosen platform, indicating phone numbers, email addresses and digital payment details. Depending on the platform, MSEs may also be required to comply with specific terms and standards (for instance, concerning stock management or availability to respond to customer requests), which can nudge them further in the direction of good business practices (Ng'weno and Porteous 2018; Pon 2020). To manage their presence on the platform effectively, MSEs may need to make specific resources available, such as a staff member who is able to take care of online marketing, compliance, interactions with customers, and so on.

This phenomenon is similar to the pull effects of digitalization experienced by MSEs within supply chains. Such effects come into play where MSEs are prompted to upgrade their own digital capacities as a result of trading partners' digital usage, which ultimately increases the enterprises' overall competitiveness and business performance (Boateng et al. 2014; Kabanda and Matsinhe 2019; Pergelova et al. 2019). One difference between supply chains and platform markets is the wider-ranging role of the platform company as an intermediary. In traditional supply chains, most types of MSE improve their existing relations rather than making entirely new connections: digital technologies help them to deepen ties with existing customers, bring down costs, save time and reduce risks (Barrantes Cáceres et al. 2012; Esselaar et al. 2007; Donner 2006; Jagun, Heeks and Whalley 2008; Srinivasan and Burrell 2015), while the enterprise's supply chain position and network remain largely the same. Platforms, on the other hand, seek to actively create and galvanize new markets by increasing the capacities of MSEs operating on the supply and/or demand side of the market. Accordingly, platforms engage in active upskilling of MSEs to increase the breadth and depth of market participation (Schiff, Nagula and Donner 2019). Upskilling efforts consist of training activities that cover a broad range of skills (from soft skills to platform-specific competencies), such as face to face training similar to business incubation (provided, for example, by Flipkart), online and video training (like that offered by Tripadvisor) and in-workflow prompts (like the in-app messages provided to motorcycle drivers by MAX in Nigeria) (Donner et al. 2020a). To target MSEs in low-income countries, platforms sometimes recruit intermediaries that offer courses and hands-on support for onboarding (UNCTAD 2017). Well-resourced and experienced platforms like Alibaba offer especially wide-ranging and sophisticated support services, with potentially transformative effects on MSEs (Jin and Hurd 2018; L. Li et al. 2018). Other examples come from the tourism industry. NightsBridge is an example of a South African hotel booking management system that provides MSEs with an easy-to-use interface and automatically integrates with large online travel providers (UNCTAD 2017).

Whether market access is direct or platform-mediated, a consistent finding is that digital technology use varies across different MSE types. The older, the larger, the more digitally skilled and the more formalized a firm, the more likely it is to trade online, to trade across national borders and to use a wider range of digital technologies, such as websites and online marketplaces (Chege, Wang and Suntu 2020; World Bank 2016; ITC 2017; Kabanda and Matsinhe 2019; L. Li et al. 2018; Schiff, Nagula and Donner 2019; Y. K. Tang and Konde 2020; UNCTAD 2017). Informal MSEs mostly use mobile phones, WhatsApp and Facebook Basics to trade and access new markets (ITC 2017; Schiff, Nagula and Donner 2019), while more sophisticated digital technologies tend to be used by MSEs faced with competitive pressure to do so, such as those in export-oriented or information-intensive sectors (World Bank 2016; Hernandez et al. 2016; ITC 2017; Saridakis et al. 2018). Export-oriented MSEs in knowledge-intensive industries, especially in high-income countries, have also been found to obtain direct access to international markets through improved market intelligence (Pergelova et al. 2019; Mäki and Toivola 2021). One study of Bulgarian SMEs suggests that women-led enterprises are more effective at using digital technologies to gain access to international markets; the authors argue that this may be due to women's better cognitive skills, which they can turn to advantage in information sourcing and communication (Pergelova et al. 2019). Export-oriented firms that are embedded in global value chains can thus benefit from competition because it impels them to adopt digital technologies more comprehensively and to be more efficient (Díaz-Chao, Sainz-González and Torrent-Sellens 2015; Iacovone, Pereira-López and Schiffbauer 2016).

Microenterprises can be particularly flexible and inventive in their use of simple ICTs. For instance, a study of the Nigerian road logistics sector found that MSEs creatively adapted mobile phones to establish a communications system that enabled them to manage various supply chain actors (Tob-Ogu, Kumar and Cullen 2018). MSEs make use of ICTs for supply chain coordination, especially for coordination with existing partners and where the benefits are specific, immediate and apparent (Wanyoike, Mukulu and Waititu 2012). For example, small hotels engaged in ecotourism use digital technologies to coordinate locally and market themselves online to tourists; farmers use email, mobile phones and spreadsheets to coordinate local supply chains; and garment producers use email to receive orders (UNCTAD 2017). To sum up, MSEs in most cases do not seem to be using digital technologies to upgrade their position in existing value chains, but they are able to use them to make the most out of the position that they already occupy. Platforms, on the other hand, function as powerful facilitators of new markets.

2.3 Digital financial services

A third important impact of digital technologies on MSEs is that an increasing number of such enterprises have been enabled to use a greater variety of financial services. Although digital financial services (DFS) are but one domain of digital applications, it has arguably proved to be the most transformative one, especially for MSEs that were previously unbanked or otherwise excluded from traditional financial services (Demirgüç-Kunt et al. 2020; OECD 2019). The positive impact that digital technologies have on inclusiveness stems from a significant reduction in the marginal cost for a given financial service, making it economically viable to charge small fees for transactions and to provide services to microenterprise customers (such as microfinancing and microinsurance). DFS that effectively include rural and poor populations rely heavily on agent and kiosk networks, which create physical "touchpoints" that promote trust and achieve a broad reach (Bull 2020; Mastercard Foundation and IFC 2018; Friederici, Wahome and Graham 2020). DFS appear to contribute to MSE productivity more directly than most other widely used types of digital applications (such as social networks), leading in turn to more pronounced impacts on MSE performance and hiring (Horne, Nickerson and DeFanti 2015; Lopez 2020) and significant economic development outcomes (Beck et al. 2018; Suri and Jack 2016; Islam, Muzi and Rodriguez Meza 2018).[7]

7 See Bateman, Duvendack and Loubere (2019) for a critical discussion of the postulate that mobile money has led to widespread poverty reduction.

Digital financial services encompass a wide range of applications, such as accounts (or wallets), payments and other transactions, credit scoring, lending and investments, financial management and insurance. DFS are offered to MSEs via a wide set of technologies and interfaces, including basic USSD[8] and text message-based mobile money services; smartphone and browser-based applications; services embedded in other applications through application programming interfaces; and more sophisticated software-as-a-service and customized financial management applications. DFS combine the traditional domains of financial institutions, mobile network operators and digital enterprises, and are subject to more rigorous, albeit fragmented regulatory and licensing regimes than other digital applications. Accordingly, DFS providers comprise mostly banks, mobile network operators and financial technology (fintech) companies, but also governments, cooperatives and civil society actors, such as microfinance providers (GPFI 2020; Raghavan, Jain and Varma 2019). Thanks to increasing levels of diffusion and interoperability, DFS constitute an ever denser stack of digital infrastructures that enhance the value of other digital services and enable further digital innovation (Raghavan, Jain and Varma 2019; GPFI 2020; Kendall et al. 2011; Mastercard Foundation and IFC 2018).

As for access to information and markets, the use cases of DFS for MSEs range from simple and immediately impactful to more complex and transformative over time. Account and transaction services are the most common types of DFS and are directly useful to MSEs. Mobile money applications are now being used by many informal MSEs in low-income countries (especially in Africa), while larger and more formalized MSEs tend to use a wider range of more sophisticated, broadband-based DFS (Demirgüç-Kunt et al. 2020; Mothobi, Gillwald and Aguera 2020).

Especially in countries with many people who are unbanked but where there is widespread use of mobile phones, mobile money has become popular among MSEs for basic wallet functions and to receive customer payments, allowing such enterprises to achieve immediate efficiency gains and time savings (Higgins, Kendall and Lyon 2012; Pasti and Nautiyal 2019). In a study covering Kenya, the United Republic of Tanzania, Uganda and Ethiopia, female MSE owners, who are less likely to have their own bank accounts than their male counterparts, were found to be using mobile money more frequently than the latter to pay their employees (ITC 2017). Moreover, mobile money accounts can function as virtual savings accounts (for instance, using airtime as currency) and can incorporate additional basic services, such as utility bill payment applications (Kendall et al. 2011; Maurer 2012). Further complementary contributions to MSE productivity can arise from the improved availability of value-added financial services, such as (micro)insurance. Over time, such services promote the resilience, formalization and stability of MSEs (Sahler and Gray 2020). More professionalized and digitally skilled MSEs may integrate account and transaction services with order processing, bookkeeping, ERP software and digital wage payment systems, thereby amplifying the transformative effects of digitalization and contributing to the gradual formalization of employment (Beck et al. 2018; Friederici, Wahome and Graham 2020; Pasti and Nautiyal 2019; Sharma and Shastri 2020).

8 Unstructured Supplementary Service Data (USSD) is a non-internet-based communications protocol used by mobile phones to communicate with the mobile operator systems. It is primarily used in mobile money services and menu-based information services (such as those providing agricultural information) and for configuring phone settings.

COVID spotlight #1. Getting through: Finding the right channel for crisis support

The coronavirus crisis has increased the financial precariousness of micro and small enterprises (MSEs) all over the world. Many governments have set up financial support programmes, but identifying eligibility and administering funds has not always been straightforward. MSEs did not necessarily change their typical approach to accessing capital during the pandemic, using own funds or borrowing from family and friends. It can be hard for MSEs to keep abreast with government initiatives, and in many cases, MSEs may simply not be aware of the support that is available or may not know how to access it. For instance, a strong demand for comprehensive information on government assistance programmes was expressed by MSEs in surveys conducted in Indonesia (with 82 per cent of enterprises requesting such information) and the Philippines (75 per cent) (ADB 2020).

As for governments, the crisis has made it clear to them that they need to have up to date and effective support procedures, and to identify ways in which digital technologies can help to align these procedures with the realities faced by MSEs. The Governments of Latvia and Mexico, for example, have enlisted fintech start ups to develop efficient and fast financing mechanisms for small and medium sized enterprises during the crisis. Regulations that in many countries prohibit the use of digital financial accounts (mobile money, online banking, e-money and the like) to receive government-to-person payments may have to be revisited and adjusted quickly. Similarly, "cash-in, cash-out" mechanisms, such as mobile money kiosks, would need to be overhauled not just with regard to the licensing regime that applies to them, but also in terms of capacity and liquidity. Governments must properly understand these financial supply chains and enable all the actors involved to fulfil their function, even where they are of the non-traditional kind.

Sources: Bull (2020); Cirera et al. (2021); ILO (2020a); OECD (2020a); Rutkowski et al. (2020); ADB (2020).

Beyond accounts and transactions, DFS have opened up an array of new forms of financing and lending opportunities for many MSEs, even if the volumes involved remain low compared with traditional finance ("**COVID spotlight #1**"). Fintech start ups, in particular, have developed new and faster ways of assessing risk – for instance, using reputation scores rather than collateral to determine creditworthiness (GPFI 2019; 2020; Klapper, Miller and Hess 2019). Peer-to-peer lending and blockchain-based services – despite very much falling short of early expectations – have further increased the supply of capital available to MSEs (Rosavina et al. 2019; Nemoto and Yoshino 2019). Crowdfunding has added financing channels for specific projects (rather than the enterprise as such), especially among non profit organizations and in the creative economy, where the activation of user communities and information campaigns are important non-monetary outcomes (OECD 2015). Where national and regional regulations have been updated, crowdfunding has become a viable source of alternative finance for digitally connected MSEs in North America, Europe, Asia and (to a lesser extent) Latin America and Africa (Jenik, Lyman and Nava 2017; Ziegler, Shneor and Zhang 2020). Such options are particularly important for enterprises that have traditionally struggled to comply with banks' financing requirements (with respect to, for example, business longevity and physical assets as collateral), such as microenterprises, start ups and innovative firms (OECD 2019). For instance, crowdfunding has been found to be associated with positive growth outcomes in small enterprises in the United Kingdom of Great Britain and Northern Ireland (Eldridge, Nisar and Torchia 2021).

In terms of market access, the role of platforms as intermediaries of DFS has increased. E-commerce platforms in particular have become essential aggregators of DFS, as they integrate payment and sometimes credit services into their processes and interfaces (Sahler and Gray 2020; Merry 2020). In the Africa region, for example, approximately 15 per cent of platforms offer some type of DFS, including insurance, digital wallets, savings or credit products (Rinehart-Smit and Schlemmer 2020). In an attempt to exploit its reach among informal MSEs, WhatsApp recently launched a payments

service in India (Chakravarti 2020). Platforms also aggregate detailed data on MSEs, which enables them to better understand the risk profiles of particular groups and, consequently, to design targeted financial products (Rinehart-Smit and Schlemmer 2020). In China, WeChat Pay (owned by Tencent) and various financing and payment services offered by Ant Financial dominate the stage, even if the latter group was recently ordered to divest by the Chinese authorities (Neate 2020).

2.4 Pathways to formalization

A fourth impact of digitalization on MSEs has been its contribution to formalization, which is not only explicitly referred to in SDG target 8.3, but is also a key issue to be tackled for progress to be made on other SDGs as well. Informality is a root cause of many deficits in human rights and workers' rights; it hampers productivity and prevents an economy from growing and becoming more resilient. Enterprise formalization refers to the process whereby an informal economic unit moves into the purview of state authority; it involves registering the unit at the relevant national institutions and ensuring that it complies with the applicable laws (Gaarder and van Doorn 2021; ILO 2015b). Beyond the importance of enterprise formalization for productivity growth, it is also a prerequisite for improving working conditions, since only once an enterprise has been formalized can its workers be registered and included in social security systems. While formalization can generate direct benefits, such as improved ability to access funding from formal sources, MSEs also incur costs and effort in the process (ILO 2017). Therefore, interventions aimed at formalizing MSEs can fall short of their target if they focus only on enforcement and neglect such enterprises' interests and incentives (De Andrade, Bruhn and McKenzie 2014).

Digitalization does not inherently bring about MSE formalization but, rather, opens up new pathways towards it. The first and most direct pathway consists of "e-formality" services: digital formalization initiatives implemented as part of broader e-government programmes (Chacaltana, Leung and Lee 2018).[9] Public agencies have begun to offer services such as electronic business registration, digital fee payments, registration of bills and payments (for example, to monitor and pay value-added taxes) or electronic payroll. Such services are often aggregated in virtual one-stop shops, which provide a single central access point for MSEs. According to World Bank data (World Bank 2020), services of this kind are offered in 90 per cent of high-income and 40 per cent of low-income countries. Providing digital services can enable formalization by making compliance less costly and incentives more accessible. While systematic and rigorous impact evaluations are not available, a host of anecdotal evidence suggests that e-formality programmes contribute to the formalization of large numbers of MSEs especially in Asia and Latin America (Bhattarai 2018; Chacaltana, Leung and Lee 2018).

The second pathway to formalization is more indirect and arises from MSEs' increased use of digital financial services (DFS) and related software, such as planning and accounting solutions. This pathway originates in the interest that MSEs have in using digital technologies for operational management. Anecdotal evidence covers a spectrum ranging from indirect and rudimentary contributions to formalization (such as informal enterprises paying salaries via mobile money) to more direct and comprehensive ones (such as MSEs' deployment of tax-compliant enterprise resource planning systems [ERPs]) (Friederici, Wahome and Graham 2020; Higgins, Kendall and Lyon 2012; Pazarbasioglu et al. 2020). In all these cases, MSEs formalize gradually and incidentally rather than immediately and deliberately, and the process happens independently of government intervention and policy. Still, digital accounting and documentation can lower the threshold to formalization, especially where digital systems are already aligned with taxation and incorporation standards. For example, the PromptPay system in Thailand provides real-time clearing and transaction settlement based on mapping a national identification number, corporate tax identifications or phone numbers to bank accounts, which allows customers to

9 This section merely touches on the effects of e-formality interventions; Chapter 5 discusses them in more detail as part of the report's consideration of policy implications and recommendations.

pay vendors using QR codes (Pazarbasioglu et al. 2020). Even where owners of MSEs do not end up formally registering their business, the comprehensive use of DFS can provide some of the same benefits in terms of productivity and decent work (for example, increasing access to finance, reducing corruption and encouraging savings).

As for e-formality, there is no systematic evidence that DFS and related software necessarily lead informal economic units to formalize, but a number of case studies have pointed to indirect effect chains (see Lopez 2020 for a recent review). In particular, MSEs' improved access to loans has been highlighted in the literature, as DFS provide such enterprises with a quasi formal credit history (Klapper, Miller and Hess 2019; Pazarbasioglu et al. 2020). The positive impacts of digital wage payments on employment formalization have frequently been highlighted as well (ILO 2020c; Sharma and Shastri 2020). Focusing on two large formal firms, a randomized controlled trial among factory workers in Bangladesh found digital wage payments to result in increased savings and market externalities, as workers and their peers learned to avoid being overcharged by mobile money agents (Breza, Kanz and Klapper 2020). At the macro level, a recent study showed that an increase in the adoption of mobile financial services decreases the share of the informal versus the formal sector within a country's gross domestic product by about 3.5 per cent (Jacolin, Keneck Massil and Noah 2019). The study uses propensity score matching, a method for inferring causal effects from observational data as reliably as possible. In line with anecdotal evidence, the authors argue that improved credit access, increases in the productivity of informal firms and spillover effects from the growth of already formal firms are the most likely mechanisms underlying the observed effect. A similar quantitative yet more granular World Bank study highlights the same negative correlation between DFS and informality (Klapper, Miller and Hess 2019). Still, the causal chain may arguably run in the opposite direction: some studies posit higher productivity, professionalization and access to credit as drivers of DFS adoption and digital technology demand (Beck et al. 2018; Bruque and Moyano 2007). In any case, a mutual relationship between DFS adoption and reduction of informality has consistently been identified in the literature.

Gradual MSE formalization through DFS can go hand in hand with e-formality and formalization policies, as one reduces barriers to, and increases points of interaction with, the other. For instance, the Government of Uruguay subsidizes MSEs that accept digital payments; it has reduced the tax withholding requirements for such firms and lowered value added taxes for end users of their services (Pazarbasioglu et al. 2020). The Government of Nepal and the Kerala state government in India have begun to mandate electronic salary payments in some sectors in order to monitor compliance with minimum wage regulations (Bhattarai 2018).

2.5 Digital transformation and entrepreneurship

The fifth opportunity opened up by digitalization is for MSEs to fundamentally change the way they do business (digital transformation) or to bring entirely new digital applications and products to market (digital entrepreneurship). Digital transformation and entrepreneurship are far less widespread, more oriented towards the long term and more indirectly impactful than the previous four areas of opportunity (Friederici, Wahome and Graham 2020; Ilavarasan and Otieno 2018).

Digital transformation implies that existing MSEs slowly but significantly alter their business models, processes, routines, relations and capacities through digital technologies (Barann et al. 2019; L. Li et al.

2018). Accordingly, it is the most advanced and difficult of the various ways in which MSEs can use digital technologies (Barann et al. 2019). Achieving digital transformation requires long-term strategic and resource-intensive investments that ultimately generate positive feedback loops between an enterprise's capabilities and digital technology adoption. As was argued in **Chapter 1**, digital transformation can therefore be seen as the far end of the spectrum of digitalization impacts on MSEs. At the lower end, MSEs adopt digital technology in simple short-term oriented ways, with small, isolated, predictable and immediate impacts. At the digital transformation end, MSEs apply digital technologies in more complex, long-term oriented ways, resulting in larger, embedded, more uncertain and indirect impacts.

The limited literature on digital transformation in MSEs suggests that the more transformative the digital-induced change, the more elusive it has proven for MSEs (Barann et al. 2019; Jones et al. 2014; Y. K. Tang and Konde 2020). Digital transformation hinges on organizational capabilities deriving from the skills and aptitude of managers and staff. Worryingly, MSEs appear to be falling further and further behind medium-sized and large firms that are better resourced and more suitably structured to take advantage of digital transformation (Barann et al. 2019; OECD 2019). Findings from high-income countries suggest that complementary effects of ICT investment and use, organizational change and training materialize directly for all larger firms, but otherwise they are experienced only by export oriented small firms and specialized SMEs (Colombo, Croce and Grilli 2013; Díaz Chao, Sainz-González and Torrent-Sellens 2015).

Micro and small enterprises thus appear to require outside help to achieve digital transformation – for instance, from neutral and subsidized government advisory services or from large platforms that seek to embed MSEs more deeply into their overall market ecosystem (Barann et al. 2019; L. Li et al. 2018). In low-income contexts, only exceptional informal microenterprises seem to be able to apply digital technologies in more integrative ways – for instance, by implementing digital operations, planning, relationship management and support systems (Boadi et al. 2007; Boateng et al. 2014; Y. K. Tang and Konde 2020). Despite its rare occurrence, the digital transformation of MSEs does warrant policymakers' attention: there appear to be clear positive links between more multidimensional and innovative uses of digital technologies and economic empowerment (Boateng et al. 2014; Chatterjee, Dutta Gupta and Upadhyay 2020).

Digital entrepreneurship is a related but separate realm of opportunity for MSEs. Instead of fundamentally changing processes in existing organizations, digital entrepreneurship involves the creation of a new market-opportunity-oriented venture based on the development of a business model that defines how the venture can generate and capture value by means of digital technologies. Digital entrepreneurship is the domain of digital start ups (that is, newly created, growth-oriented firms), which are often MSEs but of a nature different from that of informal and subsistence-oriented small enterprises. Digital start ups embody particular skills, cultures and resources (Avle and Lindtner 2016; Weiss and Weber 2016), which explains why digital entrepreneurship remains a rather exclusive and evolving phenomenon, concentrated in large cities with a long history of digital innovation (Friederici, Wahome and Graham 2020; Storper et al. 2015). Still, vibrant digital entrepreneurship scenes have given rise to a variety of new types of MSE – from software development firms through designer collectives to "maker communities" – and can now be found in most major cities of the world, even in many low-income countries (Ndemo and Weiss 2017; Quinones, Heeks and Nicholson 2017; Seo Zindy and Heeks 2017).

Digital entrepreneurship leads to productivity effects mostly by generating spillover effects that arise within entrepreneurial ecosystems and from the application of more locally and regionally relevant digital products and innovations (UNCTAD 2012; 2019). Digital start ups ultimately offer software-based products, but they also engage with customers face to face in order to learn about their needs. Moreover, their value creation often combines digital and analogue components, as when the firms behind e-commerce apps also open warehouses, recruit agents and establish fleets of motorcycles, or when ERP system providers offer customized and user friendly solutions for local small firms (Friederici, Wahome

and Graham 2020). In this way, digital entrepreneurship (newly created MSEs offering digital products) gradually and indirectly enhances digital transformation (fundamental change in existing MSEs).

2.6 Green digital business

Finally, digital technologies present an opportunity for MSEs by virtue of their application to green technology and business. As a result of the intensified focus on the climate crisis and environmental change, policymakers and development organizations have begun to explore how digital technologies can help MSEs to operate more sustainably, contributing particularly to SDGs 6, 7, 13, 14 and 15. Out of the six opportunity areas discussed in this report, digitalization's ecological potential for MSEs is the least understood, since broad-based qualitative and quantitative evidence about digital "greening" and its impacts on MSEs is still unavailable. So far, studies with a global or regional scope outline potentials (Bayat-Renoux 2018; Bianchini 2019; World Economic Forum 2020) or call on policymakers in general terms to combine MSE-oriented digital and ecological initiatives (APEC 2017; European DIGITAL SME Alliance 2020). This section therefore briefly outlines current fields of activity but does not present empirical evidence on the subject.

One central field of activity is green digital finance.[10] The overall intention is to apply the scale and data-analytical opportunities of digital technologies to the financing of climate projects, making funding more efficient and enabling actors in the value chain to take more informed decisions (Bayat-Renoux 2018). These ideas connect to earlier proposals to employ digital technologies to administer greening-oriented funding for MSEs on the basis of data collected on, for example, their compliance with sustainability standards (Sommer 2017). Digitalization is also envisaged as having the potential to broadly support the alignment of the financial system with ecologically sustainable development (Bayat-Renoux 2018). Ant Financial, the digital payments and finance provider within the Chinese Alibaba Group, is a key advocate of green digital finance, providing MSEs with access to green and sustainable credit and financial services by building on its microfinance programme (IFC 2015).

Similarly, digital technologies are being used to extend the coverage of climate risk insurance to MSEs through microinsurance – as in the case of one multi-stakeholder collaboration in Bangladesh (InsuResilience Global Partnership 2020). Potentially, climate data that insurance companies use for risk modelling could be used to tailor insurance products to MSEs, and, vice versa, MSE-collected data could help to improve risk models. Such programmes often draw inspiration from success stories like M-KOPA Solar, a start up from Kenya that distributes solar panels and energy-efficient devices such as mini-fridges and televisions to poor remote households across Africa. Through a partnership with Safaricom (Kenya's leading mobile network operator), the start up bundled device sales with mobile money-based loans and savings products, allowing customers to finance their purchase from M KOPA while at the same time building a credit, energy use and savings profile.

Other approaches focus on employing digital technologies to save energy and resources, or to otherwise render the operations of existing small enterprises more environmentally sustainable. For instance, a survey of Eastern European SMEs found that they implemented resource efficiency measures mainly in response to increases in the price of electricity and raw materials; the next two motivating factors, in terms of relative importance, were the desire to gain a competitive advantage over other firms and concern for the environment (OECD 2018). Indeed, major ecological impacts of digital technologies have been identified at the macro level (for example, emissions savings through reduced travel) (European DIGITAL SME Alliance 2020) and the meso level (efficiencies in MSE-oriented energy infrastructures, such as rural mini grids) (DCED 2014). However, examples of digital technologies having had impacts at the enterprise level are sparse. Specific technological applications of energy saving digital technologies for

10 See the website of the Green Digital Finance Alliance, https://greendigitalfinancealliance.org/initiatives-publications/.

MSEs have been discussed only in specialized engineering studies that draw on exploratory qualitative work in high-income countries. For instance, some studies of this kind have highlighted the application potentials of smart technologies for energy and load management in the United Kingdom and Germany (Hilger et al. 2018; United Kingdom, Department of Energy and Climate Change 2016; Warren 2017). Another study investigates the energy efficiency potential of photovoltaic equipment implemented by Romanian SMEs and proposes a system for estimating the resulting savings (Suciu et al. 2017). A key challenge appears to be that MSE operations are typically too small to make it worthwhile to implement energy efficiency systems. One answer could be the development of green businesses. "Venture builders" and business advisory services[11] offer consulting and technical advice to support the launch of green start ups or to enable process improvements in existing MSEs, especially in agriculture. Green business development can help with the application of digital technologies in context- and enterprise-specific ways – for instance, to increase resource efficiency, reduce waste or collect and analyse data related to business processes.[12]

11 See, for instance, https://www.green-venture.net/, https://www.greenmanage.biz/consulting-services/business-strategy/.

12 See, for example, https://www.unenvironment.org/switchafricagreen/what-we-do/components/green-business-development.

Chapter 3. Barriers

This chapter outlines barriers that have prevented digitalization from enhancing MSE productivity. It should be noted that these barriers reinforce one another and thus need to be tackled in parallel, by multiple support actors. **Chapter 4** summarizes how barriers collectively influence MSEs, while **Chapter 5** discusses holistic policy approaches.

3.1 Digital divides and limited infrastructures

Digital divides and incomplete digital infrastructures constitute a widespread barrier that stops the positive impacts of digitalization from benefiting MSEs. Given that only a few MSEs are located in technology parks or other zones with exceptional infrastructure conditions, their difficulties with access are in many ways similar to those of individual internet users.

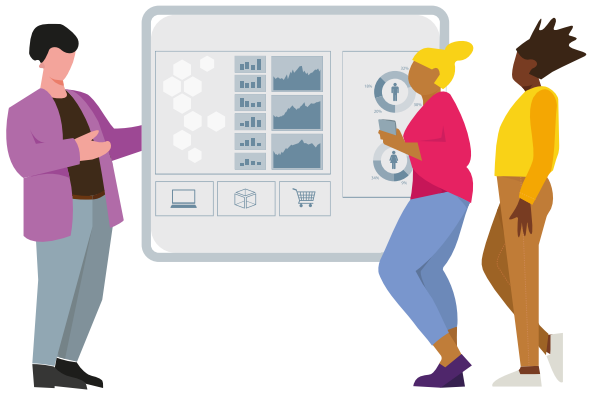
Access and adoption barriers are mutually reinforcing; moreover, there is a strong negative correlation with income levels and population density. While the exact constellations of access barriers vary between countries and sectors (Cirera et al. 2020; Deen-Swarray, Moyo and Stork 2013), studies generally confirm that adoption is positively correlated with MSE size and formalization across different settings, being lowest in the rural areas of low-income countries and highest for larger MSEs in the urban centres of high-income countries (Afolayan et al. 2015; World Bank 2016; ITC 2017; LIRNEasia 2020; Mothobi, Gillwald and Aguera 2020; OECD 2019; Souza, Siqueira and Reinhard 2017). There is evidence that this status quo results in a vast loss of productivity: all else being equal, MSEs may in fact be benefiting more than larger firms from the same levels of connectivity (in terms of bundles of bandwidth, devices, and so on) (Cataldo, Pino and McQueen 2020). The cumulative hurdles constraining MSEs' effective adoption of digital technologies will be discussed in turn, starting with necessary and moving towards sufficient conditions for digital adoption.

Securing basic access to a mobile or internet connection and to devices is an initial obstacle. Once access is ensured, the next differentiator is the available bandwidth (for instance, basic internet connection vs. broadband, or 3–5G mobile broadband technology) and reliability (frequency and duration of outages, or bandwidth volatility). The available device types (and their quality and design features) may be limited, with a descending order of professional functionality from in-house connectivity infrastructure (especially servers) to desktop computers, laptops, tablets, smartphones, feature phones (2.5G) and 2G phones (telephony and text messaging only). The actually available bandwidth and application capacity for MSEs depends on the weakest link in the "chain" of connectivity hardware, network subscription and local infrastructures. For instance, the adoption of cloud applications can be hampered by large distances to the nearest cloud servers (Khayer et al. 2020).

An additional, less immediately obvious technical connectivity barrier is the mismatch between an MSE's operational setting and the available hardware and software. MSEs tend to be creative and adapt technology to their needs as much as possible (Donner 2007; Martin and Abbott 2011; Tob-Ogu, Kumar and Cullen 2018), but some material constraints do not allow workarounds. Device and application requirements such as power usage, operating system standards, bandwidth requirements, cloud-dependent system software or update and security settings are often designed with high-income country conditions in mind, resulting in serious functionality limitations for users who do not have easy access to always-on broadband and electricity, or for those who need to operate devices with outdated firmware in hot temperatures (Friederici, Wahome and Graham 2020). MSEs in areas with no or unreliable electricity may be hampered in their use of always-on digital products such as cashier systems (Afolayan et al. 2015; Ilavarasan 2019). Inadequate infrastructures

can therefore make it difficult to use technology in the originally intended manner, limiting the productivity outcomes of the same technologies in lower-income vis à vis higher-income settings (Afolayan et al. 2015).

Even where devices and connections are technically available, MSEs need to be able to afford them. Prohibitive cost has consistently been identified as a major factor limiting their adoption by MSEs compared to larger firms (see, for example, Boadi et al. 2007; Ilavarasan 2019; Shah Alam 2009). An additional problem is that affordability (measured in terms of the share of household income that needs to be spent to achieve a certain level of connectivity) is closely intertwined with the roll-out of infrastructure and the local presence of a competitive telecommunications and digital sector, which is itself related to digital consumer market opportunities (Friederici, Wahome and Graham 2020). Ultimately, the lowest affordability levels are often to be found in the poorest regions (World Bank 2016). Although there are no recent representative surveys of informal businesses covering the affordability of digital technologies, a study conducted in 2012 in nine African countries found that affordability was a particular issue in Rwanda (where 55 per cent of informal business owners who did not use mobile phones for business purposes identified cost as the main barrier), Cameroon (47 per cent), the United Republic of Tanzania (42 per cent), Ethiopia (41 per cent) and Uganda (37 per cent); the issue was less pronounced in Nigeria (19 per cent), Namibia (19 per cent), Ghana (17 per cent) and Botswana (7 per cent) (Deen-Swarray, Moyo and Stork 2013). The most recent country-based, non-MSE-specific assessment by the Alliance for Affordable Internet (2020) ranks Liberia, Sierra Leone, Ethiopia, the Democratic Republic of the Congo and Haiti as the countries with the worst affordability. It commends countries such as Rwanda, Malaysia, Colombia and Costa Rica for increasing affordability through effective national broadband planning.



Ultimately, digital adoption remains very low among MSEs and, for many of them, it is confined to simple, non-internet-based mobile phone services such as telephony, USSD and text messaging (Ilavarasan 2019). For instance, a recent representative survey of informal businesses in selected African countries showed that, while the adoption of basic mobile money was common, only 7 per cent of these businesses used the internet (Mothobi, Gillwald and Aguera 2020). Representative surveys of informal businesses in the Lao People's Democratic Republic, Mozambique and Zimbabwe conducted by the World Bank (Islam and Jolevski 2019) found even lower rates: internet adoption was assessed at 0.5 per cent in Mozambique and 1.9 per cent in Zimbabwe, while 1.2 per cent of informal businesses in the Lao People's Democratic Republic and 0.9 per cent in Mozambique were found to use computers for business purposes (internet usage and computer usage were not assessed for, respectively, the Lao People's Democratic Republic and Zimbabwe). Gender gaps are also widespread: female-owned MSEs have consistently been found to be less likely to be digital adopters (Deen-Swarray, Moyo and Stork 2013; ITC 2017; Kabanda and Matsinhe 2019) and to benefit less from ICT adoption than those owned by men (X. Li, He, and Zhang 2020; Martin and Abbott 2011).

Internet use is again divided more unevenly for different kinds of usage, with simple social media (WhatsApp and Facebook) being the most prevalent among MSEs (Schiff, Nagula and Donner 2019). The exact technologies used can vary by country, sector and region, depending on the local digital infrastructures and firm-specific capacities and use cases (Cirera et al. 2020). For instance, the above-mentioned World Bank survey (Islam and Jolevski 2019) also examined mobile money usage, finding much higher uptake in the two African countries: 48.4 per cent in Zimbabwe and 40.8 per cent in

Mozambique, compared with just 2 per cent in the Lao People's Democratic Republic. The adoption of different types of application can be mutually reinforcing, especially when moving from informal to formal uses, as more sophisticated digital applications require prior build-up of foundational hardware, software and human resources (including such assets as computer hardware, maintenance personnel, server infrastructure and cybersecurity) (Abdullah et al. 2018; Al Somali, Gholami and Clegg 2015).

The skewed distribution of digital adoption among formal and large businesses vis à vis informal and small ones, and in high income countries vis à vis low-income ones, can be observed consistently for various digital applications. Divides have been shown most rigorously for digital financial services (DFS) (Demirgüç-Kunt et al. 2020). For instance, the study cited in **section 2.4** above showing a positive impact of DFS adoption on employment formalization (Klapper, Miller and Hess 2019) cites empirical evidence of successful payroll system implementation only for large formal firms (Blumenstock et al. 2015; Breza, Kanz and Klapper 2017; 2020), while it acknowledges that microenterprises barely enrol in payroll systems in most countries (**p. 42**). Similarly, studies have found that the particular circumstances of workers have to be taken into account when firms shift to digital wage payment, and different types of supporting measure may be called for (Sharma and Shastri 2020). A recent survey in several Asian countries assessing micro, small and medium-sized enterprises' responses to the COVID 19 crisis found that less than 3 per cent used DFS such as peer-to-peer lending and crowdfunding during the pandemic (ADB 2020). Limited use of simple digital tools like websites has been found to hamper MSEs' ability to trade (González 2019).

Adoption and infrastructure barriers typically compound each other at local and national levels, meaning that a given MSE may be "dragged down" by an environment where adoption is generally low, even if it has access to, is able to afford, and has the capacity to use digital technologies. Accordingly, for adoption to turn into significant productivity gains for MSEs, minimum thresholds of adoption have to be achieved at the country level (Dedrick, Kraemer and Shih 2013). Similarly, MSEs located in settings where adoption was generally lagging behind were found to struggle more than those in settings with widespread adoption, even where the former had rich experience of digital applications (Afolayan et al. 2015). Vice versa, through spillovers (or positive externalities) such as market efficiencies, businesses can benefit from overall increases in internet usage within the same market or industry even if they do not themselves adopt digital technologies (Jensen 2007; Paunov and Rollo 2015).

3.2 Digital skill shortages

A second common barrier is digital skill shortages among MSEs. The spectrum of digital skill sets with relevance for MSEs is as broad as the range of digital technologies. At the low end of sophistication, there is the ability to use basic and feature phones for business purposes – for instance, rural farmers using USSD short codes to obtain up-to-date and localized meteorological and agricultural information. At the far end lies an MSE's ability to develop digital products (such as creating turnkey software for a large corporate customer) by setting up a development team, writing original code, using software development kits, integrating with legacy systems through application programming interfaces, running tests and debugging. Most MSEs do not require such advanced digital production skills, and instead benefit from business-specific usage skills, such as setting up email and other customer communication channels, creating a website using templates, integrating digital payment channels on the business website, or running simple cloud and server applications to manage and store data. Broadly speaking, use of a greater variety of digital technologies, and in particular of more sophisticated ones, puts greater demands on users, meaning that the higher the potential utility of a technology, the wider the set of

skills that an MSE's employees need to have (Boateng et al. 2014; Krone and Dannenberg 2019; Khayer et al. 2020).

Digital skills may be defined as an MSE's capacity and ability to employ digital technologies to maximum effect once digital access has been established (Donner 2015). It follows that, even where digital technology has been adopted by an MSE, its full potential may not be exploited owing to digital skill shortages within the firm or in its surroundings. For example, in a study of Nigerian micro-traders it emerged that both their own abilities and the abilities of immediate supply chain partners were determining the benefits that the traders derived from digital adoption (Boateng et al. 2014).

Limitations in digital skills are often distributed similarly to access barriers (that is, they are stratified by enterprise size and formality, regional income levels and so on), and they compound, and are in turn reinforced by, a lack of demand for digital adoption (LIRNEasia 2020; Mothobi, Gillwald and Aguera 2020; Y. K. Tang and Konde 2020). Digital skills are thus complementary to digital access: at similar digitalization levels, productivity gains will be higher for firms with better digital skills (World Bank 2016). Shortages of digital skills can therefore be understood as second-order digital divides (Arendt 2008; Souza, Siqueira and Reinhard 2017).

Digital skills have a technical and a soft skills component. An organization's skills are embodied and enacted by the people working for it, meaning that an MSE's digital skills in particular comprise not only the cognitive abilities (skills in a narrow sense) of managers and staff but also their attitudes (such as awareness, resourcefulness, willingness to learn and confidence) and social attributes (such as the ability to explain new procedures to colleagues or an openness to seek support) (Good Things Foundation 2019; Schiff, Nagula and Donner 2019). Therefore, digital skill limitations amalgamate with shortages of other types of skills in MSEs, such as managerial, communication, critical thinking and problem-solving skills (OECD 2019).

Digital skills build up over time through both explicit learning (as when staff attend a course) and experiential learning (as when a web manager uses a content management system in day to day operations). Although there are no detailed studies about learning processes in MSEs, it stands to reason that experiential learning is much more common for such firms and especially for informal and microenterprises, since they are rarely able to invest their own resources to offer training to employees (OECD 2019). Explicit and experiential learning can also blend into each other where micro-entrepreneurs explore specific and contextualized learning content that helps them to improve their performance with tasks and problems that they encounter in their daily routines (Schiff, Nagula and Donner 2019).

Digital skill divides tend to grow over time because skill attainment is largely cumulative: knowledge gain often generates even more knowledge (Jones et al. 2014). For instance, in a study conducted in Kenya, micro-entrepreneurs were generally found to be creative in their use of tutorials offered by e-commerce platforms or on YouTube; yet, precisely those entrepreneurs who were originally more digitally skilled also engaged in the more inventive learning practices (Schiff, Nagula and Donner 2019). Similarly, owing to their cumulative and social nature, digital skill shortages often manifest themselves together with other intangible limitations in MSEs' abilities – for instance, with regard to staff literacy and confidence (Good Things Foundation 2019). Studies have indeed found a mutually reinforcing relationship between material digital access, actual skill levels, self-efficacy (that is, perceived confidence and competence)

and usage, especially among women-led MSEs (Chatterjee, Dutta Gupta and Upadhyay 2020; Shah Alam 2009).

Digital skill shortages tend to affect MSEs more than large firms because of their lower ability to compete for skilled workers (Abdullah et al. 2018). As outlined above, global digitalization has opened up opportunities but also introduced competitive pressures for many MSEs, especially those operating in export oriented sectors and international supply chains. However, digitally skilled labour is in high demand everywhere, and since workers based anywhere in the world are able to offer their services to well-paying customers in high-income countries through online labour platforms such as Upwork or Toptal, the supply crunch has intensified, especially in low-income countries (Friederici, Wahome and Graham 2020; Lehdonvirta et al. 2019).

Finally, digital skills not only need to be present in MSEs: they also need to be put into action within organizational contexts. In other words, the existence of flexible management structures (staff roles, interactions and division of labour) also helps to determine whether MSEs are able to effectively implement digital technologies to increase productivity (Dedrick, Kraemer and Shih 2013; Hernandez et al. 2016). For example, studies in Brazil and Viet Nam found that, above a minimum threshold of ICT adoption, firms that had flattened their organizational hierarchies increased productivity through digital adoption to a greater extent than those that had not (Commander, Harrison and Menezes-Filho 2011; World Bank 2016). The more sophisticated the digital technology, the more important it becomes to invest in skills and structural organizational changes (World Bank 2016).

3.3 Low adoption readiness and gender barriers

A third barrier has to do with MSEs' low readiness, in some cases, to adopt digital technologies. MSEs reject these when they do not feel that they would be useful, when they believe that adoption would be too costly or burdensome, when social pressures inhibit them or when they generally distrust technology. Alongside skill limitations, low adoption readiness is another important explanation for why MSEs make limited and ineffective use of digital technologies even when "hard" factors such as access and affordability issues have been resolved (UNCTAD 2011).

MSEs' perceived need to use the internet has been assessed in a limited number of surveys. These studies indicate that a large majority of MSEs that do not use the internet in low-income countries may simply not believe that they need it. For instance, a study conducted across several African countries found this share to be 85 per cent in Kenya, 79 per cent in Senegal, 73 per cent in Ghana and 68 per cent in Nigeria (Mothobi, Gillwald and Aguera 2020). An earlier study of Kenyan formal small enterprises identified "no perceived benefit" and "not consistent with business needs" as by far the most prevalent reasons for MSEs not adopting ICTs (Wanyoike, Mukulu and Waititu 2012). Similarly, a recent survey in Sri Lanka found stark differences between internet-adopting and non-adopting MSEs: over 90 per cent of firms which used the internet for business believed that internet access was important or very important, while 79 per cent of non-internet using firms did not feel that they needed it (LIRNEasia 2020).

These studies make it clear that large numbers of MSEs refuse digital technologies; however, it remains unclear whether this is a reflection of such technologies actually being useless for these enterprises, or whether they could be used productively if the firms were to try them out. In view of the many material and skill barriers outlined above, positive impacts may indeed be hard to achieve for many MSEs. Taking the above-mentioned survey results as an example, the lion's share of the 85 per cent of non-internet-adopting Kenyan MSEs that voluntarily remain disconnected may indeed struggle to derive substantial benefits from any ICTs other than mobile phones. They tend to be poorer street traders in motor parts, furniture, groceries and vegetables, or tailors and cleaners, with locally confined value chains and customer bases (Mothobi, Gillwald and Aguera 2020).

Direct contacts also play an important role as (de)motivators. Female micro-traders in Nigeria benefited more from mobile phone adoption when their value chain partners had also adopted such phones (Boateng et al. 2014). However, small businesses relying purely on walk in customers and with limited access to electricity may not have any use for an internet connection (Ilavarasan 2019). Both in-depth and survey-based studies of microenterprises found that external pressures from customers and partners, rather than strategic concerns, were influencing their decision to adopt ICTs (Jones et al. 2014; Ntwoku, Negash and Meso 2017).

Non-representative studies have further investigated the cognitive and attitudinal factors underlying digital adoption readiness. This research has confirmed for MSEs what is a long established finding for large formal firms, namely that strong management support, risk friendly attitudes and staff socialization are essential for effective digital adoption, especially where technologically complex applications are involved (AlBar and Hoque 2019; Bruque and Moyano 2007; Khayer et al. 2020). Adoption readiness thus appears to be connected to MSEs' culture, embodied by staff and nurtured through hiring decisions and social interactions (Fernández-Esquinas, Oostrom and Pinto 2017; Shah Alam 2009).

Three specific facets of limited MSE readiness have been found to be detrimental to the adoption and effective use of digital technologies.

- The first is conservatism and resistance to change (AlBar and Hoque 2019; Shah Alam 2009). In this sense, low readiness consists of a kind of "short-termism" and the absence of innovation, risk and growth orientation, all of which have been found to positively contribute to productive digital adoption (AlBar and Hoque 2019; Chatterjee, Dutta Gupta and Upadhyay 2020; Jones et al. 2014; Y. K. Tang and Konde 2020). Accordingly, the relative predominance of entrepreneurial versus necessity orientation in MSEs has been found to correlate with more sophisticated digital use (Bhattacharya 2019; Souza, Siqueira and Reinhard 2017).
- The second facet is low awareness and negative perceptions specifically about the benefits of digital technologies (Abdullah et al. 2018; MacGregor and Kartiwi 2010; Shah Alam 2009).
- The third widespread form of low readiness is a lack of self efficacy – that is, of confidence on the part of the MSE owner and staff in their own ability to use digital technologies productively (Chatterjee, Dutta Gupta and Upadhyay 2020; Khayer et al. 2020).

Gender gaps in the digital adoption of MSEs also arise from attitudinal barriers; however, in this case, constraints are imposed on women by their social environment. In many societies, women face a range of structural disadvantages, including restrictive gender role expectations, more limited access to education and finance, and higher non-business constraints on time and mobility (UNCTAD 2014). For instance, an early study of farmers in Uganda confirmed that women entrepreneurs were more likely to use mobile phones for keeping in touch with family and friends in addition to business purposes, and that patterns of use differed between men and women according to the distribution of household tasks (Martin and Abbott 2011). A more recent study of MSEs in China finds that women-led MSEs benefit less from accessing government and industry information and society-related information than those led by men, while no differences were found with regard to information on suppliers and buyers (X. Li, He, and Zhang 2020).

Under these conditions, determination and resilience appear to be even more important for women entrepreneurs than for their male counterparts. Confidence in one's own abilities to use digital technologies and an entrepreneurial orientation have been found to lead to deeper and more effective digital adoption by female-owned MSEs – for instance, for micro entrepreneurs in India (Chatterjee, Dutta Gupta and Upadhyay 2020; Chew, Levy and Ilavarasan 2011; Chew, Ilavarasan and Levy 2015). While women-led MSEs are more likely to be digitally excluded (Deen-Swarray, Moyo and Stork 2013; ITC 2017; Kabanda and Matsinhe 2019), those female MSE owners who do manage to use digital technologies

successfully can over time experience boosts in confidence and become more economically and socially empowered (Boateng et al. 2014; Chatterjee, Dutta Gupta and Upadhyay 2020).

Ultimately, low adoption readiness – whether it is the result of societal or individual constraints – can be a barrier wherever MSEs would be able to use technologies productively if only they tried them out. While the magnitude of the problem remains unquantified, it is clear that a non trivial share of MSEs are missing out on discovering and adapting digital technologies for their purposes, given that some exceptional MSEs are so successful at it (Tob-Ogu, Kumar and Cullen 2018). Unwarranted resistance may thus be a subtle yet important barrier towards long-term productivity gains for conservative or unexposed MSEs. It remains to be seen whether the COVID 19 pandemic will act as a jolt to change this status quo by prompting the mobilization of substantial funds (see "**COVID spotlight #2**" below).

COVID spotlight #2 The time is now? How the crisis could accelerate the digitalization of micro and small enterprises

Small enterprises have traditionally been prone to digitize workflows and enable remote and distributed work only to the minimum necessary extent. When the COVID 19 pandemic erupted, many were caught off guard and had to rapidly strive to upgrade their teleworking capacities. Yet, despite greater willingness, adjusting to the new conditions has been difficult because of the limited resources of micro and small enterprises (MSEs) and the lower base from which they start in terms of digitalization. Many MSEs had to worry about sustained financial losses due to ongoing fixed costs over the following months. Additional investment in technology is always challenging, but especially so under such circumstances. In particular, the costs for online safety and data protection, shifts in workflows and the equipment for teleworking can be prohibitive for small enterprises. For instance, in a survey of Canadian small businesses, 44 per cent responded that they were facing technology challenges. In Japan, 48 per cent of large corporations but only 10 to 20 per cent of small and medium sized enterprises (SMEs) offer teleworking, which is due to their more limited infrastructure and digital skills (OECD 2020a). To tackle such challenges, governments introduced a range of direct and indirect support measures. Japan, for example, set up help desks to offer consultation services. Argentina established a fund worth €7.2 million to help SMEs to improve their teleworking capacities. Chile launched a wide-ranging programme, including technical assistance to SMEs and a change to labour law in order to enable teleworking. In the Republic of Korea, as part of the "Korean New Deal" introduced by the Government, increased threats of online crime are addressed through cybersecurity training targeted at SMEs. Finally, in the United States, the national telecommunications regulator proved to be flexible and creative by allowing network operators to temporarily use a new frequency band to meet increased broadband demand in rural areas during the crisis.

Sources: Brussevich, Dabla-Norris and Khalid (2020); Cirera et al. (2021); OECD (2020a); ADB (2020); J.

Tang and Begazo (2020).

3.4 Limited power in value chains and platform markets

A fourth barrier preventing MSEs from benefiting from digitalization arises from their typically marginal positions in value chains and platform markets. In such cases, MSEs may in fact benefit from digitalization in absolute terms but suffer from long-term relative disadvantages. Specifically, MSEs remain in positions where they are confined to low-value contributions, resulting in limited value capture opportunities while they grow more dependent on lead firms and platforms, which, as a result of increasing power differentials, are ultimately able to use their dominant position to extract rents from MSEs (UNCTAD 2019).

As ICTs began to diffuse globally, it was widely hoped that they could disintermediate traditional supply chains, giving peripheral players such as MSEs more direct access to customers or upstream supply chain partners by "cutting out the middleman" (Ritchie and Brindley 2000). However, the available evidence suggests rather clearly that disintermediation happens only in specific segments of supply chains in certain sectors, while ICTs generally augment existing value chains without fundamentally reconfiguring them (Donner and Escobari 2010; Foster et al. 2018; Jagun, Heeks and Whalley 2008; Murphy and Carmody 2015; UNCTAD 2017).

Similarly, hopes that MSEs in value chains would thereby achieve technological upgrading have mostly been dashed. While MSEs can experience a digitalization pull from already digitalized supply chain partners (Boateng et al. 2014), lead firms are typically able to use digital technologies to gain more control over the entire chain, allowing them to retain high value innovative activities for themselves while relegating downstream MSEs to labour intensive, commodified activities (Foster et al. 2018; Murphy and Carmody 2015; Raj Reichert 2020; UNCTAD 2017). Similarly, medium-sized and large firms involved in export sectors have been found to adopt digital technologies more deeply and thereby to increase their productivity as a result of competition from foreign firms (Díaz-Chao, Sainz González and Torrent-Sellens 2015; Iacovone, Pereira-López and Schiffbauer 2016; OECD 2019); however, it is uncertain whether the average MSE would be able to withstand such pressure. Even if overall market efficiencies were to increase, analysts point to the risk of rising inequality and call for support to be offered to poorly resourced MSEs (Foster and Graham 2015; Malecki and Moriset 2007; UNCTAD 2017; 2019). In the process, linkages between MSEs and multinationals can become denser (OECD 2019), while those that are unable to cope with this pressure may be excluded (Jagun, Heeks and Whalley 2008).

Risks of marginalization also apply to MSEs that use digital platforms. Platforms by definition orchestrate markets by assuming a central "gatekeeper" position, which they ultimately seek to monetize. The most immediate way in which platform governance can disadvantage MSEs is a platform's charging of transaction fees. Especially for traders in low-income settings, such fees can cut into already thin margins.[13] For example, African e-commerce platforms' transaction fees have been found to contribute to higher prices for some goods, thus undermining some of the advantages of informal economies (Pon 2020). More indirectly, MSEs that depend on platforms for market access can experience pressure, unfair treatment and exclusion. For example, MSEs do not usually have insight into a platform's algorithmic decision-making and lack meaningful mechanisms for redress (Donner et al. 2020b). Platforms' requirements can also be inadvertently exclusive. Hotels in Rwanda, for instance, were found to refrain from using large online travel providers because they deemed their technical and usage requirements to be too complex and invasive (Foster and Graham 2015). Platform-dependent MSEs in Kenya reported significant levels of stress as they felt compelled to mix

13 See UNCTAD (2019, 31) for a useful overview of transaction fees charged by selected global platforms.

private and business communications in order to signal trust and availability to customers, and as their economic livelihoods became tied to the platform's success (Donner et al. 2020b).

3.5 Digital security and data protection

The final main barrier discussed in this chapter is that MSEs face greater challenges than larger firms when it comes to implementing appropriate cybersecurity and data protection measures. The key reason is that setting up a digital security system of a certain quality is a one off cost, irrespective of firm size. Since cybersecurity companies tailor their pricing to maximize revenue across firms of all sizes, MSEs are typically priced out of quality solutions, leaving them particularly exposed (OECD 2019). Which level of security system sophistication and investment is appropriate for MSEs depends on a wide range of characteristics, such as sector, revenue, size or the importance of data integrity (Mijnhardt, Baars and Spruit 2016). It can be difficult for MSEs to assess their needs, especially because barely any data governance frameworks and training opportunities exist that would be appropriate and understandable for microbusinesses and informal enterprises (Begg and Caira 2012).

Qualitative studies confirm that MSEs' reasons for not adopting cybersecurity measures are similar to the factors underlying digital skills shortages and organizational resistance mentioned in sections **3.1** and **3.2** above: cost, a lack of management support and sceptical attitudes (Kabanda, Tanner and Kent 2018). While these hurdles also apply to MSEs in high income countries (Allan et al. 2003; Bada and Nurse 2019; Gupta, Seetharaman and Raj 2013), they are more pronounced in low-income settings (Abubakar, Bass and Allison 2014; Kabanda, Tanner and Kent 2018). Attitudinal factors in particular weigh more heavily there. For example, case studies of MSEs using cloud services in Nigeria showed that participants did not perceive cybersecurity to be an important issue (Abubakar, Bass and Allison 2014). A study of South African SMEs found that managers believed that their business was not complex enough to warrant cybersecurity investments, that a small business was not an attractive target for cybercrime and that existing security applications were too complex to be useful for their needs (Kabanda, Tanner and Kent 2018). Ultimately, MSEs often come to the conclusion that the cost of better cybersecurity and data governance outweighs the benefits as far as they are concerned (Begg and Caira 2012).

Chapter 4.
Two models of how digitalization leads to MSE productivity

In the preceding chapters, this report has shown that digital technologies open up a range of new opportunities for MSEs to increase their productivity (**Chapter 2**), but that a number of barriers prevent them from exploiting these opportunities to the fullest possible extent (**Chapter 3**). The present chapter summarizes the most important positive and negative factors that studies have found to apply broadly across different types of MSE and across contexts. Factors are categorized as internal (capabilities) and external (environment). The chapter then describes two models of how digitalization can lead to productivity gains in MSEs: one based on capabilities, the other on environmental factors. These models illustrate how internal and environmental factors work together to facilitate MSE productivity growth to varying degrees. Both models are the result of a summative review of the available evidence: while no single source suggested these models as such, all of their main elements are taken from the empirical studies reviewed (see the **Appendix**). The models thus highlight and logically connect all those factors that the literature review showed to be dominant and broadly applicable.

4.1 Summary of key observations

To set a foundation for the modelling, this section summarizes the findings as simplified stylized facts. These statements deliberately neglect outliers and contradictory but inconclusive evidence; their focus is on consistent patterns.

1. **MSEs do not digitalize "automatically" and by default; instead, digitalization is driven by deliberate decision-making on the part of MSEs, which may be hampered by incomplete information and risk-averse attitudes.**

MSEs adopt available digital technologies if they expect tangible short-term benefits that are assumed to outweigh the cost. They also digitalize if they experience pressure to do so from customers, suppliers, competitors or digital platforms. MSEs are sensitive to the cost and effort of digital adoption, may be conditioned by a conservative culture, and can struggle to understand strategic and long-term threats and benefits. Female-owned MSEs can face particular constraints in some societies, as they are held back by structural disadvantages and the social expectations of peers, partners and customers. MSEs will generally digitalize more easily and more substantially if they are enabled to do so – for example, through upskilling efforts by supply chain partners and digital platforms. They are also more likely to digitalize if supporting analogue components in the local digital ecosystem are in place and accessible (such as agent networks for mobile money and agricultural supply chain services).

2. **The extent to which MSEs are able to increase their productivity through digitalization is determined by their internal capabilities: depth of digital adoption, digital skills, innovation orientation and flexible management.**

From the first studies on mobile phone use to the most recent analyses of platform-induced digitalization, digital adopters have consistently been found to be more productive and successful than non-adopters. MSEs that adopt digital technologies, irrespective of size, in all sectors investigated, and in practically any location, seem to be able to employ even basic ICTs in useful ways (for example, to strengthen ties with customers). However, digital technologies need to be enabled through intangible MSE capabilities. While different factors matter for different firms, the depth of digital adoption, the level of digital skills (in a holistic sense; see **section 3.2**), innovation orientation (the owners' and staff's growth orientation, entrepreneurial attitudes, risk friendliness, proactiveness and so on) and flexible management (the enterprise's ability to actively and adaptatively change roles and organizational structures, using flat hierarchies or distributed teams, to allow fluid evidence based decision making by all staff) have all proven to be positively related to an increase in productivity for most MSEs. These capabilities are complementary: they enable and enhance one another. For example, if a farming operation moves from mobile phones to a comprehensive cloud-based ERP, this will increase productivity a lot more than moving to a smartphone (digital adoption), but only if staff learn how to enter and interpret information (digital skills), if the farmer motivates staff to use the system and draws on the newly gained information to make investments (innovation orientation), and if a staff member is tasked with running the system and is given authority to instruct team members to respond to newly created insights (flexible management).

3. **The potential depth of digitalization and the associated capability levels depend on an MSE's size, degree of formalization, export orientation and the information intensity of the sector in which it operates.**

MSEs generally shy away from costly and complex digital applications, but some use a greater variety of more sophisticated digital technologies than others. Significantly, MSE size, formality, export orientation and sectoral information intensity are observable features that are related to varying degrees of digitalization. While many locally oriented informal microenterprises have adopted mobile phones and low-bandwidth social networks, formal knowledge-based small enterprises with clients abroad use combinations of cloud, productivity, digital finance, security, insurance and planning applications. These varying levels of adoption reflect different starting points in terms of capabilities and different possible returns on digitalization for different MSE types. Microenterprises, locally oriented small enterprises, export-oriented small enterprises, knowledge-based small enterprises and start ups all have different thresholds below which digitalization – enabled by capabilities –increases productivity. More digitalization is ultimately not always possible or desirable for all MSEs. Instead, MSEs of different types benefit from investments and interventions customized to their basic capability levels.

4. **MSE digitalization is affected by three sets of external influences: the local digital ecosystem, an MSE's business network, and its broader social and policy environment. Microenterprises are more directly dependent on their environment than other types of MSE.**

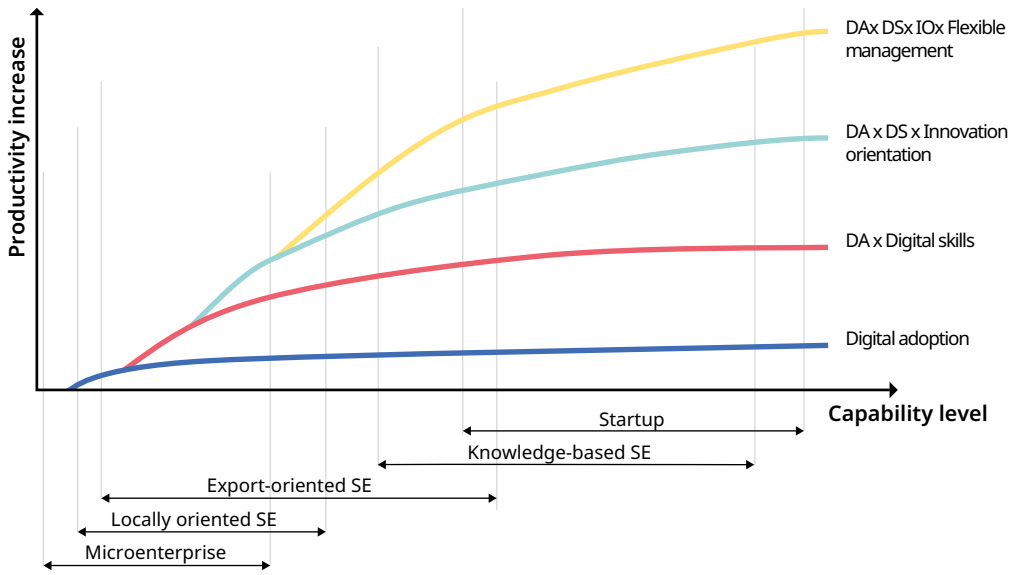
Local digital ecosystems fundamentally influence an MSE's digitalization opportunities. They comprise the locally available digital infrastructure (see sections **1.2** and **3.1**) but also locally customized digital products (often offered by local start ups and technology firms) and the local digital labour market (software engineers, data specialists, web designers and so on). Business networks, such as customers, supply chain partners and platforms, make up a second set of influences: they can pressure and incentivize MSEs to digitalize or become a limiting factor if they themselves have low adoption. A third set consists of broader influences including social factors (like gender-based social norms), macroeconomic conditions, and policy and government support. Microenterprises often depend on their environment more directly than other types of MSE: owners often mix business and non-business use of digital

technology, and they can be overwhelmed by the immediacy and flexibility that digital technologies demand of them. In contrast, even small formal enterprises – especially those that are specialized and operate in knowledge-intensive sectors – typically have teams of dedicated and better educated staff, allowing a flexible division of labour and more independent decision-making.

4.2 Capability and environmental models of MSE digitalization

Drawing on the above observations, it is possible to develop first of all a capability based model of how MSE digitalization can lead to productivity (**figure 5**). The model illustrates that moving from simple to sophisticated digital adoption does not practically lead to any gains unless this shift is complemented by advances in the other capabilities. The model thus reflects how digital adoption is just one of several prerequisites for digitalization to increase MSE productivity: adoption will be of little consequence if it is not complemented by investment in complementary intangible assets (see Tambe et al. 2020). It organizes the four important capabilities as a hierarchy from necessary to sufficient conditions, and highlights the fact that different capabilities matter to varying degrees for different types of MSE (see **section 1.4**), as they face different thresholds of productivity increases. Beyond digital adoption, a minimum level of digital skills and innovation orientation is required for any MSE to achieve significant productivity growth. Flexible management is not applicable to microenterprises, while other types of MSE can reach maximum productivity gains only if they have this capability.

Figure 5. Combined productivity effects of four digitalization capabilities

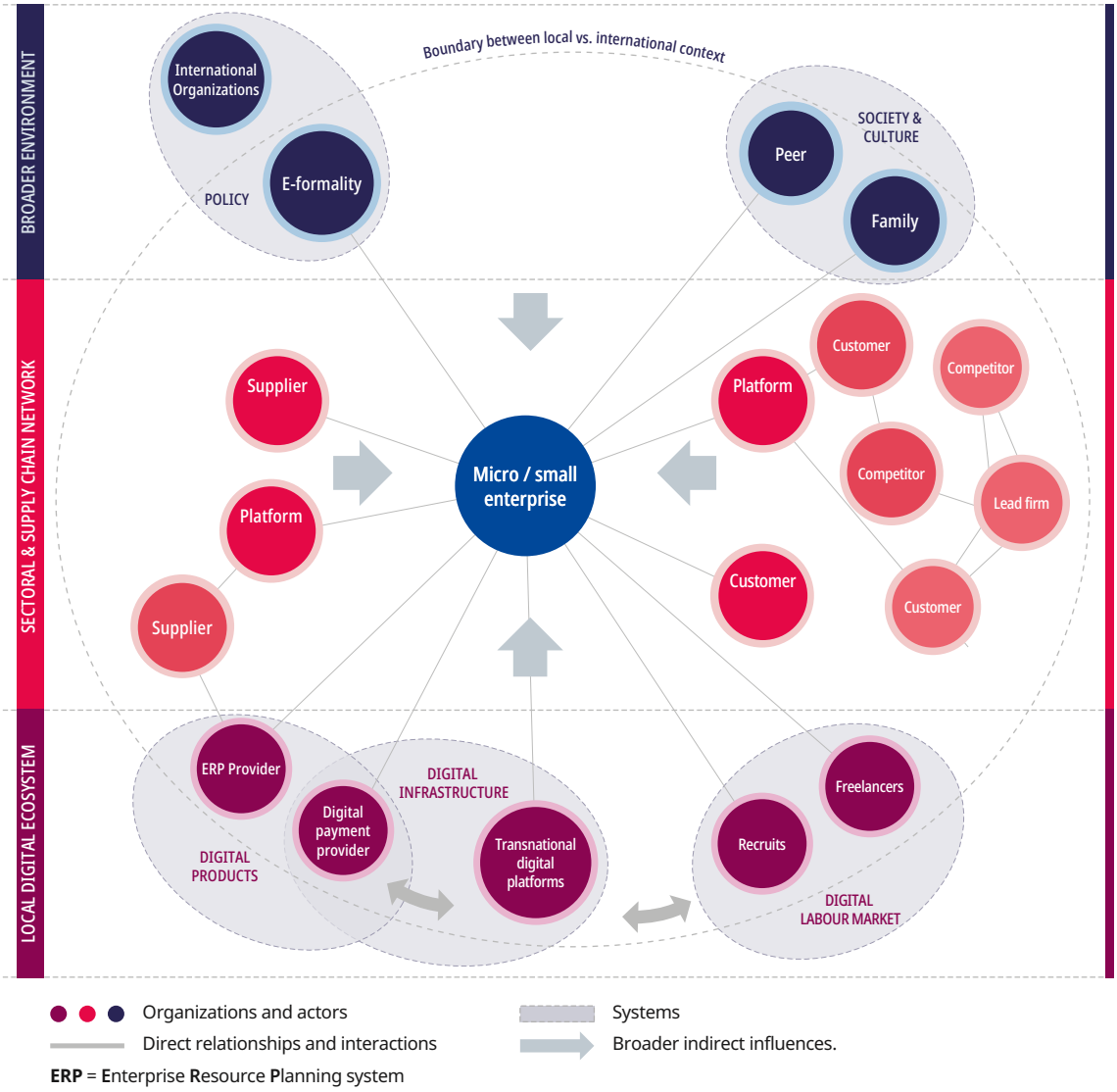


DA = digital adoption; DS = digital skills; IO = innovation orientation; SE = small enterprise

Note: "x" represents the productivity function for combined capabilities.

Beyond digitalization capabilities as internal factors, the review of the literature identified the local digital ecosystem, an MSE's business network, and its broader social and policy environment as the most important contextual factors (**figure 6**). External factors influence MSEs' ability to translate digital adoption into productivity increases by enabling or limiting incentives and the room for action.

▸ Figure 6. Three sets of external influences on the digitalization of micro and small enterprises

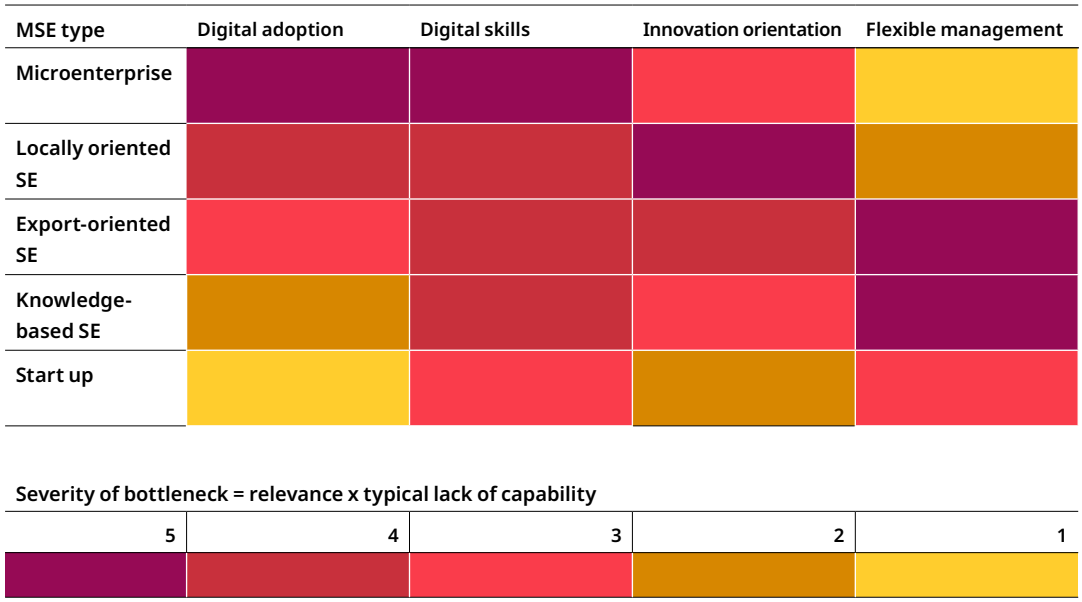


4.3 Bottlenecks for specific MSE types

To understand how policy and support interventions can be targeted more effectively, it is useful to explore how digitalization bottlenecks differ across different types of MSE. Bottlenecks are understood here not in the sense of the overarching barriers discussed in **Chapter 3**, but in the sense of the most critical limitations that deserve the greatest attention and resources. **Figure 7** presents a heat map illustrating which capabilities are typically the most important and in the shortest supply for each of the five MSE types considered in this report. For each type, the heat map postulates an average MSE within a given category that is faced with typical environmental conditions. For instance, given the prevalence of microenterprises in low-income countries, one might imagine a subsistence farmer in northern Ghana

or a street vendor in Lilongwe, Malawi, as representative of this category. As an example of an average knowledge-based small enterprise, one might imagine a creative agency in a technology park on the outskirts of Ho Chi Minh City, Viet Nam, or a specialized legal practice in the San Isidro district of Lima, Peru. While the underlying generalizations are bound to under represent the immense variation within any given MSE category, the heat map seeks in this way to reflect how the findings of the review apply to each type specifically.

▶ Figure 7. Heat map of capability bottlenecks for different types of micro and small enterprises



MSE[s] = micro and small enterprise[s]; SE = small enterprise

Source: Author

Microenterprises are the most directly exposed to the conditions in their immediate vicinity, and they lack the resources and organizational set up to make investments or implement digital technologies in the most productive ways. The bottlenecks faced by microenterprises have to do with fundamentals: because of the typically poor digital infrastructure conditions, digital adoption usually remains confined to calls, text messages, WhatsApp exchanges and possibly transfers of mobile money. Micro-entrepreneurs are self-taught technology users, and rarely have digitally skilled staff with whom to share tasks. Their personal lives and cultural influences directly affect the digitalization prospects of the enterprises they run, often in a constraining manner. Higher level capabilities such as flexible management are of limited relevance, as is the vibrancy of local digital labour markets, because microenterprises struggle with more basic problems. On account of their informality, it is often difficult for microenterprises to be targeted by policy measures. Still, support and incentives from direct business relationships, including relationships with digital platforms, are essential and typically constitute the central driver of digitalization.

Locally oriented small enterprises (LSEs) face many of the same capability and environmental constraints as microenterprises, but to a different extent. While broadband connectivity may be more readily available and affordable for them, LSEs often have more advanced access requirements, which can be harder to meet in rural and peri-urban locations and are more dependent on stable electricity (such as basic cloud software, sturdy laptop computers and point of sale devices). The typically limited availability

of localized digital products that are customized to LSEs' needs goes hand in hand with low digitalization levels among customers and suppliers, resulting in limited mutual incentives and pressures. LSEs would benefit from recruiting staff with basic digital skills, but competition for such talent in local labour markets can be very high because of the limited resources of the latter. LSEs are often family-owned and offer labour-intensive, commodified products and services. Hierarchies are typically explicit, while social expectations and role divisions can run counter to LSEs' innovativeness. Hands-on platform training and policy interventions offering tangible and immediate benefits (especially e-formality programmes) can boost LSEs' digitalization. Indeed, the COVID 19 crisis has led many of them to introduce digitally mediated delivery options.

Export-oriented small enterprises (ESEs), by virtue of being embedded in international supply chains and markets, face rather different capability challenges. They are part of informational and relational networks that extend beyond local contexts, resulting in a range of opportunities but also pressures. As ESEs face incentives to integrate with the technological systems and standards of lead firms and transnational digital platforms, their digital infrastructure requirements (in terms of bandwidth, devices, cloud software, cybersecurity, and so on) can be rather specific and difficult to satisfy even in generally well-connected areas. Yet, the most important challenges for ESEs are inertia of managerial aptitudes and shortages of digitally skilled talent and knowledge workers in local contexts. More than the use of specialized software, the swift and effective process adaptations required by digital technologies can be very difficult for the small teams of ESEs. Unlike larger export-oriented firms, ESEs do not typically offer high enough salaries and career prospects that would enable them to attract the most competent administrative staff, and they rarely have the capital to outsource. While ESE executives tend to be educated and experienced in their sector, the complex managerial challenges that come with digitalizing under international competitive pressure can be overwhelming for them. They will often benefit from participating in extended training courses and workshops offered by non-governmental organizations that provide individualized support on how digital technologies can be embedded in processes and staff be motivated to contribute to the adoption of these.

Knowledge-based small enterprises (KSEs) tend to be located in urban centres. As a result, they typically have access to affordable and stable high-bandwidth internet and computers, providing them with a range of free or cheap software products and applications that directly contribute to their value creation processes (for example, collaborative and productivity software such as Google Sheets or Slack, web-based design software, online learning, analytical software, databases, professional social media, and so on). In a sense, the supply of digital products is a central input factor for KSEs. The target markets of KSEs typically consist of local corporate customers that are digitally more advanced than the local market as a whole. KSEs depend on typically young, creative and flexible staff who are equipped with a broad set of digital skills: for instance, they may be able to use design software or statistical packages without necessarily being software developers. Such talent is not easy but also not impossible to find, given that work at KSEs can be interesting and a stepping stone in the career of university graduates. KSEs are not usually the focus of policy incentives or of pressure from societal factors. KSEs typically struggle with scaling, professionalizing and stabilizing their operations, because they often have to compete with larger, more established firms for ad hoc contracts. It is crucial for them to build up flexible governance structures and retain staff so as to develop unique assets that give them long-term competitive advantages other than price.

Like KSEs, start ups are almost always based in cities, although they may operate outside urban centres if that is an integral part of their value proposition (as in the case of agricultural technology start ups). While start ups' access to digital infrastructure is similar to that of KSEs, their requirements are the greatest among all MSEs, which can be at odds with what is locally available (as with start ups needing to establish their own physical server infrastructure). Digital start ups require software engineers with both technical and soft skills, a combination that can be hard to find in many settings, because such individuals are often recruited by well-paying employers in high-income countries. Other technology and social start ups also depend on staff who are highly digitally skilled – for instance, being able to operate specialized software or develop digital components for the start up's product. Start ups are not usually embedded in global

value chains but offer, rather, digital products that are adapted to local market realities. Therefore, their customers are also their main source of innovation, since these compel start ups to be creative. Policy is usually a neutral or minor negative factor – for instance, where policymaking is slow and prioritizes the interests of incumbents, as in the case of prohibitive licensing regimes for fintech start ups. Cultural factors can be limiting in risk-averse societies, but the growing social desirability associated with entrepreneurship worldwide gives start up owners external validation and recognition.

5

Chapter 5. Policy and support approaches

This chapter outlines ways in which policymakers and support organizations can effectively promote the digitalization of MSEs so as to fully unlock their significant potential as drivers of progress towards the SDGs. It maintains the MSE perspective by evaluating approaches against their relevance to the bottlenecks outlined in **section 4.3** above. This chapter therefore refers back to the MSE typology introduced in the previous chapter and highlights the need to address intangible digitalization capabilities, beyond physical access. Overall, the chapter emphasizes that it is important for policymakers and international organizations to consider carefully how digital technologies fit into MSEs' business processes and their wider economic context (UNCTAD 2011). The options presented here are based on the assumption that different digitalization bottlenecks can best be addressed by different external stakeholders (governments setting policy, supply chain partners and platforms providing training, and so on).

5.1 Bridging digital divides and promoting capabilities inclusively

A policy priority suggested by the literature is to provide targeted support to different kinds of MSEs, and to pursue holistic approaches that address the most important bottlenecks simultaneously. For microenterprises and locally oriented small enterprises, digitalization often falls short already at the level of digital adoption and digital skills. At the same time, these enterprises are particularly significant job providers in low-income and least developed countries, and generally in rural contexts. These two types of MSE should thus be a primary focus for tangible and hands-on support in the form of digital infrastructure expansion and skill development.

Given the systemic and interdependent nature of challenges for micro and small informal enterprises, any digitalization support targeting them cannot be separated from broader digital inclusion work, especially with regard to tackling gender barriers. These MSEs are directly dependent on networks and resources in their immediate local environments. Providing opportunities and eliminating barriers for structurally disadvantaged actors is a multifaceted endeavour. This report does not seek to replicate the extensive policy advice that is already available. Instead, **table 2** below provides an overview of the key policy realms where there is potential to remedy digital divides, in each case outlining MSE-specific areas of application. In addition, the response to the COVID 19 crisis could serve as an opportunity to "build back better" by providing MSEs with a digitalization boost. Paradoxically, it could be a good moment for such a boost partly because more funds can be released more quickly as part of the response, and partly because MSEs are in need of and amenable to change (see "**COVID spotlight #2**" in **section 3.3**).

Beyond fundamental digital inclusion efforts, the findings and models presented in this report suggest that policy and support interventions should also focus on the inclusive promotion of MSE capabilities. The support provided should be tailored to the development level of a given target group of MSEs. In the case of microenterprises and locally oriented small enterprises that have not yet adopted digital technologies, such programmes ought to showcase role models, offer direct incentives and establish analogue access points (for example, kiosks and agents). For those with superficial levels of adoption (WhatsApp, mobile phones), the focus should be on deepening digital adoption (for example, by promoting essential applications such as digital financial services and e-commerce platforms) and the upgrading of skills through online methods (such as online courses and tutorials) but also analogue resources (such as face-to-face training offered at digital resource centres and innovation hubs). For deep adopters with a lack of digital skills, innovation orientation or flexible management, support measures

might include encouraging a stronger integration of digital systems into organizational processes (for example, through one-on-one consulting sessions or comprehensive training programmes), tackling the insufficient interoperability of digital payment systems (also across borders), and offering career building, networking and talent exchange programmes for staff.

The central policy challenge is to reach MSEs where they are, and to effectively include those that are currently excluded from the digital economy. Microenterprises and informal small enterprises are the largest contributors to employment in low-income countries (ILO 2019a), but they can also be the hardest to reach, precisely because they have not digitalized and formalized. Policymakers have to acknowledge increasing inequality as the other side of the coin as far as digitalization is concerned (World Bank 2016), and they should concentrate on measures to at least mitigate these negative tendencies.

Similarly, the quality of interventions depends on locally available capacities (such as experienced trainers). This can mean that support is the most difficult and costly to provide exactly where it is needed the most. The interdependence of digitalization capabilities and contextual factors leads to a widening gap between those who are able and those who are unable to make productive use of digital technologies. Significantly, the roll-out of digital infrastructure is likely to be only a necessary but not a sufficient condition for development, and it may account for only a small share of the total investment required (UNCTAD 2017). Capability building depends on long-term oriented, stepwise work that takes human capacities, needs and limitations into consideration.

The inclusive promotion of capabilities should be informed by two guiding principles: need and opportunity. First, it may be advisable for policymakers and development organizations to direct the greater part of their support at where it is needed the most – that is, at informal and rural small enterprises, even if the economic returns are not immediately measurable and significant (cf. ILO 2015a). Given the vast number of MSEs in this category, the difficulty in accessing them and their low current capability levels, direct and one-on-one support can be used where it is essential and/or scalable, although macro-oriented digital inclusion policies and value chain- or sector-based interventions may often be more cost-effective. Second, an opportunity to generate significant economic development may lie in supporting informal but sustainable locally oriented small enterprises, knowledge-based small enterprises and start ups. In many countries, these MSEs have immediate potential that can be activated through targeted support: they are often on the verge of formalization and it is in their own interest to professionalize and digitalize their operations. Owing to prevalent specialization and sector-specific dynamics, digitalization support can rarely be standardized. Instead, a mix of direct and locally targeted interventions, focusing on training and cross-organizational coordination, could yield promising results. Local counterparts (such as employer and business membership organizations, innovation hubs and ICT resource centres) continue to be essential focal points in the analogue world.

For such ambitious support programmes to be effective, contributions by a wide range of stakeholders are required across the local, national and international levels. Governments, international organizations, educational institutions, foundations, grassroots organizers, digital platforms, multinational corporations and many others all have a role to play. Within such a wide arena, coordination and consolidation are critical, while national and subnational assessments remain necessary. National and regional digital industrial policies can provide guiding frameworks for other support interventions. Partnerships among international organizations are also vital to avoid duplication of efforts and knowledge – for example, as when the ILO in July 2020 joined the "eTrade for all" initiative[14] led by the United Nations Conference on Trade and Development (UNCTAD); similarly, the ILO is one of the partners of the Decent Jobs for Youth alliance.[15]

14 See https://unctad.org/news/commonwealth-and-ilo-join-global-partnership-inclusive-e-commerce.

15 See https://www.decentjobsforyouth.org/partners.

Table 2. Core policy measures for digital inclusion

Policy realm	Description	Examples of MSE-specific initiatives	Key supporters	Detailed resources
Internet infrastructure roll-out and affordability (supply-side)	• Affordable universal broadband access as target; public intervention where roll-out is not economically viable for private providers • Balance direct subsidies, loans and public–private partnerships • Prioritize bottlenecks in national backbone vs. last-mile infrastructure • ICT resource centres with free internet access • Community networks and WiFi	• Detailed mapping of MSE clusters and bandwidth needs • Universal service funds earmarked for clusters	National governments, multilateral organizations, international finance, network operators	World Bank (2016); Internet Society (2020); World Bank and ITU (2020)
Enabling digital adoption (demand-side)	• Direct subsidies for devices and internet subscriptions • Reduction of value-added tax and import duties on digital devices • Expanding local ICT sector and start up ecosystem to enhance creation of digital products (direct procurement and financial support for local sector) • Mutual dependence of digital payment infrastructures / digital financial services (DFS), cybersecurity, consumer protection, data protection, digital identity and formalization	• Offer free subscriptions for MSEs that document demand • Understand device demand among MSEs and offer rebates • MSE-satisfaction-based investments or cash incentives for local start ups addressing marginalized MSEs • Ensure that licensing regime allows MSE-targeted DFS • Ensure availability of agent and kiosk networks for MSEs • Ensure interoperability across providers and borders	National and subnational governments, original equipment manufacturers, network operators, digital platforms, local start ups	World Bank (2016); GPFI (2019); Philbeck (2017); Staschen and Meagher (2018); UNCTAD (2011; 2020a)
Skill development	• Direct: courses and community-building at ICT resource centres and innovation hubs • Direct: platform upskilling through online and physical tutorials • Indirect: education system reforms, focus on critical and creative thinking • Indirect: make digital use habitual across society (“digital natives”)	• Courses and networking for specific MSE groups • Career development and recruiting for MSE staff (technical and vocational education and training, internships, apprenticeships, team building) • Joint programmes at universities between sector-specific and digital departments (e.g. agriculture and computer science)	Subnational governments, non governmental organizations (NGOs), digital platforms, intermediaries, educational institutions	Donner et al. (2020a); GIZ (2019); ITC (2020); ITU (2018); S4YE (2018); UNCTAD (2017)
Gender	• Women- and girls-focused coding programmes and training • Promoting role models • Campaigns against stereotypes	• Subsidized consulting and internships for women at MSEs • Promote and network innovative female MSE leaders	International organizations, NGOs, intermediaries	ITC (2017); S4YE (2018); UNCTAD (2014)

5.2 Strengthening links between formalization and digitalization

Another set of interventions can focus on strengthening existing links between MSE formalization and digitalization support. E-formality programmes are the most direct lever at the disposal of governments (Chacaltana, Leung and Lee 2018). Most e-formality support addresses the concerns of small enterprises by either saving time and cost for previously analogue processes or efficiently attaching incentives to formalization. Digital services that are commonly offered within e-government programmes to encourage formalization are electronic business registries including electronic fee and tax payments (one-stop shops), continuous or real-time registration of bills and payments, and e-wage payment systems. E wage registration can be particularly helpful to translate enterprise formalization into employment formalization, thereby extending and expanding social security systems. Relevant case studies include Peru's electronic payroll system designed to facilitate the registration of workers and a similar system with a focus on domestic labour in Uruguay.[16]

Like other interventions, e-formality policies have to be geared towards MSEs' realities, which means, for instance, considering their level of internet access and digital skills. Conceptual methods such as design thinking and generally a focus on simplicity and efficiency can be helpful for government administrators as guiding principles (OECD 2020b). For example, UNCTAD has developed a micro-legalization programme which supports governments in harmonizing and organizing formalization and e-government procedures so that they can then go on to develop simpler and more desirable processes for microenterprises (UNCTAD 2020b). UNCTAD has also worked with governments to extend and maintain e-formality systems for social security administration, grant disbursements and the allocation of tax relief during the COVID 19 crisis (Grozel 2020). Those interventions that MSEs are able to take part in without major changes in existing practices, or those that are enforced by customers, can be particularly impactful. In Hungary, an online cash register has begun to record data reported by point-of-sale devices via a mobile connection, leading to a significant increase in the collection of value-added tax (Chacaltana, Leung and Lee 2018). MSEs are incentivized to buy the machines through subsidies. A similar programme, integrating digital invoices with the national revenue authority, has been introduced in Chile, reportedly saving time for MSEs (OECD 2019). Also in Chile, the PreviRed system has assisted enterprises, employers operating from their own homes and self-employed workers to comply with social security requirements (Henriquez Amestoy 2019).

It is important to ensure that e-formality initiatives cover non- or basic digital adopters as far as possible – for instance, through the direct provision of devices and training (**Box 2**). In low-income countries, voluntary contributions to social welfare funds can be enabled through mobile money, without requiring MSEs to log into a government portal. For instance, partnerships between government agencies and mobile network operators in Ghana (Vodacom) and Kenya (Safaricom) have enabled microenterprises and self-employed workers to pay into national health insurance and pension funds (Chacaltana, Leung and Lee 2018). In Nigeria, a government-run multi-product agricultural information system for farmers has helped to promote the digitalization and formalization of farmers (Uduji, Okolo-Obasi and Asongu 2019).

16 See the following two ILO videos, both published on 12 July 2019: "Electronic Payroll in Peru" and "Registro electrónico de trabajo doméstico en Uruguay".

Beyond e-formality, policymakers can also explore synergies between previously separate formalization and digitalization programmes, especially those aimed at the introduction of digital financial services (DFS) and improved managerial practices. The guiding principles for such interventions are often similar and specific policy instruments are consistent with one another, which means that there is the potential for consolidation and coordination. In both cases, interventions need to be flexible, take into account the perspective of enterprises and cater to particular MSE subgroups (Alliance for Financial Inclusion 2020; Klapper, Miller and Hess 2019; ILO 2015a). Coordinated, multidimensional and holistic policy reforms are more effective than piecemeal approaches (ILO 2017; UNCTAD 2017). Programmes should strive to identify the meaningful and tangible reasons that drive MSEs both to digitalize more deeply and to formalize.

If one juxtaposes the present analysis with established best practices on formalization policies (Gaarder and van Doorn 2021; ILO 2017; ILO 2015a), it emerges that MSEs with the potential to formalize are likely also to be interested in further developing their digital capabilities. Informal, younger growth- or export-oriented MSEs, including those looking to take out a formal loan or to buy property, are suitable targets for joint digitalization and formalization efforts (Klapper, Miller and Hess 2019; ILO 2015a; ILO 2017). Specifically, small enterprises on the verge of formalization may sometimes have several small staff teams (for example, serving shifts in restaurants) and already rely on analogue bookkeeping – for instance, to keep track of stock and of wage payments. They may also engage in some degree of distributed decision-making and have informally established internal hierarchies. Staff and owners may use mobile money or other forms of digital payments, and possibly basic administrative software such as Google Sheets or Microsoft Excel. For such enterprises, the time is ripe to adopt more holistic managerial approaches and to undertake more sophisticated digitalization efforts. The methods for, and benefits of, organizational reform could be highlighted during comprehensive training sessions for MSE owners and staff, covering such topics as access to finance, entrepreneurship, and staff motivation and retention. This training should be geared towards increasing revenue and business opportunities, which would motivate owners to participate. Using training to contextualize digitalization and formalization from the angle of MSEs for which these two processes can actually yield returns could be highly effective.

In contrast, survivalist microenterprises and already formal MSEs may not benefit from such programmes. Microenterprises often lack the organizational conditions for formalization to be immediately feasible (Gaarder and van Doorn 2021), just as it does not fit their circumstances to employ advanced digital technologies. For instance, in India, the demonetization programme was found to have mostly harmed MSEs (KAS and FICCI 2017). Pushing through formalization may actually disincentivize these enterprises from adopting DFS (Klapper, Miller and Hess 2019). On the other hand, the voluntary uptake of DFS could help them to codify transactions (for example, through mobile money accounts), while short-term-oriented and tangible skill development (for example, through the standardized tutorials offered by platforms and digital payment systems) could further build their capabilities. It may even be opportune for financial regulators to work together with informal MSE creditors, since the latter can function as unique channels for access to informal microenterprises even where they operate illegally or extralegally (Alliance for Financial Inclusion 2020). In sum, basic digitalization first needs to bring microenterprise operations to a level of stability and consistency where formalization and deeper digitalization become both possible and attractive.

At the other end of the spectrum, formal small enterprises are likely to already have implemented more advanced digital technologies (cloud software, ordering and booking systems, and so on) and to have established some internal roles. These enterprises could be good targets for a combination of "carrots and sticks" (Gaarder and van Doorn 2021; ILO 2017). For example, compliance audits could

be complemented by measures to drive system integration and employment formalization, such as the promotion of e wage payment systems and assistance with their implementation.

5.3 Value chain, platform and sectoral interventions

A final set of support interventions addresses MSEs' dependency on market, supply chain and trading partners, including digital platforms. MSEs will face vastly different pressures and incentives to digitalize depending on whether they are export-oriented, form part of global value chains, rely on digital platforms to reach customers, and so on. Enhancing support for MSEs in this area can be difficult for governments, because market and value chain structures can be deeply ingrained and controlled by private businesses headquartered in high-income countries (as in the case of lead firms and transnational platforms) (UNCTAD 2017). Still, governments can assist local MSEs in the adoption of specialized software such as ERP systems through training courses and workshops, since having these technologies in place can be a precondition for joining global value chains. Broader support programmes for export oriented MSEs can include digital-specific contents.

Interventions in value chains therefore often take the form of partnerships or the regulation of platforms and lead firms, and depend on third parties for their implementation and facilitation. For instance, agricultural development commissions can be tasked with conducting information management and digital supply chains linking MSEs and agribusiness aggregators, which coordinate inputs and handle exporting logistics (UNCTAD 2017). Similarly, intermediaries should be resourced to support MSEs that cannot afford to pay for certification of compliance with the quality standards that pertain to digitized supply chains (Foster et al. 2018).

In the same spirit, governments and development organizations can target digital platforms with a view to enhancing and broadening their digitalization impacts. As outlined in **Chapter 2**, platforms often provide training and onboarding measures to MSEs to increase network effects within digital platform markets (Donner et al. 2020a; L. Li et al. 2018). Platforms typically try to provide such services at minimum cost by standardizing them and offering online-only support (such as online tutorials and frequently asked questions). They engage in more resource intensive onboarding (such as face-to-face training, agents and local offices) only when under competitive pressure to do so, to achieve critical mass, and for particular MSEs offering a unique value proposition that is in high demand on the other side of the platform market (for example, a delivery platform onboarding a popular restaurant). This can lead platforms to systematically neglect certain groups of MSEs, such as those run by older owners and staff, those without stable internet connections or those lacking the skills to market themselves in online environments. For example, traders may require more advanced e-commerce functionalities than those offered by Facebook – that is, such advanced features as order fulfilment, digital payments and dashboards – but they may also find the fees and requirements of platforms such as Jumia prohibitive (Ng'weno 2018).

Governments, development organizations and local intermediaries such as employer and business membership organizations can collaborate to identify MSE groups that would benefit from participating in platform markets,[17] and then provide training and possibly actively facilitate onboarding for these groups. However, such initiatives have to discern carefully between benefits for the platform and those for MSEs, and examine cost and revenue sharing agreements. Where no private platforms exist despite poor market coordination and vast information asymmetries,

17 See the Financial Inclusion on Business Runways project, implemented by BFA Global with support from the Mastercard Foundation, for a selection of case studies illustrating how MSEs engage with platforms: https://superplatforms.tumblr.com.

governments may also consider implementing their own digital platforms (see "COVID spotlight #3" below).

COVID spotlight #3: Governments and e commerce during the pandemic

When lockdowns were imposed in most countries, analogue channels of trade and commerce were closed off overnight. Existing online shopping and delivery platforms saw a skyrocketing rise in demand. However, small vendors were often unprepared to make the switch to such platforms. This led a number of governments to introduce measures that could support micro and small enterprises (MSEs) in building an online presence. For example, Malaysian MSEs in the agricultural sector received support to sell their produce on e-commerce platforms. The Chinese Government introduced a range of measures to encourage safe deliveries (contactless delivery, fresh food packaging). The Republic of Korea extended a similar offer to brick-and-mortar shops, and Japan to small firms in any sector, in each case encouraging MSEs to adopt digital solutions and establish e-commerce channels. In Chile, SMEs received support so that they could better connect to the country's major e commerce platforms and end users. In other contexts, suitable platforms did not yet exist. In Senegal, such a situation led the Trade Ministry to set up a new platform to increase visibility for MSEs that provided essential goods during the pandemic. The crisis also spurred the Government to move forward with its e commerce strategy: it convened a national e commerce consortium and initiated the establishment of an e commerce observatory within the Ministry of Trade.

Sources: OECD (2020a); ADB (2020); UNCTAD (2020d; 2020c).

Beyond supporting platforms to include more MSEs, policymakers could also consider other approaches to steer platform governance towards better outcomes for MSEs as platform users – for instance, ensuring fair trading practices and data access conditions. The European Union's Platform-to-Business Regulation[18] is an example of a legal regime recently established to address many typical challenges (Ryan, Farish and Labontu-Radu 2020). The second element of platform regulation concerns data sharing. For individual MSEs, it can be useful to access data about their operations stored on the platform, which functions as a planning system. Regulations could mandate that platforms allow users to export data about their digital activities. Given that more value can typically be generated from aggregated data, regulations could also require platforms to make such data available (Duch-Brown, Martens and Mueller-Langer 2017; UNCTAD 2019). Collective data could be organized in collective data funds, which make anonymized data available for analysis – for instance, to researchers and industry associations (Duch-Brown, Martens and Mueller-Langer 2017; Mazzucato 2018). The European Union has published a data strategy and a draft regulation on data governance,[19] in which it proposes the establishment of international data spaces for domains such as healthcare, mobility, environmental protection, agriculture and public administration – a proposal recently operationalized through the launching of the GAIA X project.[20] While such ambitious publicly led approaches have not been tried in developing countries, there is certainly potential. Especially as far as the informal sector is concerned, large platforms like Facebook may have better data at their disposal than local governments – data that open up vast analytical opportunities (Pon 2020).

18 See https://ec.europa.eu/digital-single-market/en/platform-business-trading-practices.

19 See https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy, https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-european-data-governance-data-governance-act

20 See https://www.data-infrastructure.eu/GAIAX/Navigation/EN/Home/home.html.

Chapter 6. Conclusion and outlook

An MSE-centric review of evidence was conducted for this report in order to understand how digital technologies can increase MSE productivity. This review confirmed that MSE digitalization is influenced by external factors, namely the availability and affordability of digital infrastructure, the overall diffusion of digital technologies in local environments, the supply of digital labour, supply chain relations, digital platforms, policy programmes and cultural norms. However, it emerged that external factors provide only a partial explanation for the large variance in MSEs' success with digitalization. Internal digitalization capabilities were identified as decisive enterprise-level factors. The most capable enterprises use digital technologies in deep and adaptive ways (digital adoption); their owners and staff acquire rich and varied competencies (digital skills); they make investments, take risks and experiment with new applications (innovation orientation); and they create new organizational structures and roles that allow staff to draw on insights derived from digital adoption in order to make better decisions (flexible management).

These overall findings suggest that policymakers should not overestimate the immediate benefits that MSEs can reap from digitalization. Many other internal and external factors have to be in place for digitalization to actually translate into significant productivity gains for MSEs. Transformational outcomes and upgrades in supply chain positions may thus remain rare exceptions. It is important to note that standardized interventions fail to do justice to the diversity of MSEs. Policymakers and support organizations should identify MSE groups with room to improve before they reach capability thresholds (for instance, by using the typology outlined in **table 1** in **section 1.4** or the bottleneck mapping presented in **figure 7** in **section 4.3**), helping these MSEs to make the most out of their initial capability level and the circumstances they are faced with.

While this report has shed light on some of the complex realities of MSE digitalization, it has also underscored the need for further analysis. First, it confirms a drastic mismatch between the employment contribution of MSEs versus the availability of evidence and data about them. "Small matters", yet MSEs continue to be the least measured of enterprises. Existing firm level evidence is heavily skewed towards high-income countries and large firms. Across world regions and sectors, the picture is blurred and incomplete. Quantitative data on digital adoption by informal and small enterprises remain patchy, which means that international comparisons are not possible. Large-scale assessments that capture basic data on firms' digital uptake (such as the World Bank's Doing Business survey) under represent informal and small enterprises. More comprehensive and representative surveys exist for some countries, but they use different survey instruments. Given the variety of conceptualizations and measurement methods, it is difficult to undertake rigorous sectoral and regional comparisons. For the time being, comprehensive digital economy assessments at the national level would still seem to be the best basis for policy decisions.

Secondly, future research should specify how digitalization, productivity and decent work are interlinked in MSEs. The studies reviewed for this report focused on the impact of digital technologies on productivity, but not a single rigorous study could be identified that explicitly conceptualized and investigated the ensuing impacts on job quality and social protections. There is a considerable body of literature on the macro-level consequences of artificial intelligence and automation, but such studies

only discuss deteriorating labour market conditions for workers lacking particular skill sets, irrespective of employer (for example, Brynjolfsson and McAfee 2012; Frey and Osborne 2017; Larsson and Teigland 2020). Another set of studies have examined digital labour in the gig and sharing economy, but they have concerned themselves with conditions of work for the self-employed and freelancers (for example, Scholz 2016; Wood et al. 2019) or for workers employed by large or medium-sized outsourcing firms (Anwar and Graham 2020; Melia 2020; Sandeep and Ravishankar 2018). These studies say little about the net contribution of digitalization to decent work in MSEs, which tend to start from a low base with regard to working conditions and compensation (ILO 2015a; OECD 2019). Exploring how digitalization affects the quality of work in MSEs, and how productivity is linked with decent work, should therefore be a priority in future policy-oriented analysis in this field.

While the impact of digitalization on working conditions requires further research, its importance for MSEs in terms of productivity, access to finance, growth and sustainable business practices has been highlighted in this report. The analysis has revealed that the potential of digitalization for MSEs has not been fully harnessed. Unlocking that potential would lead to tremendous benefits not only for the enterprises themselves, but also for economies and societies at large. The policy recommendations in this report call for determined follow-up efforts. The 2020s must become a decade of action. If the 2030 Agenda for Sustainable Development is to be implemented and the SDGs attained, Member States need to focus on the job and growth engines in their economies, namely on MSEs. The recommendations presented here should stand policymakers and practitioners in good stead as they support MSEs in leveraging the opportunities of digitalization as part of comprehensive strategies aimed at achieving the SDGs.

References

References

Abdullah, Ahmed, Brychan Thomas, Lyndon Murphy, and Eoin Plant. 2018. "An Investigation of the Benefits and Barriers of e-Business Adoption Activities in Yemeni SMEs". *Strategic Change* 27 (3): 195–208.

Abubakar, A. D., Julian M. Bass, and Ian Allison. 2014. "Cloud Computing: Adoption Issues for Sub-Saharan African SMEs". *Electronic Journal of Information Systems in Developing Countries* 62 (1): 1–17.

Accenture. 2020. *ASEAN SME Transformation Survey 2020: Are You Ready to Turn Today's Challenges into Opportunities?*

ADB (Asian Development Bank). 2020. *Asia Small and Medium-Sized Enterprise Monitor 2020: Volume II – COVID-19 Impact on Micro, Small, and Medium-Sized Enterprises in Developing Asia.* Manila.

Afolayan, Ademola, Eoin Plant, Gareth R.T. White, Paul Jones, and Paul Beynon-Davies. 2015. "Information Technology Usage in SMEs in a Developing Economy". *Strategic Change* 24 (5): 483–498.

Aker, Jenny C. 2010. "Information from Markets Near and Far: Mobile Phones and Agricultural Markets in Niger". *American Economic Journal: Applied Economics* 2 (3): 46–59.

AlBar, Adnan Mustafa, and Md. Rakibul Hoque. 2019. "Factors Affecting the Adoption of Information and Communication Technology in Small and Medium Enterprises: A Perspective from Rural Saudi Arabia". *Information Technology for Development* 25 (4): 715–738.

Albaz, Abdulaziz, Marco Dondi, Tarek Rida, and Jörg Schubert. 2020. "Unlocking Growth in Small and Medium-Size Enterprises", McKinsey & Company, 2 July 2020.

Alexander, Thomas F. 2019. "The Global Informal Economy: Large but on the Decline". *IMF Blog* (blog). 30 October 2019. https://blogs.imf.org/2019/10/30/the-global-informal-economy-large-but-on-the-decline/.

Allan, Craig, Justin Annear, Eric Beck, and John Van Beveren. 2003. "A Framework for the Adoption of ICT and Security Technologies by SMEs". In *Proceedings of the 16th Annual Conference of the Small Enterprise Association of Australia and New Zealand*. Ballarat: University of Ballarat.

Alliance for Affordable Internet. 2020. *The Affordability Report 2020.*

Alliance for Financial Inclusion. 2020. *Regional Policy Framework for Enhancing MSME Financing Ecosystem in Africa*.

Al-Somali, Sabah Abdullah, Roya Gholami, and Ben Clegg. 2015. "A Stage-Oriented Model (SOM) for e-Commerce Adoption: A Study of Saudi Arabian Organisations". *Journal of Manufacturing Technology Management* 26 (1): 2–35.

Anwar, Mohammad Amir, and Mark Graham. 2020. "Between a Rock and a Hard Place: Freedom, Flexibility, Precarity and Vulnerability in the Gig Economy in Africa". Competition & Change, April.

APEC (Asia–Pacific Economic Cooperation). 2017. "APEC Strategy for Green, Sustainable and Innovative MSMEs", adopted at APEC Small and Medium Enterprises Ministerial Meeting, Ho Chi Minh City, Viet Nam, 14 September 2017.

Apedo-Amah, Marie Christine, Besart Avdiu, Xavier Cirera, Marcio Cruz, Elwyn Davies, Arti Grover, Leonardo Iacovone, Umut Kilinc, Denis Medvedev, Franklin Okechukwu Maduko et al. 2020.

"Unmasking the Impact of COVID-19 on Businesses: Firm Level Evidence from Across the World", World Bank Policy Research Working Paper No. 9434.

Arendt, Lukasz. 2008. "Barriers to ICT Adoption in SMEs: How to Bridge the Digital Divide?" *Journal of Systems and Information Technology* 10 (2): 93–108.

Avle, Seyram, and Silvia Lindtner. 2016. "Design(ing) 'Here' and 'There': Tech Entrepreneurs, Global Markets, and Reflexivity in Design Processes". In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, 2233–2245. New York: Association for Computing Machinery.

Bada, Maria, and Jason R.C. Nurse. 2019. "Developing Cybersecurity Education and Awareness Programmes for Small- and Medium-Sized Enterprises (SMEs)". *Information and Computer Security* 27 (3): 393–410.

Banerjee, Probir Kumar, and Louis C. Ma. 2012. "Routinisation of B2B e-Commerce by Small Firms: A Process Perspective". *Information Systems Frontiers* 14 (5): 1033–1046.

Barann, Benjamin, Andreas Hermann, Ann-Kristin Cordes, Friedrich Chasin, and Jörg Becker. 2019. "Supporting Digital Transformation in Small and Medium-Sized Enterprises: A Procedure Model Involving Publicly Funded Support Units". In *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences*, edited by Tung X. Bui, 4977–4986. Honolulu: University of Hawaii at Manoa.

Barley, Stephen R., and Gideon Kunda. 2004. Gurus, Hired Guns, and Warm Bodies: *Itinerant Experts in a Knowledge Economy*. Princeton, NJ: Princeton University Press.

Barrantes Cáceres, Roxana, Aileen Agüero, Martín Cavero, and César Huaroto. 2012. "The Impacts of the Use of Mobile Telephone Technology on the Productivity of Micro- and Small Enterprises: An Exploratory Study into the Carpentry and Cabinet-Making Sector in Villa El Salvador (English)". *Information Technologies & International Development* 8 (4): 77–94.

Bateman, Milford, Maren Duvendack, and Nicholas Loubere. 2019. "Is Fin-Tech the New Panacea for Poverty Alleviation and Local Development? Contesting Suri and Jack's M-Pesa Findings Published in 'Science'". *Review of African Political Economy* 46 (161): 480–495.

Bayat-Renoux, Fiona. 2018. *Digital Technologies for Mobilizing Sustainable Finance: Applications of Digital Technologies to Sustainable Finance*. Sustainable Digital Finance Alliance.

Beck, Thorsten, Haki Pamuk, Ravindra Ramrattan, and Burak R. Uras. 2018. "Payment Instruments, Finance and Development". *Journal of Development Economics* 133 (July): 162–186.

Begg, Carolyn, and Thomas Caira. 2012. "Exploring the SME Quandary: Data Governance in Practise in the Small to Medium-Sized Enterprise Sector". *Electronic Journal of Information Systems Evaluation* 15 (1): 3–13.

Bhattacharya, Rajesh. 2019. "ICT Solutions for the Informal Sector in Developing Economies: What Can One Expect?" *Electronic Journal of Information Systems in Developing Countries* 85 (3): e12075.

Bhattarai, Tejeshwi Nath. 2018. "Emerging Trends in the Use of Technology as a Driver of the Transition to Formality: Experiences from Asia and the Pacific", ILO Asia–Pacific Working Paper Series.

Bianchini, Marco. 2019. "OECD Digital for SMEs Global Initiative". OECD Centre for Entrepreneurship, SMEs, Regions and Cities, Concept Note.

Blumenstock, Joshua E., Michael Callen, Tarek Ghani, and Lucas Koepke. 2015. "Promises and Pitfalls of Mobile Money in Afghanistan: Evidence from a Randomized Control Trial". In ICTD '15: *Proceedings*

of the Seventh International Conference on Information and Communication Technologies and Development, 1–10. New York: Association for Computing Machinery.

Boadi, Raymond A., Richard Boateng, Robert Hinson, and Robert A. Opoku. 2007. "Preliminary Insights into m-Commerce Adoption in Ghana". *Information Development* 23 (4): 253–265.

Boateng, Richard, Robert Hinson, Rakiya Galadima, and Longe Olumide. 2014. "Preliminary Insights into the Influence of Mobile Phones in Micro-Trading Activities of Market Women in Nigeria". *Information Development* 30 (1): 32–50.

Bollou, Felix, and Ojelanki Ngwenyama. 2008. "Are ICT Investments Paying off in Africa? An Analysis of Total Factor Productivity in Six West African Countries from 1995 to 2002". *Information Technology for Development* 14 (4): 294–307.

Bonina, Carla, Kari Koskinen, Ben Eaton, and Annabelle Gawer. 2021. "Digital Platforms for Development: Foundations and Research Agenda". I*nformation Systems Journa*l, January.

Bouza, Amancio. 2018. "What Is Digital Transformation, Digitalization, and Digitization", Medium, 23 March 2018.

Breza, Emily, Martin Kanz, and Leora Klapper. 2017. *The Real Effects of Electronic Wage Payments: First Results*. International Growth Centre.

—. 2020. "Learning to Navigate a New Financial Technology: Evidence from Payroll Accounts", World Bank Policy Research Working Paper No. 9495.

Bruhn, Miriam, and David McKenzie. 2014. "Entry Regulation and the Formalization of Microenterprises in Developing Countries". *World Bank Research Observer* 29 (2): 186–201.

Bruque, Sebastián, and José Moyano. 2007. "Organisational Determinants of Information Technology Adoption and Implementation in SMEs: The Case of Family and Cooperative Firms". *Technovation* 27 (5): 241–253.

Brussevich, Mariya, Era Dabla-Norris, and Salma Khalid. 2020. "Who Will Bear the Brunt of Lockdown Policies? Evidence from Tele-Workability Measures across Countries", International Monetary Fund Working Paper No. 20/88.

Brynjolfsson, Erik, and Andrew McAfee. 2012. Race against the Machine: *How the Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*. Lexington, MA: Digital Frontier Press.

Bull, Greta. 2020. "The Best Laid Plans . CGAP's Response to COVID-19 (Coronavirus)". *CGAP Leadership Essay Series* (blog). 16 April 2020. https://www.cgap.org/blog/cgaps-response-covid-19-coronavirus.

Burrell, Jenna, and Elisa Oreglia. 2015. "The Myth of Market Price Information: Mobile Phones and the Application of Economic Knowledge in ICTD". *Economy and Society* 44 (2): 271–292.

Cataldo, Alejandro, Gabriel Pino, and Robert J. McQueen. 2020. "Size Matters: The Impact of Combinations of ICT Assets on the Performance of Chilean Micro, Small and Medium Enterprises". *Information Technology for Development* 26 (2): 292–315.

Chacaltana, Juan, Vicky Leung, and Miso Lee. 2018. "New Technologies and the Transition to Formality: The Trend towards e–Formality", ILO Employment Policy Department Working Paper No. 247.

Chakravarti, Ankita. 2020. "WhatsApp Payments Live in India, Here Is How to Enable Feature on App". India Today, 10 November 2020.

Chatterjee, Susmita, Sangita Dutta Gupta, and Parijat Upadhyay. 2020. "Technology Adoption and Entrepreneurial Orientation for Rural Women: Evidence from India". *Technological Forecasting and Social Change* 160 (November): 120236.

Chege, Samwel Macharia, Daoping Wang, and Shaldon Leparan Suntu. 2020. "Impact of Information Technology Innovation on Firm Performance in Kenya". *Information Technology for Development* 26 (2): 316–345.

Chew, Han Ei, Vigneswara P. Ilavarasan, and Mark R. Levy. 2015. "Mattering Matters: Agency, Empowerment, and Mobile Phone Use by Female Microentrepreneurs". *Information Technology for Development* 21 (4): 523–542.

Chew, Han Ei, Mark Levy, and Vigneswara Ilavarasan. 2011. "The Limited Impact of ICTs on Microenterprise Growth: A Study of Businesses Owned by Women in Urban India". I*nformation Technologies & International Development* 7 (4): 1–16.

Cirera, Xavier, Diego A. Comin, Marcio Cruz, and Kyung Min Lee. 2020. "Technology within and across Firms", National Bureau of Economic Research Working Paper No. 28080.

Cirera, Xavier, Marcio Cruz, Elwyn Davies, Arti Grover, Leonardo Iacovone, Jose Ernesto Lopez Cordova, Denis Medvedev, Franklin Okechukwu Maduko, Gaurav Nayyar, Santiago Reyes Ortega, et al. 2021. "Policies to Support Businesses through the COVID-19 Shock: A Firm-Level Perspective", World Bank Policy Research Working Paper No. 9506.

Colombo, Massimo G., Annalisa Croce, and Luca Grilli. 2013. "ICT Services and Small Businesses' Productivity Gains: An Analysis of the Adoption of Broadband Internet Technology". *Information Economics and Policy* 25 (3): 171–189.

Commander, Simon, Rupert Harrison, and Naercio Menezes-Filho. 2011. "ICT and Productivity in Developing Countries: New Firm-Level Evidence from Brazil and India". *Review of Economics and Statistics* 93 (2): 528–541.

David-West, Olayinka, and Peter C. Evans. 2016. *The Rise of African Platforms: A Regional Survey*. The Center for Global Enterprise.

DCED (Donor Committee for Enterprise Development). 2014. *Green Growth and Private Sector Development: Stocktaking of DCED Experiences*.

De Andrade, Gustavo Henrique, Miriam Bruhn, and David McKenzie. 2014. "A Helping Hand or the Long Arm of the Law? Experimental Evidence on What Governments Can Do to Formalize Firms". *World Bank Economic Review* 30 (1): 24–54.

Dedrick, Jason, Kenneth L. Kraemer, and Eric Shih. 2013. "Information Technology and Productivity in Developed and Developing Countries". *Journal of Management Information Systems* 30 (1): 97–122.

Deen-Swarray, Mariama, Mpho Moyo, and Christoph Stork. 2013. "ICT Access and Usage among Informal Businesses in Africa". info 15 (5): 52–68.

Deloitte. 2019. *Future of Risk in the Digital Era: Transformative Change. Disruptive Risk*.

Demirgüç-Kunt, Asli, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. 2020. "The Global Findex Database 2017: Measuring Financial Inclusion and Opportunities to Expand Access to and Use of Financial Services" *World Bank Economic Review* 34 (Supplement_1): S2–8.

Díaz-Chao, Ángel, Jorge Sainz-González, and Joan Torrent-Sellens. 2015. "ICT, Innovation, and Firm Productivity: New Evidence from Small Local Firms". *Journal of Business Research* 68 (7): 1439–1444.

Donner, Jonathan. 2006. "The Use of Mobile Phones by Microentrepreneurs in Kigali, Rwanda: Changes to Social and Business Networks". *Information Technologies & International Development* 3 (2): 3–19.

—. 2007. "The Rules of Beeping: Exchanging Messages via Intentional 'Missed Calls' on Mobile Phones". *Journal of Computer-Mediated Communication* 13 (1): 1–22.

—. 2015. After Access: *Inclusion, Development, and a More Mobile Internet*. Cambridge, MA: MIT Press.

—, and Marcela X. Escobari. 2010. "A Review of Evidence on Mobile Use by Micro and Small Enterprises in Developing Countries". *Journal of International Development* 22 (5): 641–658.

Donner, Jonathan, Marissa Dean, Jessica Osborn, and Annabel Schiff. 2020a. "Platform-Led Upskilling: Marketplace Platforms as a Source of Livelihoods Training". In *ICTD2020: Proceedings of the 2020 International Conference on Information and Communication Technologies and Development*. New York: Association for Computing Machinery.

Donner, Jonathan, Shikoh Gitau, Nasubo Ongoma, and Tessie Waithira. 2020b. *The Experience of Platform Livelihoods in the Global South: A Literature Review*. Caribou Digital.

Duch-Brown, Néstor, Bertin Martens, and Frank Mueller-Langer. 2017. "The Economics of Ownership, Access and Trade in Digital Data", European Commission/Joint Research Centre Digital Economy Working Paper No. 2017–01.

Eldridge, Derek, Tahir M. Nisar, and Mariateresa Torchia. 2021. "What Impact Does Equity Crowdfunding Have on SME Innovation and Growth? An Empirical Study". *Small Business Economics* 56 (1): 105–120.

Esselaar, Steve, Christoph Stork, Ali Ndiwalana, and Mariama Deen-Swarray. 2007. "ICT Usage and Its Impact on Profitability of SMEs in 13 African Countries". *Information Technologies & International Development* 4 (1): 87–100.

European DIGITAL SME Alliance. 2020. *The Path to Sustainable Digitalisation*. DIGITAL SME live webinar. 15 October 2020. https://www.youtube.com/watch?v=sQj1qpjF8sg&feature=emb_err_woyt.

Evans, Peter, and Annabelle Gawer. 2016. The Rise of the Platform Enterprise: *A Global Survey.* The Center for Global Enterprise.

Fernández-Esquinas, Manuel, Madelon van Oostrom, and Hugo Pinto. 2017. "Key Issues on Innovation, Culture and Institutions: Implications for SMEs and Micro Firms". *European Planning Studies* 25 (11): 1897–1907.

Foster, Christopher, and Mark Graham. 2015. *The Internet and Tourism in Rwanda: Value Chains and Networks of Connectivity-Based Enterprises in Rwanda*. Oxford Internet Institute.

—, Laura Mann, Timothy Waema, and Nicolas Friederici. 2018. "Digital Control in Value Chains: Challenges of Connectivity for East African Firms". *Economic Geography* 94 (1): 68–86.

Frey, Carl Benedikt, and Michael A. Osborne. 2017. "The Future of Employment: How Susceptible Are Jobs to Computerisation?" *Technological Forecasting and Social Change* 114 (January): 254–280.

Friederici, Nicolas, Michel Wahome, and Mark Graham. 2020. *Digital Entrepreneurship in Africa: How a Continent Is Escaping Silicon Valley's Long Shadow*. Cambridge, MA: MIT Press.

Gaarder, Edwin, and Judith van Doorn. 2021. "Enterprise Formalization: An Introduction", ILO Thematic Brief No. 1/2021.

GIZ (German Agency for International Cooperation). 2019. Toolkit: *Learning and Working in the Informal Economy*.

González, Javier López. 2019. "Fostering Participation in Digital Trade for ASEAN MSMEs", OECD Trade Policy Paper No. 230.

Good Things Foundation. 2019. *Improving Digital Skills for Small and Micro Businesses*.

GPFI (Global Partnership for Financial Inclusion). 2019. *G20 Policy Guide: Digitisation and Informality – Harnessing Digital Financial Inclusion for Individuals and MSMEs in the Informal Economy*.

—. 2020. *Promoting Digital and Innovative SME Financing*. World Bank Group.

Grozel, Frank. 2020. "How UNCTAD's e-Government Platform Helps Countries Stay Open for Business during COVID-19". United Nations Conference on Trade and Development.

Gupta, Prashant, A. Seetharaman, and John Rudolph Raj. 2013. *"The Usage and Adoption of Cloud Computing by Small and Medium Businesses". International Journal of Information Management* 33 (5): 861–874.

Harteis, Christian, ed. 2018. *The Impact of Digitalization in the Workplace*. Cham, Switzerland: Springer International Publishing.

Henriquez Amestoy, Lysette. 2019. *Formalization: The Case of Chile*. ILO.

Hernandez, Kevin, Becky Faith, Pedro Prieto Martín, and Ben Ramalingam. 2016. "The Impact of Digital Technology on Economic Growth and Productivity, and Its Implications for Employment and Equality: An Evidence Review", Institute of Development Studies Evidence Report No. 207.

Higgins, Dylan, Jake Kendall, and Ben Lyon. 2012. "Mobile Money Usage Patterns of Kenyan Small and Medium Enterprises". *Innovations: Technology, Governance, Globalization* 7 (2): 67–81.

Hilger, Lukas, Thorsten Schneiders, Frederic Pascal Meyer, and Jean-Pierre Kroll. 2018. "Use of Smart Technologies for Energy Efficiency, Energy- and Load Management in Small and Medium Sized Enterprises (SMEs)". In *Proceedings of the 7th International Energy and Sustainability Conference (IESC), Cologne, Germany, 17–18 May 2018*. Institute of Electrical and Electronics Engineers.

Horne, Daniel R., Dionne Nickerson, and Mark DeFanti. 2015. "Improving Supply Chain Efficiency through Electronic Payments: The Case of Micro-Entrepreneurs in Kenya and Tanzania". *Journal of Marketing Channels* 22 (2): 83–92.

Iacovone, Leonardo, Mariana Pereira-López, and Marc Schiffbauer. 2016. "ICT Use, Competitive Pressures, and Firm Performance in Mexico". *World Bank Economic Review* 30 (Suppl.): S109–118.

IFC (International Finance Corporation). 2015. "Using the Internet to Expand Microfinance in China". 3 February 2015.

Ilavarasan, P. Vigneswara. 2019. *"Present and Future of the Use and Impact of Information and Communication Technology in Informal Microenterprises: Insights from India". Electronic Journal of Information Systems in Developing Countries* 85 (3): e12091.

—, and Albert Otieno. 2018. "Tiny Impact of ICTs and Paucity of Rigorous Causal Studies: A Systematic Review of Urban MSMEs in the Developing World". *Information Technologies & International Development* 14: 134–150.

ILO. 2013. *The Informal Economy and Decent Work: A Policy Resource Guide Supporting Transitions to Formality*.

—. 2015a. *Small and Medium-Sized Enterprises and Decent and Productive Employment Creation*. ILC.104/IV.

—. 2015b. Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204).

—. 2017. "Enterprise Formalization", ILO Enabling Environment for Sustainable Enterprises (EESE) Team.

—. 2019a. *Small Matters: Global Evidence on the Contribution to Employment by the Self-Employed, Micro-Enterprises and SMEs.*

— 2019b. "Policy Responses to New Forms of Work: International Governance of Digital Labour Platforms". Background paper prepared for the second meeting of the G20 Employment Working Group under the Japanese G20 Presidency, Tokyo, 22–24 April 2019.

—. 2020a. "Enabling Environment for Sustainable Enterprises and the Post-COVID-19 Rapid Response", ILO Policy Brief, June 2020.

—. 2020b. "ILO Monitor: COVID-19 and the World of Work. Sixth Edition", 23 September 2020.

—. 2020c. "The ILO Intensifies Its Efforts to Accelerate the Transition from Cash to Digital Wage Payments", 17 December 2020.

—. 2021. *World Employment and Social Outlook 2021: The Role of Digital Labour Platforms in Transforming the World of Work.*

InsuResilience Global Partnership. 2020. "Climate Risk Insurance Gets a Major Boost in Bangladesh", 30 June 2020.

Internet Society. 2020. "Building Wireless Community Networks". https://www.internetsociety.org/tutorials/wireless-community-networks/.

Islam, Asif, and Filip Jolevski. 2019. "The Digital Disconnect of Informal Businesses". *World Bank Blogs, Let's Talk Development* (blog). 27 June 2019. https://blogs.worldbank.org/developmenttalk/digital-disconnect-informal-businesses.

Islam, Asif, Silvia Muzi, and Jorge Luis Rodriguez Meza. 2018. "Does Mobile Money Use Increase Firms' Investment? Evidence from Enterprise Surveys in Kenya, Uganda, and Tanzania". *Small Business Economics* 51 (3): 687–708.

ITC (International Trade Centre). 2017. "Closing the Small-Business and Gender Gap to Make Trade More Inclusive". In *Aid for Trade at a Glance 2017: Promoting Trade, Inclusiveness and Connectivity for Sustainable Development*, 219–241. World Trade Organization and OECD.

—. 2019. *SME Competitiveness Outlook 2019: Big Money for Small Business – Financing the Sustainable Development Goals.*

—. 2020. "SME Trade Academy". eTrade for all initiative, https://learning.intracen.org/.

ITU (International Telecommunication Union). 2018. *Digital Skills Toolkit*.

Jacolin, Luc, Joseph Keneck Massil, and Alphonse Noah. 2019. "Informal Sector and Mobile Financial Services in Developing Countries: Does Financial Innovation Matter?", Banque de France Working Paper No. 721.

Jagun, Abi, Richard Heeks, and Jason Whalley. 2008. "The Impact of Mobile Telephony on Developing Country Micro-Enterprise: A Nigerian Case Study". *Information Technologies & International Development* 4 (4): 47–65.

Jenik, Ivo, Timothy Lyman, and Alessandro Nava. 2017. "Crowdfunding and Financial Inclusion", Consultative Group to Assist the Poor, working paper.

Jensen, Robert. 2007. "The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector". *The Quarterly Journal of Economics* 122 (3): 879–924.

Jin, Huijun, and Fiona Hurd. 2018. "Exploring the Impact of Digital Platforms on SME Internationalization: New Zealand SMEs Use of the Alibaba Platform for Chinese Market Entry". *Journal of Asia-Pacific Business* 19 (2): 72–95.

Jones, Paul, Geoff Simmons, Gary Packham, Paul Beynon-Davies, and David Pickernell. 2014. "An Exploration of the Attitudes and Strategic Responses of Sole-Proprietor Micro-Enterprises in Adopting Information and Communication Technology". *International Small Business Journal* 32 (3): 285–306.

Kabanda, Salah, Maureen Tanner, and Cameron Kent. 2018. "Exploring SME Cybersecurity Practices in Developing Countries". Journal of Organizational Computing and Electronic Commerce 28 (3): 269–282.

Kabanda, Salah, and Fernanda Matsinhe. 2019. "Contextualist Inquiry into e-Commerce Institutionalization in Developing Countries: The Case of Mozambican Women-Led SMMES". *Interdisciplinary Journal of Information, Knowledge, and Management* 14 (October): 325–341.

KAS (Konrad-Adenauer-Stiftung) and FICCI (Federation of Indian Chambers of Commerce and Industry). 2017. *Informal Economy in India: Setting the Framework for Formalisation*.

Kendall, Jake, Bill Maurer, Phillip Machoka, and Clara Veniard. 2011. "An Emerging Platform: From Money Transfer System to Mobile Money Ecosystem". *Innovations: Technology, Governance, Globalization* 6 (4): 49–64.

Khayer, Abul, Md. Shamim Talukder, Yukun Bao, and Md. Nahin Hossain. 2020. "Cloud Computing Adoption and Its Impact on SMEs' Performance for Cloud Supported Operations: A Dual-Stage Analytical Approach". *Technology in Society* 60 (February).

Klapper, Leora, Margaret Miller, and Jake Hess. 2019. *Leveraging Digital Financial Solutions to Promote Formal Business Participation*. World Bank.

Krone, Madlen, and Peter Dannenberg. 2019. "Development or Divide? Information and Communication Technologies in Commercial Small-Scale Farming in East Africa". In *Digital Economies at Global Margins*, edited by Mark Graham, 79–101. Cambridge, MA: MIT Press.

La Porta, Rafael, and Andrei Shleifer. 2014. "Informality and Development". *Journal of Economic Perspectives* 28 (3): 109–126.

Larsson, Anthony, and Robin Teigland, eds. 2020. *The Digital Transformation of Labor: Automation, the Gig Economy and Welfare*. Abingdon; New York: Routledge.

Lehdonvirta, Vili, Otto Kässi, Isis Hjorth, Helena Barnard, and Mark Graham. 2019. "The Global Platform Economy: A New Offshoring Institution Enabling Emerging-Economy Microproviders". *Journal of Management* 45 (2): 567–599.

Li, Liang, Fang Su, Wei Zhang, and Ji-Ye Mao. 2018. "Digital Transformation by SME Entrepreneurs: A Capability Perspective". *Information Systems Journal* 28 (6): 1129–1157.

Li, Xiaoqing, Xiaogang He, and Yifeng Zhang. 2020. "The Impact of Social Media on the Business Performance of Small Firms in China". *Information Technology for Development* 26 (2): 346–368.

LIRNEasia. 2020. "Internet and ICT Connectivity Linked to SME Business Success in Sri Lanka", policy brief.

Lopez, Mariana. 2020. *Mobile Money: Driving Formalisation and Building the Resilience of MSMEs*. GSM Association.

MacGregor, Robert C., and Mira Kartiwi. 2010. "Perception of Barriers to e-Commerce Adoption in SMEs in a Developed and Developing Country: A Comparison between Australia and Indonesia". *Journal of Electronic Commerce in Organizations* 8 (1): 61–82.

Mäki, Marko, and Tuija Toivola. 2021. "Global Market Entry for Finnish SME eCommerce Companies". *Technology Innovation Management Review* 11 (1): 11–21.

Malecki, Edward J., and Bruno Moriset. 2007. *The Digital Economy: Business Organization, Production Processes and Regional Developments*. London: Routledge.

Maltaverne, Bertrand. 2017. "What Is the Digital Transformation of Procurement Really About?", Medium, 25 May 2017.

Martin, Brandie Lee, and Eric Abbott. 2011. "Mobile Phones and Rural Livelihoods: Diffusion, Uses, and Perceived Impacts among Farmers in Rural Uganda". *Information Technologies & International Development* 7 (4): 17–34.

Mastercard Foundation and IFC (International Finance Corporation). 2018. *Digital Access: The Future of Financial Inclusion in Africa*.

Maurer, Bill. 2012. "Mobile Money: Communication, Consumption and Change in the Payments Space". *Journal of Development Studies* 48 (5): 589–604.

Mazzucato, Mariana. 2018. *The Value of Everything: Making and Taking in the Global Economy*. London: Allen Lane.

Melia, Elvis. 2020. *African Jobs in the Digital Era: Export Options with a Focus on Online Labour*. Bonn: German Development Institute.

Merry, Alice. 2020. *The Landscape of Microinsurance 2020*. Microinsurance Network.

Mijnhardt, Frederik, Thijs Baars, and Marco Spruit. 2016. "Organizational Characteristics Influencing SME Information Security Maturity". *Journal of Computer Information Systems* 56 (2): 106–115.

Mothobi, Onkokame, Alison Gillwald, and Pablo Aguera. 2020. "A Demand Side View of Informality and Financial Inclusion", Research ICT Africa Policy Paper Series No. 5 (After Access: Assessing Digital Inequality in Africa), Policy Paper No. 9.

Murphy, James T., and Pádraig Carmody. 2015. *Africa's Information Revolution: Technical Regimes and Production Networks in South Africa and Tanzania*. Chichester: Wiley Blackwell.

Ndemo, Bitange, and Tim Weiss, eds. 2017. *Digital Kenya: An Entrepreneurial Revolution in the Making*. Palgrave Studies of Entrepreneurship in Africa. London: Palgrave Macmillan.

Neate, Rupert. 2020. "China Orders Alibaba Founder Jack Ma to Pare down Fintech Empire". *The Guardian*, 28 December 2020.

Nemoto, Naoko, and Naoyuki Yoshino, eds. 2019. *Fintech for Asian SMEs*. Kasumigaseki, Japan: Asian Development Bank Institute.

Ng'weno, Amolo. 2018. "Njeri and the Superplatforms", Medium; BFA Global, 30 May 2018.

———, and David Porteous. 2018. "Let's Be Real: The Informal Sector and the Gig Economy Are the Future, and the Present, of Work in Africa". Center For Global Development.

Ntwoku, Habib, Solomon Negash, and Peter Meso. 2017. "ICT Adoption in Cameroon SME: Application of Bass Diffusion Model". *Information Technology for Development* 23 (2): 296–317.

OECD (Organisation for Economic Co operation and Development). 2015. *New Approaches to SME and Entrepreneurship Financing: Broadening the Range of Instruments*.

—. 2017. "Enhancing the Contributions of SMEs in a Global and Digitalised Economy". Document prepared for the OECD Ministerial Council Meeting held in Paris on 7 and 8 June 2017.

—. 2018. *Environmental Policy Toolkit for SME Greening in EU Eastern Partnership Countries*. OECD Green Growth Studies.

—. 2019. *OECD SME and Entrepreneurship Outlook 2019*.

—. 2020a. "Coronavirus (COVID-19): SME Policy Responses". OECD Centre for Entrepreneurship, SMEs, Regions and Cities.

—. 2020b. *Digital Government in Chile: Improving Public Service Design and Delivery.* OECD Digital Government Studies.

— and ILO. 2019. *Tackling Vulnerability in the Informal Economy*. OECD Development Centre Studies. Paris: OECD Publishing.

Pasti, Francesco, and Anant Nautiyal. 2019. Mobile Money for Enterprise Customers: *Addressing the Financial Services Needs of MSMEs in Sub-Saharan Africa*. GSM Association.

Paunov, Caroline, and Valentina Rollo. 2015. "Overcoming Obstacles: The Internet's Contribution to Firm Development". *World Bank Economic Review* 29 (Suppl_1): S192–204.

Pazarbasioglu, Ceyla, Alfonso Garcia Mora, Mahesh Uttamchandani, Harish Natarajan, Erik Feyen, and Mathew Saal. 2020. *Digital Financial Services*. World Bank Group.

Pergelova, Albena, Tatiana Manolova, Ralitsa Simeonova-Ganeva, and Desislava Yordanova. 2019. "Democratizing Entrepreneurship? Digital Technologies and the Internationalization of Female-Led SMEs". *Journal of Small Business Management* 57 (1): 14–39.

Philbeck, Imme. 2017. *Connecting the Unconnected: Working Together to Achieve Connect 2020 Agenda Targets*. International Telecommunication Union.

Pon, Bryan. 2020. "The Race to Digitize Commerce in Sub-Saharan Africa", Medium; Caribou Digital, 6 October 2020.

Quinones, Gerardo, Richard Heeks, and Brian Nicholson. 2017. "Digital Start-Ups in the Global South: Embeddedness, Digitality and Peripherality in Latin America", Centre for Development Informatics Working Paper No. 67.

Raghavan, Vivek, Sanjay Jain, and Pramod Varma. 2019. "India Stack: Digital Infrastructure as Public Good". *Communications of the ACM* 62 (11): 76–81.

Raj-Reichert, Gale. 2020. "Global Value Chains, Contract Manufacturers, and the Middle Income Trap: The Electronics Industry in Malaysia". *Journal of Development Studies* 56 (4): 698–716.

Rinehart-Smit, Kate, and Lucia Schlemmer. 2020. "The Potential of Digital Platforms as Distributors and Enablers of Financial Services in Africa", Cenfri, 4 November 2020.

Ritchie, Bob, and Clare Brindley. 2000. "Disintermediation, Disintegration and Risk in the SME Global Supply Chain". *Management Decision* 38 (8): 575–583.

Rosavina, Monica, Raden Aswin Rahadi, Mandra Lazuardi Kitri, Shimaditya Nuraeni, and Lidia Mayangsari. 2019. "P2P Lending Adoption by SMEs in Indonesia". *Qualitative Research in Financial Markets* 11 (2): 260–279.

Rutkowski, Michal, Alfonso Garcia Mora, Greta L. Bull, Boutheina Guermazi, and Caren Grown. 2020. "Responding to Crisis with Digital Payments for Social Protection: Short Term Measures with Long-Term Benefits". *World Bank Blogs, Voices* (blog). 31 March 2020.

Ryan, Tim, Kelsey Farish, and Oana Labontu-Radu. 2020. "The Platform to Business Regulation (the 'P2B Regulation'): Why Worry?", DAC Beachcroft, 24 August 2020.

S4YE (Solutions for Youth Employment). 2018. *Digital Jobs for Youth: Young Women in the Digital Economy*. World Bank Group.

Sahler, Gregor, and Jeremy Gray. 2020. *Managing Risks (More) Effectively: Rethinking Insurance for MSMEs*. Microinsurance Network.

Sandeep, M. S., and M. N. Ravishankar. 2018. "Sociocultural Transitions and Developmental Impacts in the Digital Economy of Impact Sourcing". *Information Systems Journal* 28 (3): 563–586.

Saridakis, George, Yanqing Lai, Anne-Marie Mohammed, and Jared M. Hansen. 2018. "Industry Characteristics, Stages of e-Commerce Communications, and Entrepreneurs and SMEs Revenue Growth". *Technological Forecasting and Social Change* 128 (March): 56–66.

Schiff, Annabel, Kishor Nagula, and Jonathan Donner. 2019. *Micro-entrepreneurs in a Platform Era: Understanding the Platform Practices of Micro-entrepreneurs in Kenya*. Caribou Digital. Report prepared for the Partnership for Finance in a Digital Africa.

Scholz, Trebor. 2016. Uberworked and Underpaid: How Workers Are *Disrupting the Digital Economy*. Cambridge, UK; Malden, MA: Polity.

Schwettmann, Jürgen. 2020. "COVID-19 and the Informal Economy: Impact and Response Strategies in Sub Saharan Africa". Friedrich-Ebert-Stiftung.

Seo-Zindy, Ryoung, and Richard Heeks. 2017. "Researching the Emergence of 3D Printing, Makerspaces, Hackerspaces and FabLabs in the Global South: A Scoping Review and Research Agenda on Digital Innovation and Fabrication Networks". *Electronic Journal of Information Systems in Developing Countries* 80 (1): 1–24.

Shah Alam, Syed. 2009. "Adoption of Internet in Malaysian SMEs". J*ournal of Small Business and Enterprise Development* 16 (2): 240–255.

Sharma, Nithya, and Shilpi Shastri. 2020. *From Cash to Digital Wage Payments in Vietnam: Win-Win for Enterprises and Workers*. ILO and Women's World Banking.

Smallwood, Norm, and Dave Ulrich. 2004. "Capitalizing on Capabilities". *Harvard Business Review*, June, 119–128.

Sommer, Christoph. 2017. *Drivers and Constraints for Adopting Sustainability Standards in Small and Medium-Sized Enterprises (SMEs)*. Bonn: German Development Institute.

Souza, Cesar Alexandre de, Érica Souza Siqueira, and Nicolau Reinhard. 2017. "Digital Divide of Small and Medium-Sized Enterprises: An Analysis of Influencing Factors Using the TOE Theory". *Revista de Administração* Mackenzie 18 (2): 15–48.

Srinivasan, Janaki, and Jenna Burrell. 2015. "On the Importance of Price Information to Fishers and to Economists: Revisiting Mobile Phone Use among Fishers in Kerala". *Information Technologies & International Development* 11 (1): 57–70.

Staschen, Stefan, and Patrick Meagher. 2018. "Basic Regulatory Enablers for Digital Financial Services", Consultative Group to Assist the Poor, Focus Note No. 109.

Storper, Michael, Thomas Kemeny, Naji Makarem, and Taner Osman. 2015. *The Rise and Fall of Urban Economies: Lessons from San Francisco and Los Angeles.* Stanford, CA: Stanford Business Books, Stanford University Press.

Suciu, George, Adrian Pasat, Robert Coanca, and Stefania Secu. 2017. "The Adoption of Photovoltaic Solutions for Increasing Energy Efficiency within SMEs". In *Proceedings of the 14th International Conference on Engineering of Modern Electric Systems (EMES), Oradea, Romania, 1–2 June 2017*, 236–239. Institute of Electrical and Electronics Engineers.

Suri, Tavneet, and William Jack. 2016. "The Long-Run Poverty and Gender Impacts of Mobile Money". Science 354 (6317): 1288–1292.

Tambe, Prasanna, Lorin Hitt, Daniel Rock, and Erik Brynjolfsson. 2020. "Digital Capital and Superstar Firms", National Bureau of Economic Research Working Paper No. 28285.

Tang, Jiawen, and Tania Begazo. 2020. "Digital Stimulus Packages: Lessons Learned and What's Next". *World Bank Blogs, Digital Development* (blog). 17 December 2020.

Tang, Yee Kwan, and Victor Konde. 2020. "Differences in ICT Use by Entrepreneurial Micro Firms: Evidence from Zambia". *Information Technology for Development* 26 (2): 268–291.

Task Force on Digital Financing of the Sustainable Development Goals. 2020. *People's Money: Harnessing Digitalization to Finance a Sustainable Future*.

Tob-Ogu, Abiye, Niraj Kumar, and John Cullen. 2018. "ICT Adoption in Road Freight Transport in Nigeria: A Case Study of the Petroleum Downstream Sector". *Technological Forecasting and Social Change* 131 (June): 240–252.

Uduji, Joseph Ikechukwu, Elda Nduka Okolo-Obasi, and Simplice Anutechia Asongu. 2019. "The Impact of e-Wallet on Informal Farm Entrepreneurship Development in Rural Nigeria". *Electronic Journal of Information Systems in Developing Countries* 85 (3): e12066.

UNCTAD (United Nations Conference on Trade and Development). 2010. *Information Economy Report 2010: ICTs, Enterprises and Poverty Alleviation*.

—. 2011. *Information Economy Report 2011: ICTs as an Enabler for Private Sector Development*.

—. 2012. *Information Economy Report 2012: The Software Industry and Developing Countries*.

—. 2014. *Empowering Women Entrepreneurs through Information and Communications Technologies:* A Practical Guide. UNCTAD Current Studies on Science, Technology and Innovation No. 9.

—. 2015. *Information Economy Report 2015: Unlocking the Potential of e-Commerce for Developing Countries*.

—. 2017. I*nformation Economy Report 2017: Digitalization, Trade and Development.*

—. 2019. *Digital Economy Report 2019: Value Creation and Capture – Implications for Developing Countries.*

—. 2020a. *Fast-tracking Implementation of eTrade Readiness Assessments.*

—. 2020b. "Formalize the Informal Sector". Business Facilitation Program (website). https://businessfacilitation.org/topics/formalization/.

—. 2020c. "Senegal's e-Commerce Sector Helps Country Cope with COVID-19", 24 April 2020.

—. 2020d. *COVID-19 and e-Commerce: Impact on Businesses and Policy Responses.*

United Kingdom, Department of Energy and Climate Change. 2016. *Potential of Smart Technologies in SMEs: Final Report.*

Vuori, Vilma, Nina Helander, and Jussi Okkonen. 2019. "Digitalization in Knowledge Work: The Dream of Enhanced Performance". *Cognition, Technology & Work* 21 (2): 237–252.

Wanyoike, Daniel M., Elegwa Mukulu, and Anthony G. Waititu. 2012. "ICT Attributes as Determinants of e-Commerce Adoption by Formal Small Enterprises in Urban Kenya". *International Journal of Business and Social Science* 3 (23): 65–74.

Warren, Peter. 2017. "The Potential of Smart Technologies and Micro-Generation in UK SMEs". *Energies* 10 (July): 1050.

Weiss, Tim, and Klaus Weber. 2016. "Globalization in Action: Templates, Tensions and Strategies of Action in Kenyan Entrepreneurship". *Academy of Management Proceedings* vol. 2016 (1): 15070.

Wood, Alex J., Mark Graham, Vili Lehdonvirta, and Isis Hjorth. 2019. "Networked but Commodified: The (Dis)Embeddedness of Digital Labour in the Gig Economy". *Sociology* 53 (5): 931–950.

World Bank. 2016. *World Development Report 2016: Digital Dividends*.

—. 2020. "Starting a Business: Good Practices". World Bank Doing Business (website). https://www.doingbusiness.org/en/data/exploretopics/starting-a-business/good-practices#Using.

—. n.d. "Individuals Using the Internet (% of Population)". World Development Indicators database. https://data.worldbank.org/indicator/IT.NET.USER.ZS. Accessed 5 January 2021.

World Bank and ITU (International Telecommunication Union). 2020. *Digital Regulation Handbook*. Geneva.

World Economic Forum. 2020. *Accelerating the Impact of Industrial IoT in Small and Medium-Sized Enterprises: A Protocol for Action.*

Ziegler, Tania, Rotem Shneor, and Bryan Zheng Zhang. 2020. "The Global Status of the Crowdfunding Industry". In Advances in Crowdfunding: Research and Practice, edited by Rotem Shneor, Liang Zhao and Bjørn-Tore Flåten, 43–61. Cham, Switzerland: Springer International Publishing.

Appendix. Overview of empirical studies reviewed for this report

Reference	Geographical scope	Region	Type of MSE	Sector / Industry	Method	Central variables	Findings
Abdullah et al. (2018)	Yemen	Arab States	SMEs (23.5% had between 1 and 9 employees; 76.5% between 10 and 49)	Any	Exploratory interviews, survey of 102 SMEs (random sample from national database), linear regressions	Adoption of e-commerce software	Limited adoption of e-commerce software is due to low level of technology use, lack of qualified staff, limited financial resources and a lack of computer software and hardware.
Abubakar, Bass and Allison (2014)	Nigeria	Africa	SMEs (mostly medium-sized)	Knowledge economy	Ten qualitative case studies	Use of cloud services	SMEs are not concerned with security, more with the efficiency of cloud service use, especially with the accessibility of data.
Afolayan et al. (2015)	Nigeria (Lagos)	Africa	SMEs (39.1% were microenterprises employing fewer than 10 people; 44.7% small enterprises with between 10 and 49 employees; and 26% medium-sized enterprises with between 50 and 199)	Any	Survey of 161 SMEs (random sample from Lagos Chamber of Commerce and Industry)	ICT adoption	A variety of ICTs are used and operational improvements have been achieved. However, the lack of training and awareness prevents deeper use. Incomplete infrastructure is a key shortcoming, and corruption undermines user confidence.
AlBar and Hoque (2019)	Saudi Arabia (rural areas near Jeddah)	Arab States	SMEs	Any	Survey of 137 SMEs (no sample information)	ICT adoption	Support from senior management, organizational culture, the regulatory environment, owner innovativeness and digital skills were positively related to ICT adoption.
Arendt (2008)	Spain, Portugal, Poland	Europe and Central Asia	Small and micro (average size of enterprise: 14 employees in Poland; 10.1 in Portugal; 10.25 in Spain), formal	Any	Survey of 1,101 enterprises from industry databases	ICT & e-commerce adoption	The main barrier is not lack of access to ICT ("material access" barrier) but lack of knowledge, education and skilled owner-managers and employees ("skills access" barrier).
Banerjee and Ma (2012)	China (Hong Kong)	Asia and the Pacific	Small (13, 13, 18, 40 employees), formal	Electronics and fashion traders	Interpretative case studies of four enterprises	Routine ICT and e-commerce adoption	Organizational features (e.g. information technology infrastructure), environmental characteristics (e.g. ecommerce usage in the industry) and perceptions of e-commerce (risks and benefits) are interlinked and influence the degree of e-commerce routinization.
Barrantes Cáceres et al. (2012)	Peru (Villa El Salvador neighbourhood in Lima)	Americas	Micro	Carpentry and cabinet-making	Case studies of nine enterprises (purposeful sampling of four survivalist and five diverse other microenterprises)	Mobile phone adoption and use	Mobile phones are used mostly for marketing and client relations, not in production; mobile phone use results in benefits with regard to existing socio-economic relationships, rather than having transformational effects.
Beck et al. (2018)	Kenya (Nairobi)	Africa	Micro and small (median 6 employees), 75% formally registered	Any	Survey of 1,047 SMEs (Kenya FinAccess business survey 2014), regressions and dynamic equilibrium model	Mobile money adoption	Entrepreneurs with higher productivity and access to trade credit are more likely to adopt mobile money as a payment instrument vis-à-vis suppliers.
Boadi et al. (2007)	Ghana (Central and Eastern Regions)	Africa	Not applicable	Farming, fishing	Case studies of one fishing and one farming community-based enterprise	Firm-level outcomes of mobile commerce adoption	Mobile commerce (m-commerce) enables cost reduction, helps to strengthen internal and external business relationships, and expedites the delivery of time-sensitive information and thereby also decision-making. However, m-commerce cannot entirely replace business value chains.

Boateng et al. (2014)	Nigeria (Abuja)	Africa	Micro (female)	Traders	Two case studies of women traders, 15 pilot study interviews	Mobile phone adoption	Benefits of mobile phone adoption are partly influenced by mobile use among trading partners in the value chain; knowledge of microenterprise determines type of mobile functionality used; microenterprises that innovatively integrate mobile services alter market structural processes and become more economically empowered; mobiles improve revenue acquisition and enhance decision-making and control in microtrading.
Bruque and Moyano (2007)	Spain (Andalusia)	Europe and Central Asia	SME (family-owned and cooperative)	Wood and furniture, services, computing, textiles and manufacturing	Case studies of 15 firms purposely sampled from business registers	Intensity and speed of ICT adoption	Enabling factors are the socialization of workers, rotation of personnel, parallel implementation of ICT and quality assurance systems, and the professionalization of family firms. Inhibiting factors are a firm's hierarchy and power structures and the lack of qualified staff.
Burrell and Oreglia (2015)	Uganda (Lake Kyoga), China (Shandong and Hebei provinces)	Africa; Asia and the Pacific	Micro	Fishing, agriculture	Ethnography of two sites	Forms of mobile phone use	Mobile phones are essential for traders, but not to access market price information; microenterprises use mobile phones to maintain relationships, limit risks and improve decision-making.
Cataldo, Pino and McQueen (2020)	Chile	Americas	MSMEs	Any	Survey of 5,519 enterprises (representative national survey by Ministry of Economy, Development and Tourism)	Firm performance, combinations of ICT	The ways in which MSMEs combine different digital technologies follow a four-stage maturity model. Each stage has positive effects on MSMEs' revenues and profits. The enterprise's size influences the impact of ICTs on productivity: the smaller the company, the more significant the benefits of ICT assets.
Chatterjee, Gupta and Upadhyay (2020)	India (West Bengal)	Asia and the Pacific	Micro (female)	Handicraft, incense stick making, garment manufacturing, soft toys manufacturing and spice making	Structured interviews with 631 enterprises	ICT adoption, entrepreneurial orientation	ICT adoption is determined by material access and efficacy; ICT adoption is positively related to entrepreneurial orientation.
Chege, Wang and Suntu (2020)	Kenya (rural, Tharaka-Nithi County)	Africa	Micro and small	Agriculture (43.7%), services (36.2%), manufacturing (20%)	Survey of 297 enterprises, random sample from county database	ICT adoption, innovation orientation, organizational structure	ICT impact on firm performance needs to be catalysed by other firm-level attributes; technology innovation influences firm performance positively.

Chew, Levy and Ilavarasan (2011)	India (Mumbai)	Asia and the Pacific	Micro (female)	Trading, services	Multi-stage survey of 231 enterprises, two structural equation models	Microenterprise growth	Statistically significant, but limited causal relationship between access to ICTs and business growth; importance of mediating factors such as formality, the perceived usefulness of ICTs, education and perceived empowerment.
Colombo, Croce and Grilli (2013)	Italy	Europe and Central Asia	SMEs (mean of 58 employees)	Services, manufacturing	Survey of 799 enterprises from stratified national sample, econometric model	Productivity, broadband adoption	Impact of basic broadband applications is negligible or negative; SMEs benefit from adopting selected advanced broadband applications depending on contingent factors: (a) industry of operation (services vs. manufacturing); (b) relevance of applications for SMEs' industry of operation; and (c) complementary strategic and organizational changes.
Deen-Swarray, Moyo and Stork (2013)	Uganda, United Republic of Tanzania, Rwanda, Ethiopia, Ghana, Cameroon, Nigeria, Namibia, Botswana	Africa	MSMEs (emphasis on informal)	Any	Survey of 4,799 enterprises across nine African countries, representative samples	ICT adoption	Mobile phone most commonly used ICT among informal businesses; use of internet, fixed-line telephones and computers remains negligible; businesses communicate more with suppliers than with customers via mobile phone; low use of the different kinds of ICTs is due to limited need, affordability, availability and access.
Esselaar, Stork and Deen-Swarray (2007)	14 African countries	Africa	MSMEs	Any	Survey of 3,691 enterprises, representative samples	Labour productivity, profitability, ICT adoption	ICT expenditure is positively related to labour productivity and profitability of SMEs, especially for informal ones.
Higgins, Kendall and Lyon (2012)	Kenya	Africa	MSMEs	Any	Survey of 865 enterprises, non-representative sample	Mobile money adoption	SME owners use mobile money to pay utility bills, salaries or suppliers; almost all use mobile money for personal purposes (99.5%), most for business purposes (67%); many SMEs adopt mobile money because they were asked to by customers or suppliers; wage payments remain predominantly cash; high fees and limited access to record-keeping and payment-management interfaces are main adoption barriers.
Jagun, Heeks and Whalley (2008)	Nigeria (south-west, rural, peri-urban)	Africa	Micro	Textiles	Case study of local garments sector, interviews	Mobile phone adoption	ICTs reduce costs and risks and save time, often by substitution of journeys; journeys and physical meetings continue to be necessary to establish trust, especially for complex interactions; de-localization or disintermediation are not happening; competitive divide means that enterprises with access to ICTs benefit more from the adoption of mobile technologies than those without.

Jensen (2007)	India (northern districts of Kerala State)	Asia and the Pacific	Not specified (fishing units, probably informal, micro, small)	Fishing	Time-series surveys of fishing units	Market price dispersion, waste, welfare	Mobile phones lead to a drastic reduction in price dispersion; welfare gains for local industry due to reduction of information asymmetry / increases in market efficiencies.
Jones et al. (2014)	United Kingdom	Europe and Central Asia	Micro (sole proprietor)	Various	Longitudinal case studies of 10 SMEs		Progressive vs. conservative attitudes connected with ICT skills; progressive enterprises perceive clear benefits of ICTs as pragmatic business solutions with immediate impact; customers, competitors and suppliers are essential triggers of ICT adoption; focus on short-term impacts, while neglecting long-term transformational outcomes.
L. Li et al. (2018)	China	Asia and the Pacific	SME (export-oriented, exact size not specified)	Various	Case studies of seven SMEs	Digital transformation	Digital transformation results from iterative and complementary enhancements of managerial cognition, managerial social capital, business teams and organizational capabilities; large e-commerce platforms can work as facilitators of SME digital transformation, offering technical features beyond online transaction processing (e.g. data analysis functionalities).
X. Li, He and Zhang (2020)	China (city of Yiwu)	Asia and the Pacific	Small (3–4 employees)	Traders	Survey of 405 enterprises, random sample within large marketplace	Business performance, use of social media to search for information	Seeking information on government and industry policies, but not on customers and suppliers, through social media had a significant impact on the business performance of small traders in a large physical marketplace; gender and education were significant moderating variables.
LIRNEasia (2020)	Sri Lanka	Asia and the Pacific	MSME (size distribution not specified)	Any	Survey of 403 SMEs, nationally representative sample	Internet adoption	Mobile phones are the main forms of connectivity for SMEs, especially for small enterprises; 40% of SMEs use the internet or social media for business purposes; among those SMEs that use the internet, 90% consider that internet access is important, while out of those not using the internet, 79% do not feel the need to do so.
MacGregor and Kartiwi (2010)	Indonesia, Australia	Asia and the Pacific	SME (size distribution not specified)	Any	Survey of 247 non-adopters of e-commerce in Australia and 179 in Indonesia, non-representative sample	E-commerce adoption	Several perceptual barriers to e-commerce adoption are more pronounced in developing than in developed countries, including absence of apparent benefits, poor product fit, lacking resources, lacking implementation knowledge, and e-commerce solutions being too complicated and time-intensive.

Martin and Abbott (2011)	Uganda (Kamuli District)	Africa	MSME (size distribution not specified)	Farming	Structured interviews with 90 enterprises	Mobile phone adoption and usage	Main areas of application are coordination of agricultural inputs, market information, monitoring financial transactions, and consulting with agricultural experts; frequency and variety of uses increase over time to fit changing needs
Mothobi, Gillwald and Aguera (2020)	Kenya, Ghana, Mozambique, Nigeria, Rwanda and United Republic of Tanzania	Africa	Informal	Any	Surveys of informal businesses, stratified samples from survey of 13,644 households	ICT adoption	Internet access and use are very low in Africa (7% of informal businesses use the internet for business purposes); other than mobile money, use of fintech platforms (e.g. crowdfunding) remains very low in Africa; more than 75% of non-internet users believe they do not need the internet to operate their businesses.
Ntwoku, Negash and Meso (2017)	Cameroon	Africa	MSMEs (24% had 1–5 employees; 35% had 6–20 employees; 41% had over 20 employees)	Any	Survey of 93 enterprises, non-representative sample	ICT diffusion	Diffusion of ICTs is driven largely by imitation rather than innovation; SMEs that are larger, have multiple sites and are run by better-educated owners are more likely to be early ICT adopters.
Pergelova et al. (2019)	Bulgaria	Europe and Central Asia	MSMEs (average 23 employees)	Any	Survey of 300 enterprises, nationally representative sample	ICT adoption, internationalization	Digital technology adoption enhances enterprises' propensity to internationalize, mediated by the firms' access to international market intelligence; women entrepreneurs benefit more from digital technologies in gathering international market intelligence, thereby partially making up for some resource disadvantages.
Saridakis et al. (2018)	United Kingdom	Europe and Central Asia	SMEs (between 1 and 250 employees)	Any	Survey of 15,502 enterprises, nationally representative, stratified sample	E-commerce adoption, revenue growth	Enterprises in high-information-intensity value chains / product industries with business websites / social media profiles experience greater revenue increases than enterprises in other industries or without e-commerce development; improved performance does not vary significantly across enterprises at different e-commerce stages.
Schiff, Nagula and Donner (2019)	Kenya (Nairobi)	Africa	Micro	Any	Interviews and participatory exercises with 27 enterprises	E-commerce and social media adoption	Platforms have complemented and replaced foundational ICTs as important channels for microenterprises; enterprises use platforms for search, promotion and discovery; microenterprises flexibly incorporate WhatsApp and Facebook into their business processes.

Shah Alam (2009)	Malaysia (Klang Valley area)	Asia and the Pacific	SMEs (fewer than 150 employees)	Manufacturing (74%), services (26%)	Survey of 465 enterprises, non-representative sample from regional industry database	Internet adoption	Managers' attributes, perceived benefits, organizational culture, digital skills competency and cost are significant factors for internet uptake.
Souza, Siqueira and Reinhard (2017)	Brazil	Americas	SMEs (51.3% had 10 to 49 employees, 48.7% had 50 to 249 employees)	Any	Survey of 3,231 enterprises, national survey database (representativeness not specified)	Intensity of ICT use	Technology and internet access, ICT skills and attitudes are correlated with more intense ICT use.
Srinivasan and Burrell (2015)	India (northern districts of Kerala State)	Asia and the Pacific	Not specified (fishing industry, probably consisting of mostly informal, micro and small)		Ethnography of regional fishing industry as field site, including 80 interviews	Mobile phone use	Effects of mobile phones on markets and welfare are context-dependent and idiosyncratic; mobile phones are used for many more welfare-enhancing purposes than sharing price information, such as maintaining trade relations, coordination, and protection against risk, vulnerability and emergency.
Y. K. Tang and Konde (2020)	Zambia (Lusaka Kalingalinga-Mutendere area and central business district)	Africa	Micro (fewer than 10 employees)	Any	Survey of 259 enterprises, face-to-face census in three urban areas	Intensity of ICT use	Entrepreneurial attitudes are positively related to intensity of ICT use; different attitudes are correlated with different kinds of ICT use; innovativeness is positively related to any kind of ICT use; growth orientation beyond local markets is positively associated with "online information and network access" and "online transaction and interaction"; proactiveness is positively associated only with "ICT for in-house operations"; "risk-taking" is positively associated only with the ICT use category "online information and network access".
Tob-Ogu, Kumar and Cullen (2018)	Nigeria (North-Central, South-West and South-South regions)	Africa	SMEs	Transport operations in downstream petroleum sector	Case studies of nine enterprises	ICT adoption and use	ICT use at the firm level is linked to local contextual factors; SMEs adopt ICTs out of competitive pressure; small enterprises adopt ICTs less intensely, but are more likely to adapt them to their locally specific purposes.
Uduji, Okolo-Obasi and Asongu (2019)	Nigeria (12 rural farming communities)	Africa	Informal	Farming	Survey of 1,152 enterprises, three samples (registered and users of government e-wallet, only registered, not registered), samples representative of selected regions	Mobile phone adoption and use	Strong gender bias in farm hierarchies is reflected in mobile phone adoption; illiteracy is a significant barrier to adoption; lacking network coverage is a strong predictor of non-adoption; productive farming practices are positively related to mobile phone adoption and e-wallet use.
Wanyoike, Mukulu and Waititu (2012)	Kenya	Africa	Formal small enterprises	Any	Survey with 224 enterprises	E-commerce and ICT adoption	Immediate and apparent benefits motivate ICT adoption, especially for supply chain coordination.

Other publications

The power of small: Unlocking the potential of SMEs

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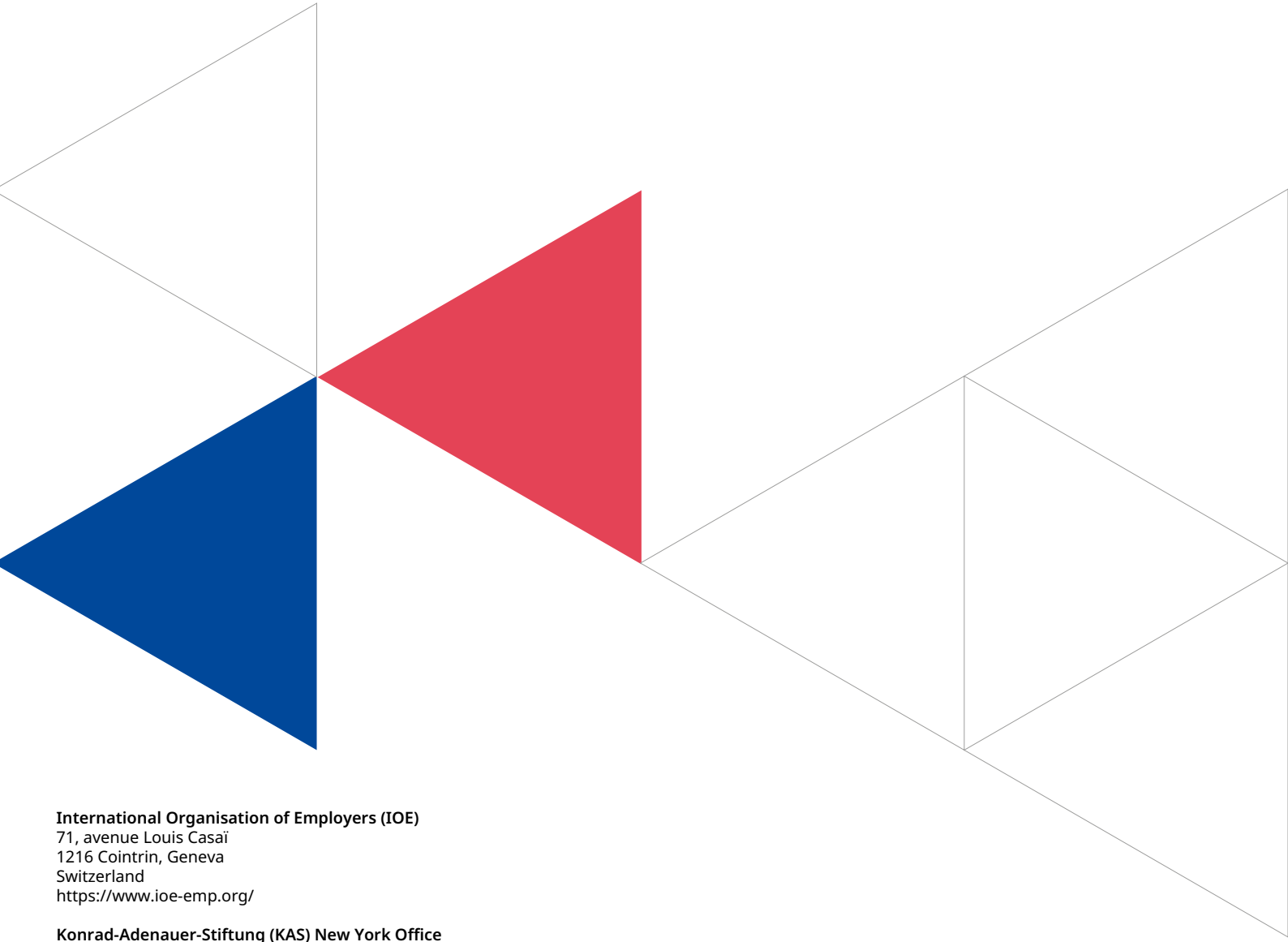

International Organisation of Employers (IOE)
71, avenue Louis Casaï
1216 Cointrin, Geneva
Switzerland
https://www.ioe-emp.org/

Konrad-Adenauer-Stiftung (KAS) New York Office
220 East 42nd Street (The News Building), Suite #3300
New York, NY 10017
https://kas.de/newyork

International Labour Organization
Small and Medium Enterprises Unit
Route des Morillons 4
1211 Geneva 22 - Switzerland
www.ilo.org/sme

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