POLICY BRIEF

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Implications of COVID-19 for digital transformation in South Africa

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Introduction

The COVID-19 pandemic and the resultant global lockdown have caused enormous disruptions to global production, trade and supply networks, as well as to labour markets (Behuria 2020). The effects of COVID-19 are expected to be uneven across countries due to two broad factors: the respective lockdown measures implemented in the affected countries, and the unique economic structures of each country, both of which directly influence the rate at which economies are expected to recover. As a result, the pandemic exposed the vulnerability of the global economy and, in the process, gave greater impetus to digitalisation. Economies that had adopted and digitalised their industries were able to show greater resilience in the light of the pandemic (Jenny 2020). Thus, the digitalisation of economies is prudent for mitigating the effects of external economic shocks, such as the one brought by COVID-19, and demands a permanent shift to foster the transition to the adoption of advanced technology.

Digitalised industries can more easily transition production processes and systems to advanced technology, thereby mitigating the negative effect of the pandemic (McKinsey & Company 2020. In the light of this, many countries are turning to digitalisation-driven industrial policies in order to promote digital transformation, thereby fostering resilience to current and future external shocks (Bell et al. 2021). The rationale for this shift in policy focus is that a widespread digital transformation, underpinned by the adoption of digital technologies and processes by firms and industries, offers significant improvements in productivity and economic recovery (Baldwin and Lin 2002).

The emerging evidence on the COVID-19 pandemic suggests that the uptake of digital solutions, tools and services has accelerated and, in turn, is speeding up the global transition towards digitalised economies. However, the degree of digital transformation occurring in many economies is not homogenous across industries and sectors, with many applications of digital technology occurring in experimental or niche areas (Barnes et al. 2019). Uneven uptake of digital technologies weakens the economic resilience of those firms and industries most at risk from external shocks posed by the pandemic.

This policy brief focuses on the effects of COVID-19 on South African manufacturing firms in the context of a global shift towards digitalisation and its implications for digital

technology adoption and skills in South Africa.[1] The brief leverages several outputs from the Industrial Development Think Tank's (IDTT) on-going work on COVID-19, digitalisation, digital technologies adoption and skills based on the digital technologies and skills survey of 516 manufacturing firms across three manufacturing sector education and training authorities (SETAs) in South Africa.[2]

Covid-19 and manufacturing exports in South Africa

The manufacturing sector in South African has been declining over time. However, it is still a major source of employment and a gateway to the adoption of technology. The manufacturing sector remains a key engine of economic growth for middle-income economies such as that of South Africa (Su and Yao 2016). Any downturn in manufacturing activities has extensive implications for the economy, such as a loss of jobs, reduced revenues, and falling behind in the adoption of new technology and innovations (Bell et al. 2018). These implications could be far-reaching; for instance, in relation to the decline in industry competitiveness and productivity on a regional and global scale.

The pandemic affected the South African economy primarily in two ways; firstly, by slowing down domestic production outside of essential services, with gradual relaxation. Secondly, the pandemic affected the global economy, as most major economies went into full lockdowns from March 2020. The global slowdown reduced investment in emerging markets and resulted in lower export demand. This led to a sharp fall in manufacturing firms' sales, both in the domestic and export markets. As a result, the South African manufacturing sector contribution to gross domestic product fell by 12% in 2020 (Trade & Industrial Policy Strategies ([TIPS] 2020b).

This decline in the manufacturing sector in 2020, at the peak of the pandemic, is also confirmed by changes in manufacturing output in the sub-sectors. For example, the transport equipment (including motor vehicles and parts) sub-sector was the hardest hit, as output plummeted 97.9% (year on year) in April, followed by furniture and other industries (-84.4%), non-metallic mineral products (-82.5%), and clothing, textiles, leather, and footwear (-76.3%) (IDC 2020). The automotive industry likewise was affected extremely by the lockdown, with new passenger vehicle sales coming to a standstill in April (-99.6% y-o-y). The declines in sub-sectoral output were eventually accompanied by large-scale retrenchments and factory closures. In this case, the clothing, textiles, leather, footwear, and metals & machinery sub-sectors recorded the sharpest decline in the first and second quarter, shedding more than 50 000 jobs each (Avenyo et al. 2021).

Secondly, the pandemic and resulting global economic downturn disrupted existing trade networks and flows. These disruptions to external trade were the result of blockages to transport, as well as falling international demand. For South Africa, the second quarter of 2020 saw a strong decline in goods exports,

[1] The digital technologies and skills survey project is led by the Industrial Development Think Tank (IDTT) and funded jointly by the Centre for Competition, Regulation and Economic Development (CCRED) and the South African Research Chair in Industrial Development at the University of Johannesburg, supported by the Department of Trade, Industry and Competition. The survey, conducted in March 2021, covered 516 firms across three SETAs: the Chemicals Industry SETA (CHIETA); the Manufacturing, Engineering and Related Services SETA (MerSETA); and the Fibre Processing and Manufacturing (FP&M) SETA.

[2] Manufacturing, Engineering and Related Services Sector Education and Training Authority (MerSETA), Chemical Industries Education and Training Authority (CHIETA), and the Fibre Processing and Manufacturing Sector Education and Training Authority (FP&M SETA).

combined with an even stronger slump in imports. Manufacturing sectors, such as the automotive industry, petroleum products, chemicals, rubber and plastic, metals, metal products, machinery and equipment, and food, beverages, and tobacco, were affected the most as exports declined. However, other firms recorded marginal increases over the same period, especially in the chemical sectors (21%), while textiles and furniture sector exports were affected, leading to a decline. At the peak of the pandemic, the trade data showed a massive decline in the nominal value of South African exports, which tumbled by 55.2% (month on month) in April 2020 due to significantly weaker demand in key export markets, and by domestic production restrictions and logistics constraints (IDC 2020).

The sharp fall in South African manufacturing exports due to COVID-19 is confirmed in our research. The analysis of our firm-level digital technologies and skills survey shows that exports as a proportion of sales by the sampled manufacturing firms decreased by 57%, while about 27% of firms' exports were unchanged. Surprisingly, firms that operate within the metal and engineering, pharmaceuticals, fast moving consumer goods, and automotive component manufacturing sub-sectors experienced an increase of about 17% in their exports.

To gain deeper insight into the effects of COVID-19 on digitalisation in the South African manufacturing sub-sector, we classified our sampled manufacturing firms into three technology-intensity categories – high, medium and low – using the OECD (2011) classification. This classification enabled us to assess the impact of the pandemic on firms' exports based on the technological intensity of their sector of activity (Figure 1). Using export data collected from the firms, we can identify the external vulnerabilities of the surveyed firms as a result of the COVID-19 pandemic. The findings are mixed, with low technology-intensive industries experiencing the lowest decrease in export activity (about 50% of firms), while also experiencing the highest proportion of unchanged exports due to COVID-19 (about 33% of firms). This confirms their lower level of export capabilities.

On the other hand, medium and high technology-intensive industries' exports were affected severely, with 71% of firms in the medium to high technological category (including firms in the glass and plastics industries) experiencing decreases in exports. In the high-technology industries such as pharmaceuticals, metal and engineering, retail motor and components, and base chemicals and petroleum, 57% of firms indicated a decline in exports, while 17% of the firms saw their exports increasing. These results could be due to a higher proportion of medium- and high-technology firms engaging in export activities that were directly and negatively affected by the shocks of the pandemic.

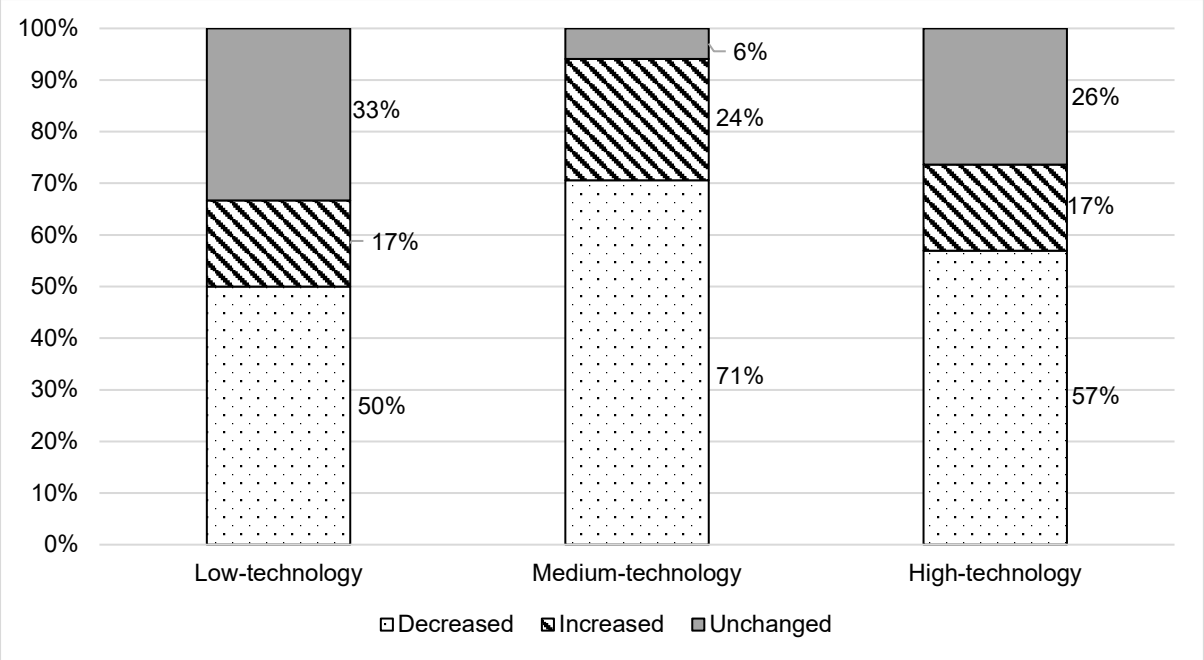

Figure 1: Impact of COVID-19 on firms' exports as a proportion of sales by technology intensity
Source: Authors' illustration

While Industry 4.0 technologies proved critical to early adopters in their crisis response, the pandemic also forced companies to re-evaluate the progress of their digital transformations. Our analysis highlights that the sampled manufacturing firms that had scaled up the adoption of digital technologies prior to COVID-19 found themselves better positioned to respond to the crisis. These firms were able to navigate through lockdown restrictions, since most of the operations could take place with fewer employees. The figure below (Figure 2) shows the technological adoption behaviours of the firms and how the pandemic affected their exports. A higher proportion of manual and semi-automated manufacturing firms (60%) witnessed a decrease in their export activities compared to firms with fully automated and ICT- and digital-enabled systems (50%). Furthermore, evidence from the sampled manufacturing firms suggests that manufacturers that have adopted fully automated and ICT- and digital-enabled systems were able to realise increases in exports during the pandemic. As a result, we deduce that firms that are adopting automated, ICT- and digital-enabled systems exhibit **greater resilience** to shocks such as the one presented by the pandemic.

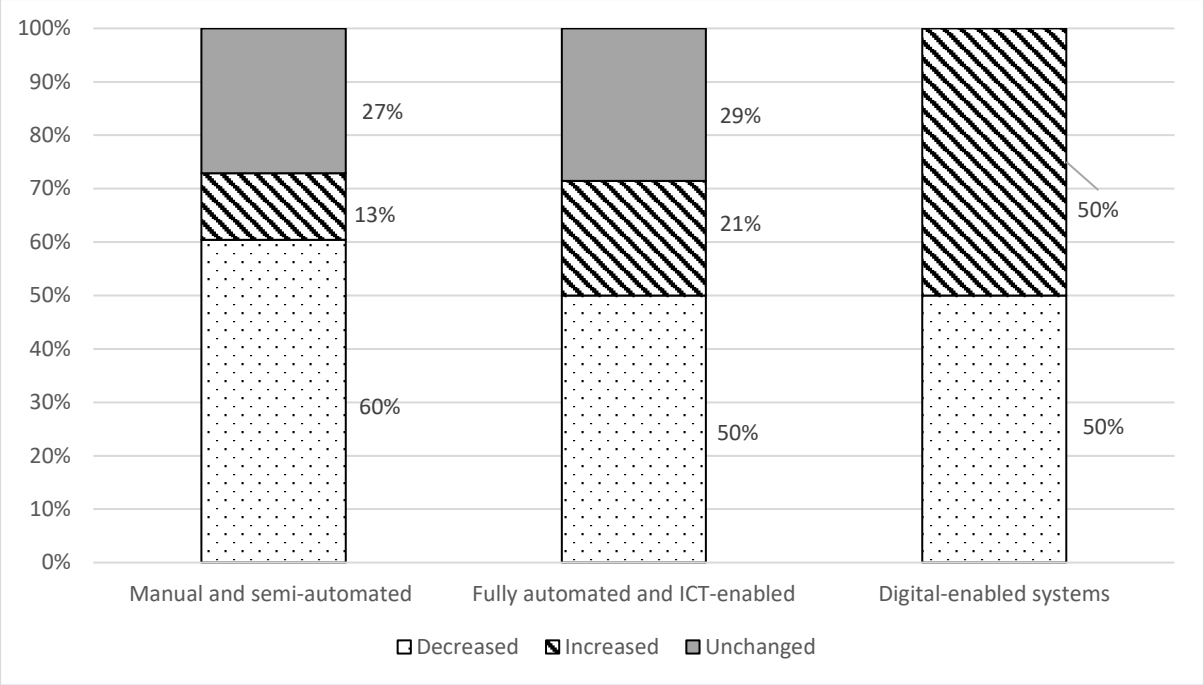

Figure 2: Technology adoption and COVID-19 effect on exports
Source: Authors' illustration

The current technology adoption behaviours of the sampled manufacturing firms suggest lower levels of uptake of the digitalised systems compared to other middle-income countries. As such, the pandemic provided manufacturing firms the opportunity to re-evaluate their adoption of digital technology strategies, especially because of the resilience shown by firms that had adopted. This transition to the digital era is also leading a shift in the demand for digital skills, with many firms and industries seeking higher skilled employees to ensure a smooth transition to a digitalised future (OECD 2019).

COVID-19 and the demand for digital skills in South Africa

To register success in the adoption of digital technologies, a vital factor is the level of skills within the digital ecosystem of firms or industries. The importance of digital skills was magnified, as industries were forced to cease operations to protect the health of workers and promote compliance with mitigation and containment policies due to COVID-19. In the light of these events, digital skills have become the primary drivers of organisational competitiveness and innovation (Van Laar et al. 2017).

Based on our research, we provide a preliminary reflection of the impact of COVID-19 on skills requirements in the context of Industry 4.0 in South Africa. Specifically, our analysis looks at how COVID-19 has influenced the demand for skills, including science, technology, engineering and mathematics (henceforth, STEM) skills, soft skills, human-computer interaction skills, and manual/ repetitive skills. Our early reflections suggest that COVID-19 has not significantly altered the demand for skills in the surveyed manufacturing firms (Figure 3). However, notable increases in demand can be observed for soft skills (24%), human-computer interaction skills (37%), and STEM skills (26%) due to the COVID-19 pandemic. This finding is consistent across the different levels of technological intensity of firms.

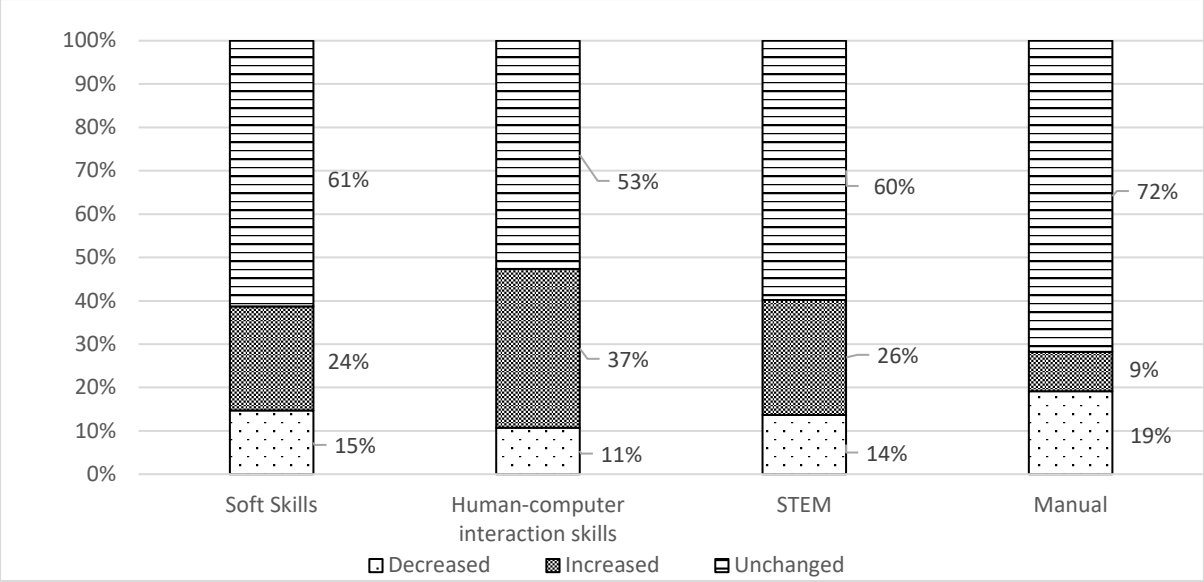

Figure 3: Impact of COVID-19 on demand for skills
Source: Authors' illustration

Previous research has shown that South African manufacturing firms with STEM employees have a higher likelihood of adopting digital technologies (Avenyo et al. 2022). These technologies also have implications for skills demand, especially at a time when the digital age has exponentially raised the need for digital skills. Linking the above finding to firms' current technological adoption behaviours, our analysis highlights that most of the sampled manufacturing firms are still largely driven by manual and semi-automated processes. This low-technology environment implies a lower demand for STEM skills, which are essential for improving **industrialisation** through **digitalisation**.

Policy implications

This brief explored the effects of COVID-19 on South African manufacturing firms in the context of a global shift towards digitalisation and its implications for digital technology adoption and skills in South Africa. The findings show that the pandemic exposed the vulnerability of manufacturing industries, as is clear from the decreases in exports, with low technology-intensive firms affected severely, unlike firms that had adopted fully automated, ICT- and digital-enabled systems. The latter exhibited greater resilience during the pandemic, suggesting that adoption of new technology and innovation can entrench resilience in manufacturing firms' performance.

These early reflections offer an opportunity for policymakers to adopt an aggressive policy package aimed at rebuilding and shaping economies for the post-COVID-19 era and taking advantage of the digital economy. While there have been several policy actions towards economic recovery, an acceleration towards digitalisation in the post-pandemic era will demand large-scale support for firms, industries and sub-sectors that were already struggling to catch up technologically prior to the pandemic. Furthermore, this support should also take into account the differences in the firms' technology levels, since businesses are either lagging or catching up or forging ahead, depending on their cost and organisational structure. However, this should not dampen the need for a coordinated institution-led effort to step up support for the even uptake of digital technologies across all manufacturing sub-sectors to strengthen industries' resilience.

A key priority area for policy intervention is the need to accelerate and deepen the adoption of digital technologies by supporting firms to overcome barriers stifling the transition to advanced and enhanced productivity systems. These barriers include a lack of capital and organisation, and institutional bottlenecks. Intertwined with the adoption of digital technologies are the skills implications of the transition. It therefore is critical that there is a coordinated strategy aimed at scaling up skills and human capabilities to function in the digitalisation era. Specifically, the transition to advanced digitalisation processes requires scaling up STEM skills. A review of training, skills development and re-skilling of employees to meet the human capital demand that enables digital transformation therefore is paramount. To achieve this, it will require all relevant stakeholders (government, non-governmental, and education and training sectors) to collaborate in fostering the use of digital applications and systems, as well as scaling up STEM skills.

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