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Implications of COVID-19 on Digital Transformation in South Africa

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CCRED-IDTT Working Paper 2022/07

July 2022

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1. Introduction

The Covid-19 pandemic and the resultant global lockdown have caused enormous disruptions to global production, trade, and supply networks as well as labour markets.¹ The effects of Covid-19 are expected to be uneven across countries due to two broad factors: the respective lockdown measures implemented in 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 giving greater impetus to digitalisation. Economies that had adopted and digitalised their industries were able to show greater resilience in light of the pandemic.² Thus, the digitalisation of economies is prudent in mitigating the effects of external economic shocks such as the one brought by Covid-19 and demands a permanent shift in fostering the transition to advanced technology adoption.

Digitalised industries may more easily transition production processes and systems thereby mitigating the negative effect of the pandemic.³ In 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.⁴ 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 offer significant improvements in productivity and economic recovery.⁵

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.⁶ Uneven uptake of digital technologies weakens 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 on digital technology adoption and skills in South Africa.⁷ The brief leverages several outputs from the Industrial

¹ Behuria, P., 2020. Covid-19 and The Myth of Convergence: The West, the Rest and the urgent need for fiscal space in the Remainder. [Online] Available at: <https://developingeconomics.org/2020/11/05/covid-19-and-the-myth-ofconvergence-the-west-the-rest-and-the-urgent-need-for-fiscal-space-in-the-remainder/>

² Jenny, F., 2020. Economic Resilience, Globalization and Market Governance: Facing the COVID-19 test, Paris: OECD

³ McKinsey & Company. 2020. How COVID-19 has pushed companies' over the technology tipping point—and transformed business forever. Accessed at: <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance>

⁴ Bell, J.F., Goga, S., Mondliwa, P. & Nyamwena, J. 2021. International Industrial Policy Responses to COVID-19: Lessons for South Africa.

⁵ Baldwin, J. & Lin, Z. 2002. Impediments to advanced technology adoption for Canadian manufacturers. *Research Policy*, 31(1), pp. 1-18.

⁶ Barnes, J., Black, A. & Roberts, S. 2019. *Towards a Digital Industrial Policy for South Africa: A Review of the Issues*, Rosebank: Industrial Development Think Tank (IDTT).

⁷ The digital technologies and skills survey project is led by the Industrial Development Think Tank (IDTT) and jointly funded by the Centre for Competition, Regulation, and Economic Development (CCRED) and the South African Research Chair in Industrial Development at the University of

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.⁸

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 employment and gateway in the adoption of technology. Manufacturing sector remains key engine of economic growth for middle-income economies like South Africa.⁹ Any downturn in manufacturing activities has extensive implications on the economy, such as loss of jobs, reduced revenues, and falling behind in the adoption of new technology and innovations.¹⁰ These implications could be far-reaching, for instance, 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 lock downs 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 2020.¹¹

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%).¹² The automotive industry likewise was extremely affected 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 &

Johannesburg, supported by the Department of Trade, Industry, and Competition. The survey conducted in March 2021, covered 516 firms across 3 SETAs: Chemicals Industry SETA (CHIETA); the Manufacturing, Engineering and Related Services SETA (MerSETA); and the Fibre Processing and Manufacturing (FP&M) SETAs.

⁸ Manufacturing, Engineering and Related Services Sector Education and Training Authority (merSETA), Chemical Industries Education and Training Authority (CHIETA), and Fibre Processing and Manufacturing Sector Education and Training Authority (FP&M SETA).

⁹ Su, D & Yao, Y., 2016. Manufacturing as the Key Engine of Economic Growth for Middle Income Economies. Asian Development Bank Institute Working Paper 573.

¹⁰ Bell, J., Sumayya, G., Mondliwa, P. & Roberts, S., 2018. Structural Transformation in South Africa: Moving towards a smart, open economy for all, Johannesburg: CCRED Working Paper 9/2018.

¹¹ TIPS Tracker. 11-17 May 2020. The Economy and the Pandemic. Accessed at:

<https://www.tips.org.za/manufacturing-data/tips-tracker-economy-and-the-pandemic>

¹² IDC, 2020. Economic Overview: Recent Developments in the global and South African Economies, Johannesburg: IDC Department of Research and Information

machinery sub-sectors recorded the sharpest decline in the first and second quarter, shedding more than 50 000 jobs each.¹³

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, combined with an even stronger slump in imports.¹⁴ 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 the most impacted as exports declined. However, other firms recorded marginal increases over the same period especially in the chemical sectors (21%) while the 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.¹⁵

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 about 17% increase in their exports.

To gain deeper insights into the impacts of Covid-19 on digitalisation in South African manufacturing sub-sector, we classified our sampled manufacturing firms into three technology intensity categories- high, medium, and low- using the OECD classification.¹⁶ This classification enabled us to assess the impact of the pandemic on firms' export 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 from 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 severely affected with 71% of firms in the medium-high technological (including the glass, plastics industries firms) 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-

¹³ Avenyo, E.K, Bell, J.F., Nyamwena, J. & Robb, N. 2021. Identifying vulnerable and priority manufacturing sectors for economic recovery in South Africa. CCRED Working Paper

¹⁴TIPS. The Real Economy Bulletin-Second Quarter 2020.

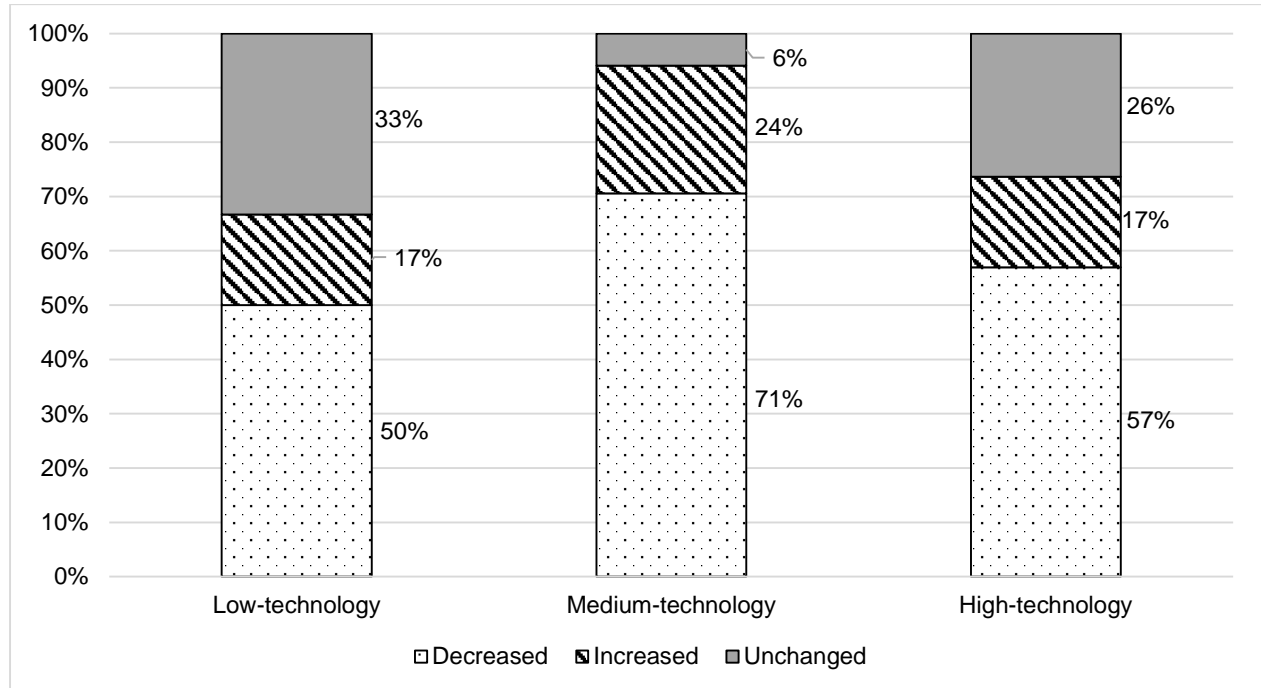
Accessed at: https://www.tips.org.za/images/REB_Q2_2020_International_trade.pdf

¹⁵ IDC, June 2020. Economic Overview.

¹⁶ See <https://www.oecd.org/sti/ind/48350231.pdf>

technology firms engaged in exporting activities that were directly and negatively impacted by the shocks of the pandemic.

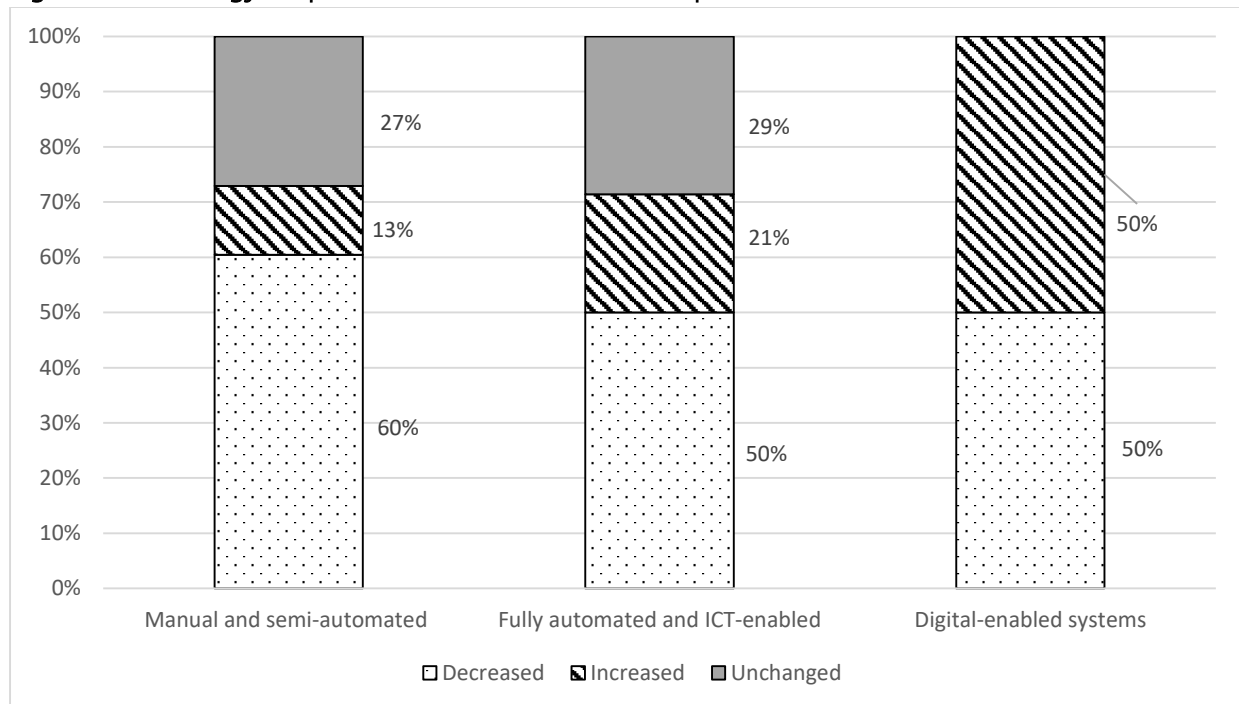
Figure 1: Impact of COVID-19 on firm's exports as a proportion of sales by technology intensity



Source: Authors Illustration

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

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 in the digitalised systems to other middle income countries. As such the pandemic provided manufacturing firms the opportunity to re-evaluate their adoption of digital technology strategies, especially with the resilience shown by firms that have adopted. This transition into 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 towards a digitalised future.¹⁷

3. 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 light of these events, digital skills have become the primary drivers of organisational competitiveness and innovation.¹⁸

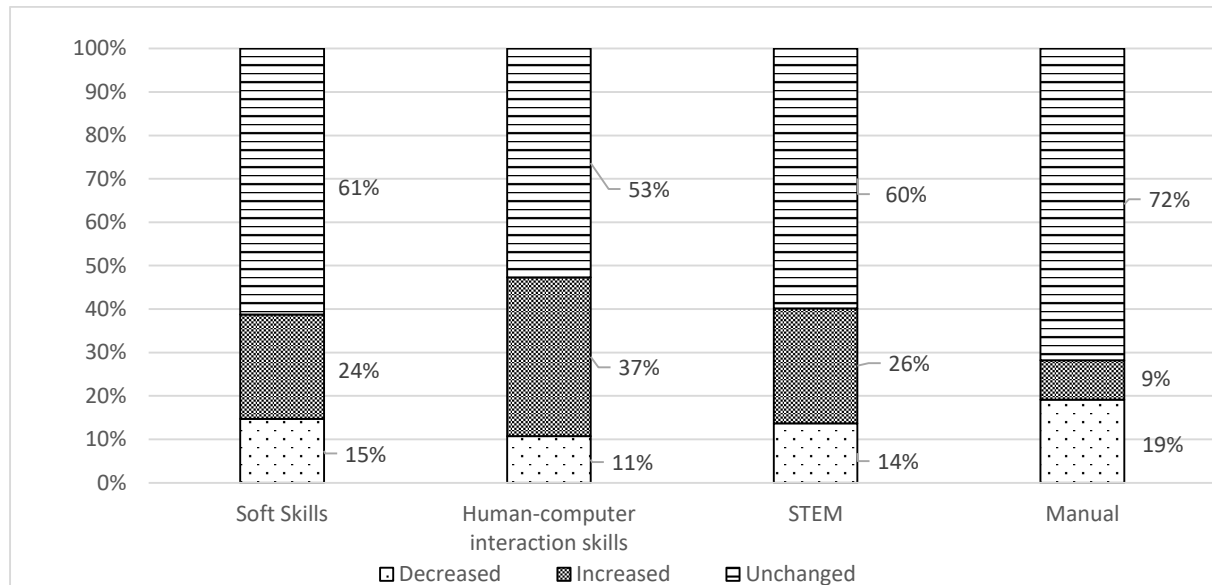
Based on our research, we provide a preliminary reflection of the impact of Covid-19 on the skills requirements in the context of industry 4.0 in South Africa. Specifically, our analysis looked at how COVID-19 has influenced the demand for skills including Science, Technology, Engineering, and Mathematics (henceforth, STEM) skills, soft skills, human-computer

¹⁷ OECD. 2019. How's Life in the Digital Age? Opportunities and Risks of the Digital Transformation for People's Well-being, OECD Publishing.

¹⁸ Van Laar, E., Van Deursen, A., Van Dijk, J. & De Haan, J. 2017. The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in human behaviour*, Volume 72, pp. 577-588.

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 skills demand



Source: Authors Illustration

Previous research has shown that firms with STEM employees have a higher likelihood to adopt digital technologies in South African manufacturing firms.¹⁹ These technologies also have implications on skills demand especially at a time when the digital age has exponentially raised the need for digital skills. Linking the above finding to the firm's 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 lower demand for STEM skills that are essential in improving **industrialisation** through **digitalisation**.

4. 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 on digital technology adoption and skills in South Africa. The findings showed that the pandemic exposed the vulnerability of manufacturing industries as shown by decreases in exports, with low technology intensive firms severely impacted, unlike firms that have adopted fully automated, ICT and digital enables systems. The latter exhibited greater resilience during the pandemic suggesting that adoption of new technology and innovation can entrench resilience in manufacturing firm's 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

¹⁹Avenyo, E.K, Bell, J.F., Nyamwena, J.2022. Determinants of digital technologies' adoption in South African manufacturing: Evidence from a firm-level survey.

advantage of the digital economy. While there have been several policy actions towards economic recovery, an acceleration towards digitisation in the post-pandemic era will demand large-scale support for firms, industries, and sub-sectors who were already struggling to catch up technologically prior to the pandemic. Furthermore, this support should also take into account the differences in the firm's technology levels since some 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 institutional-led effort to step up support for even uptake of digital technologies across all the manufacturing subsectors that will 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 like lack of capital, organisation, and institutional bottlenecks. Intertwined with the adoption of digital technologies are the skills implications that the transition demands. Thus, making it critical for a coordinated strategy aimed at scaling up skills and human capabilities to function in the digitisation era. Specifically, the transition to the advanced digitalisation processes requires scaling up STEM skills. Therefore, it is now paramount for a review of training, skills development, and re-skilling of employees to meet the human capital demand that enables digital transformation. To achieve this, it will require all relevant stakeholders (governmental, non-governmental, and education and training sectors) to collaborate in fostering the use of digital applications and systems and as well as scaling up STEM skills.

