



INDUSTRIAL DEVELOPMENT REPORT 2022

THE FUTURE OF INDUSTRIALIZATION IN A POST-PANDEMIC WORLD

BRIEF 4



Covid-19 and the megatrends that are reshaping industrial development

Executive summary

The structure of the world economy was undergoing seismic changes when the COVID-19 pandemic struck. These changes, i.e. megatrends, are rooted in **deep structural shifts** arising from the interrelated forces of technology, demographics and the growing carbon footprint. Three megatrends are of particular relevance for industrial development – **the increasing digitalization and automation of manufacturing production; the shift in the world's centre of economic gravity towards Asia; and the gradual greening of industrial production.** The relationship between these shifts and the COVID-19 pandemic is complex and multifaceted. Preliminary evidence suggests that the pandemic has accelerated these megatrends. As countries recover from the crisis, they will need to **adapt and strategically engage with the megatrends.** Industrial capabilities are key if firms and countries are to effectively cope with the challenges and take advantage of the opportunities offered by these megatrends.

Key Findings

1.

Three megatrends are reshaping the landscape of industrial production: digitalization and automation; the shift in global economic power towards Asian emerging industrial economies; and the increased urgency of industrial greening.

2.

According to manufacturing firms surveyed by UNIDO, the pandemic has triggered changes to business models and technology towards greater digitalization and environmental awareness – and that these changes are likely to stay post-pandemic.

3.

Continuous investment in industrial capabilities is crucial if developing and emerging industrial economies are to take advantage of the windows of opportunity the megatrends have opened.

Three megatrends are reshaping industrial development

The world economy was experiencing deep structural shifts when the COVID-19 pandemic struck. For several years, economic actors worldwide had been coping with, and adapting to an increasingly large set of challenges and opportunities arising from demographic changes in both industrialized and emerging industrial economies, growing technology-fuelled inequality within large economies, and the ongoing threat of climate change.

Among these shifts, three so-called “megatrends” are particularly relevant in shaping the future direction of industrial development (Altenburg et al., 2021), namely the growing digitalization and automation of industrial production; the shift in global economic power towards

emerging industrial economies, most notably China; and the increased urgency of green industrial production in a rapidly warming world.

These megatrends all share some characteristics – they have been in the works for at least a decade, have far-reaching socio-economic consequences, and are global in nature. Moreover, they were all well underway prior to the outbreak of COVID-19. The pandemic has influenced their pace and direction. Perhaps more importantly, the long-run impact of COVID-19 will, to a large extent, likely depend on its relationship with these structural shifts.

Three megatrends are reshaping industrial development

Figure 1



The digitalization of industrial production

The progressive diffusion of advanced digital production (ADP) technologies is transforming industrial processes, business models and value chains (UNIDO, 2019). Digital capabilities will become ever more important for firms and countries seeking to compete in the global race for industrial development.

Panel A in Figure 2.1 makes this abundantly clear. The share of industrial robots per thousand manufacturing workers quadrupled between 2000 and 2020, accelerating after 2010. What is more, robotization appears to have become inevitable. Evidence collected by UNIDO suggests that the COVID-19 pandemic has intensified digitalization. Firms surveyed for the IDR2022 reported increased online activity and a growing movement towards automation.

The majority of surveyed firms stated that pandemic-induced changes are likely to remain (Figure

2.1, Panel B). Not only is digitalization here to stay, its diffusion is spreading to regions which, until recently, had been marginal actors in the digital race. Findings from UNIDO's survey suggest that the COVID-19 crisis did not only spark digitalization efforts in industrialized economies – firms reported a growing use of e-commerce and automation across all income groups.

This is no cause for celebration, however. If the adoption of ADP technologies is becoming more widespread, their design and production remains heavily concentrated in industrialized economies, creating challenges for upgrading, value addition and capture among developing and emerging industrial economies (DEIEs)

The centre of economic gravity is shifting eastwards

The world's centre of economic gravity is shifting. Asia's contribution to global gross domestic product (GDP) has been growing rapidly in recent decades, boosted by China's impressive growth performance. A look at manufacturing data clearly reflects this trend. The latest available UNIDO estimates indicate that Asian DEIEs now account for nearly 45 per cent of global manufacturing value added (MVA) (Figure 2.2, Panel A). Their share was only 15 per cent in 2000.

Data on the distribution of suppliers to the largest 750 manufacturing publicly listed firms confirm China and other Asian DEIEs' prevalence in global production. The share of global firms sourcing their components from Asia has increased from 18 per cent in 2013 to 42 per cent in 2019. This trend is particularly pronounced in medium-high and high-tech industries, suggesting that the accumulation of R&D and production capabilities is increasingly proceeding in lockstep.

How has the pandemic affected this shift towards Asia? Preliminary data suggest that, at least in the early phase of recovery, the COVID-19 shock might have accelerated this megatrend. Hard hit at the onset of the pandemic, China's manufacturing sector quickly rebounded to reach pre-pandemic growth levels. Consequently, the share of China and Asian DEIEs in world MVA continued to grow in 2020 and 2021.

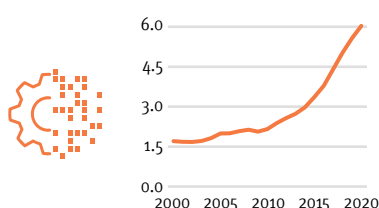
Firm-level data collected by UNIDO corroborate these preliminary indications (Figure 2.2, Panel B). Business sentiment remained strong across the region during the first half of 2021, with over 50 per cent of Asian firms reporting that they planned to increase investments in physical equipment and software despite the pandemic. Expectations were decidedly less optimistic elsewhere, with only one in three firms outside Asia planning to continue investing despite the COVID-19 outbreak.

Megatrends: speed, magnitude and the preliminary impacts of COVID-19

Figure 2.1

The digitalization and automation of industrial production is transforming industrial processes

World industrial robot density
(robots per thousand workers)



Firms introducing new equipment to reduce workers on the shop floor
(i.e. automation) in response to the pandemic

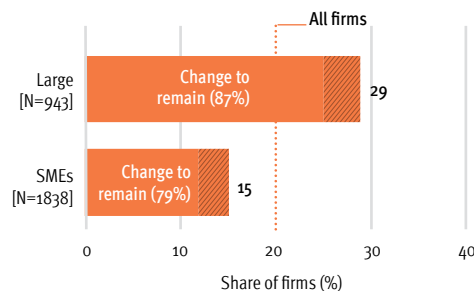
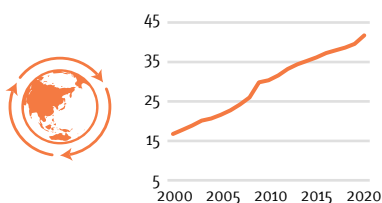


Figure 2.2

The world's center of gravity is shifting eastwards

Asia-Pacific DEIEs share in world MVA (%)



Firms planning to increase post-pandemic investments in new equipment

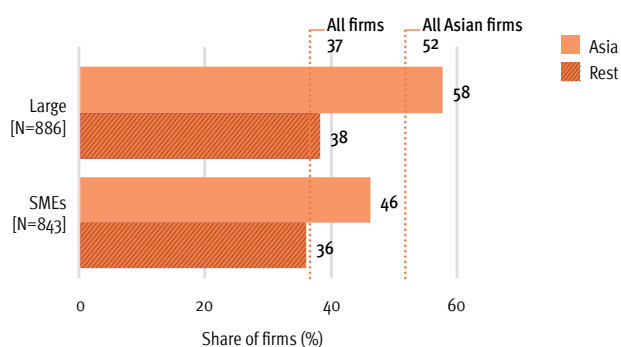
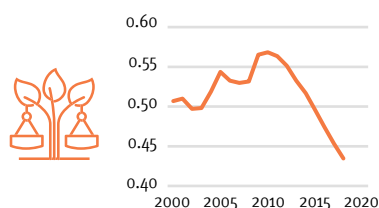


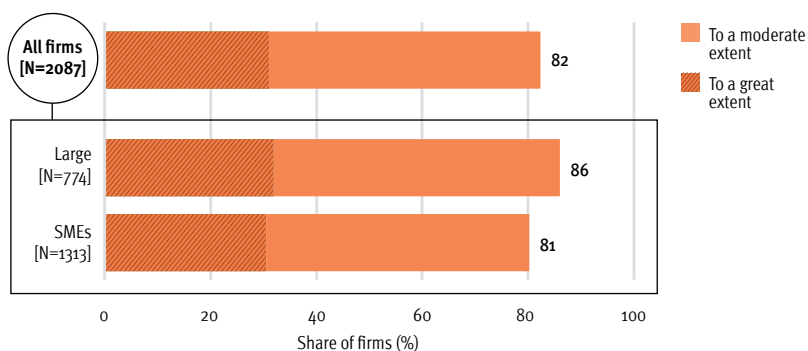
Figure 2.3

Greater environmental awareness increases the urgency for an industrial greening

World industrial CO₂ emissions per unit of MVA
(kilograms per 2015 \$)



The pandemic has triggered the adoption of new environmental-friendly practices



Note: Industrial robot density is defined as the total stock of industrial robots divided by the total number of manufacturing CO₂ = carbon dioxide; DEIEs = developing and emerging industrial economies; MVA = manufacturing value added.

Source: The UNIDO Industrial Development Report 2022. <https://www.unido.org/idr2022>

Industrial greening

Among the three megatrends, climate change is the longest-lived phenomenon. Decarbonization is a relatively recent policy priority, enshrined in high-level strategies and agreements such as the European Green Deal, the Paris Agreement, and China's new Five-Year Plan. Accompanied by the rapid drop in the costs of renewable energy technology, decarbonization is gaining momentum — increasingly driven by the efforts of firms and governments in DEIEs.

In relative terms, manufacturing has become markedly cleaner over the years. The combination of stricter environmental regulations and the gradual diffusion of clean technologies has resulted in a decrease in manufacturing-related CO₂ emissions per unit of MVA (Figure 2.3, Panel A). In absolute terms, however, greenhouse gas (GHG) emissions from manufacturing activities remain high. Much remains to be done to fight climate change.

Against this backdrop, the pandemic's effects on industrial greening have been mixed. In the short run,

government-mandated restrictions to mobility contributed to emission reductions across the board. In 2020, global CO₂ emissions fell by 7 per cent. As soon as the restrictions were lifted, however, GHG emissions rapidly rebounded. Moreover, the pandemic has accelerated trends that are potentially harmful for the environment, such as plastic pollution, online shopping and e-commerce.

Other trends are more encouraging. Firms across DEIEs surveyed by UNIDO by and large asserted that they expect environment-friendly practices to be adopted more widely post-pandemic (Figure 2.3, Panel B). Increasingly stringent government regulation, new incentive packages, changes in consumer behaviour and rising awareness as well as investors' increasing appetite for the stocks of ESG (environmental, social, and governance performance) certified firms all seem to be contributing to this movement.

Synergies and trade-offs between the megatrends

These megatrends did not occur in isolation. They mutually influence each other and are linked by a complex web of synergies and feedback loops (Altenburg et al., 2021). Industrial greening, for instance, depends to a very large degree on the digitalization of production plants (think smart lighting and heating), transport and electricity generation (think smart grids).

Technological change—particularly the information and communications technology (ICT) revolution that ADP technologies build on—has also been instrumental in facilitating the outsourcing of production activities from industrialized to emerging industrial economies, thus paving the way for the shift in the economic centre of gravity that has occurred in recent decades.

Trade-offs exist as well, however. The continued rise of Asia and its middle class will likely create new challenges for climate change mitigation efforts. Similarly, while the widespread adoption of ADP technologies unlocks opportunities for productivity and consumer welfare in many parts of the global economy, it also entails substantial challenges for all those firms and countries that are currently excluded from their design, production and use.

The megatrends and COVID-19 recovery

How do we ensure that the post-pandemic recovery reinforces the positive effects of digitalization and greening while also addressing the divides these megatrends have created? With industrial policy back on the agenda, the diffusion of ADP technologies among firms in least developed countries (LDCs) and DEIEs has become a key priority.

The evolutionary nature of digital technologies means that firms will have opportunities to learn and adapt. Traditional sectors are changing fast, including textiles—with the use of CAD/CAM laser-cutting technologies and 3D printing for prototypes—and agriculture, with the rise of precision farming. Cutting across sectors, e-commerce can help local producers launch their products on the global stage. Participation in GVCs also remains an important avenue for technology diffusion, especially for firms in DEIEs.

Industrial greening is another pressing issue. Yet it also represents an important economic opportunity. Circular economy business models and renewable energy generation tend to be labour-intensive activities with employment-generation potential. Moreover, just as is

the case with digitalization, the greening of manufacturing also opens up substantial learning opportunities for firms in developing economies.

As demand for renewable energy generation equipment increases, opportunities for firms in DEIEs to enter higher value-added segments of clean energy value chains are likely to arise. The production of turbines and batteries, for instance, has extensive economic multipliers and several cross-linkages to other sectors. Navigating this complex and rapidly changing landscape requires strategic engagement with foreign investment, as well as substantial investments in capability-building.

Achieving inclusive and sustainable industrialization (ISI) and the sustainable development goals (SDGs) in a post-pandemic world will require extensive government-level investments in the accumulation of human and physical capital and in the strengthening of industrial capabilities – from basic production capabilities to advanced digital skills. No programme of socioeconomic rebirth can be sustained without industrial capabilities that are fit for purpose.

References and/or suggestions for further reading

- [Altenburg, T., Brandi, C., Pegels, A., Stamm, A., Vrolijk, K. and T. Zintl. 2021. Covid-19: Turning Point in the Process of Industrialization? Background Paper to the IDR2022. Vienna.](#)
- [UNIDO. 2019. Industrial Development Report 2020: Industrializing in the Digital Age. Vienna.](#)
- [UNIDO. 2021. Industrial Development Report 2022: The Future of Industrialization in a Post-Pandemic World. Vienna.](#)

Contacts

For further information, contact IDR@unido.org or a.lavopa@unido.org