

17. Implications of selected digital solutions for the globalisation process

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Abstract: Digital technologies are explored as forces capable of reshaping globalisation rather than simply accelerating it. The chapter reviews artificial intelligence, work automation, telemigration, 3D printing, block-chain and the Internet of Things, drawing on the literature and reports from international organisations. These solutions can improve efficiency, enable new forms of coordination, transform production and expand digital service delivery. At the same time, they may reduce traditional outsourcing, alter global value chains, intensify competition for data and technological control, and deepen tensions between corporate efficiency and state security. Transnational corporations may seek flexible digital networks, whereas governments increasingly prioritise sovereignty, resilience and strategic autonomy. The chapter anticipates a form of techno-geopolitics, in which technological capability and data governance become central to the future of global economic integration.

Keywords: digital solutions, digitalisation, globalisation, transnational corporations, nation states, global economy.

Introduction: Digital advances in the 21st century

Over the course of the 21st century, impressive progress is taking place in the development of digital technologies.¹ Consequently, the unfolding digitalisation of economies and societies² offers increasing opportunities to integrate technological solutions that can significantly shape the globalisation process. Indeed, most have significant potential to cause disruptions to the process as we have seen it so far, arguing for the need to modify existing paradigms and

¹ One of the most important reasons for this is the exponential growth in the amount of machine-readable information and digital data transmitted via the Internet, which in turn enables their further processing (IJP, 2021).

² This manifests itself, e.g., in the dynamic growth in the value of digital service exports, the share of e-commerce sales in retail over the 21st century, or the exponentially increasing cross-border data flows (Hązła, 2024a).



beliefs relating to the role of key globalisation actors such as nation states or transnational corporations (TNCs).³

In the context of the above trends, the aim of this chapter is to review selected digital solutions and then consider their potential implications for the functioning of transnational corporations, nation states and the global economy. For this reason, the chapter is divided into two main parts. The first discusses the following digital solutions: the development of AI, work automation, telemigration, 3D printing, blockchain technology and the Internet of Things. The second part is devoted to inferring the implications of developing the aforementioned solutions for TNCs, nation states and the global economy using inductive reasoning. Given the conceptual nature of the discussion, the key research method involves analysing the body of literature and reports from international organisations.

17.1. Digital solutions

This subsection reviews selected solutions whose implementation may have momentous implications for the way transnational corporations, nation states and the global economy operate. These are largely aligned with the concept of the ‘Nine Pillars of Industry 4.0’: Big Data, work automation, simulation, Internet of Things, augmented reality, 3D printing, cyber security, cloud computing, and horizontal and vertical systems integration (Leong et al., 2021). However, the implementation capabilities of some of these solutions were validated during the COVID-19 pandemic (in particular, augmented reality), while other technologies not included in the original concept (e.g., telemigration and blockchain technologies) have gained prominence. This led to slight adjustments being made to the original proposal.

17.1.1. Development of artificial intelligence (AI)

The development of AI provides the basis for many solutions that, until recently, were not possible due to the lack of required computing power. AI has already surpassed human capabilities in data retrieval and processing, optimisation and planning, and recognition of known patterns (Manyika et al., 2017), which has inspired a growing number of authors to envisage scenarios where AI will quickly

³ Given the multitude of socio-economic crises, increasing geopolitical tensions and the consequences of the COVID-19 pandemic and the war in Ukraine, the process of globalisation in the 21st century differs significantly from its 20th-century iteration, in which transnational corporations led the way through the progressive liberalisation of trade and capital flows, addressed in (Hązła 2024b).

become significantly better than humans in all possible activities (Bostrom, 2014). However, it is likely to take many more decades to achieve high-level machine intelligence (HLMI), where AI is able to perform all activities better than humans, for the simple reason that the high potential in applying AI to routine or computational activities does not translate into creative skills that require improvisation or searching for new patterns (Lindenberg, 2018). It is therefore possible that over the course of the 21st century, ‘soft skills’ related to social and emotional reasoning and collaboration with people, which are seemingly more difficult to automate, may take precedence over ‘hard skills’ (Baldwin, 2020).

17.1.2. Work automation

The growing capabilities of artificial intelligence, meanwhile, provide the basis for work automation. At the current level of technology, up to 80% of repetitive physical activities and up to 70% of data analysis and processing activities could already be automated, together accounting for up to 51% of employment in the United States (Manyika et al., 2017). The only barrier that still remains is the cost of software, meaning that employing human labour remains an economically rational decision for most professions (Lindenberg, 2018). However, this is poised to change in coming decades: an empirical analysis of robot prices from 2000 to 2013 found that they are falling by an average of 10% per year (Manyika et al., 2013). Maintaining this dynamic implies that the cost of implementing workplace automation solutions will halve every seven years, which will mean the obsolescence of many professions involving simple, repetitive tasks (Grace et al., 2018). For example, recent years have seen the emergence of more and better AI models, with ChatGPT at the forefront. The effects of its increasing integration into the business models of many companies will include, higher productivity but also a growing risk of many full-time jobs being replaced (Wu, 2024).

17.1.3. Telemigration

Another trend related to labour displacement is telemigration. This involves the outsourcing of jobs to countries with lower employment costs using ICT, without the need for physical contact. Currently, this invariably takes the form of hiring part-time workers on freelance contracts, for which they compete on portals such as Fiverr, Freelancer, Toptal or Guru, (Nabilla, 2024). Telemigration accelerated significantly during the 2020–2021 pandemic. After a few months of adjustment, it became apparent that up to 37% of US employees could perform

their work entirely remotely, without compromising its quality, thereby saving several hours a day otherwise spent commuting (Dingel & Neiman, 2020). This has paved the way for the perceived 'removal' of geographical barriers to hiring and propelled the outsourcing of office jobs from developed countries. As a consequence, workers in developed countries will increasingly be affected by technological unemployment, as can already be seen in the computer software sector, where jobs are being relocated to India (Kaur 2023). This is likely to become an argument for expanding the social safety nets in developed countries in coming years, which will need to be financed through greater taxation of TNCs (Rodrik & Stantcheva, 2021).

17.1.4. 3D printing

By contrast, 3D printing is an example of a technology that can challenge many of the existing presumptions about production and foreign trade patterns. Today, 3D printers can work on a variety of materials, such as plastic, steel, ceramics or even human proteins (Hao & Lin, 2020). The possible range of their applications is likewise growing rapidly: between 2010 and 2020, the global 3D printing market grew from USD 1.2 billion to USD 13 billion, representing an average annual growth rate of 27% (Wohlers et al., 2020). Since the COVID-19 pandemic, the potential of 3D printing in mitigating the risk of disrupted supply chains has also been recognised. During the lockdowns of global manufacturing plants in China, some medical facilities began to source the necessary equipment themselves using this technology, thereby also proving its usefulness in highly specialised industries (Kleinman, 2020). Although for the time being 3D printing is a niche solution, with the increasing geopolitical tensions between the West and China and the reshoring of manufacturing, it is possible that in the future it will act as a catalyst for significant shifts in the current global trade model. Indeed, it offers an alternative solution for TNCs seeking to minimise costs, which will no longer need to develop foreign subsidiaries in low-production-cost countries.

17.1.5. Blockchain

Blockchain technology is emerging as another potential paradigm-shifter to date. Since the introduction of the Bitcoin code in 2008, blockchain has been mainly associated with cryptocurrencies, whereas they are in a sense a by-product of a broader solution. The basic idea behind blockchain is to create a distributed (decentralised) database that is accessible to all users. Any user can view bal-

ances and make transactions at any time, as their record is not controlled by any central entity such as a central bank, a fact that significantly reduces the cost of handling them (Hougan & Lawant, 2021). Two main conclusions are currently being drawn from this premise. Firstly, blockchain technology is finding an increasing number of applications in institutions that manage huge databases, such as public sector organisations, supply chain management systems, property registries, statistical offices, international organisations and many others. Thus, it has the potential to address many of the data management needs of developing countries, leading to the bridging of gaps resulting from low levels of digital infrastructure development (Gillpatrick et al., 2022). On the other hand, the nature of blockchain technology also offers a greater array of tools than ever to those interested in tax evasion or even money laundering (Prendi et al., 2023). As a result of these technological opportunities, TNCs are increasingly prioritising small, liquid assets, enabling them to circumvent taxation on an even larger scale than previously possible (Trentini, 2021). Combined with the aforementioned solutions designed to restrict the establishment of foreign subsidiaries, the nature of TNCs is likely to change significantly in years to come.

17.1.6. Internet of Things (IoT)

The final technology in this review is the Internet of Things. It consists of systems of interconnected devices that collect and exchange data with each other and can be controlled and monitored online (Aguzzi et al., 2014). Until recently, its applicability was limited by the cost of large-scale data transmission, but with the increasing integration of 5G technology, the affordability and reliability of the Internet of Things is also expanding (Teckshawer, 2023). This expansion is reflected in the number of 'smart' devices connected to the internet, totalling 8.6 billion in 2019, which could reach 29.4 billion by 2030 (Statista, 2023). Like the previously described technologies, IoT development will shape the globalisation process by enhancing the role of digital corporations in the global economy. On one hand, this will further erode traditional paradigms of international production, as an ever-increasing number of TNCs will begin to shift their sphere of activity towards information processing and downstream sectors such as marketing, social media, user health monitoring or traffic management (Saidu et al., 2015). On the other hand, a growing number of nation states are becoming sceptical of unregulated information engineering, with responses ranging from the protection of personal data in democratic countries to the complete subjugation of the internet in autocratic countries (Azhar, 2021). To these premises, it is worth noting the standardisation requirements necessary for the integrated

functioning of the Internet of Things, which are most likely to occur within state groupings such as the European Union (Saidu et al., 2015). Paradoxically, this regulatory fragmentation could drive an increasing regionalisation of the Internet, and thus of the activities of digital TNCs.

17.2. The implications of digital solutions

The dynamic development of digital technologies will have a significant impact on the existing operating model of transnational corporations, nation states and the global economy as a whole over the coming decades. This subsection attempts to identify the directions in which these may evolve in this period, building on the earlier description of key digital solutions.

17.2.1. Transnational corporations

In the case of TNCs, it can be surmised that they will make less and less use of outsourcing production to industrialising countries, with China at the forefront. This is related to rising geopolitical tensions and the desire to de-risk supply chains, but also the opportunities offered by labour automation and 3D printing. The growing applicability of the Internet of Things will, in turn, encourage deeper cooperation between countries with a high level of regional integration, facilitating the introduction of necessary regulations and standards, contributing to the emergence of local clusters. On the other hand, as more and more spheres of activity move to the virtual world, increased use of telemigrant services will be possible, and blockchain technology will encourage a change in the basic form of foreign investment. Instead of FDI historically tied primarily to manufacturing activities, portfolio investments and other intangible assets will gain in importance, facilitating tax avoidance by TNCs.

17.2.2. Nation states

The implications for nation states will largely depend on their current level of development, although many patterns will remain common to most of them. Labour automation and telemigration will be a challenge mainly for developed countries, while it may become an opportunity for industrialising and developing countries. Given the lower labour costs in developing countries, telemigrants from these countries will be able to compete on price with robots for longer

than workers in developed countries, who will be affected by technological unemployment. To avoid increasing social unrest, developed countries will need to expand their social safety nets, which in turn will require higher corporate taxation. Instead, 3D printing may deprive many developing countries of their competitive advantage of low production costs, the basis for their attracting substantial foreign direct investments since the 1990s. The Internet of Things, on the other hand, threatens to further exacerbate technological inequalities, as its smooth functioning requires a highly developed digital infrastructure that is absent in most catching-up economies. As digital TNCs will operate in isolation from the previous constraints of geographic distance, many of the previous beneficial externalities associated with their operations, such as job creation, local infrastructure development or falling prices of consumer goods, will cease to occur. Over the course of the twentieth century, these have provided a strong argument for cooperation between nation states and TNCs, resulting in countries ceding much of their power to shape the globalisation process. However, the 21st century will see an increasing number of cracks on the existing model, and cooperation might quickly turn into competition.

17.2.3. Global economy

All this will translate into significant changes across the global economy. The reduced international activity of TNCs will most likely translate into a stagnation or decline in the aggregates hitherto considered as indicators of the level of progress in the globalisation process, in particular concerning exports of goods and FDI flows. On the other hand, there will be an increase in the importance of digital forms of cooperation, based on data flows and new technological solutions such as blockchain and the Internet of Things. The importance of regional integration groupings and some international organisations will also grow, reflecting the increased efforts of states to keep new forms of TNC activity related to data engineering and tax avoidance in check. Combined with rising geopolitical tensions and the aspirations of states to regain sovereignty in strategic industries, it will thus be possible to observe a progressive regionalisation of the global economy.

Conclusions: The globalisation process in the wake of digitalisation

Although the above review of selected digital solutions is not exhaustive, it does expose certain regularities related to the post-progressive digitalisation of

the global economy. Solutions such as AI, work automation, telemigration, 3D printing, blockchain or the Internet of Things may also contribute to rising geopolitical tensions in the international arena, despite their undeniable potential to support the technological convergence of developed and developing countries. This is due to their disruptive nature, with the potential to alter many existing paradigms regarding the international division of labour and production. While TNCs will seek to exploit a new range of opportunities, nation states are likely to attempt to regulate them to a greater extent than before, which will also translate into accelerated processes of regional integration of groupings such as the EU or ASEAN. It is therefore possible that over the coming years we will see the emergence of what might be termed 'techno-geopolitics', which will increasingly condition the evolution of the globalisation process.

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