

# GLOBALIZATION AND ITS IMPACT ON TECHNOLOGICAL DEVELOPMENT

DANKA MILENKOVIĆ, JASNA PETKOVIĆ &  
SANJA MARINKOVIĆ

University of Belgrade, Faculty of Organizational Science, Belgrade, Serbia.

E-mail: dm20203317@student.fon.bg.ac.rs, jasna.petkovic@fon.bg.ac.rs,

marinkovic.sanja@fon.bg.ac.rs

**Abstract** Globalization is the main feature and an inevitable process of the time we live in. It allows for the global movement of people, ideas, information, technologies, and capital. It erases the outdated borders and helps establish more intense and dynamic connections between global and local events. On the other hand, today's world of turbulent changes shows beyond doubt that modern development depends on innovations and technological development. The subject of this paper is the influence of globalization on technology and its development. This research was made possible through a review of current literature in this field along with two case studies, with the goal of helping the reader become more familiar with the concept of technological development caused by globalization, and providing him an insight into technological changes in production methods, system of business management, new job openings, requirements for additional education and training of the workers, at the same time emphasizing the importance of the maximization of positive, and minimization of negative trends that go along the technology development.

**Keywords::**

globalization,  
technological  
development,  
digital  
technologies.

## 1 Introduction

Globalization is the main feature and an inevitable process of the time we live in. It has been a subject of analysis by many theoreticians, academics, but by ordinary people as well since it refers to a complex concept that covers the economic, political, and social aspects. It allows for the global movement of people, ideas, information, technologies, and capital. It erases the outdated borders and helps establish more intense and dynamic connections between global and local events.

This paper sets the research focus on the influence of globalization upon technology and its development through a review of current literature in this field. The first chapter explains the concept of globalization, the second deals with the relation between globalization and technology, the third chapter discusses the relation between innovations and globalization, while the fourth explains the concept of innovation network and technology transfer. The fifth chapter recognizes information technologies as one of the main reasons of globalization advancement, while the sixth presents the results of two case studies – the first one that exhibits the relation between globalization and adoption of digital technologies, and the second one that highlights the benefits of globalization and technology changes on the example of Australia.

The purpose of this paper is to help readers become more familiar with the concept of technology development induced by globalization and to provide an insight into technological changes in production methods, system of business management, new job openings, requirements for additional education and training of the workers, but also trends and social issues caused by developed technology.

## 2 Globalization- definition and concept

The term "globalization" first appeared in the second half of the twentieth century, but its history is much longer. In English, the noun "globe" dates back to the 15<sup>th</sup> century (it was derived from the Latin word *Globus*) and began to denote a spherical representation of the earth several hundred years ago. The adjective "global" came into use at the end of the 17<sup>th</sup> century and began to mean "world scale" at the end of the 19<sup>th</sup> century, in addition to its earlier meaning "spherical". The verb "globalize" appeared in the 1940s, along with the term "globalism". The word

"globalization", as a process, first appeared in English in 1959, and two years later it entered the dictionary. The terms "globality" as a condition began to be used in the 1980s. The vocabulary of globalization has expanded to other languages over the last few decades (Scholte, 2008).

We can define globalization as world production and consumption, but it actually encompasses much more than that. People's attitudes towards her are diverse. Some see it as a negative force that destroys economies, contributes to the mixing of cultures and leads to interethnic conflicts, but there are also those, on the other hand, who talk about its strengths, its strength to connect people, easier to find, educate and raise awareness. So, it is neither Pandora's box nor Aladdin's lamp, but a series of causes and consequences mediated by human elections (Chareonwongsak, 2002).

Scholte (2008) presents globalization as a force that involves reducing barriers to transnational social contacts. People become more connected - physically, legally, linguistically, culturally and psychologically wherever they are (Scholte, 2008).

At the social level, globalization shapes society in many ways. According to Chareonwongsak, those are (Chareonwongsak, 2002):

- Data transmitted around the world brings changes in the social and cultural aspects. Global culture influences local traditions and imposes a different way of life on them, which can be reflected in nutrition, employment, education, health, politics, etc. ;
- Capitalism drives technology and competition between the competition to provide consumers with the best quality products and services at the lowest price;
- In addition, he emphasizes digitalization and biotechnology because companies strive to increase their efficiency and productivity, which can only be achieved by developing their own technology or importing it.

### 3 The relationship between globalization and technology

Businesses facing the challenges of globalization need to understand how globalization is affected by three basic drivers: demography, technology, and sustainability, the relationship of which is shown in Figure 1 (Aggarwal, 2011).

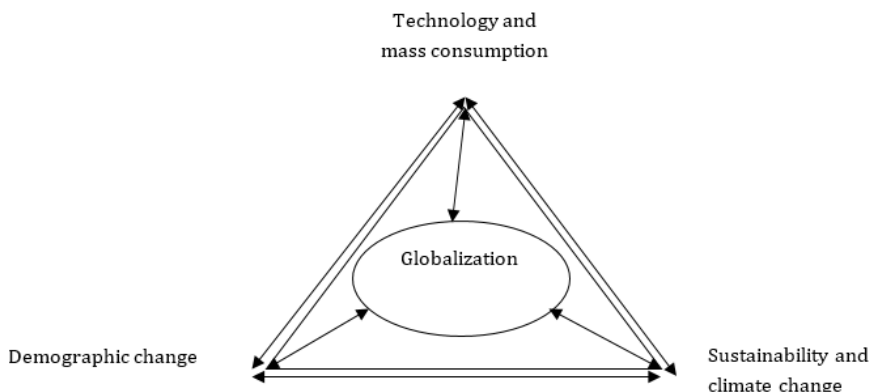


Figure 1: Drivers of globalization (according to Aggarwal, 2011)

Aggarwal points out that efficient international business must include these three categories and sets out the following statements (Aggarwal, 2011):

- Firstly, as far as demography is concerned, it states that there is a strong negative correlation between income and birth rate. We are in a situation where, although incomes are growing, the birth rate is declining in most countries, and the total world population is still growing. Due to falling birth rates, life expectancy is rising and population growth is uneven in all countries. Such global and national demographic changes have important implications for fiscal policies and business strategies.
- Secondly, businesses face the challenges of coping with sustainability and climate change mitigation.
- Finally, many changes are related to technology. It is moving from the industrial to the information age. Information and communication technologies are complemented by new materials and business models that include the deconstruction of value chains.

Taking all this into account, Aggarwal (2011) explains the relationship between technology and globalization and states the following:

- Technology makes globalization easier and possible;
- Globalization adds value and increases the availability of technology.

Thus, globalization accelerates the development of new technologies and increases the value of new technology by increasing its potential market. Technology facilitates globalization while globalization makes technology more valuable.

#### **4 Techno-activity associated with globalization**

The process of globalization is closely linked to technological innovation. Innovation is a major driver of human progress, so improving innovation performance should be a priority for decision makers. Dynamic innovation platforms can provide countries with long-term growth and increased productivity.

The causes and consequences of globalization can be observed through several indicators. However, traditional technology-based indicators are based solely on inputs for innovation. That is why more effort is being put into understanding the innovation process itself. It is very important to analyze the indicators of technological cooperation, which is reflected in strategic alliances, joint ventures and close ties between suppliers and manufacturers.

This type of analysis examines the relationship of key organizational entities, ie companies, universities and government agencies in the globalization process (Rycroft, 2003).

The main link between technological innovation and globalization are multinational companies (MNCs) which are considered to be the main actors of globalization. Their role changes with the appearance of the organizational form of the network, but they continue to lead.

Rycroft (2003) identifies categories of technological activities that are associated with increased globalization. These include:

– Technological exploitation

Organizations, mainly MNCs, are increasingly trying to make profit from innovations by bringing technology products and processes to international markets. This process has led many to define globalization in terms of technological exploitation – as international market exploitation. (Rycroft, 2003).

– Technology generation

Multinational companies headquartered in one country often innovate in the host country. Technology creation outside of host country is spreading moderately though some types of foreign direct investments (FDI), but also through the movement of research and development (R&D) facilities in the host country and patents generated by MNCs foreign subsidiaries. There is no systematic evidence to suggest that the widespread globalization of technology generation took place. Furthermore, it is stated that most of the globalization of technology generation was an intra-European phenomenon for the most part (Rycroft, 2003).

– Technological cooperation

The most visible feature of technological innovation is that only a small number of companies and other organizations can innovate independently regardless of whether those are simple or complex technological sectors. International companies and othersubjects taking part in these joint activities tend to preserve their national identity and property. Strategic alliances, joint ventures, and other types of technological cooperation are key indicators for this category (Rycroft, 2003).

Expanding learning opportunities is a key reason for the internationalization of R&D. Learning from advances in science and technology taking place in other sectors, other countries and their interactions is becoming as important as learning based on R&D activities. By promoting and strengthening innovation performance, countries become more competitive, more attractive for investment and better prepared to face the new economic, social and environmental challenges of globalization.

## **5 Networking and technology transfer**

Nowadays, networking is a key form of connectivity. Castells (1999) states that it represents a set of interconnected nodes that have the same importance. The foundation of globalization is networking. However, it is not globalization that has brought networking. Networks have existed in human organization since ancient times, but today they are certainly the most powerful form. Thus, innovation networks and globalization follow each other, and globalization enables and encourages faster technological progress.

The fact is that most innovations involve various organizations, especially when it comes to valuable, interesting and complex technologies. Firms, universities, research institutes and organizations engage in cooperative networks of cooperation through strategic alliances, joint investments and the development of special relationships between manufacturers and suppliers around the world (Rycroft, 2003).

Technology transfer is the transfer of a complex set of skills, technological knowledge and organizational structures needed for effective technology management. This dynamic technological effort implies a learning process that is qualitatively different from the traditional "learning by doing", because it involves an active attitude. Learning is achieved in various ways and passive "learning from work" is just one possibility (Archibugi & Pietrobelli, 2003).

Access to and acquisition of foreign advanced technology alone is not enough to ensure local technological and industrial development. Additional investments are needed.

Archibugi & Pietrobelli (2003) state that an additional central component of a country's industrial development policy strategy is a continuous process aimed at absorbing, adapting, mastering, and improving technology.

Therefore, technology transfer should be assessed in accordance with the country's ability to use and accept technology and to adapt it to its local conditions.

## **6 Information technology and globalization**

Speaking of the influence of globalization on the world, one cannot ignore the main reason for its acceleration, and that's information technology (IT). Thirty years ago, there was no collective world integration since global processes were still one-dimensional. However, the occurrence of IT leads to its creation. Certain number of successes that had a crucial impact on the progress of globalization and its relationship with businesses are to be recognized in the emergence of personal computers, invention of the World Wide Web, optical cables, workflow software, supply chains, the emergence of digital, mobile, personal and virtual networks (Lawlor, 2008).

The important thing to understand and which Castells (1999) states is that companies achieve higher productivity only when they combine new technologies with a new way of doing business. Organizations whose focus is only on technology can never achieve such success as those who find a way to integrate new platforms into their business. The relationship between new technologies and business processes is circular, ie new business processes make IT more valuable, while new technologies provide new and more valuable processes (Castells, 1999).

In order to achieve global business strategies, it is mandatory to implement IT that facilitates the exchange of information and resources around the world. In this way, new ideas and products are created, which leads to new ways of doing business.

## **7 Case studies**

Building on the previous chapter, the aim is to highlight the importance of the link between digital technology as a driver of economic development and globalization and then to bring the topic closer through the case of Australia.

A study conducted by Scarea & Soriano (2021) examined the impact of globalization on the rate of international digital adoption. They studied the main determinants of digital technology transfer in order to discover the importance of globalization in that process. In their research, they state that the adoption of technology is a complex social and developmental process that depends on individual construction. Globalization improves technology adoption through the



transfer of foreign knowledge, increasing international competition but differences in the economic, social and political dimensions of globalization among countries affect the level of technology adoption (Skarea & Sorianob, 2021).

Skarea & Sorianob (2021) state that various authors in their individual studies came to the conclusion that:

- Openness of trade and foreign licensing agreements are essential determinants of technology transfer;
- Imports from industrialized economies benefit the spread of innovation;
- Technological imports from technologically advanced countries benefit the productivity of local firms and technology adoption;
- Spreading of technology and knowledge among countries is intensifying due to increasing globalization.

However, these limited results of empirical studies led them to expand their analysis of the relationship between globalization and digital technology using a sample of 183 countries and the following data (Skarea & Sorianob, 2021):

- DAI index, which is an index of digital technology adoption;
- KOF globalization index that measures the economic, social and political dimensions of globalization;
- GCI index as a global competitiveness index that measures the country's distance from the limit of competitiveness;
- TPF as total factor productivity which is the part of output that is not explained by the number of inputs used in production.

The result of the study showed that (Skarea & Sorianob, 2021):

- Dynamics of digital technologies adoption in the EU companies differs by company size and technology type. Large-size companies quickly adopt big data analysis and cloud computing, while medium and small-size firms are falling behind.
- Countries such as Holland, Finland, Japan, Belgium, Denmark, Australia, and Sweden lead in digital technology, while countries with low penetration of digital technology, such as Lithuania and Estonia have great demand for digital jobs.

- Total factor productivity depends on the type of technology penetration into companies, with Cloud computing leading the way.
- Barriers for digital technology adoption are bigger in developing economies, and main ones are as follows: barriers present in electronic transactions (human capital and regulations), infrastructure and connectivity (high speed internet), intellectual property rights (lack of protection and absence of institutional regulation), and payment systems (highly regulated and high-risk financial systems).

Based on these facts they have proved a two-way connection of Granger causality. On the one hand, they showed the causal link between the level of globalization and the adoption of digital technology, and on the other hand, that the transfer of technology through globalization affects innovation. The penetration of digital technology is a key mechanism by which globalization affects global competition and, consequently, innovation (Skarea & Sorianob, 2021).

On the example of Australia and a study conducted by Sila & Hemmings (2019), it was observed that this country has experienced a large increase in living standards whose main drivers were technological change and international trade. Technology has been key to productivity growth, supporting wage growth, GDP per capita and general well-being, along with improvements in health, infrastructure and educational attainment. Trade liberalization has led to productivity growth and trade integration has increased economic efficiency and technology diffusion.

In their study, Sila & Hemmings (2019) explain this process and emphasize a number of structural changes that accompany it. It has been observed that certain industries such as manufacturing are disappearing while services have seen growth, then many jobs, such as routine manual ones, have disappeared and some groups of people face a high risk of poverty and difficulty finding work. On the other hand, there is a need for new skills and new tasks, especially in information and communication technologies and automation. Women's employment rates have remained low and they are more often involved in part-time jobs. From there, it is quite clear that technology and globalization have not brought prosperity to everyone.

Therefore, the need for a well-informed and well-targeted policy to ensure that it benefits from technology and globalization - higher productivity, new and better jobs as well as new and better products and services - is widely shared. The main pillars of such policy refer to labor markets, education/skills and urban surrounding (Sila & Hemmings, 2019).

## **8 Conclusion**

Globalization is most definitely a process that has changed the way the world works. It is a subject of many interpretations of not only theoreticians but others as well. The accompanying inconsistencies are the result of a mismatch between defining globalization as a scientific term and its existence as a universal social process. Those discrepancies are also due to the fact that some ideologize it while others equalize it with a general social process. Theoretical and ideological discrepancies as well as conflicts of opposed conceptions greatly affect the understanding and character of globalization.

One thing is certain – namely, globalization ensures greater efficiency and lower costs that would not be possible without its impact on the global market. Manufacturers are allowed to find the best location for their business, while the consumers are in a position to satisfy specific needs for products from around the globe. The fact is that globalization permeates all spheres of life while the emergence of ICT has enabled it to expand through innovations. The progress initiated by technologies has changed the way of living and the methods of communication between people, companies, and government institutions. Globalization has connected a myriad of individuals to the world full of communication and interaction.

The speed of operating business is higher than ever before and with globalization gaining momentum, companies must be able to immediately respond to challenges and quickly adapt to changes. To run a successful business, organizations must continually invent business processes that help develop new products and services in an innovative way.

To accomplish that, organizations increasingly integrate technology in their business strategies. There is a need to become a part of the global chain regardless of the size of organization. This additionally stimulates competition and the use of information technology. Therefore, companies must seriously work on their strategic goals and on solving challenges imposed by global surrounding, and then apply functional technology to help them accomplish those goals.

The first evaluated study has shown that globalization is a key channel, but not the only one through which the penetration of digital technology affects innovation. It has been shown that globalization has as triking influence on global competition, and it serves as a tool for reducing barriers within technology transfer, at the same time boosting innovations and productivity. It has also been demonstrated that the rate of digital technology adoption in different countries reflects the differences in the level of globalization at an international level.

The second study has displayed the changes that Australia has undergone over the past few decades. More specifically, it has shown an increase in living standards empowered by technological changes and international trade, but it has also portrayed a great number of structural changes, the disappearance of certain industries and jobs, the difficulty of some people to adapt, to find new jobs, and their fear of poverty...Although technology and globalization have not reduced the total rate of unemployment, certain people, groups and communities have suffered devastating changes and experienced a steep decline in living standards. This resulted in the need for well-informed and well-targeted policy to ensure that the benefits from technology and globalization reach all people equally.

Overall analysis of this paper leads to a conclusion that those countries that wish to increase economic growth by increasing multi-factor productivity should get more engaged in globalization processes. This will spark the transfer of technology and knowledge, boost the adoption of digital technology, globalization, and development. Companies and countries that choose not to accept globalization as the main factor affecting their business and fail to take full advantage of accompanying benefits are in danger of lagging behind and eventually going bankrupt.

## References

- Archibugi, D., & Michie, J. (1995). The globalisation of technology: a new taxonomy. *Cambridge Journal of Economics*, 19, 121-140.
- Archibugi D., Iammarino, S. (1999). The policy implications of the globalisation of innovation. *Research Policy*, 28, 317–336.
- Archibugi D., & Pietrobelli C. (2003). The globalisation of technology and its implications for developing countries Windows of opportunity or further burden?. *Technological Forecasting & Social Change*, 70, 861–883.
- Athreye S., & Cantwell J. (2007). Creating competition? Globalisation and the emergence of new technology producers. *Research Policy*, 36, 209–226.
- Aggarwal, R. (2011). Developing a Global Mindset: Integrating Demographics, Sustainability, Technology, and Globalization. *Journal of Teaching in International Business*, 22:1, 51-69.
- Castells, M. (1999). *Information Technology, Globalization and Social Development*, UNRISD Discussion Paper No. 114.
- Chareonwongsak, K. (2002). Globalization and technology: how will they change society? *Technology in Society*, 24, 191–206.
- Ethier W (2005) Globalization, globalisation: Trade, technology, and wages. *International Review of Economics and Finance*, 14, 237–258.
- Fan, P. (2011). Innovation, globalization, and catch-up of latecomers: cases of Chinese telecom firms. *Environment and Planning A*, Volume 43, 830-849.
- Lawlor, R. B. (2008). *The Age of Globalization: Impact of Information Technology on Global Business Strategies* (honors thesis).
- McMahon, P. (2001). *Technology and Globalisation: An Overview*, *Prometheus: Critical Studies in Innovation*, 19:3, 211-222.
- Rycroft, R. (2003). Technology-based globalization indicators: the centrality of innovation network data. *Technology in Society*, 25, 299–317.
- Rugman, A., & Oh, H. C. (2008) Friedman's Follies: Insights on the Globalization/ Regionalization Debate, *Business and Politics*: Vol. 10: Iss. 2, Article 4.
- Scholte J. (2008) Defining Globalisation. *The World Economy*, 1471-1502.
- Sila, U & Hemmings, P (2019). Benefitting from globalisationan technological change in Australia. *Economics department working papers No. 1537*.
- Skarea, M & Soriano, R.D (2021). How globalization is changing digital technology adoption: An international perspective. *Journal of Innovation & Knowledge* 6. 222–233.
- Zander, I. (1999). How do you mean global? An empirical investigation of innovation networks in the multinational corporation. *Research Policy*, 28, 195–213.

