Past, Present, and Intended Digitalization around the World: Leading, Catching up, Forging Ahead, and Falling Behind

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ARTICLE INFO

Original Scientific Article

Article History:
Received June 2022
Revised August 2022
Accepted August 2022

JEL Classification:
O33, O57

Keywords:
Digitalization
Adoption of technology
External enabler
Globalization
Inequality
Convergence
Divergence

UDK: 005.4:004.7
DOI: 10.2478/ngoe-2022-0013

Cite this article as: Samsami, M., & Schøtt, T. (2022). Past, Present, and Intended Digitalization around the World: Leading, Catching up, Forging Ahead, and Falling Behind. *Naše Gospodarstvo/ Our Economy, 68*(3), 1-10. DOI: 10.2478/ngoe-2022-0013.

Abstract

Businesses around the world are rapidly adopting digital technologies. Adoption, though, is not even, but it varies over time and differs from society to society, depending on resources in the ecosystem. This study addresses how past, present, and future digitalization is developing globally and, in each society, depending on its resources. A survey of businesses in 47 countries, conducted by the Global Entrepreneurship Monitor in 2021, provides national-level measures of digital technology adoption before and during the pandemic and the intention for adoption in the near future. Adoption of digital technology is found to vary significantly across both time and place. Before the pandemic, adoption was concentrated in the wealthiest societies. The pandemic was an external enabler, pushing less digitalized societies to catch up, independent of national economies, thus entailing some convergence. The early pandemic has been followed by intentions to digitalize, which differ widely, entailing some divergence. Intentions are strong in some societies that are forging ahead, but they are weaker in some less-digitalized and low-income societies that may be falling behind. The findings contribute to understanding digitalization as a global phenomenon and the pandemic as an external enabler that has promoted catching up and convergence in digitalization. Still, recovery is uneven and entailing divergence, as some societies are forging ahead while others are falling behind.

Introduction

Catching up, Forging Ahead, and Falling Behind is a seminal article on the development of societies in their economic output, written by Moses Abramovitz (1986). The focus is on global trends such as growth, convergence, and differences in national trajectories. The study became a paradigm for analyzing universals and particulars in international development. It has been an inspiring analysis of developments across a broad spectrum of the phenomenon, here digitalization.

Digital technology is being adopted by businesses around the world. Adoption is not a one-time event. Instead adoption is continuous or serial. Digital technology adopted years ago is obsolete today, and it tends to be replaced

by new technology. Some businesses adopted digital technology before the pandemic, some companies began adoption during the pandemic, and some early adopters adopted new technology during the pandemic. Indeed, the pandemic has been discussed as the great accelerator of digitalization (Amankwah-Amoah et al., 2021). Research on digitalization worldwide and global data collections have focused on people's use of information and communication technology (e.g., Karim et al., 2022). The World Bank published a Digital Adoption Index, including adoption by businesses for 2016 and a little earlier, but discontinued that data collection. Although observers are discussing global digitalization, there is a paucity of data collection and research on the international divide, convergence, and divergence (Autio et al., 2021; Kraus et al., 2021).

Based on recent adoption by businesses, we should expect some companies that have not yet digitalized to be digitalized in the near future. Likewise, based on past recurring adoption, we should expect some businesses, that have digitalized, to be digitalizing further in the near future. Therefore, it is valuable to not only research past and present digitalization but also to research likely future digitalization.

Digitalization is global, but adoption is not even across time and space. Adoption somewhat varies over time and differs from society to society. Digitalization began in advanced wealthy economies, and they have been leading in global diffusion. Less digitalized economies may be catching up, some may even be forging ahead, while others may fall behind. Digitalization is promoted by national ecosystems and their resources, notably wealth, which supports digitalization and provides a market with opportunities that entrepreneurs may pursue effectively with digital technologies (Szerb et al., 2022).

Authorities worldwide are promoting digitalization in business, government, and the population, as a means to enhance competitive advantage, wealth, and well-being and are calling on management scholarship to devise ways to promote adoption and utilization (e.g., OECD, 2021; World Bank, 2016).

These considerations frame our research question, how is past, present, and future digitalization developing globally and in individual societies, depending on their resources? This question is addressed by analyzing a survey conducted in a sample of 47 societies where businesses reported on the adoption of digital technology. We have access to the national-level aggregates of the responses from all 47 societies.

Adoption is found to vary significantly across both time and societies. The pandemic has been an external enabler of adoption (Davidsson et al., 2021). Before the pandemic, adoption by businesses in society was extensively promoted by resources indicated by GDP per capita. During the early pandemic, however, adoption was hardly dependent on resources in the society, as less munificent and less digitalized societies were catching up. Intention for digitalization in the near future tends to be stronger in societies with some resources but with some divergence, as some are forging ahead while others are lagging. The findings contribute to understanding digitalization as a global but uneven phenomenon.

The following offers a theoretical perspective, describes our research methods, reports analyses, and concludes by discussing findings.

Theoretical Perspective

A general perspective on human behavior is that cultural values tend to be internalized by people and guide their behavior and pursuit of opportunities enabled by their resources. This perspective pervades the social sciences as a paradigm. Paradigmatic exemplars are Weber's study of values in capitalism originating in religion, Hofstede's distinction among dimensions of culture, Stam and colleagues' conceptualization of an ecosystem (Stam, 2021; Stam & Van de Ven, 2019; Stam et al., 2012, 2021; Wurth et al., 2021), and Acs and colleagues' research on the digital ecosystem (Song, 2019; Sussan & Acs, 2017; Szerb et al., 2022). We apply this perspective to a national ecosystem.

The national ecosystem around digitalization refers to the institutions and resources in a society that enable and constrain the adoption and utilization of digital technologies. This comprises cultural values, the national capital, and entrepreneurial opportunities in society, following Stam (Stam & Van de Ven, 2021). The cultural values encompass the value of accumulating wealth (as examined since Max Weber), the value of an ambition to make a difference in the world (especially salient in socially oriented entrepreneurship), the value of continuing a family tradition in business (as fundamental in succession in family businesses), and the value of earning a living through entrepreneurship when jobs are difficult to get (as manifest in need-oriented entrepreneurship; Dencker et al., 2021).

The capital in the national ecosystem encompasses financial, social, and human capital in society. The financial capital in society is economic production, expressed in the Gross

Domestic Product per capita. Social capital is the networking in society, dense in some societies and sparse in others. The human capital in society comprises general human capital as acquired by education of the population, and specific human capital, here indicated by levels of self-efficacy and risk-willingness in the population. Capital is well-known for providing resilience to resist a crisis and recover, for ecosystems, organizations, and entrepreneurs (e.g., Martin & Sunley, 2020; Futonge Nzembayie & Buckley, 2022).

The national ecosystem expectedly influences the timing and extent of digitalization. Businesses and nations are trying to create competitive advantages (Lafuente et al., 2020; Leão & da Silva, 2021). Digital technology is widely considered to bring a competitive advantage. But adoption of digital technology is neither free nor easy (Nambisan & Baron, 2019). Adoption requires financial resources to acquire the technology and requires human resources to develop and operate the technology. Therefore, we expect that national resources promote adoption in the form of wealth and social capability, such as education of the population (Solberg et al., 2020). Nations with resources are hypothesized to adopt earlier and more extensively than others. An earlier study has found digitalization to be closely coupled with national economic production (Cruz-Jesus et al., 2017). We reexamine this proposition, but we reach different conclusions.

Research Design

The Global Entrepreneurship Monitor (GEM) consortium surveyed businesses in 47 countries in mid-2021 by randomly sampling the adult population (Global Entrepreneurship Monitor, 2022; on the GEM consortium and its research, see Bosma 2013). The total sample of businesses is 28,000, and the sample in each country is between 100 and 3,000 firms. The 47 countries are (with internet codes, used in the later Figures), Belarus (BY), Brazil (BR), Canada (CA), Chile (CL), Colombia (CO), Croatia (HR), Cyprus (CY), Dominican Republic (DO), Egypt (EG), Finland (FI), France (FR), Germany (DE), Greece (GR), Guatemala (GT), Hungary (HU), India (IN), Iran (IR), Ireland (IE), Israel (IL), Italy (IT), Japan (JP), Kazakhstan (KZ), Latvia (LV), Luxembourg (LU), Morocco (MA), Netherlands (NL), Norway (NO), Oman (OM), Panama (PA), Poland (PL), Qatar (QA), Romania (RO), Russia (RU), Saudi Arabia (SA), Slovakia (SK), Slovenia (SI), South Africa (ZA), South Korea (KR), Spain (ES), Sudan (SD), Sweden (SE), Switzerland (SW), Turkey (TR), United Arab Emirates (AE), United Kingdom (UK), United States (US), and Uruguay (UY). This diverse set of societies is somewhat representative of the societies around the world. Therefore, with some confidence, findings may be generalized to the world's present-day societies.

The owner-managers of new and established businesses reported on adoption before and during the pandemic and reported on the intention for adoption soon. GEM is scheduled to do its survey with the information from individual businesses in all countries available to the public by 2025. For now (2022), the GEM consortium makes national-level aggregate measures on the 47 countries available to its members on its website www.gemconsortium.org, so we analyze these national-level measures in the following.

In a few countries, local GEM members have reported individual-level analyses of businesses in their own countries (Calvo et al., 2022). Our national-level research and findings are consistent with their individual-level results. The consistency lends some validity to our national-level approach.

Measurements

Adoption of digital technology in society: Before and during the pandemic

Adoption of digital technology was measured in the survey in mid-2021 by asking the responding entrepreneur in the business,

- In response to the coronavirus pandemic, has your business changed its use of digital technologies for selling your product or service?

The entrepreneur replied by giving one of these four possible answers,

- Yes – you adopted digital technologies in response to the coronavirus pandemic.
- Yes – you enhanced your initial plans with new or improved digital technologies.
- No – you already planned a range of digital technologies before the coronavirus pandemic.
- No – your business can function without digital technologies.

The four response options entail three dichotomies,

- adoption before the pandemic is reported by the second and third responses;
- the first and second responses report adoption during the early pandemic;
- adoption by mid-2021 is reported by the first, second, and third responses.

The national-level rates of adoption are the three percentages,

- the percentage of businesses in the society which adopted before the pandemic;
- the percentage of businesses in the society which adopted during the early pandemic;
- the percentage of businesses in the society which had adopted by mid-2021.

These three variables for national rates of adoption are analyzed in the following.

Intention to adopt digital technology in society

Intention to adopt is measured when asking,

- Do you expect your business will use more digital technologies to sell your product or service in the next six months?

The entrepreneur's reply was recorded as Yes, No, or Maybe. They entail three national-level aggregates, the percentage answering Yes, the percentage answering No, and the percentage answering Maybe. The last and a rather small percentage is split, half considered Yes and half considered No. The so recorded percentage for intending in each society, as a national rate of intention, is analyzed in the following.

Results

This section first explores the global development of digitalization, focusing on convergence and divergence, especially as externally enabled by the pandemic. Second, we explore national trajectories, focusing on the relationship between digitalization and national resources as indicated by GDP per capita (counted as international constant U.S. dollars at purchase power parity, coded from the website of the World Bank (2022)).

Past, present, and future adoption

The first question is, what has been the variation of adoption in time and space? We describe the variation by the distribution of adoption rates in the 47 societies at various times, Table 1, using the national-level percentages described in the above subsection on measurement.

Before the pandemic, adoption was unequally distributed worldwide, from a low of only 4.9% of the businesses in a country to a high of 69.3%. The inequality before the pandemic is described succinctly by the high coefficient of variation, .36.

The societies that had been low before the pandemic were catching up during the early pandemic, as more than 18% of the businesses in every society adopted during the early pandemic.

Table 1

Adoption in societies at various times (N=47 societies)

	Adoption before the pandemic	Adoption during the early pandemic	Adoption by 2021	Intention to adopt
Range among societies	*4.9% – 69.3%*	*18.1% – 68.1%*	*35.7% – 88.9%*	*20.8% – 84.3%*
Mean across societies	*42.4%*	*39.9%*	*64.9%*	*54.5%*
Standard deviation	*15.2%*	*12.7%*	*13.3%*	*15.3%*
Coefficient of variation	*0.36*	*0.32*	*0.20*	*0.28*

As a consequence of this catching up during the early pandemic, adoption by mid-2021 was less unequally distributed around the world, with a coefficient of variation .20, which is much lower than the inequality before the pandemic. This shows a convergence among societies around the world.

Intention to adopt in the near future (i.e., in the six months following the survey in mid-2021), is also unequal, suggesting that some societies are forging ahead (in which more than 80% of the businesses intend to adopt in the near future) while some other societies are falling behind (in which only about 20% of the businesses intend to adopt).

In short, adoption before the pandemic was highly unequal, but the pandemic has been an external enabler, promoting adoption during the early pandemic, enabling a catch-up entailing some convergence. These developments are examined more in the following.

Recent catch-up and convergence

The question here is, what has been the development of digitalization? Specifically, what has been the relationship between adoption before the pandemic and adoption during the pandemic?

This development is explored by plotting societies according to their adoption before and during the pandemic, Figure 1 (names of the societies with their acronyms are listed in the above section on Research Methods).

The plot in Figure 1 shows that adoption during the early pandemic is essentially independent of adoption before the pandemic (the correlation is estimated at -.05, which is quite insignificant). Societies with sparse adoption before the pandemic have mostly been eagerly adopting during the early pandemic, thus catching up toward more digitalized societies before the pandemic. This indicates that the pandemic has been an external enabler promoting digitalization in less-digitalized societies, thereby promoting the development of convergence worldwide.

Future digitalization: divergence with some forging ahead and some falling behind?

The question here is, what will be the future development of digitalization? Specifically, what is the relationship between adoption at present and intention for adoption in the near future, following the survey in mid-2021? This development is explored by plotting societies according to their adoption by 2021 and their intention to adopt in the near future, Figure 2 (names of the societies with their acronyms are listed in the above section on Research Methods).

The plot in Figure 2 shows that intention to adopt in the near future, to some degree, is a continuation of adoption until the present (consistent with a study by Karim et al., 2022). The correlation is .20 (with a p-value .09, so termed marginally significant). An analysis of individual businesses shows that businesses that have adopted are more likely to intend to adopt further in the near future than businesses that have not adopted.

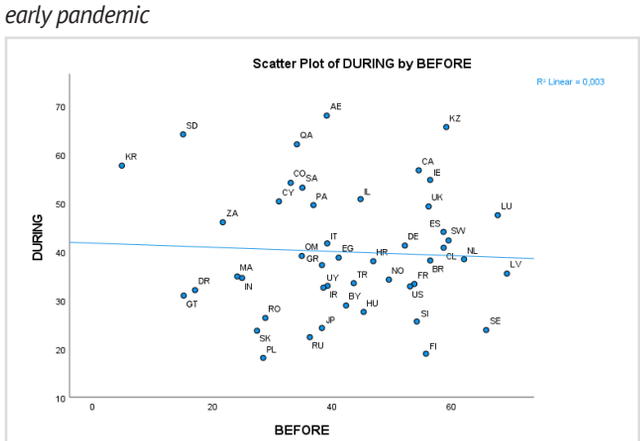
The plot in Figure 2 makes several suggestions for digitalization in the near future (after the time of the survey, mid-2021). First, a few societies that have adopted little hitherto now have high intentions and are thus likely to catch up; notably Guatemala (GT) and Dominican Republic (DR). Second, some other societies that have adopted little have low intentions, and they are thus likely to fall behind, notably Poland (PL), Slovakia (SK), Romania (RO) and Russia (RU). Third, yet other societies that have adopted extensively also have high intentions, and they are thus likely to forge ahead; notably United Arab Emirates (AE), Qatar (QA), Brazil (BR), Chile (CL), Colombia (CO), and Panama (PA). As several societies are posed to fall behind and several others are posed to forge ahead, the plot suggests a divergence in the near future in digitalization around the world, a widening of the digital divide among societies.

National developments: National resources and digitalization

Behind the global trends in digitalization analyzed above are differences in national trajectories. These differences in national developments are examined here, where we focus on accounting for digitalization in the various societies by their resources.

Figure 1

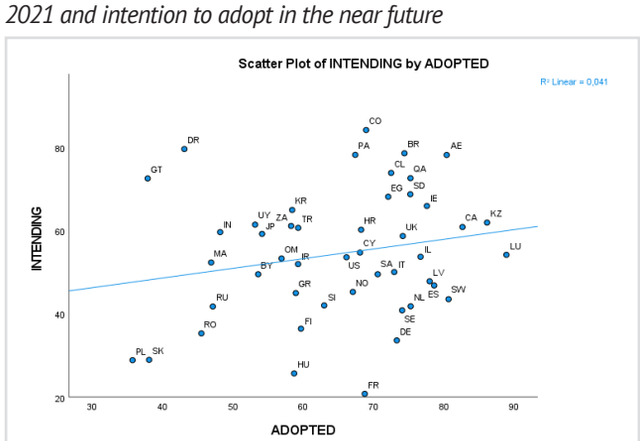
Societies by digital technologies adoption before and during the early pandemic



Source: Own research

Figure 2

Societies plotted according to digital technologies adoption by 2021 and intention to adopt in the near future



Source: Own research

Digitalization in businesses is embedded in a context that may be conceptualized as a national ecosystem around digitalization. We here focus on one ecosystemic condition, the national economic production in terms of GDP per capita in the society.

Economic production is distributed very unequally around the world. In wealthy societies such as Luxembourg and Qatar, GDP per capita is about 20 times higher than in low-income societies such as Sudan, India, and Morocco. The coefficient of variation in GDP per capita is around .6. Thus, inequality is much broader in economic production than in digitalization, as was reported in Table 1.

Their correlation in Table 2 indicates the association between GDP and digitalization.

Adoption before the pandemic correlates strongly with GDP, reflecting the concentration of digitalization in wealthy societies.

By contrast, adoption during the early pandemic is essentially unrelated to GDP, as indicated by the insignificant correlation.

Intention to adopt in the near future correlates weakly with GDP, consistent with the divergence examined above, a high intention in some societies that may forge ahead and a low intention in some societies that may fall behind.

To examine the national trajectories of the various societies, we plot societies according to their GDP per capita and their adoption at various times, Figures 3, 4, 5, and 6 (names of the societies with their acronyms are listed in the above section on Research Methods).

Figure 3 shows that digitalization before the pandemic was strongly related to GDP in advanced economies. Figure 4 shows that digitalization during the early pandemic was essentially unrelated to GDP. Figure 5 shows that cumulative adoption, up to mid-2021, was rather strongly related to GDP per capita. Figure 6 shows that intention to adopt (more) in the near future is inversely related to GDP, suggesting that some low-income countries are catching up and some may even be forging ahead, e.g. some Latin American countries.

Table 2

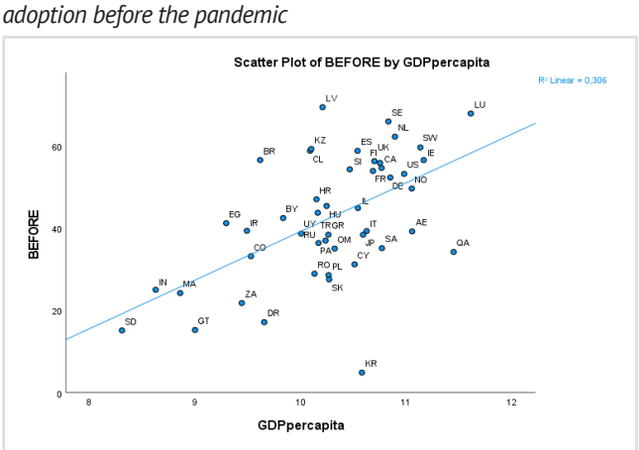
Correlation between GDP per capita and digital technologies adoption at various times (N=47 societies)

	Adoption before the pandemic	Adoption during the early pandemic	Adoption by 2021	Intention to adopt
Correlation with GDP per capita	0.55 ***	0.12 n	0.46 ***	0.20 †

† p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Figure 3

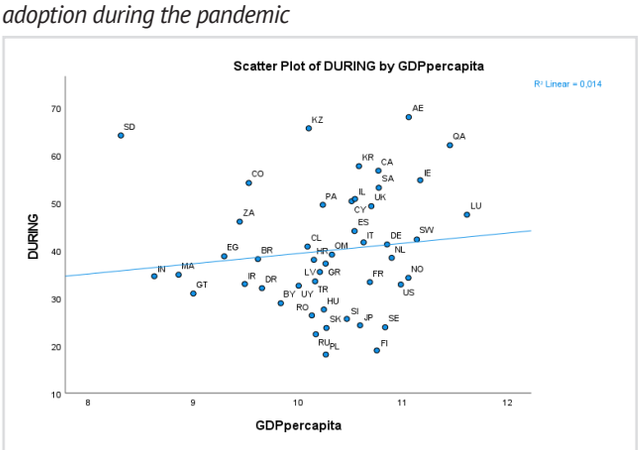
Societies plotted according to GDP and digital technologies adoption before the pandemic



Source: Own research

Figure 4

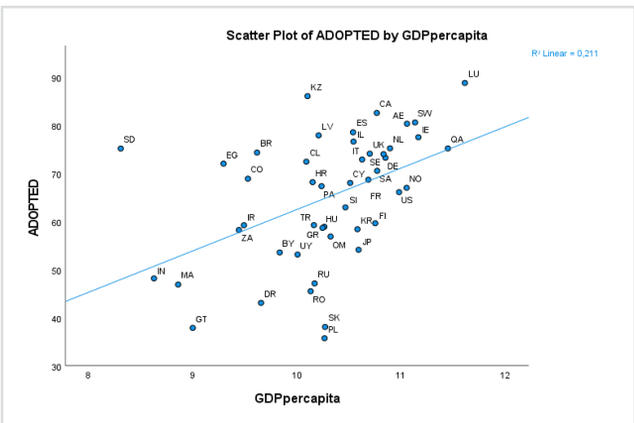
Societies plotted according to GDP and digital technologies adoption during the pandemic



Source: Own research

Figure 5

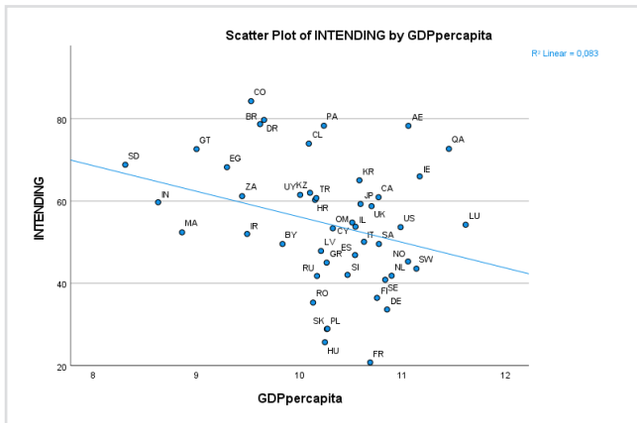
Societies plotted according to GDP and digital technologies adoption by 2021



Source: Own research

Figure 6

Societies plotted ccording to GDP and intention to digitalize



Source: Own research

Discussion

The analyses have addressed the question, how is past, present and future digitalization developing globally and in individual societies, depending on their resources? Digitalization of businesses in societies around the world is found to be related to national resources, notably wealth. Digitalization is global and low-income countries have apparently been catching up. Their resources explain much variation among societies in digitalization in terms of wealth, so slight variation is left to be explained by other conditions.

The dominant trend is an increase in digitalization as a global diffusion, pervading all societies. The digitalization in societies worldwide can be explained partly by their wealth, reconfirming a finding in an earlier study (Cruz-Jesus et al., 2017). It appears that less digitalized societies have been digitalizing faster, thus tending to catch up, and some are forging ahead, thus narrowing the digital divide among societies during the pandemic, consistent with considerations forwarded by Autio and colleagues (2021).

Digitalization of business in society is promoted in the national ecosystem, especially by the national capital. National financial capital in the form of GDP per capita is related to the digitalization of businesses, consistent with this as a resource facilitating entrepreneurial endeavoring (Stam & Van de Ven, 2021). The coupling between digitalization and capital is found to be remarkably tight at times and especially before the pandemic, so tight that we can hardly discern effects on digitalization from other institutions such as education, business opportunities, and cultural values (where especially education and GDP are multicollinear). This suggests that a laissez-faire policy in low-income countries will entail falling behind. Conversely, digitalization will be promoted by investing more in education, enhancing digital preparedness and literacy.

The pandemic has been an external enabler for digitalization (Davidsson et al., 2021). The pandemic has pushed early non-adopters to begin digitalization and early adopters to digitalize more. Moreover, digitalization is more prevalent among new businesses than among established firms – the phenomenon of 'born digital' – which is likely to promote digitalization further in the near future. However, intentions to digitalize in the near future tend to be more prevalent in wealthy societies than in low-income societies, suggesting a future widening of the digital divide and unequal development worldwide (Agarwal & Audretsch, 2020; Hai et al., 2021).

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Pretekla, sedanja in načrtovana digitalizacija po svetu: vodenje, dohitevanje, napredovanje in zaostajanje

Izvleček

Podjetja po vsem svetu uvajajo digitalno tehnologijo. Sprejemanje pa ni enakomerno, temveč se spreminja skozi čas in se razlikuje od družbe do družbe glede na vire v ekosistemu. Ta študija obravnava razvoj pretekle, sedanje in prihodnje digitalizacije v svetu in v vsaki družbi glede na njene vire. Raziskava med podjetji v 47 državah, ki jo je leta 2021 izvedel Globalni podjetniški monitor, zagotavlja meritve na nacionalni ravni glede sprejemanja digitalnih tehnologij pred in med pandemijo ter namen sprejetja v bližnji prihodnosti. Ugotovljeno je bilo, da se sprejetje digitalne tehnologije znatno razlikuje tako v času kot v kraju. Pred pandemijo je bila uporaba digitalne tehnologije osredotočena na najbogatejše družbe. Pandemija je bila zunanji dejavnik, ki je neodvisno od nacionalnih gospodarstev prisilil manj digitalizirane družbe, da so nadoknadile zaostanek, kar je povzročilo določeno konvergenco. Zgodnji pandemiji so sledile namere za digitalizacijo, ki so se zelo razlikovale, kar je pomenilo določeno razhajanje. V nekaterih družbah, ki napredujejo, so namere močne, v nekaterih manj digitaliziranih družbah in družbah z nizkimi dohodki, ki morda zaostajajo, pa so šibkejše. Ugotovitve prispevajo k razumevanju digitalizacije kot globalnega pojava, pandemija pa je bila zunanji dejavnik, ki je spodbujal dohitevanje in konvergenco pri digitalizaciji. Kljub temu je okrevanje neenakomerno in povzroča razlike, saj nekatere družbe napredujejo, druge pa zaostajajo.

Ključne besede: digitalizacija, sprejetje tehnologije, zunanji dejavnik, globalizacija, neenakost, konvergenca, divergenca