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TECHNOLOGIES 4.0 AND THEIR IMPACT ON INTERNATIONAL TRADE

TECHNOLOGIE 4.0 I ICH WPŁYW NA MIĘDZYNARODOWĄ WYMIANĘ HANDLOWĄ

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Summary: Revolution 4.0 has a multidimensional impact on international trade, international division of labor, prospects of catching-up and overcoming the development gap in all the groups of countries which lag behind. The role that the resolution in question can play here derives from acceleration and simplification of international communication which is linked with essential fall of international communications costs, as well as increased access to communications technologies. All this is followed by changes in the structure of the world economy and methods of conducting business, as all reflected in changes of foreign trade measured by geographic flows, volumes, structure. Technologies 4.0, mainly, the ICT, lower the costs of foreign exchange and accelerate the procedures, which are applied in case of trans-border transfers of goods and services. Structure of the economy, changes in international trade and its geographic flows impose consecutive changes in applied policies (industrial and trade), which are conducted by states. Without their change – access and full application of technologies 4.0 will be limited. Limitations in this specific area will have negative impact on rates of growth, structure changes, innovativeness, productivity, etc. In other words use of full existing potential of the technologies in particular economy will be limited, postponing its development. The revolution is not limited to ICT but it also covers use of Artificial Intelligence (AI) in such activities as: production, organization and processing.

Keywords: revolution 4.0, ICT, international trade, development, protection, opening of market.

Streszczenie: Rewolucja 4.0 wpływa wielopłaszczyznowo na wymianę handlową, międzynarodowy podział pracy, możliwości rozwoju i pokonania luki rozwojowej we wszystkich grupach państw, w których to opóźnienie występuje. Jej znaczenie wynika z przyspieszenia i ułatwienia w skali międzynarodowej komunikacji, z czym związany jest zasadniczy spadek kosztów komunikowania, dostępność technologii oraz zmiany zachodzące w strukturze gospodarki i sposobach prowadzenia biznesu. Technologie 4.0, a zwłaszcza ICT, obniżają koszty wymiany handlowej i przyspieszają procedury, które są stosowane w warunkach wymiany handlowej towarów i usług, które przekraczają granice państw. Struktura gospodarki, zmiany w wymianie handlowej i jej strukturze oraz kierunkach narzucają zmiany w polityce

gospodarczej (przemysłowej) oraz handlowej państw. Bez ich przedstawienia nie będzie można w pełni korzystać z nowych możliwości podniesienia wzrostu gospodarczego, jakie niesie ze sobą rewolucja 4.0, która nie ogranicza się do ICT, ale obejmuje również nowe rozwiązania dotyczące wykorzystania sztucznej inteligencji (SI) w działaniach obejmujących procesy produkcyjne, organizacyjne i przetwórcze.

Słowa kluczowe: rewolucja 4.0, ICT, handel międzynarodowy, rozwój, protekcja, otwarcie rynku.

1. Introduction

Advanced technologies work in three main ways in enhancing international trade. First they accelerate all activities which are required for international trade and second they facilitate trade between those who have such technologies and those who do not have them. Finally, coming to the third area, they have an impact on trade by easing international communication, they also stimulate changes in international business, helping to create global production networks. All three mentioned effects are natural but they are also accompanied by a fourth feature rooted in the approaches which support protectionist activities supported by a number of different arguments, no matter how effective they are in practice. The article aims at showing the three mentioned approaches enriched by some examples from practice showing the advantages and disadvantages of choosing and applying two different strategies: making use of the international division of labour and preparing grounds to catch-up by importing the newest and the most advanced technologies in order to apply them. With the passage of time they are upgraded by new solutions imported from abroad or worked out on the local market, and secondly protecting the possessed level of development assuming that in a short time, new technologies from their own laboratories will compete with those now available today on the world market. The paper is structured in the following way: the first part explains what technologies 4.0 are and shows the three mentioned approaches and their results in the area of development and catching-up. This can play the role of a theoretical introduction to the practical chapters which follow this particular part. The second part gives illustrations from the practice, exemplifying which of the approaches accelerates the opportunity of catching-up. The third part explains what conditions have to be fulfilled in order to make proper use of the possessed potential. The final part gives the conclusions.

2. Technologies 4.0 and the possible approaches in industrial and trade policies

Technologies 4.0 are used as synonyms of industries 4.0 or revolution 4.0. In general all of them show the new trend in automation, data exchange and manufacturing

technologies. The referred technologies embrace: cyber-physical systems, cloud and cognitive computing, the Internet of things, industrial internet as well as smart cities, smart grid, smart everything, etc. There are specific conditions in which technologies 4.0 are being introduced, which embrace: hesitations between liberalization and protection, increase in energy prices, prolonging negotiations on the Doha Development Round of WTO which started in 2001, and the general slow-down of the world's rate of growth in comparison to the previous decade. All the mentioned trends can be overcome if technologies 4.0 are given a full chance to enhance the world economy. It is worth recalling that the period between consecutive revolutions has narrowed as the first revolutions were separated by about 100-200 years, the third followed after the following hundred years while the fourth revolution came 20-30 years after the third one. We can anticipate that with the continuation of that trend, the next industrial revolutions will need less time to be launched and change the world economy.

Table 1. Consecutive industrial revolutions and their characteristics

No.	Consecutive revolution	Year (period)	How many years to next one	Area	What it has changed
1	First industrial revolution	1784	-	Steam, water engine, mechanical product equipment	Power of horses and of people was replaced by the power of engine. The first machines powered by engines, simple manufacturing by hand was replaced by mechanical solutions
2	Second industrial revolution	1870	c. 100	Electricity, mechanization, mass production	Division of labour, deepening specialization on national market and internationally, electricity, automatized production
3	Third industrial revolution	1969	c. 100	Electronics, IT, automated production	Electronics, IT, automatized production. More advanced processes replaced by engines
4	Fourth industrial revolution	2010	c. 30-40	Cyber-physical systems	Cyber-physical systems influencing production, specialization, division of labour, work, education, skills, norms (smart everything)

Source: own elaboration.

Consecutive revolutions deepened the divide between developed and developing markets. This resulted from a number of factors, some of a political background (lack of development helped to control the state without specific investments and financial costs), others of developmental nature (limited potential understanding of what really

needs to be done and how) and the remaining of an economic character (building a factory does not solve the problem as there was strong need of infrastructure of all types: institutional, legal, health, educational, physical, etc.) or philosophical roots (protection against former colonizers, developed states which seek expansion of their sales markets). The current revolution can be considered as a break in strongly rooted philosophies which turned out to be efficient on a limited scale as far as the number of countries who had overcome the development gap, moving from one group of advancement to another higher one, representing a more advanced level. Comparisons of the contents of the five groups of states in different periods illustrate the changes concerning the figures and lists of the states.

Table 2. Number of states in five consecutive development stages in 2018 and 2012

Stage	Characteristic of phase	Number of states in 2018	Number of states in 2012	Changes
III	Phase driven by innovation	35	35	Stable number of states
Transition from II to III	Transition from effectiveness to innovation	17	21	Decrease in number
II	Phase driven by effectiveness	30	33	Decrease in number
Transition from I to II	Transition from the phase where factors play a crucial role to a phase driven by the effectiveness of use of those factors	19	17	Increase in number
I	Phase driven by access to production factors	37	38	Decrease in number
Total	Number of states covered by research	138	144	Decrease in number

Source: [Global Competitiveness Reports 2012 and 2018...].

All in all, the number of states covered by research declined between 2012 and 2018, followed by qualitative and quantitative changes in the lists of states in the specific groups. The year 2012 marks a four year period after the start of the 2008+ financial crisis. A number of states applied in their industrial policies, stimulating financial injections, which were followed by the application of different types of protective measures (tariff and non-tariff).

What are the possible approaches in industrial and trade policies towards new technologies? In general, the evolution seems to be an objective trend and all official statements declare support for new technologies which bring progress. There are two basic questions to be answered when this approach is coined into a policy, namely: (1) should the new technology come from imports or should it be purchased from national research and production potential? (2) what will happen with the existing jobs in industries which the new technology will compete with or even crowd them out?

In trying to answer the first question, in some cases it becomes obvious that the technology can be supplied by national companies, while in other cases it can be supplied in cooperation with foreign producers and suppliers. There is also a third solution in which a country can import new technology, working on conditions of supply in which the methods which enable an upgrade of the purchased technologies are defined. This can be done in cooperation with the supplier, by the importing company or by a third company (foreign or national). All the mentioned solutions require special skills and policies which would facilitate the process of advancement. The policies applied here vary and go through an evolutionary process from clearly protectionist measures, through anti-import production, which in turn is followed by pro-export policies. All the solutions turned out to be costly and ineffective, which finally results in closer international cooperation and participation in the international division of labour. Such solutions are effective in all types of industries: intellectual property rights, manufacturing, services, agriculture production and food [*The Future...* 2017, p. 143].

The second question is even more difficult to answer, going beyond the declarations of economists shaping the policy in a country. Their declarations are usually clear: progress is needed, nobody will stop revolutionary changes but the whole process has to be done under the control of politicians and be conducted wisely [Zandt et al. 2019]. Coining such declarations into applied policies is difficult as structural changes, the replacement of one technology by another one, and finally imports – according to populist interpretation – have an impact on the labor market [Economic Policy Reforms... 2013, pp. 12-13]. Such an approach shaped into the applied policies results in the postponement of changes. On the other hand, the observation of changes and their direction seems to be always delayed in comparison with real occurrences, which happen here and today [Tan 2018, pp. 1-11]. Additional delays are caused by observation, analysis, writing, publishing and reading about them. All this means that writing about history, of what causes a growing gap between the observations concerning what goes on in the economy, analyzing it, reacting to and reshaping it into a policy, and choosing right tools which can be used in that policy making it more effective.

To sum this part it can be said that proof of the enumerated reactions to new technologies can be found in all types of economies: developed, post-industrial as well as in emerging markets which try to industrialize their economies, and also in the developing and underdeveloped economies. In all of the mentioned economies such a policy prolongs the time of the changes, increases the social and financial costs of the process, and finally undermines politically the ability to continue such changes. Here only some model solutions were mentioned. In the following part practical illustrations will be given.

3. Practical examples of the applied policies and their results

Economies represent different stages of development, which means differentiated branch-structures, the development of infrastructure, engagement in international division of labour, followed by trade. They also differ in the scope of their economic openness and engagement in international trade in goods, services, intellectual property, and FDI flows. All this is followed by differences in the applied policies concerning support of their companies, which can be done in the form of subsidies or protection, either horizontal (addressed to all) or vertical (addressed to specific branches under pressure). Generally the “presence” of the state in the economy is framed in different ways, starting with solutions imposed on a global level (WTO [Agreement...]), followed by regional solutions (like e.g. EU [State Control...], OECD [OECD Guidelines... 2015, p. 17] regulations). The assumption is that institutional opening helps to make better use of technologies 4.0. Membership of the WTO plays an important role here but it is not always transmitted into policies which stimulate market opening. A country often follows some general guidelines concerning the opening up of the economy but at the same time in particular areas it applies measures which protect the market. Such an approach is quite often applied in the area of ITC. Examples illustrating this can be found in such emerging markets as Brazil or India [Żukrowska 2018]. In the case of post-industrial economies a different form of protection is applied as a number of markets keep companies which are labeled as “zombies”. This means that the applied industrial policies help to keep alive companies which without such support would be closed down. Intervention of the state keeps them alive against any economic logic, which means the use of outdated technologies and higher costs of production [Andrews, Adalet McGowan, Millot 2017]. The reason here is mainly political but usually it is hidden behind social argumentation, which in practice only postpones the decisions and increases the financial and also the social burden of changes.

The consecutive revolutions were reshaping production, sales, consumption habits, international trade and its structure. For a long period there was a big delay in applying new technologies in countries representing different levels of development. Since industrial revolution 3.0, this has been changing and revolution 4.0 is accelerating this trend even more. Information spreads quickly over the internet, the new division of labour cuts the costs of production, e-commerce accelerates the diffusion of technologies and helps to create global value chains (GVC), often using smart grids. None of the previous revolutions had such a big impact on world production and trade as the current one. All the revolutions played an important role in the development of each group of states and each continent, but this was happening with a time-delay and within the financial limits of the specific countries. Currently this trend is changing, caused by new tendencies observed in the production process as well as in consumption habits. Advanced technologies 4.0 cut the costs of production as well as the costs of sales (distribution, marketing, transport, servicing).

Lower costs stimulate sales on domestic markets and in the cross-border transfers of goods, services and know-how.

Technologies 4.0 boost the turnover by e-commerce sales and internet access to on-line markets. The total value of e-commerce (domestic and cross-border) was estimated at \$25 trillion in 2015, which means that it increased by 56% in comparison with 2013 [World Trade Report 2018... 2019, p. 5]. The increase in turnover partly resulted from expanding access to the Internet (PCs, laptops, tablets, mobile phones, and other electronic devices), the declining costs of trade and offered goods, product diversity, easier production, distribution and transportation. These technologies have changed production, the flow of information, the structure and direction of trade and the volume of sales. Between 1996 and 2014 the costs of foreign trade declined by 15%, accompanied by a 1.8-2.0% increase in the dynamics of trade. Over 15 years the cumulative growth of international trade was estimated at 31-34%, which was accompanied by changes in the shares in the market of the specific exporters and importers as well as in the structure of import and export transfers [World Trade Report 2018... 2019, p. 8].

Much bigger changes in all of the mentioned areas are being seen in developing and emerging economies in comparison to the developed, post-industrial markets. The dynamics of these changes resulted from the low values at the starting point and the high dynamics of change, while for developed economies the starting point reflected a certain advancement both in imports and exports, thus the relatively low dynamics in comparison to the group of developing economies. This pattern follows the simple law stating that newcomers are better-off, decided by the fact that developed economies and their markets experience a certain level of saturation of the market, while in the case of emerging economies, developing markets – possibilities in supplying the markets and stimulation of sales are much bigger under the condition that consumers have sufficient financial means to pay, covering the growing costs of their consumption. Here in such markets we observe the acceleration of the development of financial services, the banking sector, and the communication sector, as well as all the remaining sectors which develop with the use of ICT (information, communication technologies).

On the one hand trade is facilitated by the reduction of trade barriers such as tariffs and non-tariff barriers, while on the other hand it is stimulated by the integration of the national markets physically by regional solutions such as the EU-internal market, the EU and EFTA agreement + Switzerland within EEA, ASEAN, ASEAN+3, ASEAN + 6, USMCA (the replacement of NAFTA), Mercosur, CARICOM, GCC, SAFTA, etc., or bilateral agreements on free trade.

Counting the total number of free trade agreements, the WTO gives a total figure of 166, while separating the agreements into goods, services and market access – makes the statistics higher, giving altogether 279 agreements. There is also a number of agreements on free trade which are signed but not ratified, as well as signed and ratified agreements which do not function properly or at all.

Table 3. Larger users of FTA agreements according to the WTO in 2018

Market/State	Number of FTA	Market/State	Number of FTA
European Union	40	Korea	18
EFTA states	31	Mexico	17
Chile	30	India	16
Singapore	24	Panama	16
Turkey	23	Japan	16
Peru	19	China	15

Source: [WTO].

The author would like to add one more country to the above data with states and numbers of their FTA's, this country is Vietnam, which has 14 FTAs registered in the WTO, meaning one FTA less than China. They embrace ASEAN-Australia-New Zealand; ASEAN-China; ASEAN-India; ASEAN-Japan; ASEAN – Republic of South Korea; ASEAN–Free Trade Area (AFTA); Chile – Vietnam; Comprehensive Progressive Agreement for Trans-Pacific Partnership (CPTPP); Eurasian Economic Union (EAEU) – Vietnam; Global System of Trade Preference among Developing Countries (GSTP); Japan-Vietnam; Republic of South Korea – Vietnam; and the early announced EFTA – Vietnam Agreement; EU – Vietnam¹. The latter is a relatively small economy in comparison to China and its trade policy seems to be much “braver” than in the case of other markets in the region as far as openness is concerned. This economy in the field of its trade policy could be compared to Chile or Israel, both representing a higher level of development. Vietnam is doing well with its economic policy, although not all of its achievements are reflected in the international rankings concerning competitiveness and economic freedom.

Table 4. Statistics of FTAs by regions

Region	Number of FTA's	Region	Number of FTA's
Europe	99	Central America	40
East Asia	86	Africa	34
South America	61	Middle East	28
CIS	44	Western Asia	25
North America	43	Caribbean	9

Source: [WTO].

In most cases, functioning agreements show that trade is stimulating development of the economies who are partners in such enterprises and usually the agreements

¹ <http://rtais.wto.org/UI/PublicSearchByMemberResult.aspx?MemberCode=704&lang=1&redirect=1> (access 25.04.2019).

between markets representing diversified levels of development indicate that they work in favour of development of the partners engaged. Such agreements show that more advanced markets gain because of structural changes, in which production factors are moving to areas with higher value added. In the case of less developed economies a similar process takes place, but the main profit is achieved by the creation of jobs in areas where production costs are lower. In both cases, jobs are created which results in the stimulation of demand and in turn pressure on production and supply. Such a simple mechanism shows that free trade is a win-win solution. Nevertheless, looking closer at the practices of individual states, one can find that industrial and trade policies, despite membership of the state in the WTO, are not as transparent as they should be, meaning that they try to protect national markets against imports from abroad. Such protectionist policies slow down the processes of change which embrace structural advancement, the replacement of old technologies by new ones, higher costs paid by consumers for the goods they purchase on the “semi opened and semi protected market”. Limited competition drives the costs of production up, quickly followed by an increase of sales prices. Moreover, limited competition resulting from protection has also its costs in the area of financing R+D, access to capital, costs of capital, and costs of intervention policies applied by the state, etc. All this is done with the use of a number of arguments which embrace labour market protection, and the protection of domestic industries, which are often labeled as “infant” [Gerber 2018, pp. 145-149]. Other arguments cover revenue linked with tax (tariff) revenues being the source that finances the state budget [Gerber 2018, pp. 145-149]. This argument seems to be used in countries where a relatively large share of production is not registered, concentrated on agriculture and food supplies, which are sold without paying taxes. Still others say that protection finds support in the area of national security or because of the need to protect the national culture or culture industries [Gerber 2018, pp. 145-149]. The final argument is linked with retaliations, which are used in trade policies. In general, most of the research carried out in the area of trans-border trade shows that the costs of tariff or non-tariff protection (quotas, devaluation, standards, etc.) are bigger than the net welfare costs of the nation [Broda, Weinstein 2006, pp. 541-585; Krugman, Obsfeld, Melitz 2015, p. 181].

Opportunities of creating jobs with the application of ICT are immense. When a country does not have proper technologies it has to import them. Protection in such conditions the postpones use of the technology, mastering it and transforming it into a production success. ICT have brought deep changes in the strategies of the creation of technologies, international division of labour, costs of starting a business, ways of managing it, location, size of the companies, employment, value of turnover and engagement in trade. With such deep changes one can expect that if a country imports the needed ICT, it can use it effectively in its strategy to create jobs and goods, and finally wealth for its nation. On the contrary, when a country has ICT but it is not evaluated as the most competitive on the national market nor globally, and additionally the market is protected, such conditions bring limited opportunities for catching-up and building wealth.

Table 5. Share of creative industries in GDP (bln US\$, %) and job creation (mln, %) in 2015, comparison of five continents

Continent	Share in GDP		Share in job creation	
	Billions US\$	%	Millions	%
North America	620	28	4.7	16
Europe	709	31	7.7	26
Latin America	124	6	1.9	7
Pacific Asia	743	32	12.7	43
Africa	58	3	2.4	8
Total	2254	100	29.4	100

Source: [OECD 2018].

Having said that, we need to be more precise on the definition of what ICTs are. A short definition, relatively often used, states that ICT (information-communication technologies) are continuation of communication technologies (CT). Such an approach turns the attention to the unification (integration) of different forms of communication framed within one integrated system. This includes telephone lines, wireless systems as well as computer equipment, basic and intermediary programs, solutions applied in collecting, storing, data and information processing, as well as audiovisual systems, and the methods applied in enabling accession and transmission, etc. Such a definition has been applied since the 1980s, and modified following the technical progress and evolution of the practical application of the available technologies. Currently the sector is creating a large industrial branch embracing three elements: technologies and techniques, their creation and their use. It is worth showing the sector's complexity by presenting the definition coined for ICT by the OECD. The primary version of ICT in the OECD was approved more than twenty years ago, in 1998, and modified in 2002 and 2007. It should be explained that the core part of the definition did not change.

Table 6. Global expenditure on IT divided into market segments in 2016 and 2017 in bln US\$

Data centers		Programs for enterprises		Equipment		Services		Communication services	
Value of expenditures in two consecutive years 2016 and 2017 (bl US\$)									
2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
170	175	333	355	588	589	899	938	1384	1408
Dynamics of growth in % comparisons between 2017 and 2016 (y-to-y in %)									
2.94		6.60		0.17		4.34		1.74	

Source: as in Table 4.

According to the OECD's definition, the ICT sector is a combination of production sectors and services, which embrace the transmission and sharing of data and information by electronic means [Annex 1...]. This definition, based on international standards of the classification of corresponding goods and activities, has been approved as the first step in the process of measuring and estimating this sector, as well as the preparation of the indicators which can effectively be used to characterize it. The OECD has also introduced additional refinements which explained and made more precise the difference between industrial activity in the sector and the provided services. In the sphere of production, products should: (1) meet the function of processing information or communications, which covers transmission and sharing; (2) apply electronic processing in detection, measurement and/or recording physical occurrences or control of physical processes. In the case of the service industry, a product can be approved as a service in the field of CT, when it allows information transfer, communication or the processing of information or data, which should be done by applying electronic means. In both cases a list of products and services is given, which strongly supports the precision of the definition.

Table 7. World values of exports: telecommunication goods, computer, information services, in 2014 and 2015

Contents	Value		Share		Year/year changes (%)		
	2014	2015	2010	2015	2010-2015	2014	2015
World	485	475	100.0	100.0	7	9	-2
North America	45	45	10.0	9.4	6	0	0
South and Central America	9	10	2.2	2.2	7	6	12
Europe	297	280	61.3	58.8	6	11	-6
European Union (28)	280	262	56.3	55.0	7	12	-6
Commonwealth of Independent States (CIS)	9	8	1.3	1.8	13	12	-4
Near East	6	6	1.4	1.2	3	5	-12
Central East	15	15	3.0	3.1	8	8	-2
Asia	105	112	20.7	23.6	10	8	7

Source: [Measuring...].

The ICT and revolution 4.0 create opportunities for the development of all groups of countries as they enable communication, international networking, and participation in GVC. This is also proved by the data in Tables 4 and 5, showing increased world turnover accompanied by a decline in exports in the developed markets and an increase in the Asian and South, Central American markets. The new industries, both in the area of the production of goods and services have an increasing share in job creation and international trade. They are not demanding

high investment expenses from the investors, they require predictable legal and institutional solutions, a developed infrastructure, an educated labour force, and the openness of the economy.

4. Conditions that need to be met to use the possessed potential

Digital technologies, brought within the technological revolution 4.0, create new markets, new products, new forms of production and new patterns of trade. These processes are accompanied by cuts in trade costs and changes in the trade structure and the geographical direction of trade. This evolution creates new opportunities and production/trade advantages. This means that all the mentioned enterprises, banking systems, education sectors as well as governments have a specific role to play here. The experience of Silicon Valley and the current analysis of the way it functions today, show what is needed. We are not able to predict everything in detail, but some frameworks are easy to draw today, even with a limited knowledge concerning the future development of technologies 4.0 or its successors like 5.0. Quantitative prognosis concerning changes (in size and patterns) of international trade by 2030 (11 years ahead) indicate that digital technologies will strongly stimulate trade. Most of them predict a continuation of the current trend, which shows a growing demand for services in developing economies. This embraces such sectors as banking, health services, education, entertainment, hotels, restaurants, sales, transport, engineering, etc. The development of that sector should be done with a wide imagination of the application in different industries of digital technologies. Moreover, it must be matched with the abilities to finance such activities which are difficult to imagine today. An example is given by Silicon Valley, when it is pointed out that today's industries could not have been developed in the Valley when the business was starting there [*Herd instincts...* 2019, pp. 23-26]. A number of companies, and this is not only an experience of the US, lose their way and this happens despite high and increasing sales, and the global scale of activity. This "losing their way" pattern is measured by losses they started to incur since the end of the 2008+ crisis. They create revenues but at the same time the operating profit is negative (in the red). At first sight this is difficult to understand but the explanation is simple: companies started with relatively high investments, the credits were not paid as the firm was bringing in profits. High operating profit margins were creating conditions to take new credits in order to expand the firm, this was followed by relatively high salaries and other costs. This functioned for a certain time without specific obstacles as competition was limited. When the competition started to grow such extravagance had to be curbed and the process of expansion stopped.

This experience can be spotted in companies operating in the US (Uber, WeWork, Lyft, Pinterest, Dropbox), China (Meituan Dianping, Pinduoduo, Tencent Music, iQIYI), Sweden (Spotify) and Singapore (Sea). The pattern of prodigality is present in all types of economies, no matter what level of development the country represents

and what political and economic system it has. The paradox is that profitability is low despite the growing scale of turnover, and the expansion of services offered on the market, in other words economies of scale do not prove to be as efficient here as they were in traditional types of production. Some argue that this resulted from the monopolistic position of some other companies which were first on the market and built a semi or pure monopolistic position, making it impossible to compete with them. Such companies as Google, Amazon, Facebook or Alibaba, are given as the examples [*Herd instincts...* 2019, pp. 23-26].

Digital technologies offer a big opportunity to S&M companies. In general they do not need a large capital to start the business, which does not mean that they do not need capital at all. They need capital to start, they require a specific climate allowing them to grow and communicating that information about their expansion to current and future customers. Otherwise the alternative solution is to downsize. This supportive climate, first of all, means economic openness, mainly the elimination of non-tariff barriers. S&Ms have limited employment, and obtaining different certificates, evidence, declarations means that there is insufficient staff to apply for, to get and deliver such certificates. Such requirements are easier met by a large company, but we need to remember that the share of S&Ms in employment and the creation of GDP exceeds the indicators' share of large companies. Moreover, the latter are more visible, which is also easily transmitted into specific policies supporting them and their activities. A reduction of trade costs by the application of 4.0 technologies does not seem sufficient here and requires additional support from governments and by the applied policies.

New technologies can significantly affect where we trade, who trades and what is traded, how it is traded and on what conditions. All the mentioned changes establish new trade patterns, which is followed by the dismantling of sources of traditional comparative advantage, with time replaced by the new ones. All this creates opportunities and challenges for all groups of countries: developed, emerging and developing. These processes affect the international fragmentation of production. The trend observed here seems to be continued in the future, nevertheless, the overall influence of the currently observed trends are not easy to predict in full. One can expect that the application of 3D printing might have a meaningful impact on patterns of GVC and trade that follows such international cooperation.

Digital technologies create new markets, new forms of trade and also the supply of new products and in parallel a new demand for them. Governments may have a new role to play in such conditions, directed into supporting the new drive and not concentrating on keeping the old industrial potential alive. Governments should concentrate on ensuring that companies can fully make use of the new opportunities. The reactions of governments in the new conditions could be local, national, regional or global. In general they can be conducted on a national or international scale in cooperation with other authorities, officials and people responsible for economic policies. The responses embrace a number of activities, covering education (more creative, less generic), information, creating platforms of communication, exchange

of experience, cooperation in R&D, enhancing infrastructure, mainly electronic and digital but not limited to these. In general, national, unilateral, reactions cover upgrading and investments in digital infrastructure, which should be followed by human capital, and the liberalization of access to the markets, etc. It also seems that national institutions and regulations need deep changes, as often the old solutions can act as barriers for new ideas, technologies, etc. The scope of internationalisation of economies shows that in most cases all of the imposed solutions should be implemented in cooperation with the main trade and economic partners, which means wider consultations and the coordination of certain moves. In some cases this will lead to the introduction of solutions already implemented in states more advanced in 4.0 law and institution changes, while in others it will mean long consultations and the multilateral approval of newly formed rules, adjusted to the new situation.

The WTO and other international organizations are promoting solutions which support the development of digital trade. Comparisons between trade barriers for goods and services and geographic directions of flows show what should be taken into account in order to boost turnover. Looking at trade of goods and their cost structure, we can say that transport costs have the highest share, while border costs are the lowest. This is proved by the following information: transport costs take up 39%, information and transaction costs respectively 21%, others 12%, logistics 11%, trade policy barriers 11%, and border costs 5%. In the case of services the situation looks different. The highest share of costs is ascribed to information and transactions, the lowest to border costs. Altogether the share of the same elements of trade costs given in the case of goods is the following in services: information and transaction costs 31%, others 23%, transport 18%, trade policy barriers 14%, logistics 11%, and border costs 3% [WTO Trade Report 2018, p. 65].

It is easy to predict that the potential of services production in developed economies will force a reduction of barriers in this segment of trade in post-industrial markets, while high border costs can be eliminated by digital technologies, which should be followed by logistic, transport, information and transactions policies. The policies applied here should control tendencies in the protection of emerging and developing economies, which should be followed by the stimulation of development of financial sectors in this group of markets. In the case of developed, post-industrial markets, the further liberalisation of services markets is recommended.

5. Conclusions

Technologies 4.0 change world trade both in scale and scope. On the one hand they increase the necessity of international trade, while on the other they accelerate the procedures applied in international trade, making the whole process easier. Those changes bring challenges to all groups of countries. The way in which the opportunities will be used depends on the created international and national environment for trade. The conducted analyses show that member states of the WTO should declare the clarifying and expanding their scope of undertaken steps within

the WTO membership commitments concerning access to their markets and national treatments under GATS. This can be done without the need to create a new body like e.g. the Information Technology Agreement (ITA). The declaration should be also followed on the level of FTAs and bilateral agreements signed by states, otherwise countries will feel free to break the WTO membership conditions. The international coordination of political moves is needed here, which seems to be clear, especially in light of their differentiated but overlapping interests. This concerns both industry as well as services.

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