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MASTER'S LEVEL QUALIFICATION PAPER
on the topic "THE IMPACT OF DIGITALIZATION ON GLOBAL TENDENCIES
OF DEVELOPMENT OF INTERNATIONAL BUSINESS"
Specialty 292 "International Economic Relations"

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Master's level degree qualification paper contains the results of own research. The use of the ideas, results and texts of other authors has a link to the corresponding source

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SUMMARY

of Master's level degree qualification paper on the theme
“THE IMPACT OF DIGITALIZATION ON GLOBAL TENDENCIES OF
DEVELOPMENT OF INTERNATIONAL BUSINESS”

student Korkh Anastasia Sergeevna
(full name)

The main content of the master's level degree qualification paper is set out on 38 pages, including a list of used sources of 70 titles, which is placed on 10 pages. The work contains 3 tables, 15 figures, as well as 2 applications, which are placed on 2 pages.

KEYWORDS: DIGITALIZATION, DIGITAL TRANSFORMATION, INTERNATIONAL BUSINESS, HIGH DIGITAL AND LESS DIGITAL INTENSIVE SECTORS, TOOLS OF DIGITAL TRANSFORMATION

The purpose of master's level degree qualification paper is to study the theoretical foundations of digitalization and to analyze the practical effect of digitalization and digital technologies on international business.

The object of study is the processes of digital transformation of international business.

The subject of the study is the impacts of digitalization processes on global trend of development of international business.

To achieve this goal and objectives there were used following scientific methods of research: analysis, synthesis, abstraction, prediction, generalization, idealization, induction, deduction, analogy, systematization and generalization (by theoretical justification - the concept of digitalization, digitization, and digital transformation), comparison (in the process of classification sectors and countries according to level of digitalization), systematic analysis (during the study of the concept competitive ability at different levels), historical method (during the analyze stages of digitalization as a global process).

The information base of the master's level degree qualification paper is scientific publications and monographs of domestic and foreign scientists, researches of modern scientists in the field of technologies and innovations, materials of scientific conferences and researches, reports and analytical materials of some Ukrainian agrarian companies, PwC, World Bank.

The main scientific results of the work are as follows:

- 1) definition the main stages of digital transformation in the enterprise,
- 2) creating practical approaches to solving problems related to digital transformation of the company,
- 3) exploring European, Korean and American experience of digitalization,
- 4) structuring of classification of high and less digital intensive sector/country,
- 5) definition the main trends of the digitization of the Ukrainian agricultural sector,
- 6) providing of analysis of successful examples of digital transformation on Ukrainian agrarian companies.

The obtained results can be used by companies that tend to digital transformation in order to gain the main benefits of digitalization.

The results of the approbation of the main provisions of the master's level degree qualification paper will be published in the article of Visnyk SSU, a series of economic sciences.

Year of Master's level qualification paper fulfillment is 2019.

Year of Master's level paper defense is 2019.

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INTRODUCTION

In the conditions of the fast development of information technology and globalization transformations, the business environment is undergoing dynamic changes. Digitalization is a catalyst for innovative development. Technological changes have led to new opportunities, but new obstacles have appeared, such as rapid technological changes, high complexity, changing in customer needs and legislation. Digitization causes structural changes in sectors and their impact are different, and it leads to questions about the impact of this process on the global tendencies of development of the international business environment. Many scientists have been examined the impact of digitization and digital technologies on business processes. Various aspects of this issue have been explored by well-known scientists and economists, among whom significant contributions have been made by David Eder [6], Christoph Buck [6], D. Schallmo [10], C. A. Williams [10] and others.

Tasks of this research are the study of theoretical bases of digitalization, and digital transformation in international business, practical impacts of digitalization on global trends of development of business, considers modern digital tools and challenges for companies that strive for technological innovations.

The purpose of master's level degree qualification paper is to study the theoretical foundations of digitalization and to analyze the practical effect of digitalization and digital technologies on international business.

The object of study is the processes of digital transformation of international business.

Study subject is the impacts of digitalization processes on global trend of development of international business.

In the master's level degree qualification paper we used such general scientific methods of scientific knowledge as analysis, synthesis, abstraction, prediction, generalization, idealization, induction, deduction, analogy. The comparative method has used when considering in the relevant sections of the master's paper of foreign

experience of digital transformation (sections 2.1, 2.2 and others), and the use of the historical method has allowed to analyze stages of digitalization as a global process (section 1.1) and separately among countries (sections 1.3, 2.1, 2.2).

The scientific novelty of the obtained results is that:

- 1) defined the main stages of digital transformation in the enterprise,
- 2) proposed practical approaches to solving problems related to digital transformation of the company,
- 3) characterized European, Korean and American experience of digitalization,
- 4) described classification of high and less digital intensive sector/country,
- 5) defined the main trends of the digitization of the Ukrainian agricultural sector,
- 6) described successful examples of digital transformation on Ukrainian agrarian companies.

The practical value of the obtained results consists in the possibility of developing on the basis of the master's paper specific proposals for companies interested in digitalization and efficiency of innovative technologies.

The results of the work will be published in the article of Visnyk SSU, a series of economic sciences.

1 THE THEORETICAL ASPECT OF DIGITAL PROCESSES IN BUSINESS

1.1 The concept of digitalization and premise of the emergence

100 years ago, people did not know about computers: entire teams of specialists carried out calculations and made analytical decisions independently. Much later, mechanical and electromechanical devices appeared that facilitated human labor. Today, digital technology does this work, and only a few people can perform complex arithmetic operations in the mind, but lose to the computer in the speed.

Digitization, digitalization, and digital transformation are three terms we use for many years but often in the wrong sense. In this section, we get an exploration of the differences as they do matter.

The term "digitalization" comes from the English language. According to K.O.Kuprina and D.L. Khananova, digitalization is a way of digitizing any kind of information [1]. A.V. Halapsis takes a somewhat different position on this issue, defining digitalization not as a way, but as related to the tendency to bring into electronic form the various kinds of information used by a person. However, despite the dominance of such views in domestic scientific circles, such a definition of the phenomenon under study does not correspond to its real essence. Misunderstanding is caused by the absence of exact analogs of foreign terms in the national language, which leads to confusion in their perception and understanding [2]. However, the term "digitalization" has not yet received a stable phonetic sound in Ukrainian. For the first time the concept of "digitalization" was used in 1971 by Professor Vachal in American literature, who in his work considered the social consequences of "digitalization of society" and the shortcomings of the transition to electronic computing systems.

In Ukraine, this term has been widely used in recent years. And increasingly it can be heard from the chairmen of various companies. From a business perspective, digitalization is the use of electronic technologies to modify a business model for

profit; transition to digital business practices. This term has become a sign of the modern era.

Scientists associate several aspects with digitalization in today's world. For example, the growth of globalization, this is happening with the help of digital technologies, which in turn contributes to the development of the economy beyond the national border. Subsequently, digitalization, informatization, and globalization lead to the fact that the borders between states will be blurred and this will lead to cultural changes, as well as will affect the capital, goods, and people themselves.

It should be noted that the concepts of "digitization" and "digitalization", as well as in Ukraine, are quite often used as synonyms in foreign scientific articles. But, as S. Brennen and D. Kreis point out, digitization and digitalization are two conceptual terms, although sometimes used as identities. But after careful analysis, we can conclude that there are clear differences between them. Referring to the Oxford English Dictionary, researchers say that digitization means the process of transforming analog streams of information into digital form. And digitalization means initiation or increase of use of digital computer technologies by organizations, industries, countries. According to some scientists, the term of digitization is approaching automation. To sum up, we can note that digitization and digitalization are the starting points on the road to all-encompassing digital transformation. However, they are only the first stage of digital transformation. Digital transformation is broader than digitalization as a tool to transition to digital business. It needs far more links to be established within the digital transformation strategy.

The technological change continues to hold our attention. Now we live in Industry 4.0. Let us consider at history. Until the end of the 17th century, physical labor existed in the industry. Then machines appeared, those driven by water and steam, which led to an increase in production volumes. It was the first industrial revolution. At the beginning of the 20th century, mass production became a reality thanks to the invention of electricity. Then with the advent of information technology, the next revolution took place. It was caused by automation in the second half of the 1900s. And the fourth phase of the industrial revolution became a reality

In view of the emergence of cyber-physical systems. Now people live in a time when technology is developing rapidly. Technology is changing our interaction with the physical world. In addition, technology makes many professions and social functions unnecessary, so those who invest in good education and in the development of unique skills that machines don't have will be able to stay afloat and keep up with the times [3].

1.2 Features and stages of business digitalization

Digitalization processes are driving forces that change the modern business. Nowadays we have a progressive merging of physical and digital worlds. This encourages companies to integrate, for example, the Internet of Things and Services into production processes. Most changes are disruptive and radically remodel existing companies, and current business models become obsolete and replaced by new ones. It is common knowledge that a business model (BM) describes a company by answering the questions "what it does", "what it offers" and "how the proposal is made" [4]. According to recent research conducted by Ernst & Young [5], digitalization has the greatest impact on such elements of the business model as internal infrastructure management and customer relationships [6].

Start of digital processes can occur at the level of individual elements of business or the whole company. The customer provides guidance to the level of novelty, but digitalization can also affect one's own business, partners, industry, and competitors. In 2017 German economist Sabine Berghaus has developed a series of phases (phases) of digital business transformation (see figure 1.1).

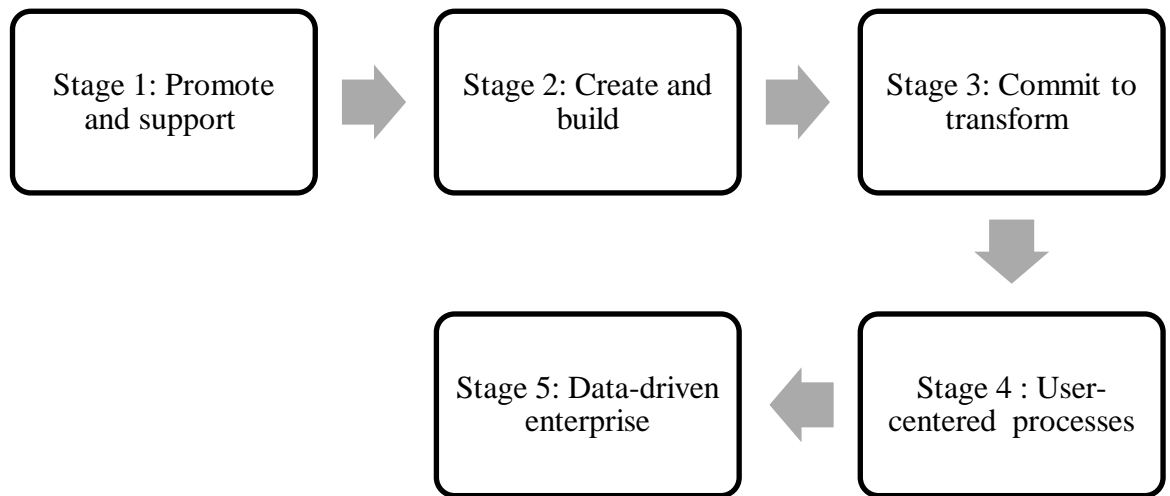


Figure 1.1 - Stages in Digital Business Transformation [7]

At the first stage, managers actively promote the idea of the need for the starting digital processes within the company, and also strongly encourage any projects related to digital transformation. Digitalization should be understood as a project of continuous strategic change. The IT- department provides needed information and technologies. In the second stage, the company begins to test and slowly launches digital innovations in internal processes, as well as in communication with customers. At this stage, the company provides a systematic assessment of new technologies and their further implementation. The third stage involves the total change of culture of doing business and organizational structure in order to conduct a complete digital transformation. Experts are involved to train employees. Already at this stage, the company can quickly respond to any changes, and routine processes are fully automated. At the fourth stage, customer service is improved along with the improvement of internal processes. Customers can share their ideas on the digital transformation of the company. Customer requests are periodically reviewed. And the final fifth stage is characterized by the fact that the company has all the factual data. And based on it, the company makes business

decisions about plans expenses, collects analyzes the customer base through various channels.

Another approach to the digitalization of business has German economists D. Schallmo, C. A. Williams & L. Boardman. They created their own roadmap which based on existing theories about the business model and digital processes [8-10]. This roadmap for digitalization of business is explained in figure 1.2. Figure 1.2 represents the various phases and activities of digital transformation of business.

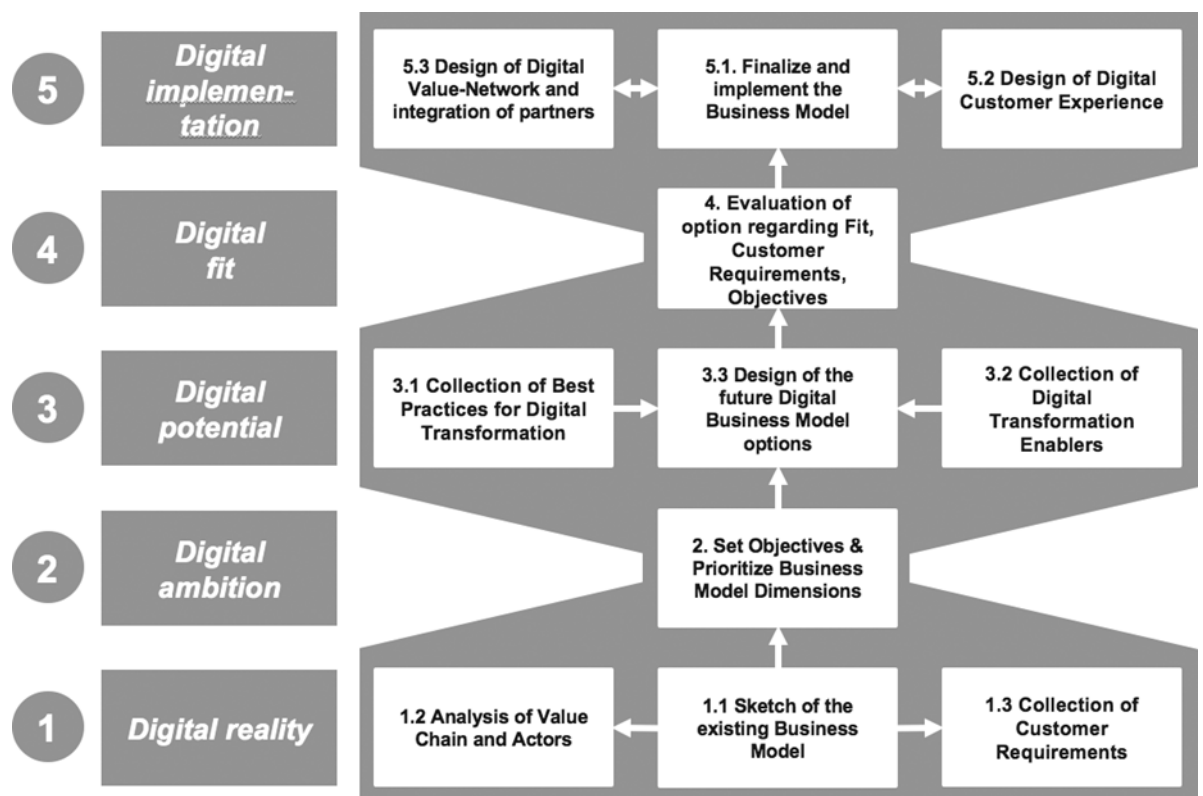


Figure 1.2 – Roadmap for digitalization of business [10]

1. **Digital Reality.** In this phase, the company should describe its own existing business model; provide a value-added analysis related to stakeholders and a review of customer requirements. This will allow the comprehension of Digital Reality for the company in different operations.

2. **Digital Ambition.** Based on the previous stage, the company defined the objectives of digitalization. These goals show a connection between finances, space, time, and quality. The second stage suggests which objectives should be considered

for the company and its business processes. Afterward, objectives of business digitalization are prioritized.

3. **Digital Potential.** Within this stage, best practices and tools for the digitalization are established. This phase like a starting point in terms of the design of a future digital model. For this reason, each business element has different options, and then these elements combined logically.

4. **Digital Fit.** The phase looks at choices for the pattern of the digital transformation, which are evaluated whether the new option lent itself to the existing model. This ensures that the company fulfils customer needs and that the company's goals are achieved.

5. **Digital Implementation.** The last phase comprises the final implementation of the digital processes to the company. In the case of digital implementation, employees can pursue other combinations of options. The implementation of digital processes includes making a detailed drawing of digital customer experience and digital systems that represent integration with partners. And also resources and capabilities are picked out in this phase.

So, in this section, we have set out to better understand which distinguish features digitalization has in case of its implementation in the company and how organizations tackle their digital transformation and also have considered stages of business digital transformation.

1.3 Modern tools of digitalization of international business

In this section, we consider four categories of digital tools for the company. Figure 1.3 detailed shows these tools. It looks like radar with different tools and applications.

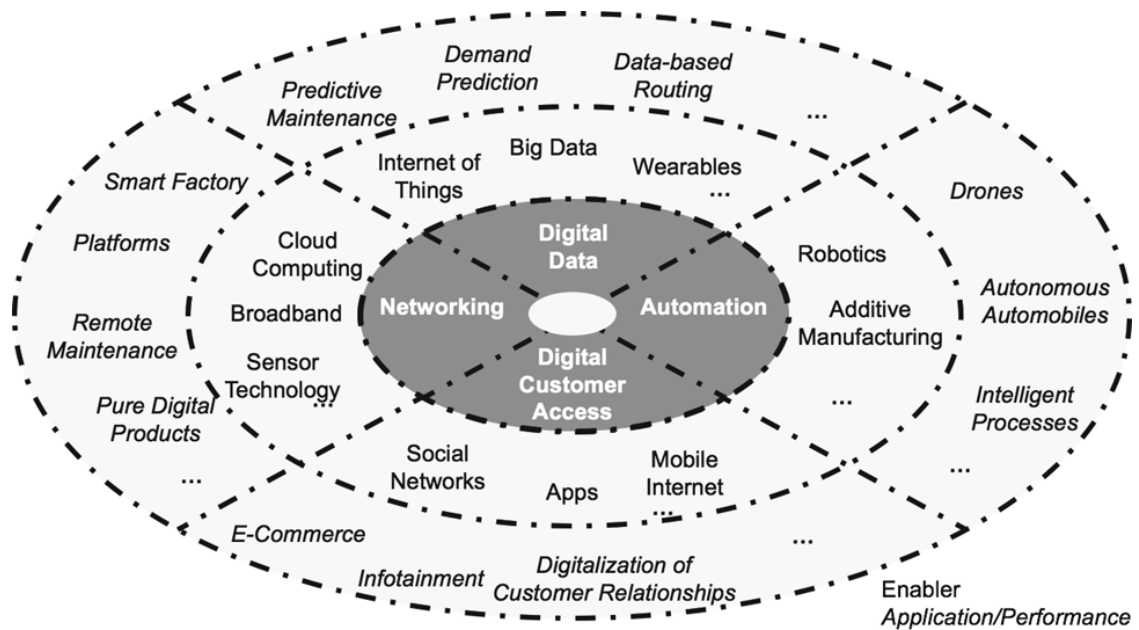


Figure 1.3 - Digitalization tools of business [10]

So, we have four categories of tools:

1. **Digital Data.** This group of tools facilitates and improves business processes in company due to the collection, processing, and analysis of data. so, the company can make predictions and decisions efficiently.

2. **Automation.** These tools imply artificial intelligence technologies that enable autonomous work and self-organizing systems. It makes possible lessens error rates, increases speed, and reduce operating costs.

3. **Digital Customer Access.** This group of tools provides direct access to the customer due to the mobile internet. Thus, the company makes available high levels of transparency for clients and can provide new services.

4. **Networking:** Mobile and wired networking of the VAC (value-added chain) provides for the synchronization of supply chains. Reason for this is the high-speed telecommunications, which cause a reduction of innovation cycles and production times.

The company can supplement more tools as needed.

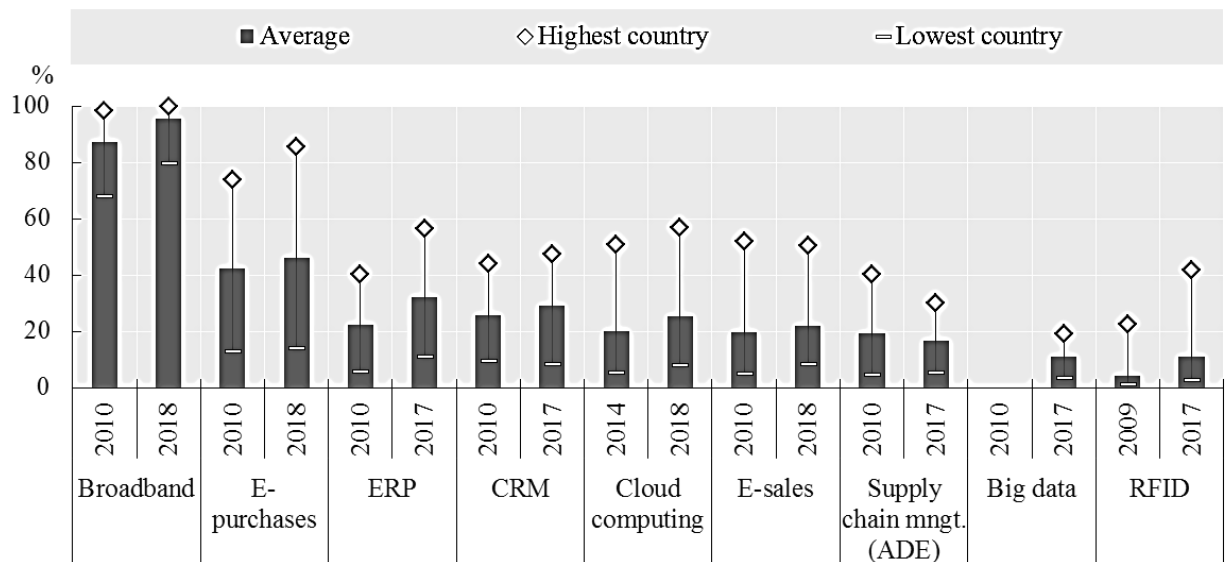


Figure 1.4 - Diffusion of selected ICT tools and activities in enterprises
2010 and 2018, % [11]

Nearly no business today is run without (Information communication technology) ICTs, but the intensity of implementation ICTs tools into business processes to vary. It depends across countries, industries, and firms. Figure 1.4 shows in percentage how many enterprises (with ten or more persons employed) use different digital tools in their activities. For instance, in developed countries 100% enterprises use broadband (means both fixed and mobile connections with a download rate of at least 256 kbit/s.), when provide their business activities. Traditionally, the poor and less developed countries lose out in using ICTs tools, as they do not possess enough knowledge, resources or financial power to make it.

2 THE DIGITAL GLOBALIZATION ERA AND ITS IMPACT ON GLOBAL BUSINESS

2.1 Digitalization of industries: digital and less digital intensive sectors across countries

In this section, we consider the intensity of digitalization by sectors and countries. Besides, the section proposes a rating of sectors according to the extent to which they have gone digital. The rating accounts for some of the key aspects of the digital transformation and acknowledges that sectors vary in their development and adoption of digital technologies. Some sectors (e.g. telecom and IT services) are placed at the top of the rating among different sectors, while others are placed in the bottom of the rating of digital intensity (e.g. agriculture, mining and real estate). The classification of sectors based on the latest data. It is undeniable that the sectors positioned in the middle, are engaged in the digital processes, but at different speeds.

Let's begin with understanding the context of digital intensity. It's the level to which digitalization drives industries and enterprises. In our work, we use an MGI's Industry Digitization Index for the United State and Europe, which shows a huge gap between digital leaders and stragglers. The McKinsey Global Institute's Industry Digitization Index uses many indicators which present information about digitalization of assets, usages, and workers.

The figure A.1 shows the estimate of the index by sector for the 15 European countries. And figure A.2 demonstrates uneven digitalization in the USA, taking into account 27 indicators (that are most important to estimate the level of digitizing of companies and industries).

On figure 2.1 presents Americans and Europeans industries by different levels of digitalization. We see that primarily the key sectors of the country become more digital. We can also conclude that the country has an important influence on the digital rate of sectors.

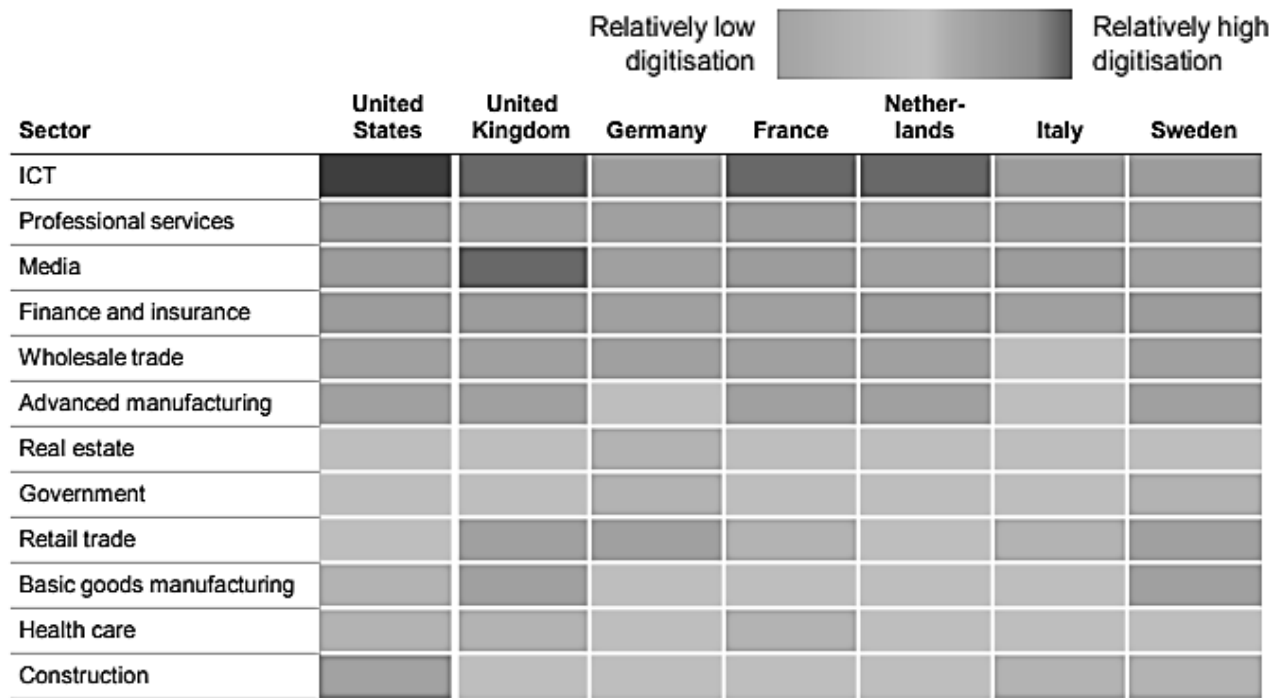


Figure 2.1 - MGI Industry Digitization Index of the United States and European nations [12]

It is commonly known that large firms seek to implement more digital tools in their business processes than small ones. It follows that the countries which have a small number of enterprises with big size may be further away from the high level of digitalization. For instance, 60 percent of companies in the United States are large (with more than 250 employees), and only 8 percent are small enterprises with 10 employees. By contrast, only 30 percent of large firms located in Italy, which is one reason for the low level of business digitalization [12-14].

As mentioned above, such sectors like Media and finance are at the digital frontier, but traditional sectors are well behind. According to the report of MGI and McKinsey, we can observe that there is also a huge dissimilarity between countries, especially between European countries. For example, France uses at 12 percent of its digital capacity, Germany is at 10 percent, and the United Kingdom is at 17 percent. Europe falls behind in its ability to make large unicorns (means a startup company with a value of over \$1 billion), but the emergence of new digital technologies gives a reason to be confident and optimistic. Europe makes go at only 12 percent of its

digital potential, compared with the United States’ 18 percent. Furthermore, we can see that some European countries have a low overall level of digital intensity. The economies of European countries is digitizing inequitably, with large inequalities among sectors and companies. All of this shows that countries (in the form of a government) can impact the degree of digitalization within their domestic economy. As we can witness, Europe gives way to the USA on digital potential. Even large sectors in Europe such as professional services, wholesale trade, and real estate are further behind compared with the USA. Moreover, some countries like Great Britain and the Netherlands are a net exporter, while Italy is a net importer of digital services. That’s why today the United States is a large maker of global content and creator of big digital platforms [15].

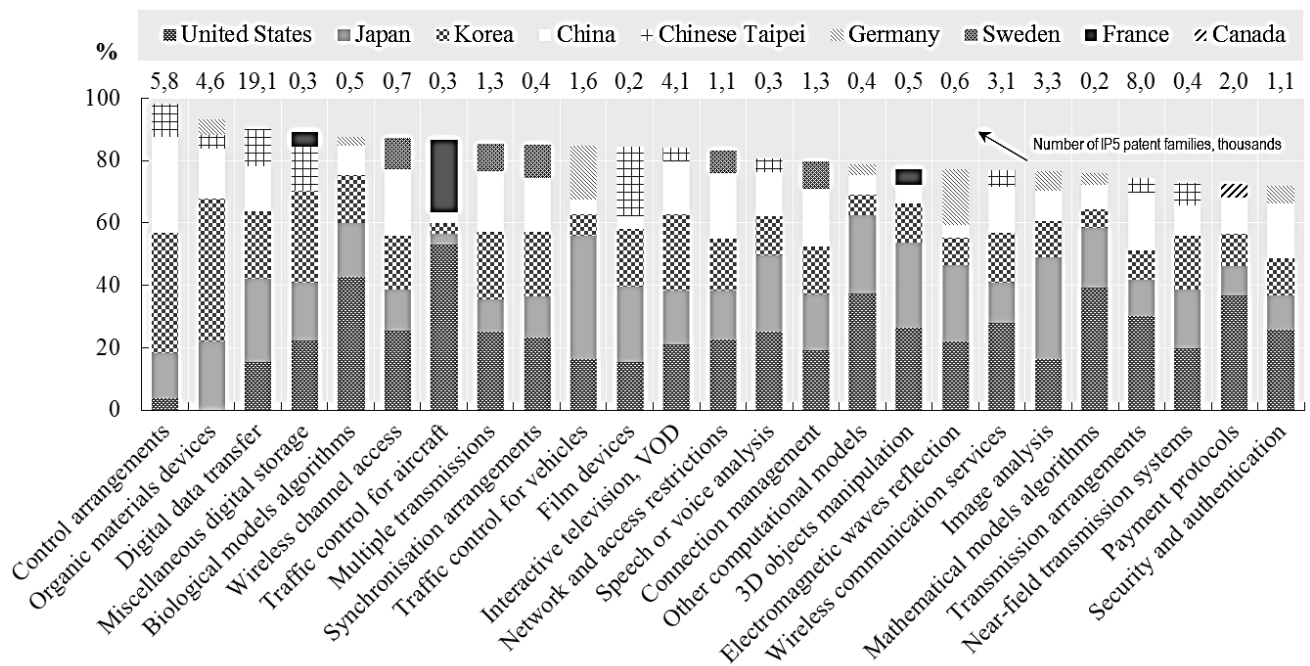


Figure 2.2 - Top countries in digital transformation by sectors, 2013-18 [13]

To achieve better results, in figure 2.2 we have described five economies are in the lead in digital technology. During 2013-18, five economies had for 72% to 98% of the 25 digital technologies. Japan and Korea played an important role in the development of all ICT tools, making 7- 68% of all activities in ICT. The United States led the development of digital technologies in traffic control for aircraft (53%)

and biological models algorithms (43%) and mathematical models (39%). China was one of the five economies developing digital technologies. Some European countries, namely Sweden, Germany, and France, also highlighted among the five players in emerging digital technologies.

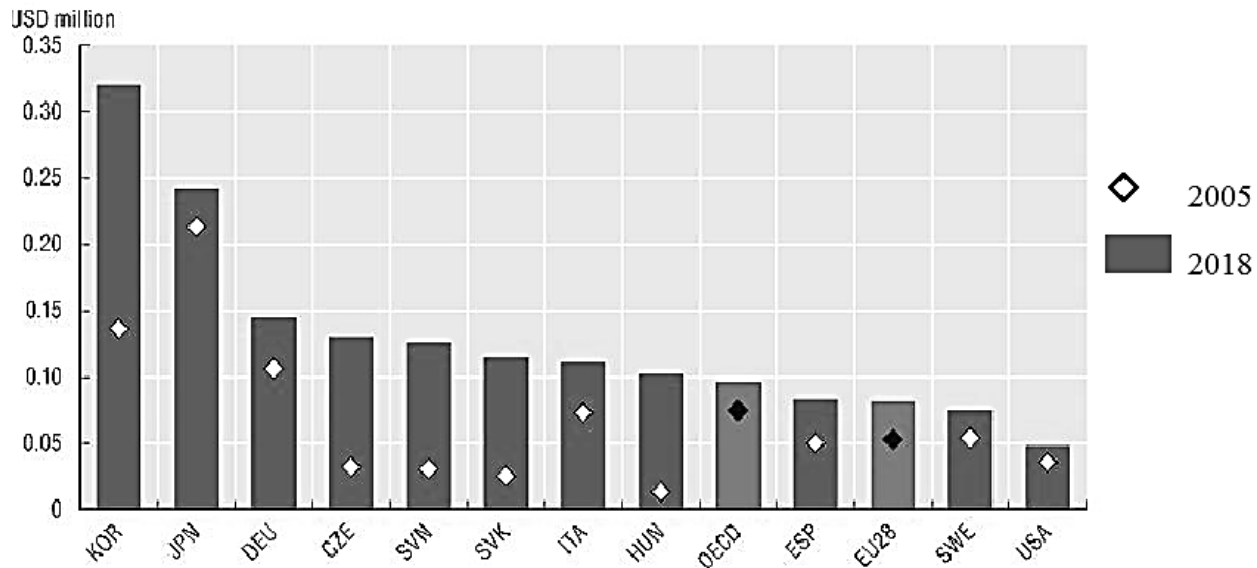


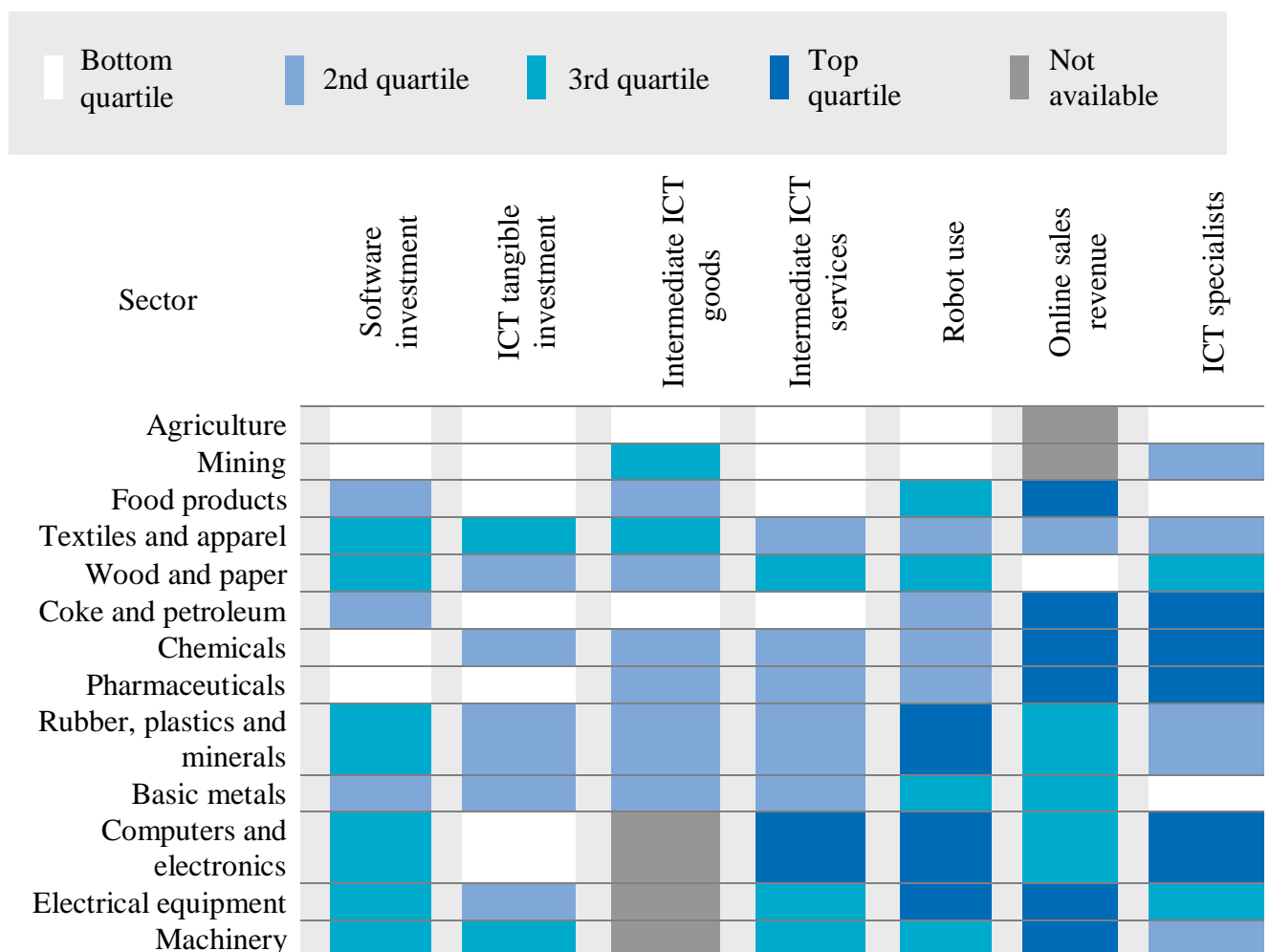
Figure 2.3 – Top robot intensive economies in 2005, 2018 [16]

We would like to focus on the progress being made in Korea. In particular, we emphasize that the digitalization can be like a force for the next production revolution in the country. Using digital technologies, Korea gets productivity benefits. And also in the nearest future, the Korean digital transformation will have significant effects on the work of companies and employees, which will bring serious changes in labour markets [16]. Figure 2.3 shows Korea and Japan have a head place in respect of robot intensity. By changing skills and social policies in the right direction, Korean governments can make sure the conversion works for all its clients and workers, companies and regions. Korea's economy has many to obtain from the widespread digital transformation that is reshaping countries, economies and societies, and which can lead to the next production revolution. Today, Korean enterprises effectively use new technologies, from 3D printing to artificial intelligence. Thereby they can raise productivity and growth by using increasingly autonomous machines, reducing errors

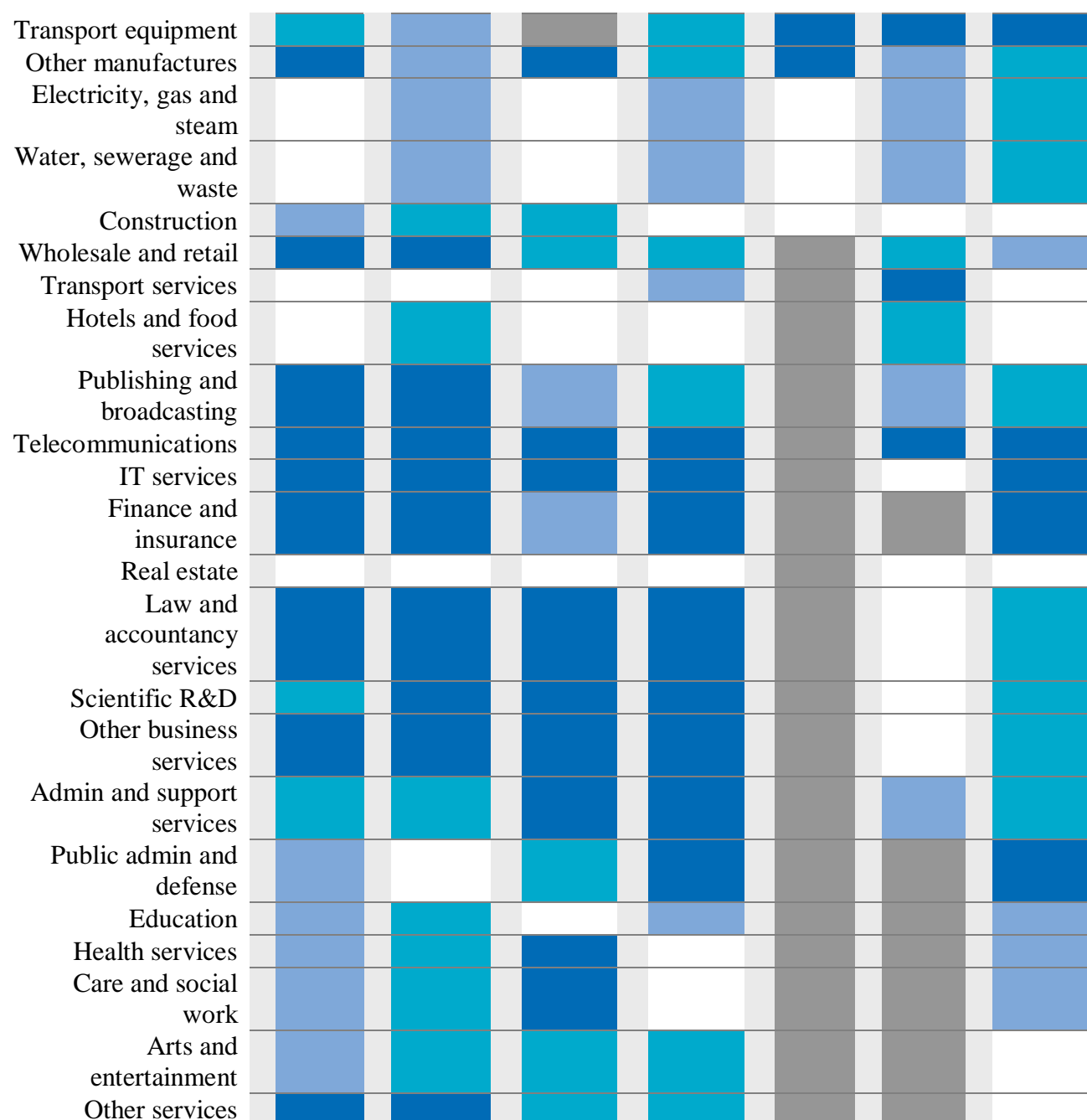
in production processes, diminishing the necessity in some production lines, making some jobs protected from harm and danger, allowing an intelligent approach to creating new products, processes, and services. Government and business should make additional attempts to uptaking of digital technologies if they want to succeed in the modern world, increase productivity, generate new business opportunities, and provide new services for clients. Korean companies are among the leaders on broadband connectivity (over 99% for small and large enterprises). However, only 60% of Korean firms have a website (compared to 90% in the five Nordic countries). In addition, 36% utilize planning software (in comparison to 56% in Deutschland firms). Merely 13% use cloud computing services (in contrast to 57% in Finland). Increasing the level of skills, as written above, is important.

We think that governments can also help some sectors due to setting some new policies to stimulate digital trends.

Table 2.1 – Taxonomy of sectors by quartile of digital intensity, 2016-18 [12]



Continuation of table 2.1



Sectors use digital technologies at various paces. In table 2.1, dark blue color shows the highest level of digital intensity (globally among OECD countries) like sectors of Telecommunications, IT services, Finance, and insurance, Publishing and broadcasting, and also Law and accountancy services, Scientific R&D, and Other services. As you can see the sectors that have a high level of digitalization are colored in dark blue, while sectors with the lowest rate - white. But we should take into consideration that, for instance, data on robot use are inaccessible for services, online

sales data are unaffordable for Agriculture, Financial Services, Mining, and others. The indicators are exposed as sectoral intensities. Each sectoral value are averages across countries (based on information for Australia, Austria, Denmark, Finland, France, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom, and the United States) and years. Sectors in the middle of the ranking represent a high level of diversity by assuming that they participate in digital transformation at different speed [14].

Artificial intelligence innovations are being used in wide fields. So, figure 2.4 shows key fields of implementation of artificial intelligence. As we can see artificial intelligence technologies are typically established deeply in computer technologies and are frequently associated with audio and visual technologies, IT methods, and medical areas.

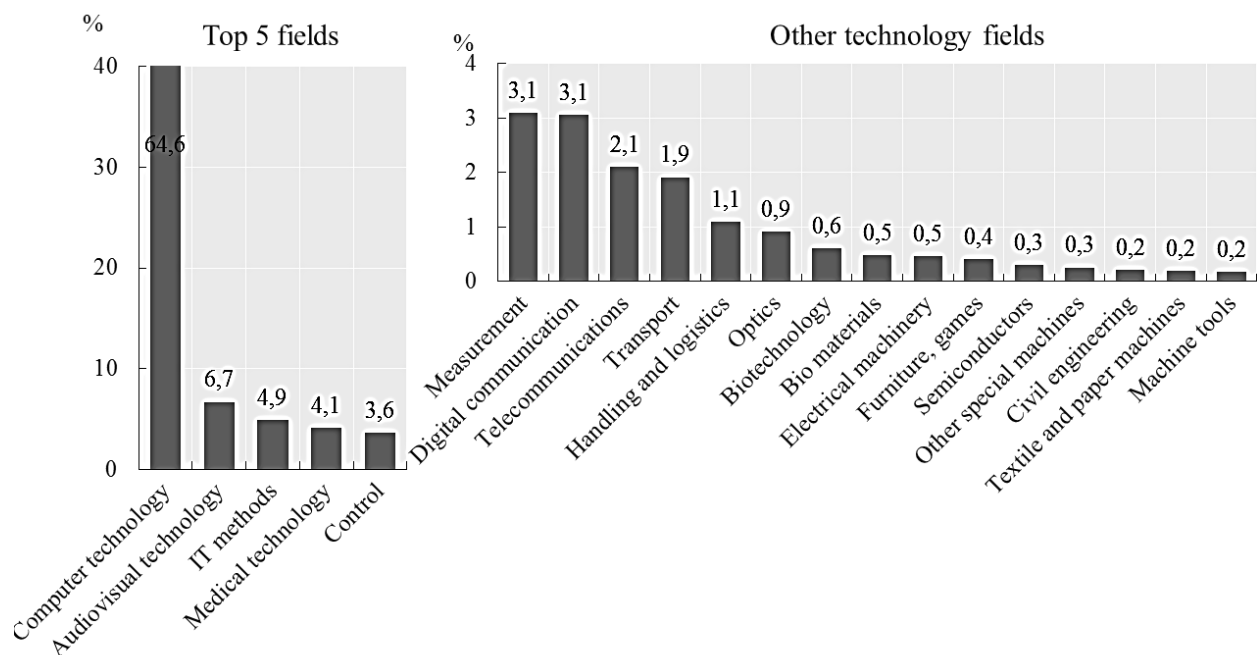


Figure 2.4 - Top fields of application of artificial intelligence technologies, 2012-18, share of application fields in artificial intelligence patents [17]

From these arguments, one must conclude that digitalization differs hugely among sectors and companies within the country. The countries under study (the USA, European countries, some Asian countries) go into the next stage of

digitalization. The country doesn't not only expanding participation but immediately tries to grow and move with the digital leaders.

2.2 Assessing the impact of digitalization on society and industries

Section 2.2 considers the impacts that digitalization has on international business. Digitalization allows a huge potential to intensify firm productivity and finally living standards of society. For instance, cloud computing provides business access to flexible data storage and data processing, online platforms can make firms' interactions with consumers more running, and artificial intelligence allows to automate complicated business tasks.

So, let's try to understand the business impacts of digitalization. Digital technologies are a part of business processes, together with other factors like labour, capital and knowledge with the purpose to increase productivity. The primary evidence of the economic impact of digitalization will emerge in data of some enterprises/sectors before displaying in macro-statistic.

Data for the study was collected from some countries (especially from countries that provide Digital Manufacturing initiatives: China, France, Germany, Korea, Japan, Singapore, US). The data mainly centered on the existed of digital applications in firms. The presented results were gathered mainly from small and medium-sized enterprises (SMEs). Furthermore, estimates of digital impact are mostly self-reported by companies. But it is important to understand that digitalization impacts might include operations in different operational and strategic processes. In other words, not all the gains reached can necessarily be associated with digital transformation. Some digital tools could change the organization of sectoral/firms and value chains; this impact might be very different. Indicators of the practical impact of digitalization on international business were obtained from three main sources: 1) we have considered national strategies and studies from different

countries; 2) we have used cases from companies on a different level; 3) and also academic literature.

At first, let's look at the impact of digitalization according to the major national government initiatives around the world. Presented data was taken from original public sources. Generally, estimates are provided by government bodies.

Table 2.2 shows a variety of indicators used to describe the impact-driven by digitalization. We use the term expected impact which provides the measurement of indicators on a national level such as productivity, value-added and jobs. For instance, governments estimate the potential impact of the digitalization include productivity increases of up to 30% by 2025 in Germany and 30% by 2024 in Singapore. In Japan, an increase in labor productivity in the manufacturing sector could be enhanced by 2% annually, after the expected using of robots by 2020. The Estimates of add value vary significantly, showing differences in the size of countries. The widespread perception that the digitalization of industry contributes to a negative impact on jobs, however, has not been borne out. All estimations say about a forecast that digital transformation will help to job creation.

Among the smaller number of countries, we have found the real observed impact. Interestingly, Singapore and Korea inform the same levels of positive changes in manufacturing efficiency (up to 30%).

Table 2.2 - Selected indicators on impact of digitalization

Country	Expected impact						Observed impact			
	Productivity	Manufacturing efficiency	Value added	Jobs	Manufacturing output	Cost reduction	Other	Manufacturing efficiency	Cost reduction	Other
1	2	3	4	5	6	7	8	9	10	11
Australia			Digital technologies contribution to GDP AU\$140-250 billion in 2010-2025 [18]		25%-35%, Above trend by 2026 [19]					
Austria	Productivity gains increase in 20% for the next 5 years [20]	€5-10 billion, Efficiency potential with the adoption of Industry 4.0 technologies 2015-2025 [21]				2.9%, Per year, for the next five years [20]	Average turnover increase on 2,6 % per year, over the next 5 years [20] €6-14 billion, and also will be increase Sales potential by 2025 [21]			

Continuation of Table 2.2

1	2	3	4	5	6	7	8	9	10	11
Canada			\$34 billion, Contribution of the “Digital Technology Supercluster” to GDP by 2025 [22]	50 Created by the “Digital Technology Supercluster”, 2017-2027 [22]						
Germany	Productivity gains of ‘up to 30% by 2025’ with the adoption of digital technologies in the industry [23]	Annual efficiency gains will increase up to 3,3% because of the adoption of digital technologies in the industry, 2016-2020 [23]	€425 billion is the sum of cumulative value added digitalizing industry, 2016-2020 [23]	390 new work places will be created by Industry 4.0 from 2015-2025 [24]		2.6% Annually with the adoption of digital technologies in the industry, 2016-2020 [23]				
Spain			€120 billion Accumulated growth in value added with the adoption of digital technologies, 2017- 2025 [25-26]	1.25 million work places created in the next 5 years with the adoption of digital technologies [25-26]	€35 billion Accumulated growth in GDP with the adoption of digital technologies 2017-2020 [26]					

Continuation of Table 2.2

1	2	3	4	5	6	7	8	9	10	11
Japan	Labour productivity in manufacturing industries increase over 2% [27]		\$270 billion Value added by advanced manufacturing by 2020 [28]							
Korea				Potential growth of output in major industries is expected to increase on 2% [29]		30 new 'Smart Factories' created for SMEs by 2025	30% Result from 2,800 digital applications primarily in SMEs [29]	15% Result from 2,800 digital applications primarily in SMEs [29]	45% reduction defective product ratio 16% reduction in delivery time Result from 2,800 digital applications primarily in SMEs [29]	
Singapore							30% Improvements in efficiency achieved by local companies with the adoption of digital technologies; 15-20% Increment in output observed by SMEs that have applied digital technologies [30]			
US							20% (primarily SME results, case studies) [31-32]			

However, despite continuing digitalization, multifactor productivity growth (also known as total factor productivity is a set of factors affecting output, with the exception of labor and capital costs. It can be seen as a measure of long-term technological change or technological dynamics) has decreased distinctly across high and low digital intensity industries over the past decades (see fig. 2.5). Benefits from digitalization have not shaken out equitably across industries/companies. Companies with larger access to important skills have benefitted more than others. These companies already inclined to has more productivity than other companies and digitalization has brought about to increasing their lead (Figure 2.5). From these arguments, one might conclude that diversity in productivity levels across companies has grown, particularly in high digital intensive industries.

The total productivity benefits from digitalization have not been enough to compensate for these negative impacts of the financial crisis. This distinguishes nowadays from the late 1990s, when a new stage of digitalization (associated with the spread of personal computers) raised productivity growth, especially in the United States. But today we encountered with “modern productivity paradox” which formulated by Robert Solow in 1987. This term related to the insufficient productivity gains from the digital transformation.

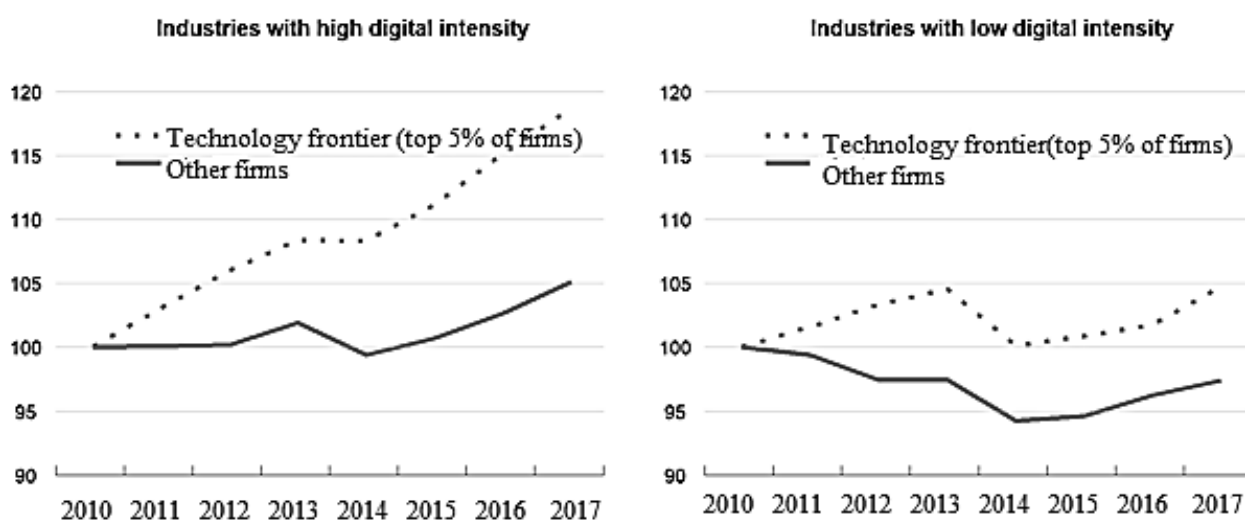


Figure 2.5 - Average multifactor productivity across industries with high and low digital intensity, index 2010 = 100 [33]

This seems to confirm the idea that the existing paradox in business about productivity gradual decreasing at the same time when the level of digitalization are quickly growing in some sectors. It puts forward that highly productive firms should complement digitalization processes with good management and digital skills among employees. The difference in rates is particularly uttered in manufacturing sectors.

Benefits from digitalization have not spread proportionately across companies. Firms having better access to important managerial, organizational, and technological skills have received more advantages than others. These companies already strived to be more productive than others and digital transformation has given to extending their lead.

The paradox and the phenomena of the drop in productivity growth have divided scientists. Some cite evidence in support that the speed of digital transformation, one of the main drivers of productivity growth, is slowing down, or that new technologies do not have the potential to increase the level of productivity as past digital changes did [34]. Others propose a more optimistic variant, putting forward that some new technologies have the potential to make productivity growth, but time is needed. This may be because of adoption lags of digital tools, adjustment costs, and the lack of complementary investments in intangible assets [35-36].

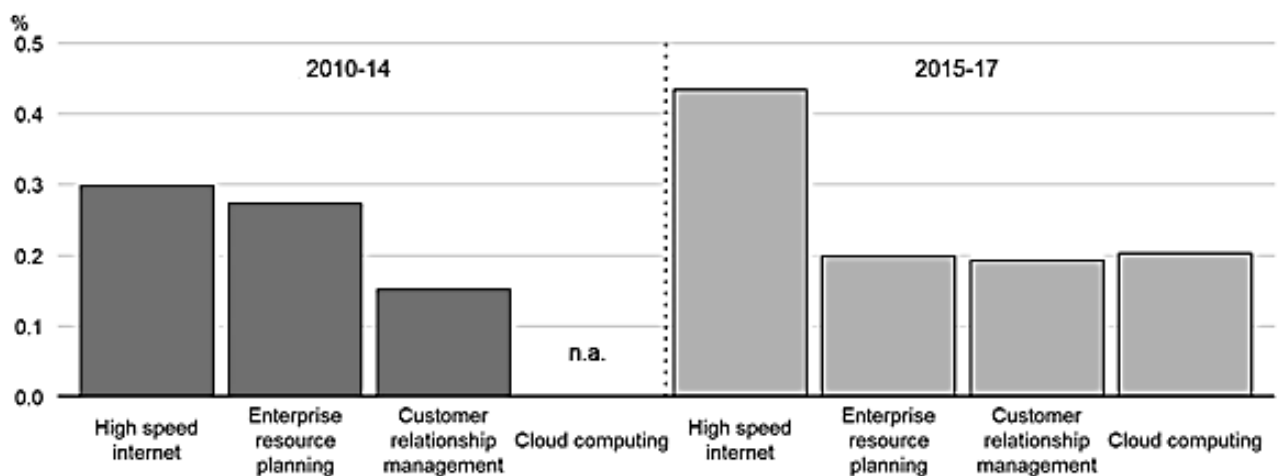


Figure 2.6 - Annual gain in productivity related to using digital technologies (average EU firm) [37]

The arguments we have presented show that productivity gains are varied across companies and depend on the level of skills, management and organization processes. In fact, reaping benefits from digitalization needs companies to restructure production processes, which in turn necessitates high-grade management and technical skills that the most common for highly productive big firms.

A lot of literature has recorded a positive link between the taking of digital technologies and company/industry-level productivity. For instance, OECD approximate that a 10-percentage point increase in using high-speed broadband internet (cloud computing) by firms is associated with a 1.4% increase in productivity for the average company at industry level after 1 year, and 3.9% after 3 years across countries (see fig.2.6) [37] The results which have shown in figure 2.6 imply that benefits from digital transformation have been valuable and may have increased productivity levels by about 1% every year in the average company if the advantages from the technologies took into account are added up.

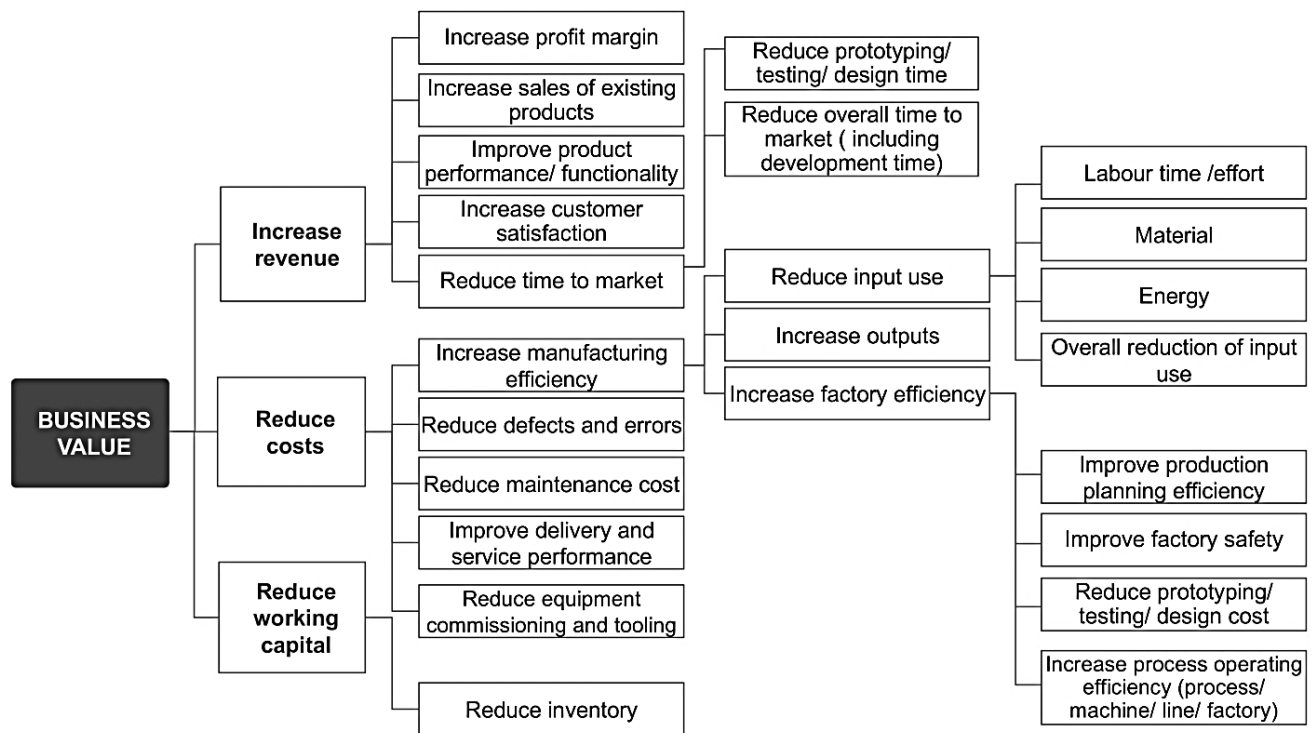


Figure 2.7 – Impact of digitalization on business

It would be unfair not to mention about other important advantages of digitalization for international business. The figure 2.7 describes the three main groups of impacts on business value. The major impact is to increase value, reduce costs and reduce working capital. Below we take a look at the impacts of digitalization on the economy with implications for international business namely for international trade. The point is the internet provides increased access to international markets for companies.

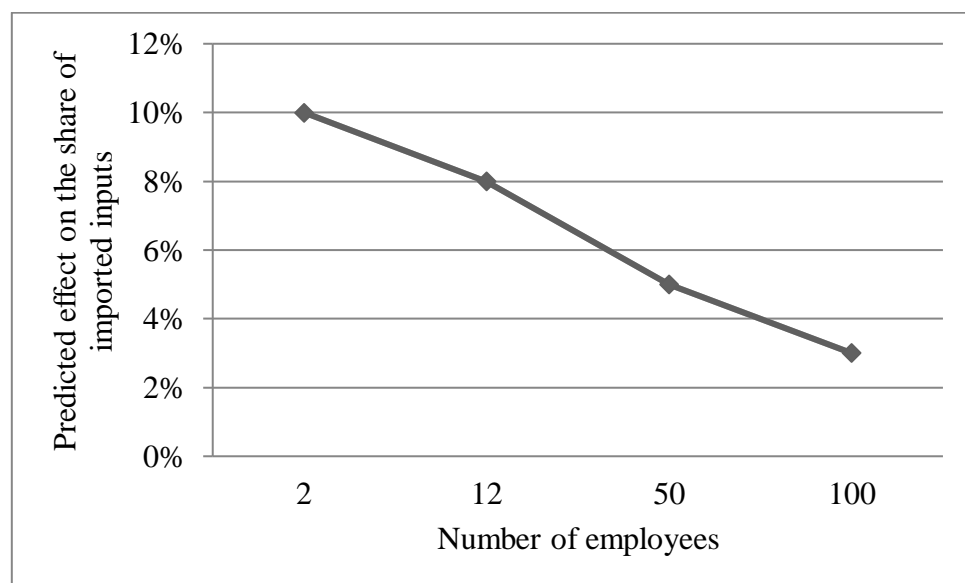


Figure 2.8 – Effect of using ICT on the predicted share of imports for production [38]

Using World Bank statistic data, we can demonstrate that, companies that have a website have a greater impact on the share of importing and exporting for SMEs, than for large firms. The figure shows that small companies of 2 employees with ICT tools would have a predicted share of import that is 10 % points higher than a company of the same size that is not used digital technologies. Similarly, a company of 12 employees would have a predicted share of 8% points higher. It is significantly more elevated than for larger firms (see fig. 2.8). The powerful effect of using digital instruments is for exporters firms with between 15 and 25 employees (see fig. 2.8)

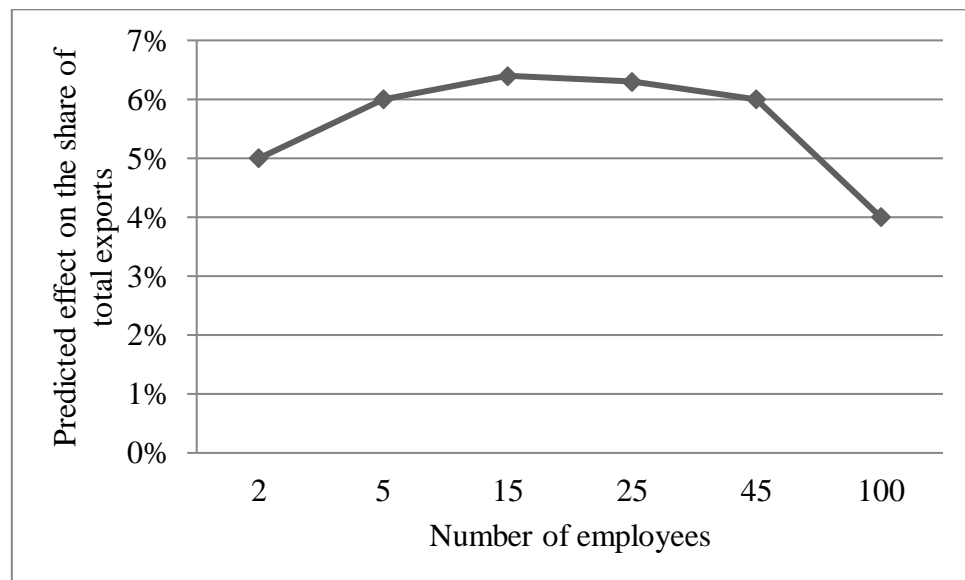


Figure 2.9 - Effect of using ICT on the predicted share of exports out of total sales [28]

We cannot ignore the fact that digital technology can support SME trade. There exist a lot of reasons why access to digital tools can enhance SMEs' participation in international business processes through trade. Access to the Internet can help companies to overcome some barriers and costs to trade but especially for SMEs as well as improve access to foreign markets by means of online sales and e-commerce [39]. Only enterprises which have resources and managers wishing to adopt innovative digital technologies can use of these opportunities [40]. So, let's consider the cost-effective properties of digitalization. Eager to make an entrance to international markets, enterprises can face higher costs than larger companies, not enough R&D and skills among employees, and meager understanding of foreign markets and international regulations. Nevertheless, digital technologies can reduce this negative impact. With regard to market research, the internet provides access to different types of information, including information about potential clients or state regulatory. Additionally, online and mobile banking, modern financial tools (for example, online crowdfunding) can supplement traditional finance for small enterprises. For instance, using Alibaba's e-Credit Line can become an important trade finance resource for SMEs. Apart from reducing costs, access to information 24

hours a day also has an important time-saving benefit. Digital technologies can also help cut costs related to regulatory working by making information available online. For instance, today companies can get information about government tax or export requirements due to the internet and get information through to state bodies utilizing e-documentation service.

After we have considered twofold impacts of digitalization on the company's productivity and other advantages for international business, let's move to think about effect on the total employment. Labour markets among sectors and countries are changing. An approximated 14% of jobs place face a high probability of automation and another 32% are likely to change over the next 10 - 20 years. However, up to this time anxieties about massive unemployment which related to technological transformation have not became an actual fact.

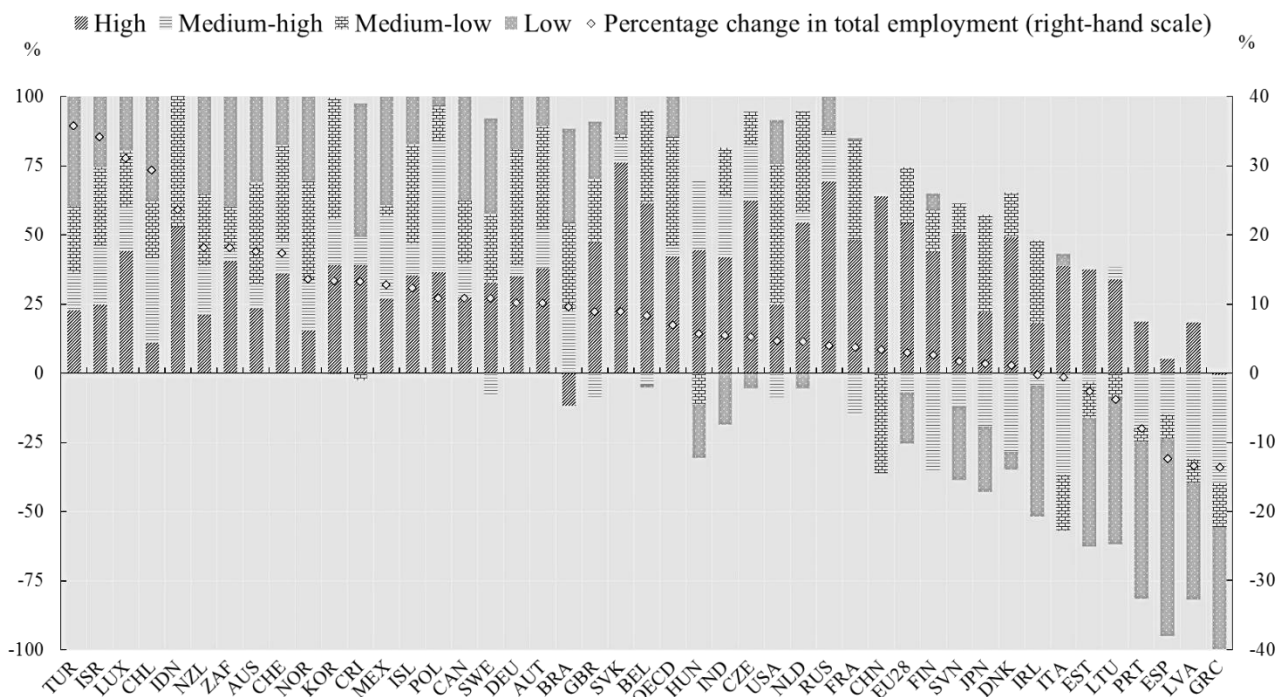


Figure 2.10 - Contributions to changes in total employment, by digital intensity of sectors, 2006-18 [41]

It is true that in some countries employment rates are at enough high level, and that's digital-intensive companies offer new job places. Between 2006 and 2018, total

employment in the OECD grew by roughly at 7% (38 million jobs). And highly digital-intensive sectors gave 16 million new jobs (see fig. 2.10).

Workers with high-skilled can benefit from digitalization because their skills are mobile to other jobs or more likely to contribute extra features to technological development. Conversely, inexperienced workers with a low-skilled face more in need of train or requalification. As more routine and intensive tasks often require lower professionalism. In case those workers wouldn't retrain, they get wage cuts or lower-skilled jobs.

This chapter explains that digitalization has supported productivity, but that worldwide productivity does not increase constantly owing to the lack of key complementary resources like technological and managerial skills among managers, capital, innovation, and financing resources in companies.

2.3 Key challenges of digitization for international business

In this chapter, we try to understand some distinctive digital transformation challenges for international businesses. But the company which wouldn't draw the attention at innovations will can't path forward. Some enterprises often change slowly, and many of the digital transformations come quickly but don't occur without difficulty or cheaply. It is true that many big and even international companies take on a little risk when starting innovative transformations. Therefore this situation is often disappointing. Bearing that in mind, we want to identify and decide five challenges that confronted firms that aspire to adopt a strategy of digitalization: 1) the opposition of employees to the digitalization; 2) absence of common strategy of digitalization; 3) lack of expertise to provide digitalization initiatives; 4) organizational structure; 5) limited budget.

Let's address the first challenge. Employees go through changes very difficult, namely digital transformation. But it is riskier when changes are not happening.

Digitalization is absolutely necessary for company that wants to make international success. Managers should provide lenient policies, be consistent and open to dialogue, and keep employees involved in the transformation process.

The second challenge relates with lack of clear strategic plan. It is clear that the company needs a strategy of digital transformation by describing a vision of changes processes, goals and required resources. It is essential to create a department responsible for digital changes. And it's also important to remember that not one person or department can make transformation successfully, but the whole company, each of the staff. The department in charge of innovations can execute on part of the strategy. Always firms should begin by thinking of the stakeholders - the company's customers. Let it aid in understanding what the company does, why it does the digital transformation. To a greater degree than ever, customers appreciate how they experience brands. Most businesses assume that customer service will be an important method in which they can differ from competitors. The main drawback is a limited time in which companies will adopt a new strategy. Business companies should understand that they should focus on points of convergence with customers not simply increase sales [42-43]. It requires companies to check out the current situation and estimate the level of pleasure of each client. Today people need to make a company that puts the client in the first place. When the company realizes customers, their needs, it could easily provide digital transformation, survive after this, and created a better business.

The skills and techniques are required to receive successful digital transformation; one is unsustainable without the other. So, the third challenge is lack of expertise. The starting of the digital process on enterprise will bring with technical challenges and it needs the people with the right skills and experience in the team. Managers need to help employees to upgrade digitally literacy and encourage them to develop skills needed in the process of transformation. The right way is to get over to invest in people. But if there are not enough own resources then the company can look for outsourcing services and find business partners in a technological area [42].

Today, the fourth issue facing international companies in digital transformation is obsolete organizational structure. One should note here that the company shouldn't allow the existed organizational structure to specify the digital future. The digital transformation may require changes in staff roles, departments or reconstruction of organizational structure. The company should consider all existed business processes can change. In fact, changes can allow the team to discard all of the unnecessary processes. The organizational structure should be flexible—because the frontier of technology doesn't exist, data and the customer experience will change in step with the times, and the company should keep up date.

And the last challenge is not endless financial resources. The company can meet with budgetary limitations that may restrict the digital transformation campaign. First of all, managers should be prepared for it. After the company calibrates policies, it uses the financial resource inherent in the company as a check to see the real situation and the way of future. High skilled people should design a plan with several stages over several years, in no case don't compromise the company due to the budgetary limitations [42].

So, we have considered the widespread challenges shared by international companies. Overall, company's managers and staff should remember to create a strong foundation first. If the company will be pursuing the path of innovations constantly, all of the benefits are reached. From these arguments, one might conclude that challenges should be tackled as they come and do everything possible to prepare ourselves in advance.

3 THE IMPORTANCE OF DEVELOPMENT OF DIGITAL PROCESSES FROM THE PERSPECTIVE OF AGRICULTURAL SECTOR OF UKRAINE

3.1 Key trends and digital technologies in the agricultural sector

Digital transformations are starting to change every ring in the global value chain as well as the food chain. In developed countries, farmers effectively use digital technologies that are making farm processes more understandable and efficient. Here are the five global trends that contribute to and enhance the digital transformation of agriculture.

Today the population is rising and as a result increasingly in demand for food. According to a UN FAO report, the world population is expected to increase to 10 billion by 2050 and increase agricultural demand by 50 percent, which will cause an increase in requests for fruits and vegetables, foods which are riched with proteins [44 - 48]. The second reason - declines in the income of farmers. According to the US Department of Agriculture, approximately farm financial gain is at a record low level for 12-year. Besides, it should not be forgotten about the new types of consumers which are among the generation of high digital and tech proficient customers. They have a lot of expectations based on their own experience in other digital intensive sectors. At the same time, food companies should be for changing consumer tastes and behaviors, for instance, buyers making the demand for organic products, etc. Another reason is that traders often need more information about the projected crop volume and in the consequence face increasingly volatile prices [49-59].

Of course, there are a number of other problems, but using digital tools in the farming processes can help address these challenges and pushing to the next agricultural revolution. On figure 3.1 we present four major digital trends developing the agricultural sector.

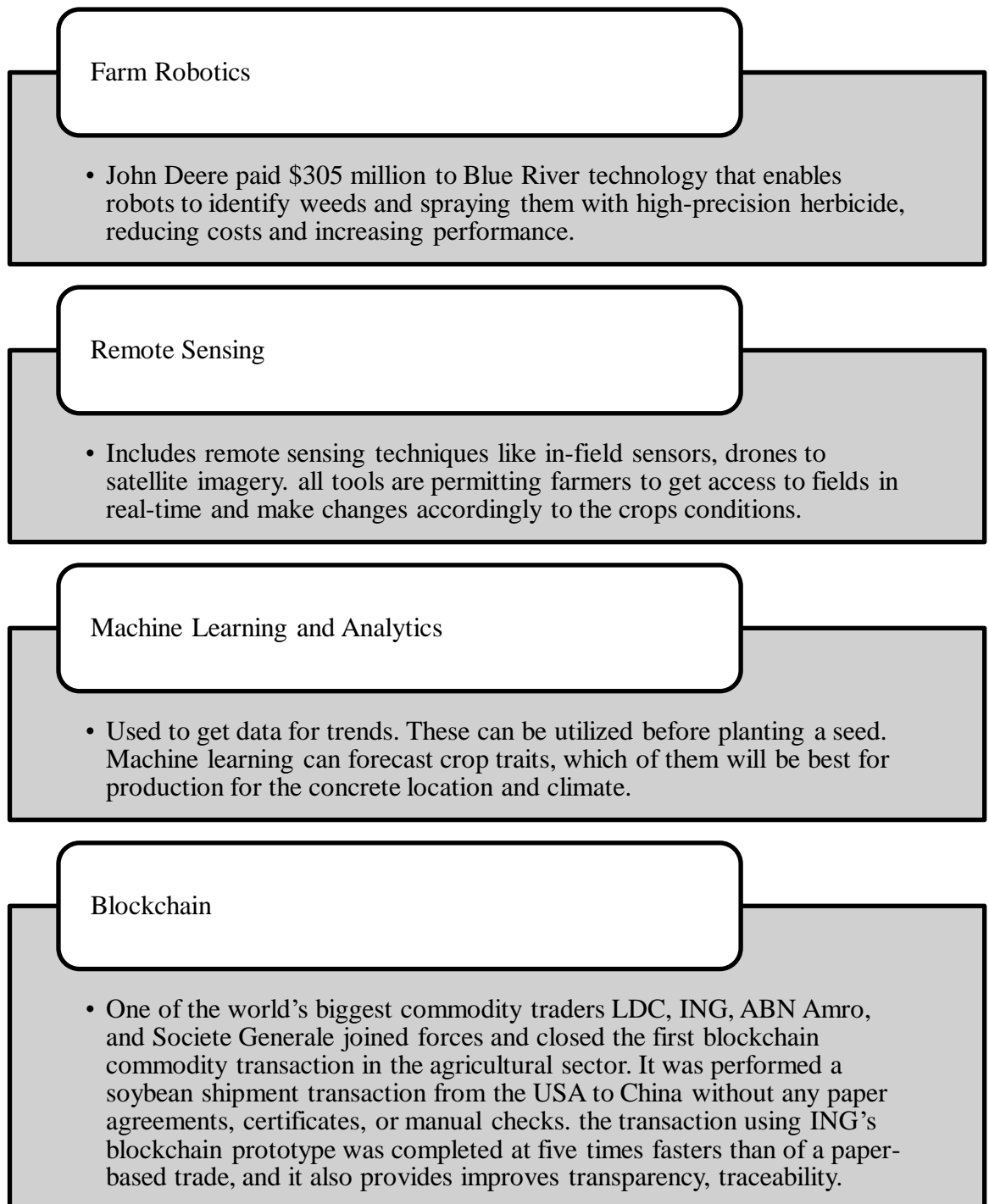


Figure 3.1 - Major digital trends in agricultural sector

So, these digital technologies are bettering agriculture through reducing labor costs and time manufacturing, and also presenting analytics, supporting farmers to be in charge of their land.

3.2 The successful results of the digitalization strategy of Ukrainian agricultural enterprises

In agriculture, the cost of error and the risks of losses are so high. In one season, management makes at least 40 key decisions. The quality of products, the implementation of the right work at the right time, the success of the season, fundamentally depends on these decisions. Now, some agricultural enterprises operate traditionally - decisions are made on the basis of inaccurate and irrelevant data. It is difficult for such farms to know what is happening on the field with plants and to monitor the progress of work on the field. And that's the digitalization in agriculture helps to solve the problem of making the most accurate and effective decisions. At one time, the changing of horses to tractors led to a jump in productivity. Nowadays, digital tools will lead - and are already leading - to a simplification in decision making. The ultimate goal is to increase profitability per hectare of land.

In Ukrainian realities, digital transformation is primarily needed for crop production and livestock farming. For large enterprises (100 thousand hectares), digitalization is especially important. Digitalization helps increase yields, in some cases by 10-15%. In addition, it helps to increase productivity up to a twofold increase in output, reduce the consumption of material assets by reducing their losses, and this is up to 50% savings. In the field of livestock, significant results on the implementation of digital technologies are not yet accessible. The main trend in the digital transformation of the agricultural sector in Ukraine is increasing efficiency by reducing costs; this includes reducing cases of stolen, improving the forecast and planning of harvest on the next season. Considering the factors that limit the development of the digital transformation of the agricultural sector in Ukraine, three problems should be identified. The first is the lack of competencies of the owners of the agricultural business. The second is a limited number of companies that are really capable of implementing digital transformation. Third, the proposed solutions are

unsuitable for small and medium-sized farms. The agricultural sector of Ukraine includes a wide variety of types of agricultural producers, both large vertical holdings and very small farms. The deterrent is the conditions of agricultural activity, which as a result leads to difficulties in creating affordable digital tools for each farm. It should also be noted that software developers almost do not have data on the activities of enterprises that are used to create applications and services. At the moment, owners and employees of small farms have low digital literacy. The state also plays an important role in the process of transformation of the agricultural sector. There are a small number of “paperless” government services in the agricultural sector. This reduces the ability to collect data on agricultural enterprises and does not provide incentives to increase digital literacy among farms.

Unfortunately, today no one can say for sure about the problems of the digital transformation of the agricultural sector in Ukraine, its drivers and its level. In general, there are no monitoring and evaluation of digitalization processes in Ukraine. Therefore, the factors of the digitalization of the agricultural sector of Ukraine cannot be estimated and compared with the world level. These factors include state policy and strategic planning, regulatory framework for the use of technology, a management system and mechanisms for financing digital transformation, the level of development of human capital in the sector, research and innovation for digitalization of agriculture, availability of favorable business environment, reliable and secure information infrastructure, digital platforms and the latest digital technologies. Perhaps we should also point out other problems. For instance, it is a limited knowledge about modern technologies and the results of using on farms by agribusiness. In addition, to get the benefits from digitalization, farms should spend money and time now, while the result will be tangible later.

In our view, the most important driver for the development of the digital processes of the agricultural sector in Ukraine is the successful examples of those who have already begun to earn more by using digital tools as a means of reducing costs and increasing profits. By the way, the state could also contribute to the development of digitalization agribusiness.

Turning to Ukrainian experience, let's look at several Ukrainian agrarian companies Kernel, LLC "Vitchyzna", MHP, Agro trade.

Kernel hit record levels with Big Data. This allowed them to form the basis for a detailed and complete analysis of processes and decision making. Confirmation of the correctness of their strategy is the record EBITDA (Earnings before Interest, Taxes, Depreciation, and Amortization) in 2018 - \$ 170 million, of which Kernel obtained \$ 25 million through the implementation of digital technologies. Today, 100% of Kernel fields are covered with high-quality RTK signals, which are the basis for precision farming. All fields are covered by meteorological monitoring. Kernel expanded the base of its own weather stations, organized a joint project with other companies. The company controls all fields using satellite imagery, copters, as well as IT tools that agronomists work directly in the fields. This allows you to analyze the processes occurring in production as efficiently and quickly as possible. Kernel also developed its own unique forecasting algorithm of yield based on satellite monitoring. This allows the company to accurately predict gross grain production, provide quality logistical services and manage the sale of products under forwarding contracts. In 2018, the algorithm was tested in all fields of the company and has proven effective [60].

Digital transformation projects were launched at MHP. The transformation concerned internal and external processes, simplification and automation of decision-making between supply and external suppliers, sales and production, sales and customers, marketing and end-users, farmers and financial services. MHP actively uses sensors for precision farming: sowing seeds, fertilizing, watering. Digitalization does not facilitate work, but increases labor productivity, that is, it changes the number of employees per hectare. It is not just about physical work, but about tasks that require high concentration and attention: measurement, control. Today, all this work is automated. In addition, digitalization has an impact on the cost. Depending on the level of digitalization, the savings on the wage fund is 5-10% [61]. As a result, digitalization increases labor productivity, reduces the amount of routine debilitating work and saves from 5 to 10% of resources.

Another agricultural holding with a completed cycle, Agro trade, cultivates more than 65 thousand hectares of land in Kharkov, Sumy, Chernihiv, Poltava and Dnipropetrovsk regions. The Cropio system allows saving at the entrance to fields up to \$ 0.5 per year per hectare. This figure includes a reduction in the cost of fuel, oil and lubricants and labor resources. The system has changed logistics processes. For example, the company wanted to reduce fuel consumption by 10 liters (from 80 liters to 70). That is, the company will not need to buy 700 tons of fuel a year, at a price of 1 \$ per liter - this is over \$ 700 thousand. It should be noted that this is a simple task. In this case, company can reduce consumption to 50 liters. As we can see, the savings is a reflection of the fact that the company is changing logistics. Other advantage is as follows. Controlling the plant of seeds, fertilizers and plant protection products allows reducing their inappropriate and incorrect use, which usually ranges from 10 to 30% [62]. According to the American PrecisionAg Institute, using variable application rates can save at least 10% of fertilizer per hectare in year. In practice, this looks like this: the price of ammonium nitrate, which is used to fertilize winter wheat, is 7500 UAH / t. It was possible to save over 23 thousand UAH on more than 560 hectares of land. Today, drones are very popular among farmers. So, Agro trade has decided to keep up with the trends. If we compare drones and conventional equipment, we will see a huge difference. One machine provides fuel delivery. The second is responsible for the supply of water and chemistry. The third machine transports the sprayer or tractor itself. And each machine has a driver, and sometimes with an assistant. To do a similar work using the drone, 2 people are enough. The average productivity of equipment is the processing of 100 hectares of area in 10-12 hours. Using of drones allow to make a very precise fertilizer and the economical use of plant protection product. It is possible to save about 15-30% of plant protection products thanks of their very accurate and uniform application. In addition, it requires a much smaller amount of water. Water savings can account for 90%. A 200-liter water tank will be enough to process 40-50 hectares of land.

Here it is worth mentioning the well-known issue. Contracts about delivering agricultural goods to the port contain an average percentage of losses during carriage

- 5% by weight (natural losses, thefts). With an average export of grain crops of 50 million tons per year [63], the losses are a huge 2.5 million tons. One solution is installing GPS-tracker on vehicles that provide services to control the movement and stops.

Table 3.1 took into account the views of agribusiness experts and agricultural producers and describes the main benefits achieved through precision farming technologies.

Table 3.1 - Impact of digital technologies on the farmers [64]

Field of application	Practical results	Describing
Precision fertilizer application	\$65 billion market based on an 18% improvement in yields	The company needs to use software for precision fertilization applications. Key tools include fertilizer sensors and applicators which mounted on a tractor, drone data, satellite data, weather data analysis. Companies can install some programs that include Trimble, Monsanto, aWhere, FarmSolutions, FarmersEdge [65]
Precision planting	\$45 billion market based on a 13% increase in yields	It includes multi-functional planters and software which collects data about aggregation and then analyzes. Deere, Great Plains, Raven provide such services for farmers [66]
Autonomous driving technologies	\$45 billion market based on a 13% yield improvement	There are can reduction a fleet of tractors. The successful companies in this area: MobilEye, Bosch, Delphi, Conti, TRW, Quanergy [67]
Precision spraying	\$15 billion market based on a 4% better in yields	The successful result is achieved by the Combination of field monitoring with the on-the-ground tools. Current companies that offer such products can be Trimble and Raven [68]
Precision irrigation	\$35 billion market based on a 10% improvement in yield	It can be providers like T-L Irrigation, Lindsay Corporation, etc [69-70]

So, in this section, we have explored how businesses in agriculture can successfully combine their operational task and technology trends, like sensors, the Internet of things, drones, big data, autonomous driving. We think we could safely say that Precision Farming in the case of digital technologies can lift the crop yields and help to make the right decisions.

CONCLUSIONS

In conclusion, we can say that the Fourth Industrial Revolution is leading to digitalization and innovations that changing many sectors, countries, and the world as a whole.

In this context, this work investigates the role of the digitalization for the global trend of development of international business, analyzes the practical impact of digital transformation, with a particular focus on productivity, efficiency, level of employment, costs, revenue, engaging in international trade.

It is vital for international companies today to invest in the latest technological tools enabling the digital transformation of business. We have described some of them according to the classification: digital data, automation, digital customer access. We have described sectors and countries depending on the level of digitalization. We have taken into account key aspects of the digital transformation, and have realized that sectors vary in their improvement and adoption of digital technologies. Some sectors (telecom and IT services) successfully do business using digital tools, unlike agriculture, mining, and real estate. The arguments we have presented in this work suggest that digitalization is already transforming global business, and technologies are applying in each country. Some countries are welcoming this new stage with enthusiasm and getting economic benefits, but some are less interested. Europe has many profoundly successful digitized companies, but the fact is that the European countries are dependent on imports of American digital technologies. In general, Europe is far not being fully used the potential of digitization as opposed to Korea, Japan, America.

We have explored the significant benefits of digitalization for international business. The major impact is to increase value, reduce costs and reduce working capital. Also, we have taken a look at the impacts of digitalization on international trade. For instance, online sales and e-commerce provide increased access to international markets for companies, online crowdfunding supplements traditional

finance, e-documentation service facilitate pay tax, online government service provides information about export requirements online.

To draw the conclusion, we can also say that digital technologies can increase productivity. But, despite digitalization, the level of productivity has decreased in most countries in the past decades. We have discovered that it has to do with the fact that technology spread has been unequally effective across companies. The positive results from digital transformation have been among firms with good human and organizational capital. And that's a key to harnessing their full potential. Only enterprises which have resources and managers wishing to adopt innovative digital technologies can use of these opportunities.

One cannot deny that digital transformation does not an easy process. And some company can face with some challenges like opposition among, absence of strategy of digitalization; lack of expertise, outdated organizational structure, and limited budget. One should, nevertheless, consider the problem from another angle. If the company will be pursuing the path of innovations constantly, all of the benefits are reached.

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ANNEXES

Annex A

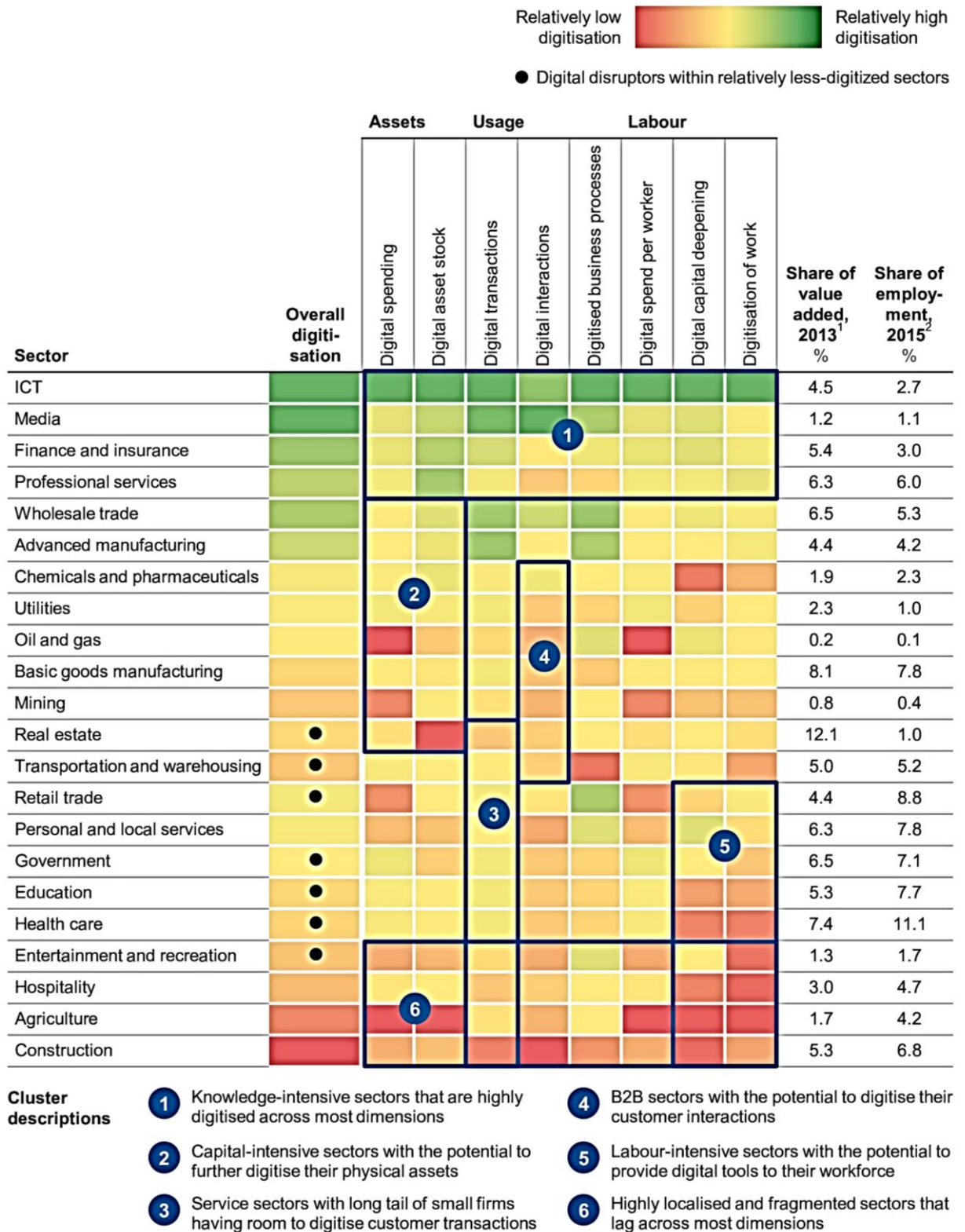
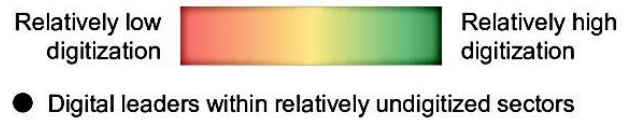


Figure A.1 – The MGI Industry Digitalization Index for Europe, 2015 or latest available data



Sector	Overall digitization ¹	Assets		Usage			Labor			GDP share %	Employment share %	Productivity growth, 2005–14 ²
		Digital spending	Digital asset stock	Transactions	Interactions	Business processes	Market making	Digital spending on workers	Digital capital deepening			
ICT										5	3	4.6
Media		1								2	1	3.6
Professional services										9	6	0.3
Finance and insurance										8	4	1.6
Wholesale trade					4					5	4	0.2
Advanced manufacturing										3	2	2.6
Oil and gas		2								2	0.1	2.9
Utilities										2	0.4	1.3
Chemicals and pharmaceuticals										2	1	1.8
Basic goods manufacturing										5	5	1.2
Mining										1	0.4	0.5
Real estate	●									5	1	2.3
Transportation and warehousing	●								5	3	3	1.4
Education	●			3						2	2	-0.5
Retail trade	●									5	11	-1.1
Entertainment and recreation										1	1	0.9
Personal and local services										6	11	0.5
Government	●									16	15	0.2
Health care										10	13	-0.1
Hospitality	●	6								4	8	-0.9
Construction										3	5	-1.4
Agriculture and hunting										1	1	-0.9

- 1 Knowledge-intensive sectors that are highly digitized across most dimensions
- 2 Capital-intensive sectors with the potential to further digitize their physical assets
- 3 Service sectors with long tail of small firms having room to digitize customer transactions
- 4 B2B sectors with the potential to digitally engage and interact with their customers
- 5 Labor-intensive sectors with the potential to provide digital tools to their workforce
- 6 Quasi-public and/or highly localized sectors that lag across most dimensions

Figure A.2 - The MGI Industry Digitalization Index for USA, 2015 or latest available data