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What Opportunities and Challenges Were Given for Digital Transformation In 2020? Reasoning the Digital Change Impacted By COVID-19 In Europe*

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Abstract

This paper studies the digital transformation in a business environment and education sector in the context of the COVID-19 pandemic. There is a vast range of practices and technologies used to cope with the pandemic. Organizations were forced to rethink their management systems and reengineer the processes. Even the businesses that had remained reluctant to introduce flexibility in operation and adopt new technologies before COVID-19, got a brief lesson of change and crisis management. People were made to convert daily routines, switch to the remote, and reorganize themselves in many spheres of life. To this end, analysis of the impact on worldwide, agile projects whose main aim is to mitigate the crisis because of the virus outbreak.

Keywords: Digital transformation, technology, new ways of working, education, pandemic, COVID-19.

Introduction

Since the 2000s development of social media, Cyber-Physical Systems (abbrev. CPS), augmented reality, cloud computing, and mobility have introduced changes driven by technology in numerous dimensions. Regarding the literature review on digital transformation (abbrev. DT), the author proposed to categorize this phenomenon due to three aspects: technological, organizational, social. From the organizational perspective, the DT is interpreted as digital changes or improvements in processes, business models, and supply chain. In this perspective, the organization is driven by gathered information, which is analysed and transferred into action, accordingly to BMWi definition (2015). The purpose of the above is to render the organization in a smart way. Martin (2008) states that the technological aspects stand for digitization and automation which is significantly related to business, the public sector, and society. The main focus of the technology transition is to introduce remote operations, management and adapt the infrastructure. All the tech-advanced solutions are made to improve the cost efficiency and quality of products and services, provide savings in operating time and increase the scalability of business models. Lastly, social aspects result in human behaviors, culture, art, and communication. The vast

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amount of information from mass media, applications, and embedded devices enable to create within technology major everyday life improvements.

The technology revolution has reshaped processes, influenced people's mindset, unleashed new behaviors of users, organizational culture, impacted business models and various segments of industries, from manufacturing up to agriculture. All the transformations consist of dealing with digital change, which is a prerequisite to provide the organization's continuity and or sustainable growth nowadays. The DT appeared a phenomenon that can't be avoided regardless of age group, social status, or digital capabilities. Referring to Kokkinakos et al. (2016) findings, the digital transformation state-of-the-art consists of distinct concepts of the considered phenomenon.

Through two decades a digital transformation phenomenon has gained importance by managing dynamic, global changes and enabling competition in new digital reality. Looking broader on digital transformation determines different classifications and theoretical discourses when categorizing DT aspects. Excluding the technological aspects of digital transformation, social, environmental, and economic factors are evolving too. Referring to Bennet and Lemoine (2014) countless papers were published on the VUCA subject, smart and sustainable solutions, which are trendy management concepts interpreting turbulent environments. Today east heads west, in a sense of the power shift in global competition is called Globalisation 2.0. This phenomenon is observed for a couple of years and affects the rapid expansion of the middle class in the emerging markets and introduces new quality in terms of collaboration and communication around the world.

Nevertheless, nobody could even imagine such a gamechanger as the COVID-19 outbreak, the world has experienced since 2020. In contrast to previous strains of coronavirus diseases, which were diagnosed locally in various regions of the world, the COVID-19 is spread on a much larger scale. According to the recent WHO (2020) statistics almost all the countries around the globe are infected, reaching over 113 million cases by the 25th of February 2021.

The high fertility of the virus has initiated government actions to mitigate the risks of the global disaster and economic recession. Top-down restrictions imposed by governments among the countries have changed the global economy, everyday rhythm has slowed down for a couple of weeks. Economies, business sectors, and nations were forced to outage daily operations and changeover the current arrangements in most of the routines.

The entertainment sector, including cinemas, clubs, theatres, sports events has crashed dramatically and these businesses were pushed for temporary transformations, which may change forever. The lockdowns and mobility constraints introduced in European countries have determined one of the most important transformations - the accelerated introduction of digital technologies.

As McKinsey (2020) indicates in the results of surveys, the COVID-19 has accelerated the adoption of digital technologies by several years and this phenomenon appears in the long term. Thereby, the main aim of this paper is to investigate the effects of the digital transformation in the pandemic and highlight their economic outlook.

Selected changes in technological and social area in 2020

The need for change has gained a profound meaning. Digital transformation and digitization as a term, have elevated to higher levels. Technology concepts were applied on a great scale in a very short period to save people's lives and to improve the quality of life during the outbreak. New challenges and opportunities either for technology, people, or the economy were exposed. Many companies that wanted to maintain the operations in pandemic were made to redesign their management systems, ensure cybersecurity, cyber privacy standards, and education in mentioned fields. All of the above were applied for starting with new collaboration models based on flexible and remote work arrangements.

The new way of working for many - remote work, hybrid and augmented reality

The quarantine forced the entrepreneurs to change current ways of working and apply the remote work model where available. The pace of redesigning the operational model was strictly dependent on the flexibility of the information and communication technologies (abbrev. ICT) systems, physical abilities of companies, and their changeover of manufacturing systems. Just as we have repeatedly experienced in the past, the need to rearm production lines for the most desirable products during a crisis happened also this time. The increased demand on the crisis first aid products such as ventilators for healthcare, disinfectants, or protective gloves and masks, created a new source of profits for companies. Global demand for hygienic antiseptics, personal protection, and sanitary equipment has witnessed a meteoric rise since the second quarter of 2020. To briefly illustrate the scale of change in selected industries, and proper change management, the author uses the reported on Statista (2020) estimated revenue published at the end of October 2020 for the over-the-counter (abbrev. OTC)

pharmaceuticals market for hand sanitizers, which gained over US$5,343.1 million in 2020 whereas in 2019 revenue amounted to US$3,188.6 million. This significant increase in revenues is the aftermath of was a higher demand for certain products, intensification of operations either in manufacturing and administration of the businesses.

According to the above, the COVID-19 induced transformation of workplaces caused by top-down restrictions and new safety requirements. Managers decided to become remote or to start the hybrid mode of working, most often the remote model was chosen rather than stationary working. According to the Digital Economy Compass report (2020), the survey carried in 134 enterprises showed that technology, media, and telecom (abbrev. TMT) and IT companies were almost entirely into remote working when other industries had lower shares in this field. This implicates the growing interest in home office equipment and facilitation, which is visible in Google Trends statistics. Thereby, on market, an enlarged consumption of technological hardware goods for householders appeared. Also, definite transformation struck the web conferencing, enterprise collaboration tools, virtual offices, and social software in 2020.

Work-life integration is the aftermath of the growing mobility of workers and the emerging influence of technologies on human lives. The integration assumes the two most important spheres of human activity: work and personal life.

A harmonious blend of these two spheres is supposed to promote mental hygiene and health. Digitization and mobility reshaped the current labor market. In the last few years process automation and robotization, mobile internet development and Big Data impacted the business models and functioning of entire organizations.

Concerning Berger (2020), the pandemic transformation of the way of working into digital workplaces started the end of the traditional workplace. The author indicates that the coronavirus caused the diminished need for office structures. As a new way of working, remote models are expected to stay relevant in the new, post-COVID-19 era. Berger provided a short study on forms of working such as telework or telecommuting, "smart working", working from home, and its blurring aspects between professional and private life. More detailed information about this theme, benefits, and struggles of working from home, is accessible in Berger's papers regarding the current culture of work and crisis management.

When it comes to managerial aspects of new forms of working, it is inevitable to mention the performance of digital workplaces. A Stanford study conducted by Bloom et al.(2015) findings, there is a massive 13% improvement in performance when working from home. This encourages rethinking performance measurement. As current metrics need to be recalibrated to reflect the real effects of work, what may be challenging when work and private life happen in the same space.

Still, the researchers explored positively that resignation at the company decreased by 50% for employees who are allowed for telework. There's no doubt that labor transformation during the pandemic has transgressive nature and influences on the social perception of working.

Digital Education and Online Learning

The house confinement determined many changes in daily routine, not only in business but also in other domains. An increase in broadband communication services usage was caused by social distancing restrictions. Internet access and remote availability have played a critical role in the context of the COVID-19 pandemic. The limited access to traditional learning implied technological challenges for schools and parents, lack of digital skills of teaching crew and youngsters. Up until 2020, education across Europe remained traditional. In the book written by Allen and Seaman (2008) there’s consideration on distance education models, which have been developed since the early 2000s. According to their research the digital content delivery has shown considerable growth in compulsory education. Thereby contributing to the transformation of the education sector across Europe and due to World Economic Forum summit in Davos agenda (2021), attempt to prepare for Education 4.0. This concept is complementary to Industry 4.0. Contributing to UNCTAD report (2019) the main aim of revolution in education systems across Europe is the reduction of existing inadequacies and delivering new skills for the future workforce to pose the threats of unproductivity and social incoherence in the European Union.

Over the last decades, education has become a life-long learning experience. Universities, which are more advanced in e-learning and since over a decade are capable within Learning Management Systems (abbrev. LMS) use a hybrid model of knowledge delivery (Allen, Seaman, 2008) faced challenges to transfer all courses into interactive form with small exceptions to practical courses with no chance of simulation or laboratory classes. Nevertheless, these challenges left a space for creativity and innovation. The application of Virtual Reality (abbrev. VR) technology is a milestone in online learning. Practical skills to be gathered in such virtual training are enabling students and professionals to take interactive learning through digital simulations. The OMS Oxford Medical Simulation company (2021) and Simforhealth (2021) are interesting

examples of how VR technology turned learning to the upper level for healthcare practices, improve performance, and patient safety. Offered VR medical and nursing pieces of training let the healthcare professionals experience knowledge in standardized, evidence-based simulations in a cost-effective way. Global access, great scalability of this solution allow train more personnel without additional resources. This is a great alternative to traditional methods which in pandemic have become insecure and less efficient.

The COVID-19 outbreak is a definite stimulant also for online courses. High expertise knowledge served on renowned universities is no longer a privilege of their adepts. Thanks to the internet, knowledge became an asset to achieve with online platforms for a comparatively low price. The giants learning platforms, like Coursera, EdX Future Learn, noticed soaring interest in offered courses and lectures in 2020. Regarding study on educational technologies (abbrev. EdTech), the forecast for expenditure on EdTech worldwide reaches approximately $22.4 billion US dollars. The overall market for online education is projected to reach $350 billion by 2025, according to data aggregated on the Statista (2020), and considers only the technologies such as augmented reality, virtual reality, artificial intelligence, robotics, and blockchain.

There's a visible trend in digital learning, which consists of knowledge delivery by technology companies. As an example, IBM started the initiative "Open P-Tech" to promote the education for customers on how to interact with IBM produced technologies, including artificial intelligence, cloud computing, and cybersecurity. Regarding digitalization in education business leaders prompt better preparation of graduates for "new collar careers" [Leasor, 2020]. All because of that modern global economy is based on knowledge and information. This implies the growing role of STEM professions (abbrev. science, technology, engineering, and mathematics). The emerging need for highly advanced professionals in data analysis and processing appears due to the growing amount of collected data and big data development. According to that fact, programming and technical lectures were the most desired and best-attended online courses. The increasing social awareness and the willingness to acquire knowledge throughout life undoubtedly owe much to the growing popularity of online learning.

Analytical Overview

The impact of COVID-19 is undeniable, but its influence on different social activities varies among nations, localization, and lifestyles. However, by looking at the data from European nations, companies, and people, some general trends can be derived. From the national perspective, the researchers Hall et al. (2020) from Oxford, have created an index that measures the impact of restrictions and policies on a given country. The index aggregates the countries' imposed restrictions like school closing, public events cancelations, restrictions on gatherings. Exhibit 1 shows these stringency indices for five main economics in Europe: Germany, United Kingdom, France, Spain, and Italy.

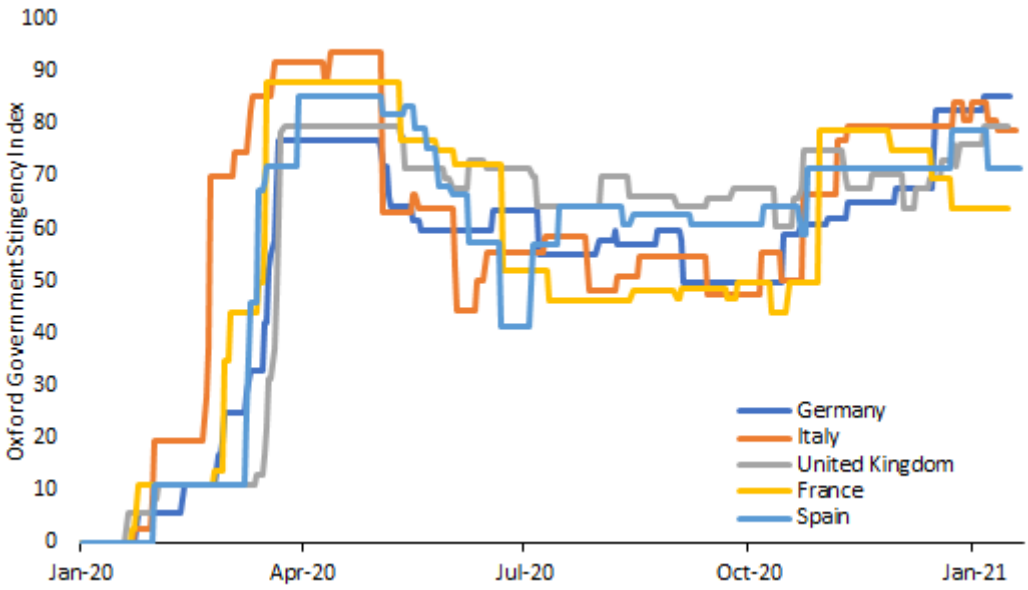

Exhibit 1: Stringency indices for five largest economies in Europe by GDP per capita

Source: Hale, T., Atav, T., Hallas, L., Kira, B., Phillips, T., Petherick, A., and Pott, A., 2020. Variation in US states responses to COVID-19. Blavatnik School of Government. (Updated on 24th January 2021)

The restrictions imposed on European citizens impact their behaviors as consumers. These limitations forced consumers to improvise as they became more time-flexible but simultaneously narrowed to their location. They are keener to adopt new technologies that may constantly change their habits, but accelerate the development of online consumer services, as referred by Sheth (2020). The Oxford restriction measure is currently still on very high levels, almost as high as it was just after the virus outbreak in April. Even though the restrictions are reaching the peak levels, the consumer behaviors are not so suppressed as they were at the beginning of the pandemic. The evidence for this may be the Consumer Confidence Index which measures the households' optimism on the current and future financial situation and potential expenditure based on surveys.

Exhibit 2 shows the index for Eurozone and United Kingdom. Both series have dropped to the levels reached just after the financial crisis in 2008 and after the European debt crisis in 2012, but the current reactions to the latest restrictions are weaker than during the first wave in April 2020.

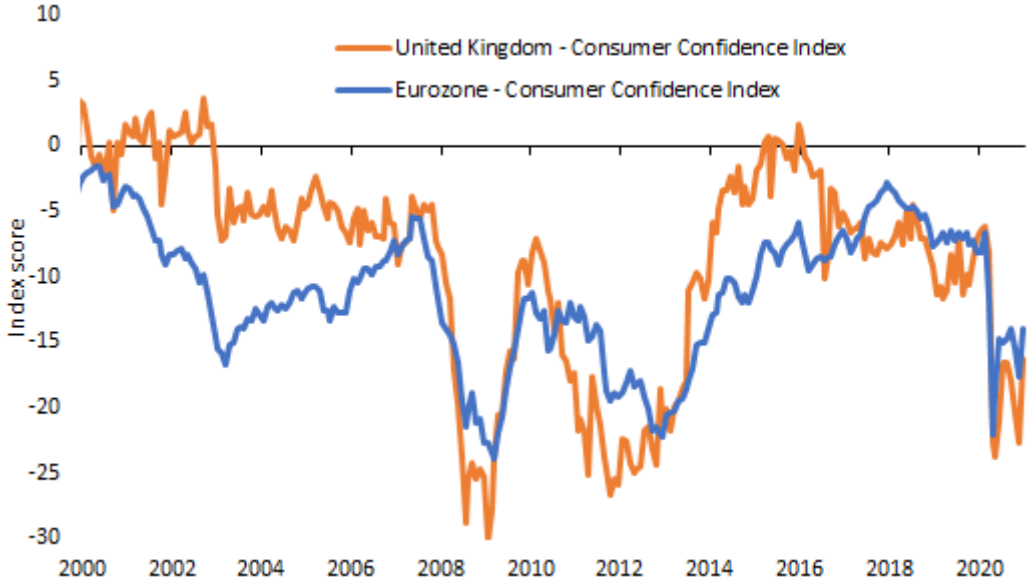

Exhibit 2: Consumer Confidence Indices for Eurozone and United Kingdom

Source: Own elaboration based on Thomson Reuters (2021), Eikon, Consumer Confidence Index (accessed 24th January 2021)

This recent, weaker response to the restrictions is explained by the adaptation of the consumers to the lockdowns and shows more confidence in consumer behaviors. This conversion to new habits like online shopping, work from home, video games, and online streaming has boosted the demand for electronic hardware: PCs, smartphones, TVs, game consoles. In 2020 the total number of personal computer shipments in EMEA amounted to about 83 million units and was 13% larger than in 2019. In the second quarter of 2020, just after the beginning of the first wave, the annual growth of shipped PCs increased to the ten-year record-high of 26% in the response to the remote work model and lockdowns [Exhibit 3].

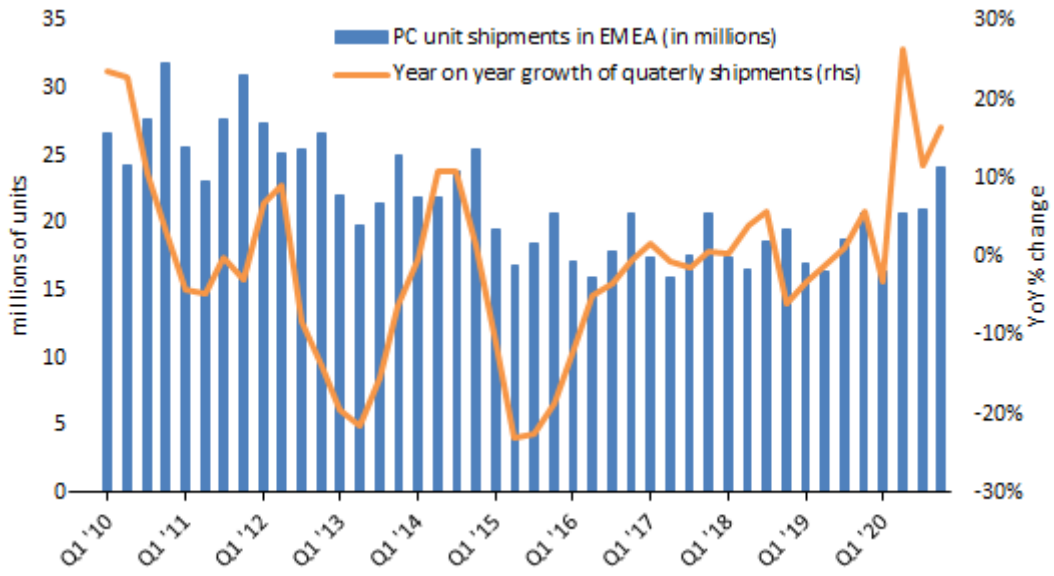

Exhibit 3: PC unit shipments in EMEA countries

Source: Own elaboration based on Statista, 2021, IDC's EMEA Quarterly PC Tracker, https://www.statista.com/statistics/268010/number-of-pc-shipments-in-emea-by-vendor/ (accessed 29th Jan 2021)

Together with the increased demand for electronic devices, increased capital expenditures were needed to develop the remote work infrastructure in the form of infrastructure as a service (IaaS). According to IDC forecasts, the ICT spending for IaaS would increase annually in Europe by 38.1% in 2020 and by over 30% in 2021 (IDC, 2020). However, according to the same report, the overall ICT spending would decrease in Europe by 3.8%, as a large number of companies suspended the non-essential investment projects. The only IT segments with a positive growth rate are PC, tablet, and PC monitor shipments and IaaS.

The remote work model has encouraged digital services companies to invest in their infrastructure with a positive stimulus in the form of the increased demand for such services. The total amount of reported CAPEX in 2020 for the 18 largest listed European companies from the consumer digital services sector has increased by almost 37% in comparison to 2019 [Exhibit 4].

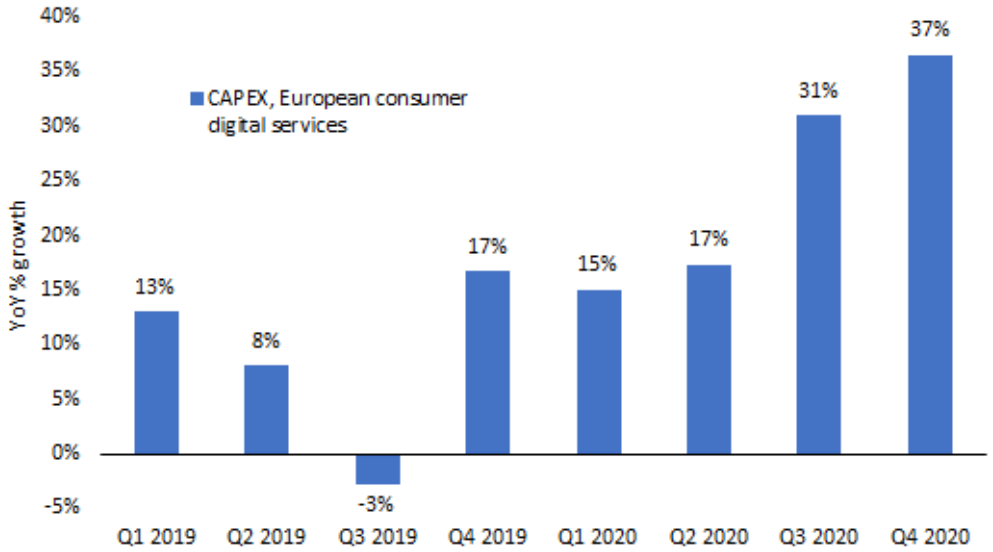

Exhibit 4: The capital expenditures reported based on a trailing twelve-month period for the consumer digital services sector in Europe, year on year growth.

Source: Own elaboration based on Thomson Reuters (2021), Eikon, Datastream Europe consumer digital services index, (accessed 29th January 2021)

The enforced digitalization also involved the demand of the online learning industry, especially the massive open online courses (MOOCs), which are characterized by unlimited participation and open access via the web. According to the Central Class research, the MOOCs providers enrolled in a total of 180 million learners, from which one-third has registered in 2020. For the largest provider, Coursera, the new registration number was almost four times larger than it was in 2019. Also, the subject of the most popular courses has been impacted by the pandemic. Before COVID-19 the computer science and programming were the most favored subjects, and when enrollment increased through a pandemic, it was personal development following Shah (2020).

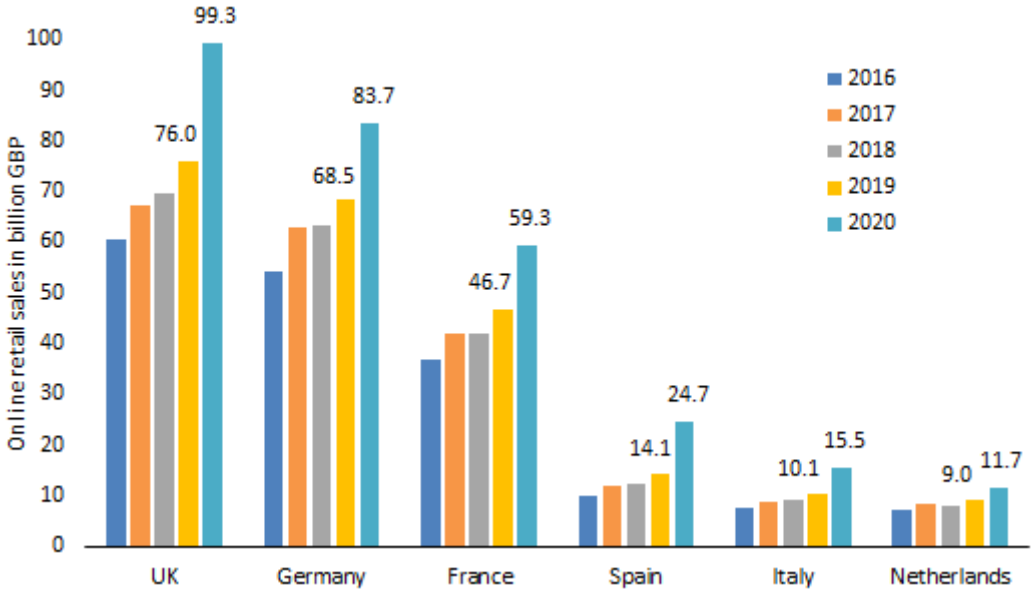

Exhibit 5: Value of online retail sales in selected European countries (in billion GBP)

Source: Own elaboration based on Statista, 2021, CRR https://www.statista.com/statistics/921453/online-retail-sales-value-european-countries/ (accessed on 29th Jan 2021). Data excluding travel, restaurants, tickets, transport.

The next highly impacted by the COVID-19 sector of the economy is e-commerce. The imposed restrictions forced consumers to change the channels for casual purchases. The total value of online retail sales in the UK, Germany, France, Spain, Italy, and the Netherlands has increased by 31.1% in 2020 in comparison to the year before, which stands for 23 percentage points above the average growth rate from 3 previous years (Exhibit 5). In Spain, the online retail market has expanded by 75%, which shows the general trend of accelerated digital transformation and changes in customer behaviors.

Conclusion

The above data and evidence show that the scale of COVID-19 in the digital world is unprecedented. There is a vast range of practices and technologies used to cope with pandemic. Changes in lifestyle and working models implied the increase in demand for digital services, technological hardware, and equipment. Even the organizations, like schools, that had remained reluctant to introduce flexibility in operation and adopt new technologies prior to COVID-19, got a brief lesson of change and crisis management.

This unexpected phenomenon in Europe and worldwide has accelerated the pace of digital transformation, which can be very beneficial for the economy in the long term. However, the common lockdowns in the European countries have made some industries highly unprofitable, like airlines, hotels, or restaurants and as a result, the downturn in economies was unavoidable. In this research, the authors have noted limitations. The limited access or lack of the data to provide accurate analysis of the entire 2020 of digital transformation manifestations was the major challenge the authors met during this study. Thus authors are motivated to further proceeding with their research on COVID-19 consequences for organizations, societies, and technology areas. In the end, there appears a question, if the current technological and social changes are possible to permanently persist in the post-COVID times? Currently, it remains unanswered. It is not yet certain when the post-COVID times will come.

The worldwide hope placed in vaccines, may not be realized. New virus strains are appearing in different places on earth and are not yet examined. Looking at 2020 figures, the pandemic has shaken up the global economy and people's way of living, but we are not able to evaluate if these changes are just temporary or will turn into new habits. Newly learned social and technical capabilities will inevitably affect “post-COVID-19 normal”. How? Let's leave open space for some innovation

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