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GLOBAL TRENDS AND PROSPECTS IN DIGITAL ECONOMY

The article examines how the topic of digitalization is covered by foreign authors, what our partner competitors in foreign companies and countries are doing in this direction. The next step was the analysis of publications of various analytical centers demonstrating trends in the development of digital technologies in the world and in Kazakhstan. The available foreign experience connected with the use of information technologies was analyzed. The article presents an overview of the digital segment of the economy that has become relevant due to the qualitative changes that have taken place in the economy and society, new technologies and platforms that allow management of enterprises and individuals to reduce the transaction costs of interaction on an increasing scale and to make closer contact with economic entities and state structures. The results of the analysis make it possible to believe that with a high degree of probability already in the near future the level of digitalization will determine the competitiveness of not only business but also entire countries. At the same time, only those countries and companies that will be able to adapt quickly and maximize the benefits of the changes that have taken place have achieved a sustainable competitive advantage.

Key words: Digital economy, global trends, digitalization, digital transformation, big data, industry 4.0.

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Цифрлық экономиканың жаһандық үрдістері мен перспективалары

Мақалада шетелдік авторлардың цифрландыру тақырыбын қаншалықты қозғайтындығы, бұл бағытта біздің бәсекелес-әріптестеріміз шетелдік компаниялар мен елдерде қандай әрекеттер жасап жатқандығы туралы қарастырылады. Келесі қадамдағы талдаудың пәні ретінде әлемдегі және Қазақстандағы сандық технологияларды дамытудағы үрдістерді көрсететін түрлі талдау орталықтарының жарияланымдары танылды. Ақпараттық технологияларды қолданумен байланысты қолжетімді шетелдік тәжірибе талданған болатын. Мақалада экономикадағы және қоғамдағы орын алған сапалы өзгерістер күшінде өзекті боп танылған экономиканың сандық сегментінің көрінісі, кәсіпорындардың менеджментіне және физикалық тұлғаларға өте үлкен мөлшерде трансакциондық шығыстарды қысқартуға және шаруашылық объектілермен, мемлекеттік құрылымдармен тығыз қарым-қатынас орнатуға мүмкіндік беретін жаңа технологиялар мен алаңдар ұсынылған. Жүргізілген талдаудың қорытындылары жақын арада цифрландыру деңгейі тек бизнес емес, сонымен қатар тұтас елдердің бәсекегеқабілеттілігін анықтай алады деп үлкен сеніммен айта аламыз. Осымен бірге тұрақты бәсекелік артықшылыққа орын алып жатқан өзгерістерге тез бейімделе алатын және оның артықшылықтарын максималды түрде қолдана білетін елдер мен компаниялар ғана ие бола алады.

Түйін сөздер: цифрлық экономика, жаһандық үрдістер, цифрлау, цифрлық трансформация, үлкен деректер, индустрия 4.0.

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Глобальные тренды и перспективы в цифровой экономике

В статье рассматривается, как тема цифровизации освещается зарубежными авторами, что делают в этом направлении наши партнеры-конкуренты в зарубежных компаниях и странах. Предметом анализа стали публикации различных аналитических центров, демонстрирующих тенденции в развитии цифровых технологий в мире и в Казахстане. Был проанализирован доступный зарубежный опыт, связанный с применением информационных технологий. В статье представлен обзор цифрового сегмента экономики, ставшей актуальной в силу произошедших качественных изменений в экономике и обществе, новые технологии и платформы, позволяющие менеджменту предприятий и физическим лицам сокращать трансакционные издержки взаимодействия во все больших масштабах и осуществлять более тесный контакт с хозяйствующими объектами и государственными структурами. Итоги проведенного анализа позволяют полагать, что с большой долей вероятности уже в ближайшем будущем уровень цифровизации будет определять конкурентоспособность не только бизнеса, но и целых стран. При этом устойчивого конкурентного преимущества достигнут только те страны и компании, которые смогут наиболее быстро адаптироваться и максимально использовать преимущества происходящих изменений.

Ключевые слова: цифровая экономика, глобальные тенденции, цифровизация, цифровое преобразование, big data, индустрия 4.0.

Introduction

Over the past decades, the world is rapidly moving towards a new type of economy, where digital technologies are becoming the main tool for its formation. In modern conditions, information technologies and digital transformation are the main factor of technological change and the condition for ensuring competitiveness both at the level of individual enterprises and at the level of countries and supranational associations, leading to a reorganization of all economic and production processes, a radical increase in productivity, improved quality and lower costs goods and services.

The digitalization of the world economy has entered a dynamic stage. The ideas of the «Third Industrial Revolution», «Industry 4.0» and different advancements both at the state and corporate level rapidly started to be joined into government projects and business systems (Rifkin, 2013).

The gap between theoretical developments and their practical embodiment is rapidly decreasing.

It is equally important to study the experience of reaction to the current revolutionary situation of more technologically developed countries – the errors of their experts, the programs and initiatives related to digitization launched by them. This will help to avoid the same mistakes in the preparation of your program and save resources.

Finally, it is necessary to analyze our own institutional field, on which the digitization of our economy and state administration will unfold. Obviously, fast enough and, at the same time, accurate changes in the regulatory framework will be necessary, and now it is important to understand that it does not correspond well to the digital call, and what is simply missing.

In the broadest sense, the process of «digitalization» usually refers to the socio-economic transformation initiated by the massive introduction and assimilation of digital technologies, i.e. technologies of creation, processing, exchange, and transfer of information

In addition, these interpretations are further aggravated by a rather wide interpretation by experts and analysts at what stage of technological and economic development humanity is at present, and what technologies (or technology groups) in the near future will have a decisive impact on economic growth. So, the universal term «Third Industrial Revolution» (TIR) became very popular the main ideologists of which are American researchers Jeremy Rifkin and Raymond Kurzweil. Supporters of the concept of TIR, in particular, believe that the First Industrial Revolution was based on the use of coal, the second – hydrocarbon resources, and only the unfolding Third implies the gradual introduction of a whole range of new technological solutions (including renewable / clean energy sources, composite and nanomaterials, biomedical innovations, 3D printing technologies, mass electrification of transport, etc.), which in turn rely

heavily on the use and further improvement digital / information technology. (Kurzweil, 2005) The topic of the digital segment of the economy has become relevant due to the qualitative changes that have taken place in the economy and society. New technologies and platforms allow the management of enterprises and individuals to reduce the transaction costs of interaction on an increasing scale and to make closer contact with economic entities and state structures. As a result, an economy is being formed based on network services, that is, digital, or electronic. The very concept of «digitalization» testifies to a new stage in improving the management of the production of goods and services and production itself on the basis of «end-to-end» application of modern IT, starting from the Internet of things and ending with e-government technologies.

The main reason for the expansion of the digital segment of the economy is the growth of the transaction sector, which in developed countries is more than 70% of the national GDP. This sector includes: public administration, consulting and information services, finance, wholesale and retail trade, as well as the provision of various public, personal and social services. (Arthur, 2011)

Although the role of the influence of digital technologies on the transformation of socio-economic systems is fairly obvious, many issues remain poorly understood. Not enough attention is paid to the development of digital potential in order to achieve innovative growth of individual firms and industries, without due attention the institutional aspects of the digital economy remain, the problems and prospects of business development in the conditions of the digital economy are poorly covered, the place of the digital economy in the overall system of modern economic relations. Therefore, the aim of the study is to examine the main aspects of the development of the digital economy and develop judgments about its role in the overall system of economic relations.

Methods

In general terms, we can distinguish four criteria for analyzing the digital economy, to varying degrees examined by different researchers: the criterion associated with the sphere of employment; spatial criterion; technological; and, in fact, economic. In this case, complementary criteria are possible, although often researchers bring to the fore a certain definition, corresponding to their own ideas. However, the basis of most definitions is the belief that quantitative changes in the sphere of data processing have led to the emergence of qualitatively new socio-economic relations. In the article were used mainly methods of empirical research, system and comparative analysis, statistical grouping and expert evaluation.

Result

Technologically, the digital economy is defined by four trends: mobile technologies, business intelligence, cloud computing and social media; in the global plan – social networks such as Facebook, YouTube, Twitter, LinkedIn, Instagram, etc. This means that when forming a national segment, it is important to use their capabilities.

Technologically, the digital economy is an environment in which legal entities and individuals can contact each other about joint activities. Thanks to modern IT production, high speeds and a variety of services and products are becoming more common. The latter are characterized by the rapid development and appearance of new products and an ever shorter period of their life (Cole, 2013).

In the last decade, the leading industrial countries of the world are also making certain efforts to develop «unified digital agendas», i.e. search for joint effective solutions and mechanisms for regulating digitalization processes at the interstate level. At the same time, the obvious leader in this direction is the European Union, whose leaders defined the formation of the single digital market as a general long-term goal. For the first time, the need to develop such a common strategy was officially announced by the President of the European Commission Jean-Claude Juncker in October 2015.

In 2010, within the framework of the implementation of the more general strategy «Europe 2020», the EU countries launched a special initiative «Digital Europe», the main focus of which was to stimulate the growth of the pan-European Internet economy. In the same year 2010 was published «Digital Agenda for Europe», which provided for the development of common approaches and priorities of the EU member states in relation to the further development of the digital sectors of the European economy and measures to stimulate digital innovation. In April 2016, the European Commission announced a new comprehensive initiative under the interim title «Digital single market – digitizing European industry», which formulated a wide range of new tools and mechanisms to support the further digitization of European industry and services. The Organization for Economic Cooperation and Development (OECD) adopted a Strategy for the

development of the common digital market. Within the framework of the Trans-Pacific Partnership (TTP), special interstate agreements have been developed in the field of telecommunications and e-commerce development. ASEAN countries in 2015 agreed on a common Master Plan for the development of ICT (OECD, 2016).

Similar work is being done in the post-Soviet space. By the decision of the Council of Heads of Government of the Commonwealth of Independent States of October 28, 2016, the Strategy of Cooperation of the CIS Member States in Building and Developing the Information Society for the Period Until 2025 and the Action Plan for its Implementation were approved. This is the second strategic document of the CIS in this area, the first one was adopted in 2012. Finally, in December 2016 in St. Petersburg, the heads of the EEA states adopted the Statement on the Digital Agenda of the Eurasian Economic Union, where they expressed their desire to provide the necessary conditions for the formation of the «digital agenda of the EEU.»

Discussion

The problems of new types of economies, including the digital economy, are actively discussed in foreign scientific literature, in particular in the works: «Business models, business strategy and innovation». (Teece, D. 2010), «When Did Britain Industrialise? The Sectoral Distribution of the Labour Force and Labour Productivity in Britain (Broadberry, S. 2013), The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. (Brynjolfsson, E. & McAfee, A. 2014), «Why Do Management Practices Differ Across Firms and Countries?» (Bloom, N. & J. van Reenen. 2010)

According to Microsoft analysts, a key role in the further development of the global IT industry should be played by the massive introduction of the so-called. «Technological platforms» – sets of compatible technologies, products, and channels for their distribution, as well as ecosystems for their distribution and use. The main elements of these new technology platforms are currently considered: cloud computing, mobility, the Internet of things, large data technologies, business intelligence and machine learning. Thanks to the cumulative impact of these advanced platform technologies, a gradual «transformation of products into services» and the expansion of value chains, the supply of goods and services, and the «lengthening of human capital supply chains» are taking place.

In 2015, the World Economic Forum (WEF), which is one of the epicenters of global business activity, announced the launch of a special long-term program Digital Transformation Initiative (DTI). This program, according to the idea of its creators, should become a focal point to identify new opportunities and directions for further digitalization of business and society. «At the same time, DTI is initially positioned as an important part of the broader» theme of the Fourth Industrial Revolution. « The last report of the WEF experts (January 2017) quite confidently states that «The Fourth Industrial Revolution (already) is in full swing» (literally «is underway»), although the head of this non-governmental organization, Klaus Schwab, about its «offensive» only a little over a year ago (Schwab, 2017).

Illustrative assessments of the possible positive impact/effect of digitalization on individual industries and groups of sectors of the world economy are contained in the updated report of the WEF Digital Transformation Initiative. In total, WEF researchers in collaboration with Accenture experts have analyzed over 10 such industries/ sectors to date. For ten of them, the authors presented forecasts of large-scale changes. The most significant effects of digitalization, according to the authors of the report, are expected by the oil and gas sector.

In addition to the intra-industry assessments, WEF analysts in the January 2017 report also attempted to forecast the cross-industry positive effect from the upcoming digital transformation. They separately examined five key cross-themes – the IT sphere (regardless of the effects for doing business within the IT industry proper), HR (Human Resource Management), finance and accounting, Supply Chain Management / Supply Chain Management (Supply) chain management/ procurement), as well as R & D (research and development)

In the IT sector, the main positive effect is expected from the introduction of cloud computing, AI technologies, as well as new technologies for working with large data (BigData) and business intelligence. Thanks to cloud computing alone, the average business costs for IT services will drop from 25 to 50%. In the longer term, great hopes are placed on quantum computing.

In the direction of HR, WEF experts estimated that as a result of the active implementation of such forms of DH as virtual collaborations, peer-to-peer reputation assessment systems, digital (remote) interviewing and new web portals for finding and hiring staff, the

average costs in this area may be reduced by about 7% over the next decade. (WEF, 2017)

In the field of corporate finance and accounting, it is predicted that new digital technologies (and, above all, cloud accounting systems and the use of various AI technologies) will, on average, reduce average costs by 40%.

In the field of supply chain management/ logistics systems material and technical supply (MTS), the main «digital drivers» are called unmanned/automated vehicles and drones, various sensors and sensors that perform on-line monitoring of the movement of goods and services, as well as 3D printing. According to WEF analysts, the average share of MTS costs for companies using digital technologies to the maximum extent will be 0.22% of their net revenue, while their less advanced competitors in the application of digital technologies – about 0.5%.

In the sphere of R & D, the three main directions of digital technologies implementation are crowdsourcing (mobilization of human resources with the help of information technologies for the joint solution of various tasks), robotics and artificial intelligence technologies.

State programs and strategies for the development and promotion of digital technologies and digitalization of national economies and industrial sectors have now been developed and implemented in dozens of different countries of the world, as well as at the interstate level. So, only in the EU countries, according to official data of the European Commission for March 2017, there are more than 30 national and regional initiatives on digitizing industry.

At the national level, according to information Coordination of European, national & regional initiatives (Figure 1)

Figure 1 –List of National Initiatives active in June 2017 (https://ec.europa.eu/digital-single-market/en/cordination-european-national-regional-initiatives, the following programs, and initiatives are being implemented)

- Austria: Industrie 4.0 Oesterreich
- Belgium: Made different – Factories of the future
- CzechRepublic: Průmysl 4.0
- Germany: Industrie 4.0
- Denmark: Manufacturing Academy of Denmark (MADE)
- Spain: IndustriaConectada 4.0
- France: Alliance pour l'Industrie du Futur
- Hungary: IPAR4.0 NationalTechnologyInitiative
- Italy: Industria 4.0
- Lithuania: Pramonė 4.0
- Luxembourg: DigitalForIndustryLuxembourg
- Netherlands: SmartIndustry
- Poland: Initiative and Platform Industry 4.0
- Portugal: Indústria 4.0
- Sweden: SmartIndustry

One of the pioneers of digitalization and the main ideologue of the «Industry 4.0» concept in Germany, which in 2011 officially introduced the state strategy under the same name (Industrie 4.0). In addition to the general concept of Industrie 4.0 in Germany at the state level, several other strategies and initiatives of a similar profile and orientation have also been developed and are being implemented. Smart Networking Strategy, on the basis of which, in turn, the Digital Agenda program was presented.

In France, in July 2015, the Alliance for the Future was created, which brings together various organizations from the private business, the academic environment and a number of state institutions and institutions.

In the UK, the new digital strategy was officially published recently, on March 1, 2017. (UK Digital Strategy 2017)

The ambitious Smart Industry program is accepted by the Government of the Netherlands.

In Japan, the main government document that defines the long-term goals and objectives of the country in the development of DH is Smart Japan ICT Strategy, officially published in June 2014.

In China, in March 2015, the national concept / strategy «Internet +» was presented. This integrated strategy identifies several key areas for further development of DH in conjunction with other industries, agriculture, the financial sector and public institutions

The main current state document in the field of scientific and technological policy of Korea is the Third Basic Plan for the Development of Science and Technology, implemented from 2013 to 2017. In it the strategy of the accelerated development of the so-called. «13 future growth engines», and almost all of these new industries and sectors are among the «subversive DH» (smart cars, 5G networks, smart robotics, smart handheld devices, etc.). At the same time, a special Manufacturing Innovation 3.0 Strategy is implemented, the focus is on the Internet of things, 3D printing technologies and Big Data. (J. Kallio, 2016)

In the United States, there is no single state development program for DH, but in different years, in cooperation with private business and the scientific community, special technological initiatives were launched. Examples include the federal initiative for cloud computing (in 2009), or President Barack Obama's initiative to create a new network of institutes / centers for advanced manufacturing (AMP – Advanced Manufacturing Partnership, in 2011) with participation of key federal ministries and major US technology companies. In addition, a special Industrial Internet Consortium (IIC) was created in March 2014, initiated by a number of leading representatives of American private business (primarily GE, AT & T, IBM, Intel and Cisco). As its main mission stated «acceleration of development, industrial introduction and wide dissemination of machines, devices connected together, and intellectual analytics. (Bloom, N., & J. van Reenen, 2012)

Kazakhstan also seeks to keep pace with its competitors.According to the results of a study by the Boston Consulting Group company, reflected in the article «Kazakhstan on the road to digital economy» , Kazakhstan occupies the 50th line of the rating of 85 countries in terms of the digitization level of the economy and is in the group with the emerging digital economy (BCG, 2015). The digital divide between the leading states and the backward countries is increasing year by year. The key to preserving the competitiveness of our economy is the development of the digital component by joint efforts of the state and business, including in the following priority areas: agriculture, mining and manufacturing, transport and logistics infrastructure, trade, and health, education and information and communication technologies.

This is an important complex task. « It should be noted that the first step towards creating conditions for the transition to an information society was the State Program «Information Kazakhstan 2020», approved in 2013. As the basis for the digital transformation of the country's economy, this program contributed to the development of the following factors: the transition to an information society, the improvement of public administration, the creation of «open and mobile government» institutions, and the growth of accessibility of information infrastructure not only for corporate structures but for citizens of the country. Based on the results of the three years of the implementation of the State Program «Information Kazakhstan 2020», implementation has already been achieved by 70% and target indicators have been exceeded by 40%.In today's world, digital technology plays an increasingly important role in the development of countries economy. Even today, more than 40% of the world population has access to the Internet, and almost every 7 out of 10 households have a mobile phone. Digital technologies have a number of advantages – simplification of the public and business access to public services, the acceleration of the information exchange, the emergence of new business opportunities, the creation of new digital products, etc. The main goal of the government

program «Digital Kazakhstan» is the improvement of the competitiveness of Kazakhstan's economy and quality of life through the progressive development of the digital ecosystem. The implementation of the State Program «Digital Kazakhstan» will be held in four key areas: Creating a «Digital Silk Road». This is the development of the reliable, affordable, high-speed, secure digital infrastructure. Creating a «creative society». This is the development of competencies and skills for the digital economy, the upgrading of digital literacy, training of ICT specialists for industries. Digital transformation in the economy branches. It is the widespread introduction of digital technology to enhance the competitiveness of various branches of the economy. Formation of «Proactive digital government». This is the improvement of electronic and mobile-government systems, optimization of the public services supply sphere (Zerde, 2017)

Conclusion

Digital technologies are rapidly changing the usual forms and methods of conducting economic life around the world. The business of not only individual companies is changing – industries, regions and entire states are changing. Digitalization begins to go far beyond changes in technology proper and even in business – they become a macroeconomic and political factor. Not only engineers, scientists, and entrepreneurs are trying to understand the changes, but also politicians, philosophers, and public figures. Some see it as a tool for fundamental changes in public life, while others, on the contrary, hope that digitalization will become an alternative to painful reforms.

During the current techno-economic wave, of which the digitization process is a part, Kazakhstan is in the echelon of the persecuting countries. If there is a plus in this position, then it is that you can take into account the experience of competitors in the forefront. In this sense, the analysis of foreign experience presented in this study provides food for thought, first of all, about what the macroeconomic effect can be expressed from the massive use of digital technologies. It turns out that this effect is expressed not so much in the quantitative increase in labor productivity, as in qualitative changes in business models, the nature of doing business, its manageability and flexibility. In addition, leading foreign analysts expect that as the scope of the digital presence in various segments of the economy expands, there will be an abrupt transition of economic efficiency indicators of their application to a new, higher level. And right now the world is on the verge of such a leap.

The technologies that can have the greatest impact on the economy are artificial intelligence technologies, «big data» analytics, cloud computing, the Internet of things, robotics, autonomous vehicles, production of customized products and 3D printing, social networks and other types of digital Internet platforms. It is important to emphasize that leading foreign analysts argue that digital technologies will not only replace existing types of economic activity but rather «unlock» their hidden economic potential. The monetary equivalent of such an unblocking is estimated at tens of trillions of dollars.

One of the key trends occurring in the global economy over the past decades is its rapid digitization. Digital transformations change the image and structure of the economy, breaking common business models, leading to the expansion of markets and opportunities, becoming the most important engine of world economic growth.

The results of this analysis suggest that with a high degree of probability in the near future, the level of digitalization will determine the competitiveness of not only business but also entire countries. At the same time, only those countries and companies that will be able to adapt quickly and maximize the benefits of the changes that have taken place have achieved a sustainable competitive advantage.

Training and retraining of personnel should become one of the key elements of the state policy. In this context, it will be necessary to adapt the educational system and infrastructure to the new requirements of the digital age. In particular, first of all, it is necessary to introduce fundamentally new approaches to teaching and ensure a high level of basic digital literacy of the population.

Thus, the digital economy is a powerful catalyst for innovation, growth and social well-being and its development in Kazakhstan is a requirement of the modern era. Deepening and expanding digitalization will increase the competitiveness of the domestic economy in the world arena, provide conditions for a phased transition to the level of the innovation economy and knowledge economy, and improve the quality and standard of living of the population.

References

Brynjolfsson, E. & McAfee, A. (2014) The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. New York: W. W. Norton & Company.

Bloom, N., & J. van Reenen. (2012) «Americans Do IT Better: US Multinationals and the Productivity Miracle.» American Economic Review 102 (1): pp. 167–201.

Bloom, N. & J. van Reenen. (2010) «Why Do Management Practices Differ Across Firms and Countries?» Journal of Economic Perspectives 24 (1): pp. 203–224.

Boston Consulting Group. (2015) The Robotics Revolution: The Next Great Leap in Manufacturing. Boston, Massachusetts.

Broadberry, S. (2013) «When Did Britain Industrialise? The Sectoral Distribution of the Labour Force and Labour Productivity in Britain, 1381–1851.» Explorations in Economic History 50 (1): pp. 16–27.

Cardona, M., T. Kretschmer & T. Strobel. (2013) «ICT and Productivity: Conclusions from the Empirical Literature.» Information Economics and Policy 25 (3): 109–125.

Cole, S. (2013). Apple's iPod Continues to Lead an Ever-Shrinking Market of Portable

Media Players. appleinsider.com, December 19.

Kallio J. Digital Disruption of Industry: case Korea. Disruption Brief No. 6 – 25.8.2016

Katz, R. L. and P. Koutroumpis. 2013. «Measuring Digitization: A Growth and Welfare Multiplier.» Technovation 33 (10–11): pp. 314–319.

Kurzweil, R. (2005) The Singularity Is Near: When Humans Transcend Biology. N. Y. : Viking, 652 p.

Organisation for Economic Co-operation and Development, (2016) OECD Compendium of Productivity Indicators 2016. Paris: OECD Publishing.

Rifkin, J. (2013) The third industrial revolution: How lateral power is transforming energy, the economy, and the world. New York: Palgrave Macmillan.

Reynolds, J. & R. Cuthbertson. (2014). Retail & Wholesale: Key Sectors for the European Economy: Understanding the Role of Retailing and Wholesaling Within the European Union. Oxford Institute of Retail Management, Saïd Business School, University of Oxford.

Schwab, K. (2017) The Fourth Industrial Revolution. Geneva: World Economic Forum.

Teece, D. (2000) Managing Intellectual Capital: Organizational, Strategic, and Policy Dimensions. Oxford University Press, Oxford.

Teece, D. (2006) Reflections on profiting from innovation. Res. Policy 35 (8), pp. 1131–1146.

Teece, D. (2007) Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strateg. Manag. J. 28 (13), pp. 1319–1350.

Teece, D. (2010) Business models, business strategy and innovation. Long Range Plan. 43 (2), pp. 172–194.

Teece, D. (2012) Next generation competition: new concepts for understanding how innovation shapes competition and policy in the digital economy. J. Law Econ. Policy 9 (1), 97–118.

Teece, D. (2014) The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. Acad. Manag. Perspect. 28 (4), pp. 328–352.

Teece, D. (2017). 5G mobile: disrupting the automotive sector. Tusher Center for the Management of Intellectual Capital Working Paper No.22. Haas School of Business, Berkeley, CA. http://businessinnovation.berkeley.edu/wp-content/uploads/2017/ 05/ Tusher-Center-Working-Paper-No.-22.pdf.

Teece, D. (2018). The tragedy of the anticommons fallacy: a law and economics analysis of patent thickets and FRAND licensing. Berkeley Technol. Law J (in press). Thoma, G., 2008. Striving for a large market: evidence from a general purpose technology in action. Ind. Corp. Change 18 (1), pp. 107–1138.

UK Digital Strategy (2017) Policy paper [https://www.gov.uk/government/publications/uk-digital-strategy/uk-digital-strategy]

World Economic Forum, (2017) Digital Transformation Initiative. Unlocking $100 Trillion for Business and Society from Digital Transformation. Executive Summary, January 2017, pp.22

Zerde, (2017) «Digital Kazakhstan» state program pp. 9–12.