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Supporting Digitalization: Key Goal for National Competitiveness in Digital Global Economy

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ABSTRACT

Creating a modern competitive economy and achieving irreversible economic growth is hardly possible without the realization of an innovation-based approach. In the 21st century, the leading role for the long-term growth of the national economy lies in new, revolutionary technologies capable to formulate and support the long-term economic growth and social welfare. Innovative development and science-based growth is incredible without digital technological development and transformation. Digital technologies affect development and introduction of innovation in several ways. In contemporary global economy digital technologies gaining speed to be incorporated in every spare of our lives over the globe. These processes entail continuous evolution of business models, which eventually are becoming more and more digitalized. The given paper analyzes one of the main factors that supports such kind of development, namely the development of physical infrastructures that is heavily relies on government efforts to develop and creates basics for private business to further advance digitalization.

Senza la realizzazione di un approccio basato sull'innovazione, è quasi impossibile creare un'economia competitiva moderna e raggiungere una crescita economica irreversibile. Nel 21 ° secolo, il ruolo guida per la crescita a lungo termine dell'economia nazionale risiede nelle nuove tecnologie rivoluzionarie in grado di formulare e sostenere la crescita economica nel lungo periodo e il benessere sociale. L'espansione delle tecnologie innovative e la crescita basata sulla scienza non sono immaginabili senza sviluppo, innovazione e trasformazione delle tecnologie digitali che influenzano lo sviluppo in diversi modi. Nell'economia globale contemporanea le tecnologie digitali acquistano velocità in quanto sono incorporate in ogni aspetto della nostra vita, in tutto il mondo. Questo processo comporta una continua evoluzione dei modelli di business, che stanno diventando anch'essi sempre più digitalizzati. Questo studio analizza uno dei principali fattori a supporto di questo tipo di sviluppo, vale a dire l'espansione di infrastrutture fisiche che derivano fortemente dagli sforzi per lo sviluppo fatti dal governo che creano le basi, per le imprese private, per far avanzare ulteriormente il processo di digitalizzazione.

Keywords: digitalization, innovative growth, international competition

1 – Introduction

Creating a modern competitive economy and achieving irreversible economic growth is hardly possible without the realization of an innovation-based approach. To do this, first of all, it is necessary to form a national innovation system

tailored to the country's social, economic, political and cultural characteristics. In the 21st century, the leading role for the long-term growth of the national economy lies in new, revolutionary technologies capable to formulate and support the long-term economic growth and social welfare. Innovation not only helps to create new firms and sectors, but also rejuvenates traditional firms and sectors, thereby accelerating economic growth.

Innovative development and science-based growth is incredible without digital technological development and transformation. Digital technologies affect development and introduction of innovation in several ways. Digital technologies expanded research methods and tools through more accurate implication of larger amounts of data and wider participation of researchers based on distance cooperation. Due to the Digital technologies new products and services were invented as well as old products and services gain new, digital dimension and thus, gain additional quality and cost advantages (Mella, 2019). At the same time, digital technologies make easier market integration through significant reducing communication costs and increasing matching efficiency, which in its turn increases competitive advantage of those who use these novelties. They support to reduce entry barriers by offering online services, like globally accessible cloud computing and online marketing platforms to small- and medium-sized enterprises and start-ups due to a significant reduction of the fixed costs of running a business both in internal markets and foreign markets. Big data equip firms with the opportunity to target products, so they more closely align with consumer preferences grounded on more accurate information about the latter.

2 – Research Methodology

In the paper from the very beginning the issue that is analyzed is identified: the digitalization process is gaining speed and 4th scientific revolution changes our everyday lives. What is the role of state policy that should be implemented by policy-makers in order to support and facilitate this process is the main question on economic agenda of national policies. The main factor that needs public funding is the development of physical infrastructure, regulatory framework and other related aspects where the government plays key role. The literature review discusses the benefits of digital technologies and importance of their use for both consumers and business and emphasizes their importance for small and medium business development and social gains. E-banking and e-signature are defined as key tolls performing digital operations in business. The Global Information Technology Report is used to estimate and make comparison among states in their readiness to use digital technologies, namely the factors that drives the information and communication technologies enabling businesses to gain greater benefits which it its turn is transformed into greater level of welfare - a task that any national policy is aiming at.

3 – Purpose

In contemporary global economy digital technologies gaining speed to be incorporated in every spare of our lives over the globe. Digitalization speed continues to gain higher and higher speed. Against the constant development of the information technologies, more and more business processes, products, goods, and services are impacted by innovations and digital technologies. These process entails continuous evolution of business models, which eventually are becoming more and more digitalized. The purpose of the given paper is to analyze one of the main factors that supports such kind of development, namely the development of physical infrastructures that is heavily relies on government efforts to develop and creates basics for private business to further advance digitalization.

4 – Literature review

The digital economy is an important part of the Fourth Industrial Revolution. It is directly related to the development of digital computer technology, which includes online services, electronic payments, internet commerce, internet advertising, internet gaming and est. Nicolas Negroponte, a scientist at the University of Massachusetts, named an economy based on digital technologies as "digital economy" (Negroponte 1995:7). By this term, he emphasized the advantage of digital economy that is heavily based on intensive development of digital and ICTs over the traditional ones.

Digital technologies significantly improve the efficiency of economy through dramatically reduction of the cost of business operations and transactions. Production processes are determined by the combination of technology and devices along the whole value chain. Information and data rule engines are often strengthening the decision-making process of the firms and making easier to manage and analyze every single aspect of business, from beginning to end. (Mella 2012). Computer-driven systems are becoming more and more common to monitor and conduct physical processes. Digital technologies create a virtual copy of the physical world. Manufacturing industries easily integrate physical objects with /into the information network, "allowing real-time adaptation in the future" (Smit et al. 2016).

Digital technologies dramatically reduce the cost of business operations and transactions, and thus, significantly improve the efficiency of economy. Unprecedented spread of digital enterprises entails new practice of social, mobile, analytics and cloud (SMAC) technologies to achieve greater productivity. At the same time, unprecedented growth of digital consumers, in its turn, boost even wider usage of SMAC technologies and thus, lead to a new era of digital economy and digital world (Mermanisvili 2019). In contemporary global development digital technologies force business to adapt novelties to survival in the transformed global industrial space against the tough international competition (Lekashvili 2019, Sepashvili 2019).

In this new reality, the government's primary goal - to increase the level of prosperity in the country - is directly linked to the promotion of science-based economics. Increasing prosperity implies increasing the efficiency of resources, ie labor and capital. Under the current conditions of science and technology development, resource efficiency is enhanced by innovations and new technological solutions. (Sepashvili 2018). Fourth Industrial Revolution is the key issue on modern development agenda in academic, political and economic circles (Schwab, 2016). Success of the country in science and research significantly defines the level of national welfare (Sepashvili 2016). However, increasing of resources, labour and capital, efficiency depends rather on usage of knowledge and technology than on simple existing of well-equipped higher educational institutions and/or highly skilled workers. Thus, just exiting of higher educational system and generating researchers do not mean higher positions in R&D (Gagnidze 2018). Therefore, supporting novelties through creating appropriate conditions and infrastructure is key for national policy (Sepashvili 2018b).

The shift towards the digital economy, and in particular, to blockchain technologies, will further increase employment in the business sector and facilitating the development of small and medium-sized enterprises. By Using digital technologies, consumers get faster services, sell and buy products online, save money in online stores, can start their own businesses online, become an entrepreneur without leaving home (Gazzola at al., 2017). In the digital economy, the focus is on the production of intellectual products, which is associated with high capital expenditure. (Gogorishvili 2019).

The use of digital technologies has both benefits and risks. The benefits are called digital dividends. These are: increasing labor productivity, increasing the competitiveness of companies, reducing production costs, creating new jobs, reducing poverty and social inequality, and economic growth. The suing of digital Technologies make easier access to any

product and service and vcretas good basis for equal treatment (Gazzola et al. 2016). The risks of using digital technologies are: the problem of protecting personal data, controlling their behavior by using human data, increasing unemployment in the labor market (as the risk of some professions and sectors disappearing) and others.

5 – Research Results

Every country is trying to keep up with the rapid development of digital technologies. Therefore, government should support by sound economic policy, which is constantly seeking investors, high-tech specialists who will be able to move across different industries to digital platforms. The policy measures vary according the countries but the common for all of them is creating appropriate and relevant legislative base and basic infrastructure. These are two main pillars that are policy-makers' responsibility, and which cannot be done by private sector.

One of the important aspects that support the development of digital economic development and equip business with necessary tools to conduct digital operations, is the digital signature. The digital signature represents an online verification of contracts or important documents necessary to prove the validity of online transactions. To say in other words, possibility to provide an approval or consent online when digital trade and exchange is occurring, is key to develop e-commerce. E-signatures represent modern means to accelerate online business processes and thus, make accounts receivable and accounts payable, as well as close deals faster by removing transaction barriers and invoicing issues (Sepashvili 2019b).

Another important aspect that support the development of digital economy is electronic banking. This new type of banking provides solutions to deal with new digital environment in the economy via connecting technology and business operations and financial transactions. Despite the fact that traditional banking models are still widely operating, they are more and more replaced by the e-banking to face changing character of global economic development resulted in changed needs of customers. Transforming of banking model into digital ones in its turn entails new challenges in the fields of regulation, economic environment, physical infrastructure, customers' awareness and skills, technology and est. (Sepashvili 2019a).

But, to widely apply digital technologies supporting the increase of e-commerce via digital signature and e-banking, physical infrastructure, appropriate electronic devises and relevant skills are necessary. So no innovation leading to digital development is to occur without the appropriate physical network infrastructure. Internet networks are connecting every person, every country, and every device. Global networks allow data to flow without hindrance, driving growth and enabling cooperative innovations in many fields and areas, from production to processes and selling. Those countries that are adapt at development of physical infrastructure enabling digital operations will continue to gain additional advantages and thus, further develop.

Since 2001, the World Economic Forum in cooperation with INSEAD and Cornell University publishes The Global Information Technology Report to estimate and measure these factors, namely the drives of information and communication technologies (Baller *et. al*., 2016). The index is called Networked Readiness Index (NRI). It has evolved since 2001 and currently measures and assess the networked readiness of the 139 countries using 53 indicators. The indicators are describe four main aspect of the country readiness for digital economy: 1. overall environment for usage and creation of the technology covering political, regulatory, business, and innovation factors; 2. Physical infrastructure of the network to use ICT and appropriate skills; 3. technology adoption/usage by the government, the private sector/business, and individuals/consumers; and 4. the economic and social impact of the new technologies.

The report emphasizes, that more and more innovation are based on digital technologies and business models, which can initiative economic and social gains from ICTs if managed in a

smart way. The means and ways through which the businesses adopt ICTs is dicicive for leveraging them for development, so supporting and encouraging businesses to fully utilize the powers of digital technologies should be a priority for national policy actions (Sepashvili 2019). Business and government should cooperate to accelerate and enforce efforts to invest in innovative digital resolutions to motivation social impact. Government should play more active role in the processes as sustainable digital economy will depend on rapidly evolving governance regulations and relevant legislation that allow societies to trust and feel secure when facing the numerous evidences of impact of digital technologies and respond quickly to changing circumstances.

According the Global Information Technology Report 2016, the Network Readiness Index (NRI) is measured through 53 indicators formulating the following 4 pillars:

1. Environment subindex
   – Political and regulatory environment (9 indicators)
   – Business and innovation environment (9 indicators)
2. Readiness subindex
   – Infrastructure (4 indicators)
   – Affordability (3 indicators)
   – Skills (4 indicators)
3. Usage subindex
   – Individual usage (7 indicators)
   – Business usage (6 indicators)
   – Government usage (3 indicators)
4. Impact subindex
   – Economic impacts (4 indicators)
   – Social impacts (4 indicators)

The calculation of the overall NRI score is based on following aggregations of scores: individual indicators are combined to gain pillar scores, which are then combined get sub-index scores. Sub-index scores are in turn combined to produce a country's overall NRI score. Networked readiness is improving almost everywhere in the world, with a clear upward trend in performance over the globe across all regions. Below in Table 1 we present the index score and ranking of selected countries to demonstration main trends in network development.

The data shows that Singapore is the only leader in this ranking, which also tops the sub-indices. The Nordic countries and the US are in the top five. Japan, which enjoys the reputation of a leading technology country, ranks tenth, with sub-indexes lagging behind to these countries and ranked second only in the usage sub-index.

The US is ahead of Japan in all indicators except the usage sub-index. EU member states, Germany, France, Italy, show a multifaceted picture. Germany is ranked best (Rank in 2016 - 15; environment sub-index-20; Readiness sub-index-13; Usage sub-index-14; Impact sub-index-15.), while France and Italy show diverse picture in sub-indexes (Rank in 2016 -24 and 45; environment sub-index -26 and 85; Readiness sub-index -27 and 41; Usage sub-index -20 and 43; Impact sub-index - 19 and 48, respectively. Italy is significantly behind France. The latter holds approximately similar positions in the sub-indices, while Italy shows a wide range of ranks in sub-indexes and has significant failure in environmental conditions. An interesting picture is created by the former Soviet states of the Baltic States, which are now EU member states. Estonia is leading. Its sub-indexes are slightly behind those of Germany and France in all sub-indexes (Rank in 2016 - 22; environment sub-index-23; Readiness sub-index-13; Usage sub-index-23;

Impact sub-index-16.), and according to the readiness and usages sub-indexes Estonia is even ahead France. As for Lithuania and Latvia, they are in a good position (rank in 2016 29 and 32, correspondently) and are ahead of EU member states such as Spain, Czech Republic, Slovenia, Hungary, Romania, Bulgaria (rank in 2016 – 35, 36, 37, 50, 66 and 69, correspondently).

	Country	Rank in 2016	Value	Rank in 2015 (out of 145)	Income level	Environment sub-index/ value	Readiness sub-index/ value	Usage sub-index/ value	Impact sub-index/ value
1	Singapore	1	6.0	1	HI*	1/6.0	1/6.1	1/6.0	1/6.1
2	Finland	2	6.0	2	HI-OECD	5/5.6	1/6.6	7/5.8	4/5.8
3	Sweden	3	5.8	3	HI-OECD	12/5.3	7/6.3	4/5.9	3/5.8
4	Norway	4	5.8	5	HI-OECD	6/5.5	4/6.4	9/5.8	9/5.6
5	United States	5	5.8	7	HI-OECD	13/5.3	5/6.4	8/5.8	5/5.8
6.	Japan	10	5.6	10	HI-OECD	17/5.2	15/6.1	2/5.9	14/5.3
7	Germany	15	5.6	13	HI-OECD	20/5.2	13/6.1	14/5.6	15/5.3
8	Estonia	22	5.4	22	HI-OECD	23/5.0	18/6.0	23/5.4	16/5.2
9	France	24	5.3	26	HI-OECD	26/5.0	27/5.8	20/5.4	19/5.2
10	United Arab emirates	26	5.3	23	HI	19/5.2	56/5.0	13/5.6	18/5.2
11	Lithuania	29	4.9	31	HI	36/4.6	42/5.4	31/4.9	28/4.8
12	Latvia	32	4.8	33	HI	37/4.6	31/5.6	35/4.6	31/4.5
13	Kazakhstan	39	4.6	40	UM	47/4.3	39/5.5	44/4.4	40/4.2
14	Russian Federation	41	4.5	41	HI	67/4.0	32/5.5	40/4.5	41/4.1
15	Italy	45	4.4	55	HI-OECD	85/3.8	41/5.5	43/4.4	48/4.0
16	Azerbaijan	53	4.3	57	UM	74/3.9	67/4.8	41/4.4	46/4.0
17	Armenia	56	4.3	58	LM	78/3.9	42/5.4	65/4.0	54/3.9
18	Georgia	58	4.3	60	LM	56/4.1	46/5.3	72/3.8	63/3.8
19	Ukraine	64	4.2	71	LM	94/3.8	30/5.7	88/3.6	69/3.7
20	Moldova	71	4.0	68	LM	111/3.5	52/5.1	76/3.8	71/3.7

Note: Income level classification follows the World Bank classification by income (situation as of July 2015). Group classification follows the International Monetary Fund's classification (situation as of April 2016).
* Income groups: HI = high-income economies that are not members of the OECD; HI-OECD = high-income OECD members; UM = upper-middle-income economies; LM = lower-middle-income economies; LI = low-income economies.

Table 1 – Network Readiness Index 2016 (Source: Global Information Technology Report 2016)

Eastern Partnership countries (Azerbaijan, Armenia, Moldova, Georgia, Ukraine, Belarus; no data in the report) hold normal positions. Moldova is lagging behind in all indicators. Georgia has the best indicator in the environment sub-index (56), Ukraine is the most advanced country in the readiness sub-index (30), while Azerbaijan is leading in the usage sub-index and Impact sub-index (41 and 46, correspondently).

The central position of networks in economics dramatically changes the environment for business actors across all sectors of economy. The result for businesses is their advanced ability to faster adjust to this importance precondition for innovation success. The innovation alone is no longer enough. Gaining wider markets and more customers is crucial due to the self-reinforcing nature of network effects. Business that advance in implication of digital opportunities, earlier gain competitive advantages that leads them to more successfully compete with rivalries and simultaneously gain greater economy of scale. Expanding of business scale is also significant for self-optimization of systems: the more participants, the faster the system updates and adjust the offers to market actors. Rapid advancement is also enabling companies to set industry standards, which can serve as a competitive advantage because the company that expand earlier create the precedent and consequently can define that precedent.

6 – Conclusion

The 4th wave of industrial revolution at the beginning of 21st century creates digital space that combines virtual world with physical and biological ones. Information and communication technologies are the pillars of this evolution. Today more than ever future of countries depends on how national governments can coordinate businesses and individuals to deal with digital technologies. This political goal equally concerns variety of issues such as physical infrastructure for internet networks, regulatory frameworks, business readiness, consumer skills and est. Policymakers have to develop such policy measures that support basic infrastructural development in closely cooperation with other stakeholders - business, academicians, individuals, - to promptly implement universal long-term goals for modern technological development and lead in adapting environment to ensure that ICTs deliver maximum benefits.

Digitization has been an advantage to the global economy. However, the digital development remains an on-going process rather than a reality of every national economy. National Governments have to redouble their efforts to create better and larger infrastructure for the digital economy to grow. The ability of expanding business through physical infrastructure cannot be considered for granted in the digital economy. Not only physical infrastructure is enough for further digitalization. The creation of an ecosystem that systematically allows top innovations to be advanced globally still remains a key policy goals.

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