INNOVATIONS AND GLOBAL ECONOMY

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Globalization of the world economy is not a new phenomenon. The old Silk Road, long journeys over the Oceans to both directions West and East are just the examples of simple forms of Globalization. Nowadays we are witnessing quite different and complicated picture of the globalized world economy, where political, social, cultural, environmental and military aspects are as important as economic ones (Keohane R., Nye J., 2000). Modern globalization is the complex interdependence of the countries which are not immediate geographic neighbours. Modern global economy went through two main stages: one area stated after the II World War, in early 1950s, when leading developing countries established different international organizations (both political and economic) to responses new realities and create the most favourable environment for global economic development. Later, in 1980s and more intensively in 1990s the process of globalization acquired new character which was caused by new technologies. Knowledge-based economy becomes the key for global world economic development. Technology, knowledge and innovations are the main pillars for raising the resource efficiency (Sepashvili, 2014).

The new goal for any national government is to insure science-based economic development to achieve higher standard of leaving for citizens. At the same time they should adequately face the challenges of globalization targeting at positive benefits that global economy offers to players meanwhile avoiding negative impact that globalized world imposes on national developments (Farazmand A., 2000).

The Ricardian concept of comparative advantage, which states that "nations, like individuals, can benefit from their differences by reaching an arrangement in which each does the things it does relatively well" (Krugman P. et al, 2012:24), is still valid if we apply it to technologies. According to its main principle, market forces will direct resources to the most productive fields. In other words, on contemporary stage of the world economic development, it is the most efficient for country to direct resources –capital and labour – to science-intensive fields, where they will be utilized in most efficient and productive way due to a high skill labour, new knowledge, developed technologies and continuous innovations. Thus, National government have to pay particular attention to issues such as educated and high skilled labour, advanced infrastructure (energy systems, telecommunications, transports etc.), well functioned market economy, prudent monetary and fiscal policy and political stability, which is vulnerable variable in modern world suffering by various armed, military or pending conflicts (Sepashvili 2018 b).

But Ricardian concept does not say anything about that everything will be happen as it is described in the theory. The concept refers the possibilities and not the reality. Therefore, the strategic point of using the concept is to determine how to make all these smart things to happen and how to translate the potential opportunities into reality. International distribution of production and pattern of the world trade are internationally determined by market forces in the world marketplace. In such reality, countries have to gain competitive advantages, which rely on knowledge and innovations. Four main determinants of the national countries shape the unique national environment that support/hamper countries' ability to success. These determinants together and separately form the environment where national firms and companies operate and create knowledge-based competitive advantages – very hard to be competed. These determinants are 1. Factor conditions; 2. Demand condition; 3. Related and supportive industries; and 4. Firm's Strategy and structure; and competition (Porter, 1998). All these systems differ according to countries. In this regard, different countries' firms have different access to resources and this creates disparities in competition on the world markets.

Despite the fact that during globalization national borders have less meaning for global firms while they seek for the most advantageous place for economic profit, national countries create unique environment for them and ensure their sound positions on science-based world markets. Thus, participation in contemporary economy means to create appropriate sources for education, adequate infrastructure, political stabilization, market economy and so on.

In such situation it is very important for each country to define their position in the world economic space in a way not to harm national interest, avoid negative consequences of globalization and completely benefit by openness of the nation economy. This goal for political and economic decision- makers means to facilitate the growth of welfare in the country, which in its turn means to raise recourses – labour and capital - efficiency.

The situation is becoming more complicated due to the fact that technology and knowledge are the most important factors for economic expansion and increasing the income

in contemporary world. On the world markets the firms of different countries and the national-less transnational corporations are competing with each other. Modern means of communications, IT technologies and transportation search for low-priced factors of production is carrying out over the globe.The development of new technologies (gen-engineering, telecommunication, microelectronics, new materials, bio-technology and etc.) is defining the nature of the XXI century. This new model of economy changes social and economic objectives of nations. Transformations are occurring in the strategies of international business and marketing (Sepashvili 2018 a).

A quick glance on global development proves that unprecedented economic growth since late 90s of the past century till 2007, before global economic crisis, was accompanied by massive development of digital technologies. Qualitative changes in IT equipment, which made able to widely spread electronic devises among wide range of populations, consumer-friendly menus, cheap and broader access to the internet, easier access to different data bases and etc. accelerated diffusion of science into modern goods and services and extremely boost companies' readiness for investment in research and development. At the same time, international institutions, like the World Trade organization, in its turn, facilitate international knowledge movement by regulations for intellectual property rights as well as in trade and investments.

Table 1. **Internet users per 100 population in 2000-2008**

World	10.77	23.69
Developed countries	37.99	62.09
Developed countries	5.03	17.41
Less-developed countries	0.26	2.06
Americas	27.68	45.50
North America	59.06	74.14
Latin America and the Caribbean	8.63	28.34
Europe	24.95	52.59
European Union	35.29	64.58
Commonwealth of Independent States in Europe	3.83	29.77
Central, Eastern and Other Europe	18.28	40.40
Africa	1.20	8.14
South Africa	6.71	8.43
Other Sub-Saharan countries(excl. South Africa)	0.52	5.68
Arab States in Africa	2.11	16.61
Asia	5.79	16.41
Japan	46.59	71.42
China	4.60	22.28
Israel	17.76	49.64
India	1.54	4.38
Commonwealth independent State in Asia	1.72	12.30
Newly Industrialized Economies in Asia	15.05	23.47
Arab States in Asia	4.05	15.93
Other in Asia (excl. Japan, China, Israel, India)	2.19	11.51
Oceania	43.62	54.04

Source: International Telecommunications Union, World telecommunications / ICT indicators database, June 2010; United Nations Department of Economic and Social Affairs (2009);

As global data shows, the number of internet users has almost doubled in developed countries, but nearly tripled in developing countries for the very short period 2001-2008. E.g. in 2002 in developed countries 37.99 internet users per 100 people were indicated meanwhile in developing countries this showing reached just 5.03. The situation has dramatically changed in few years and in 2008 this showing were 62.09 and 17.41 correspondingly. It is noticeable that the number of internet users was almost doubled in developed countries while more than tripled in developing countries. The number of internet users help us to judge about one necessary but insufficient side of knowledge diffusion and innovation creation - it is information about the quality of access of people to information and the knowledge which are the basis and "raw material" for research and knowledge spill-over. Data bellow in the table clearly indicates that developing countries are catching up rapidly the US, Japan and the EU member states in term of usage of the internet.

However, easier and cheaper access to digital technologies does not mean that any country, firm or individual will automatically benefit from it. Such kind of arrangements of the things just create good conditions for further development and just create favourable environment for creating ("forming" is better) innovation and these arrangements are to be translated into commerce and bring revenues.

New technologies require more and more high-skilled workers. The researches of different international institutions prove that the gap between the salaries of high-skilled and low-skilled workers is increasing. It is not exaggerated, to say that one of the main components of the success of economic agents on the world markets is high-skilled labour involvement and utilization. Knowledge, representing the main production factor in knowledge-based economy, is inconsistently distributed. The human resource is an exclusive production factor, holding of which by one or another firm doesn't automatically mean to hold and utilize the knowledge (Sepashvili E., 2011).

As UNESCO Science Report 2010 argues, "countries have been catching up rapidly in terms of both economic growth and investment in knowledge, as expressed by investment in tertiary education and R&D." (UNESCO Science Report 2010: 29). In number of countries, such as India, Brazil, China, Mexico, as well as Eastern and Central European Countries, are increasing year by year their spending on education and R&D. So, there is no surprise that these countries, which used to be complimentary manufacturing basis for advanced economies, slowly but steadily, are moving to gain their own positions in independent technological developments and researches

table 2. **Countries' Ranks 2016 Innovation Creation Relating Factors**

	Efficiency Enhancers		5.Higher education and training		6.Goods market efficiency		7.Labor market efficiency		8.Financial market development		9.Technological readiness		10.Market size	
Country/ Economy	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
United States	1	5.76	6	5.87	16	5.10	4	5.40	5	5.45	17	5.85	2	6.91
Japan	8	5.33	21	5.41	11	5.24	21	4.80	19	4.71	19	5.72	4	6.10
Germany	10	5.31	17	5.57	23	4.92	28	4.64	18	4.71	12	6.01	5	6.02
France	19	5.08	25	5.30	35	4.64	51	4.39	29	4.53	16	5.88	8	5.76
Korea Rep.	25	4.82	23	5.36	26	4.81	83	4.08	87	3.60	27	5.50	13	5.56
Czech Republic	26	4.78	29	5.10	37	4.63	47	4.44	24	4.62	29	5.43	47	4.47
Estonia	28	4.74	20	5.50	22	4.93	15	5.00	23	4.63	32	5.32	98	3.09
China	31	4.66	68	4.33	58	4.37	37	4.50	54	4.08	74	3.70	1	6.98
Poland	34	4.64	31	5.05	46	4.51	81	4.11	43	4.26	41	4.78	21	5.16
Lithuania	36	4.59	24	5.35	36	4.64	53	4.35	57	3.99	22	5.63	78	3.61
Latvia	39	4.56	32	5.05	34	4.64	25	4.72	37	4.39	33	5.29	94	3.24
Russian Federation	40	4.53	38	4.96	92	4.16	50	4.40	95	3.53	60	4.22	6	5.93
Italy	43	4.39	45	4.81	71	4.29	126	3.46	117	3.25	37	4.90	12	5.61
Kazakhstan	45	4.36	60	4.53	49	4.48	18	4.90	91	3.56	61	4.19	46	4.51
Turkey	48	4.33	55	4.58	45	4.53	127	3.46	64	3.93	64	4.08	16	5.41
Hungary	49	4.31	57	4.56	72	4.29	77	4.15	65	3.93	48	4.60	51	4.32
Bulgaria	50	4.31	64	4.48	61	4.35	68	4.23	59	3.98	38	4.87	65	3.91
Slovenia	56	4.21	22	5.41	47	4.50	95	4.00	128	2.85	35	5.14	85	3.39
Macedonia, FYR	64	4.11	46	4.79	33	4.65	84	4.07	52	4.09	63	4.15	108	2.94
Ukraine	65	4.09	34	5.03	106	4.02	56	4.33	121	3.18	86	.345	45	4.54
Azerbaijan	69	4.05	89	3.90	66	4.31	30	4.57	114	3.33	57	4.26	67	3.90
Georgia	77	3.96	87	4.00	48	4.48	32	4.56	68	3.87	72	3.81	99	3.05
Armenia	84	3.84	72	4.26	50	4.46	58	4.30	94	3.53	75	3.67	116	2.81
Moldova	94	3.76	79	1.09	103	4.06	85	4.07	115	3.28	53	4.39	121	2.68
Kyrgyz republic	99	3.65	80	4.09	81	4.23	88	4.06	102	3.44	95	3.27	118	2.78
Tajikistan	104	3.60	75	4.12	96	4.12	48	4.42	110	3.38	115	2.81	120	2.72

Source: the Global competitiveness Index 2015-2016: efficiency enhancers, 2016.

aiming at creating and design of new and knowledge-based products and services.

Technology achievements are a significant factor for development. Success of the country in science and more importantly, commercialization of scientific results defines positions in the world markets and generates higher incomes. However, business investments in research and development are maintaining the paces. Multinational companies try to decentralize their innovation in developing countries to reduce the expenditures. Emergence and unprecedented wide spread of digital technologies together with such new technologies as gen-engineering, telecommunication, microelectronics, new materials, bio-technology and est. dictates national governments to take special measures to generate knowledge and to encourage national firms for innovation. The models, ways and policies also differ according to countries.

	Innovation and Sophistication Factors		Business sophistication		Innovation	
Country/ Economy	Rank	Score	Rank	Score	Rank	Score
Japan	2	5.66	2	5.77	5	5.54
Germany	3	5.61	3	5.70	6	5.51
United States	4	5.59	4	5.60	4	5.58
France	20	4.97	20	5.06	18	4.88
Korea Rep.	22	4.82	26	4.80	19	4.83
Italy	28	4.35	24	4.84	32	3.86
Estonia	31	4.15	43	4.26	29	4.03
Czech Republic	32	4.14	30	4.49	35	3.79
China	34	4.11	38	4.32	31	3.89
Lithuania	37	4.02	39	4.32	36	3.73
Slovenia	39	3.99	51	4.15	33	3.83
Turkey	56	3.71	58	4.07	60	3.35
Poland	57	3.70	55	4.09	64	3.32
Latvia	58	3.69	60	4.06	62	3.33
Macedonia, FYR	62	3.62	72	3.87	58	3.38
Azerbaijan	66	3.59	73	3.86	61	3.33
Hungary	69	3.57	90	3.70	51	3.44
Tajikistan	71	3.56	78	3.80	63	3.32
Ukraine	72	3.55	91	3.70	54	3.41
Russian Federation	76	3.54	80	3.79	68	3.29
Kazakhstan	78	3.53	79	3.79	72	3.27
Bulgaria	94	3.37	98	3.64	94	3.11
Armenia	101	3.33	97	3.65	107	3.02
Georgia	118	3.10	112	3.48	123	2.71
Kyrgyz republic	122	3.04	118	3.41	125	2.67
Moldova	128	2.93	127	3.29	130	2.56

Source: the Global competitiveness Index 2015-2016: efficiency enhancers, 2016.

Increasing of resources –labour and capital- efficiency depends rather on usage of knowledge and technology than simple existing of well-equipped higher educational institutions and/or highly skilled workers. National environment or in other words "National Diamond" (Porter, 1998), encourage or harm development of new products and technologies, or re-design and re-analysing existing data, knowledge, information and etc. These processes take place in both public and private sectors. As statistical data show, population of the USA, the EU, Japan, China and Russia comprise about 35% of world population meanwhile by number of researchers these countries hold approximately 75% of the total number (UNESCO Institute for Statistical estimation, June 2010). Generally speaking, the pure number of researchers has been grown in other developing countries (India, Latin America, and Africa) as well, but highly skilled workers find it hard to be employed on qualified positions or to receive fair and attractive remuneration for their job. Consequently, brain migration occurs widely from South to North, especially, in recent decades. As UK Parliamentary Office reported (UK Parliamentary Office report, 2008), out of 59 million migrants living in OECD countries, 20 Millions are highly qualified. This vividly illustrates that just exiting of higher educational system and generating researcher do not mean automatic higher positions in R&D (Gagnidze 2018). Nature and influence of "National Diamond" in the countries determine advance positions of the US, the EU, Japan and etc. and their competitive advantages in knowledge intensive production. It is worth to mention, that, as UNIESCO report notes based on wide range of statistical data, countries' specialization in science, expressed into scientific publications (recorded in Thomson Reuters' Science Citation Index), are reflected in diverse profiles of the countries, which have different needs, geographic locations and cultural disparities as well as historical experience of industrial development.

Generally, the number of registered patents is regarded as indicator for technological achievements or development, as they (patents) reflect accumulated and implicit nature of science knowledge translated into intellectual property generating income. Data proves the US dominance in this field. Japan, Germany and Korea are the next in the list. As a whole, distribution of this kind of wealth is asymmetric in favour of North America, Asia and Europe.

Thus, to summarise, technology achievements are a significant factor for development. Success of the country in

science and research boost country's development. However, business investments in research and development are keeping the paces. But it is more important to commercialize scientific results that enable firms to produce new products and services that will be compatible at the global markets and help firms to define positions in the world markets and generates higher incomes. Emergence and unprecedented wide spread of digital technologies together with such new technologies as gen-engineering, telecommunication, microelectronics, new materials, bio-technology and etc. dictates national governments to take special measures to generate knowledge and to encourage national firms for innovation. The models, ways and policies also differ according to countries.

	Total USPTO patents		World share %		Total Triadic patents		World share %	
	2002	2007	2002	2007	2002	2006	2002	2006
world	167 399	156 667	100	100	56 654	47 574	100	100
Developed countries	155 712	141183	93	90.1	55456	45 923	97.9	96.5
developing countries	12 846	17 344	7.7	11.1	1579	2 125	2.8	4.5
Least Developed Countries	13	13	00	00	4	1	00	0
Americas	92 579	85 155	55.3	54.4	25 847	20 562	45.6	43.2
North America	92 245	84 913	55.1	54.2	25 768	20 496	45.5	43.1
Latin America and Caribbean	450	355	0.3	0.2	115	101	0.2	0.2
Europe	31 046	25 387	18.5	16.2	17 148	13 249	30.3	27.8
European Union	29 178	23 850	17.4	15.2	16 185	12 540	28.6	26.4
CIS in Europe	350	332	0.2	0.2	151	97	0.3	0.2
Central. Eastern and other Europe	2 120	1 708	1.3	1.1	1 203	985	2.1	2.0
Africa	151	134	0.1	0.1	47	48	0.1	0.1
Japan	35 360	33 572	21.1	21.4	14 085	13 264	24.9	27.9
China	5 935	7 362	3.5	4.7	160	259	0.3	0.5
Israel	1 151	1 248	0.7	0.8	476	411	0.8	0.9
India	323	741	0.2	0.5	58	96	0.1	0.2
brazil	134	124	0.1	0.1	46	46	0.1	0.11
France	4 507	3 631	2.7	2.3	2 833	2 208	5	4.6
Germany	12 258	9 713	7.3	6.2	6 515	4 947	11.5	10.4

Source: data from USA Patents and Trademark office (USPTO) and OECD, compiled for UNESCO by the Canadian observatory, February 2009

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SUMMARY

Globalization of the world economy has started centuries ago. The old trade roads like Silk Road or long ship journeys over the Oceans to both directions West and East are just the examples of simple forms of Globalization. Nowadays we are having more difficult form of Globalization of the world economy where political, social, cultural, environmental and military aspects are closely interconnected and deeply influence economic ones (Keohane R., Nye J., 2000). Modern globalization is the complex and tough interdependence of the regions and countries which are not immediate geographic neighbours. In such environment Knowledge becomes the key driver for global world economic development. Technology, knowledge and innovations are the key to raising the resource efficiency (Sepashvili, 2014).

On current stage of global economic development high skill labour, new knowledge, developed technologies and continuous innovations will be utilized in most efficient and productive way. Therefore, national economic policy should give particular attention to education and researches, advanced infrastructure development (easy internet access, telecommunications, transports etc.). Success of the country in science and more importantly, commercialization of scientific results defines positions of national firms in the global markets and generates higher incomes. Further development and unprecedented wide spread of digital technologies together with new technologies dictates national governments to encourage and support knowledge generation and innovation creation which are resulted in profit. The policies, approaches and measures are also varying according to countries and regions.