Innovative activity of enterprises in the digital economy

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Abstract. This article describes core innovative activity vectors of enterprises in the digital economy environment. The main threats, associated with the innovative activity of enterprises, and obstacles to the digital economy development in Russia have been identified.

1. Introduction

Entrepreneurial activity is carried out in the context of a constant search for more efficient business conduct methods, which will help to gain competitive advantages, expedite the implementation of new products, and form the customer experience. In addition, the market demand is also moving towards more technologically-efficient and eco-friendly products. Often, new process solutions, successfully implemented in the market, may be a subject to the intellectual property rights (in particular, protected by patents), which allows an organization to receive unique competition protection rights for a certain period of time, which is a good opportunity to maximize economic benefits.

In the Federal Law “On Science and the State Science and Technology Policy” [1], the innovation activity is defined as an activity aimed to implement innovative projects as well as to develop and support operability of an innovation infrastructure. Innovations in a general sense are characterized as a new or significantly improved product (goods, service) or process, a new sales method or a new organizational method in business practices, workplace organization or in external relations, which has been brought into use [1]. However, there are many other definitions that may differ from the definition stated in the law. Nevertheless, despite the difference in definitions, scientific and technological innovations are changing business models in seemingly well-established spheres. A typical example is the Netflix company, which has successfully implemented an artificial intelligence technology in the entertainment industry.

Another defining aspect of this paper is to describe the “digital economy” term. Yet a decade ago, there was no practical difference between the digital and IT words. However, for the time being, the difference between these terms is becoming more obvious. IT is a narrower term that defines technology as a work tool. In its turn, digital means qualitative structural changes as a result of the implementation of IT technologies, which modify the business – end user interaction models and expand the market. The possibility of implementing innovative solutions directly at manufacturing plants is of specific interest.

2. Enterprise Innovative Activity Management

Supply and demand studies in the IT solution market show that business processes, related to the development and implementation of advanced solutions by production organizations, have changed in this sector. The total number of companies, which have own in-house departments for studying advanced technologies, has decreased over the past ten years. Despite the availability of resources (e.g., business incubators, start-up platforms, crowd sourcing platforms, manufacturing companies, open source
software environments, university laboratories), most enterprises still rely on technology providers and services provided by professional consultants, in particular, industry analysts & developers as well as on competitive intelligence data. Establishing project teams and using outsourcing services (including those outside the country where the organization runs its core activities) have become more popular. Investments in key technologies by the industry with associated benefits from investments are showed in the table 1.

| Technology                  | Today (%) | In 3 years (%) |
|-----------------------------|-----------|-----------------|
| Internet of Things          | 64%       | 50%             |
| Artificial Intelligence     | 50%       | 54%             |
| Robotics                    | 45%       | 46%             |
| Augmented reality           | 7%        | 12%             |
| 3D printers                 | 8%        | 14%             |
| Drones                      | 10%       | 24%             |
| Virtual reality             | 4%        | 6%              |
| Blockchain                  | 1%        | 5%              |

*study data of PwCDigital IQ

3. Internet of Things

The concept of the Internet of Things first appeared in 1999. However, at that time such decisions were not yet realizable. At the moment, the Internet of Things technology finds its application in all spheres of the economic activity, and the industrial sector is no exception. In a general sense, the idea of the Internet of Things is that enterprises integrate into a common system based on a digital platform. As a result, major part of typical processes is controlled without human intervention, and information from any point of the chain goes to a common data processing center. At the same time, global network connectivity creates more vulnerabilities for cyber threats. That’s why the Internet of Things based investments in process automation also involve the development of security systems. The Internet implementation at enterprises is already a rather actively used service provided by such companies as Cisco, SAP, etc.

4. Artificial Intelligence

Artificial intelligence (AI) is characterized as: “designing and construction of intelligent agents, which perceive environmental objects and take actions affecting the environment” [13]. The main difference between the artificial intelligence and software is the ability to make independent decisions and “take action”. Usually, the development of artificial intelligence is advisable in the presence of large data arrays (big data).

The number of start-ups, which render services for the development and implementation of technologies based on artificial intelligence in various kinds of enterprises, as well as venture investments in these start-ups, have grown significantly. AI developing start-ups (pcs) are showed in figure 1.
Caterpillar, an American manufacturer, is among the companies, which successfully implemented the artificial intelligence technology. This company applies an assisting system to analyze and predict the demand for new and already sold products. The company uses a video analysis system to evaluate the efficiency of products and their interactions during the working cycle [19].

5. Innovative activity on non-digital technology implementation

Innovation activities are often associated exclusively with IT-technologies. However, this is not entirely true. The industrial sector of the economy faces problems, whose solution can be found in such branches of science as biotechnology, neuroscience and renewables. Using power purchase agreements (PPA) is a good example of application of these solutions. In a standard model of these agreement, the seller establishes a power (solar or wind) generation system and provides its maintenance on the buyer’s territory. Similar agreements are actively used by IT companies to service data centers. Amazon, Google and Microsoft are the leaders in the use of alternative energy sources [18]. The use of power purchase agreements are showed in figure 2.
The technological solution under review has already managed to go from the category of innovative technologies to the category of actively used practices. The renewable energy sector is one of the most developing ones. Despite the US withdrawal from the Paris Agreement, regulating greenhouse gas emissions, many organizations (Caterpillar, Amazon, Google, etc.) have decided not to abandon sustainable development policies and continue to implement and develop renewable energy systems.

6. Innovative activities in the Russian Federation
The Federal State Statistics Service (Rosstat) publishes official data on the innovation activities of Russian enterprises. It should be noted that only a negligible part of organizations (about 9% on average) uses and implements innovative approaches to doing business. However, it should be taken into account that innovation costs include, but are not identical to, R&D expenditures, which account to a relatively small percentage. According to Rosstat, only 1326 commercial organizations conducted R&D in 2016. The total costs for the same year amounted to RUB 8,737,778.7 million [20]. At the same time, a group of European Union member countries (28 countries) spends about 1.3% of GDP on innovations, with its value of EUR 15,326,468.0 million in 2017. Russian companies spend on innovation a little more than 0.5% of the country’s GDP [21]. Innovative activity of enterprises are showed in figure 3.

7. Threats related to innovation activities
Recent studies show that, in spite of the improvement, systematization and rationalization of business processes, which may become a result of a competent implementation of innovations, organizations may suffer from a loss of confidence from their clients, especially in case of implementation of IT technologies.

According to PwC, 67% of managers of the world’s largest companies expects a drop in stakeholder confidence, specifically, due to the implementation of artificial intelligence and block chain technologies [11].

Furthermore, it’s obvious that these innovations require an organization to step up to a completely different level of protection against cyber risks. The epidemics of the WannaCry and Petya viruses in 2017 showed that Russia was among the countries most affected by these attacks. One of the reasons behind this is the unpreparedness of enterprises for digital space threats. This applies to both cyber attacks and social engineering methods, encouraging employees to violate safety rules by their actions.

8. Obstacles to the development of the digital economy in Russia
It becomes obvious that the market is already oriented towards the digital economy and its consistent propagation is only a matter of time. However, there are some factors, which can slow down the development of enterprises. The first and most obvious are the complications between suppliers of products and services, which are capable to transfer business processes to the digital level, and organizations. Unfortunately, foreign developers, the interaction with which is complicated by sanctions, are at present major suppliers of technologies. Not all companies are capable to finance their own developments, and the use of free software is also associated with a fairly high level of implementation of IT technologies at enterprises. Restrictions, imposed by the sanctions, also reduce
the potential financial sources in foreign markets, which may be used for funding digital conversion of Russian companies. Another factor is the legal risks, caused by a legislative requirement to acquire, store and process information, as well as the lack of unambiguous position and regulation on some issues directly related to the innovation implementation prospects (cryptocurrency, intellectual property protection, etc.).

In conclusion, it should be noted that innovations at present are not only a method of gaining competitive advantages, but they also move into the category of factors, vital for sustainable development of enterprises. Business conduct methods become obsolete so quickly that business models need updates almost immediately after their implementation. Innovations enable more efficient cost management, which is necessary to maintain competitive positions in the market. The digital economy opens up new potential for growth and development not only for financial and IT companies, but also for organizations in the manufacturing sector.

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References
[1] Federal Law No. 127-FZ “On Science and State Science and Technology Policy” dated 23 August 1996 (as amended as of 23.05.2016) (entered into force on 01 January 2017)
[2] Alsaaad A, Mohamad R, Taamneh A and Ismail N A 2018 Technology Analysis and Strategic Management 30(8) pp 980-92
[3] Bondarenko T G, Orekhov S A, Sokolnikova I V, Soltakhanov A U and Khmelev I B 2018 Espacios 39(36) p 12
[4] Deng Z, Jean R, Sinkovics J B and Rapid R R 2018 J. of Int. Business Studies 49(8) pp 1010-32
[5] Eckhardt J T, Ciuchta M P and Carpenter M 2018 Strategic Entrepreneurship J. 12(3) pp 369-91
[6] Frolova I V, Panfilova E A, Matytsyna T V, Lebedeva N Y and Likhatskaya E A 2016 Social Sciences and Interdisciplinary Behavior - Proceedings of the 4th International Congress on Interdisciplinary Behavior and Social Science ICIBOS 13 pp 317-24
[7] Geraskina I N, Zatonskiy A V and Petrov A A 2017 Int. J. of Civil Engineering and Technology 8(10) pp 1432-47
[8] Gryzunova N V, Zaharova G S and Ordov K V 2018 Espacios 39(6) p 32
[9] Kazakova N A, Bolvachev A I, Gendon A L and Golubeva G F 2016 Studies on Russian Economic Development 27(6) pp 638-48
[10] Kuznetsov Y V, Kapustina N V and Maslova E V 2017 Managing Service, Education and Knowledge Management in the Knowledge Economic Era - Proceedings of the Annual International Conf., on Management and Technology in Knowledge, Service, Tourism and Hospitality pp 19-22
[11] Moritz E B 2017 20 Years Inside The Mind Of A CEO...What’s Next? 20th Survey of CEOs of the World’s Largest Companies, PwC, (CEOSurvey PwC) - https://www.pwc.com/jg/en/
[12] Romanchenko O, Shemetkova O, Piatanova V and Kornienko D 2019 Advances in Intelligent Systems and Computing 850 pp 245-53
[13] Russell S and Norvig P 2009 Artificial Intelligence: A Modern Approach (Upper Saddle River, NJ: Prentice Hall)
[14] Sedova N V, Gagiev N N and Melnikova D M 2017 European Research Studies J. 20(2) pp 251-60
[15] Tauscher K and Laudien S M 2018 *European Management J*. 36(3) pp 319-29
[16] Trachuk A and Linder N 2018 *J. of Innovation and Technology Management* 15(3) p 1850027
[17] Zimin A, Otto V, Filimonova N, Fedosova R and Kuznetsov Y 2016 *Advanced Science Letters* 22(8) pp 2002-6

[18] Big Business Sees The Promise Of Clean Energy The Economist
https://www.economist.com/business/2017/06/10/big-business-sees-the-promise-of-clean-energy Retrieved 2017-06-25

[19] Official website of Caterpillar - https://www.caterpillar.com/en/
[20] Official website of the Federal State Statistics Service - http://www.gks.ru/
[21] Official website of the Organization for Economic Co-operation and Development (OECD) - http://stats.oecd.org/