

## ECOSYSTEM OF THE INTELLECTUAL PROPERTY AND ITS DEVELOPMENT

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***Abstract:** This article is devoted to the consideration of issues related to the creation of the intellectual property ecosystem throughout the world, research and experimental developments, R&D expenses, as well as accounting and assessment of innovation products.*

***Key words:** intellectual property, ecosystem, artificial property, additive technology, research and development, patent, industrial sample, useful model, invention.*

### **1. Introduction.**

Currently, human capital, intellectual potential, innovative ideas, as well as high technologies in innovative globalization constitute the basis for rapid and sustainable development. As far as we know, currently the volume of the market of intellectual property objects and innovation products is rapidly increasing throughout the world. In particular, the market of “artificial intelligence”- (AI) rose from 31 percent and in 2017 this indicator accounted for 3 billion USD, and in 2018 this figure constituted 8,1 USD and this year it has amounted to 13,4 billion UZS. Moreover, it is expected, that by 2022 this indicator will total 52,5 billion UZS (Frost & Sullivan, 2019). In this regard, such advanced technologies as “SD model” and “Items from Internet” (IoT) are rapidly developing and their market is annually growing by 10-15 per cent (nowadays this figure accounts for 6 billion USD). This, in turn, requires creation of the intellectual property ecosystem and its further development. Moreover, development of the intellectual property market will be mainly connected with the creation of this ecosystem. It should be noted, that the concept of “Intellectual property ecosystem” appeared in foreign countries many years ago and currently it has approached the level of development. For example, in the USA the intellectual property ecosystem is referred to the Silicon Valley which unites major venture companies, investors, start-ups and entrepreneurs. The reason for this that head offices and lab rooms of the famous world-wide known companies and giants of the electronic industry (Apple, Google, Facebook, Intel, AMD, Electronic Arts) are located there. They are involved in the development of intellectual projects and this fact results in the creation and further development of intellectual property ecosystem, which, in turn, leads to ensuring innovative globalization.

The intellectual property ecosystem requires special emphasis on the creation and use of intellectual property through the application of new knowledge and technologies. The growth rates of the global intellectual property market are higher than 10% per year, and with the figure amount to 23 per cent in China, 5 per cent in the USA and Russia and 2 per cent in France. Over the last decade, more than one billion patented objects have been introduced into digital platforms and services for intellectual property management. According to the statistical data, “in the economically developed countries the amount of the total assets of the companies constitutes 89,0 trillion USD, out of which assets in tangible form account for 46,8 trillion USD (52,5 per cent), intellectual property objects

(goodwill included) amount to 41,9 trillion USD (in particular, 11,8 trillion USD or 28,1 per cent are intangible assets, and 30,1 trillion USD or 71,9 per cent are intangible assets which haven't been revealed). Even though the intangible assets which are unknown or not detected constitute a major part of the total business value in major companies, they are not accounted in the balance. Denmark (61,0 per cent), Switzerland (42,0 percent) and Belgium (41,0 per cent) are the countries with the highest indicators of the unknown or unrevealed intangible assets.

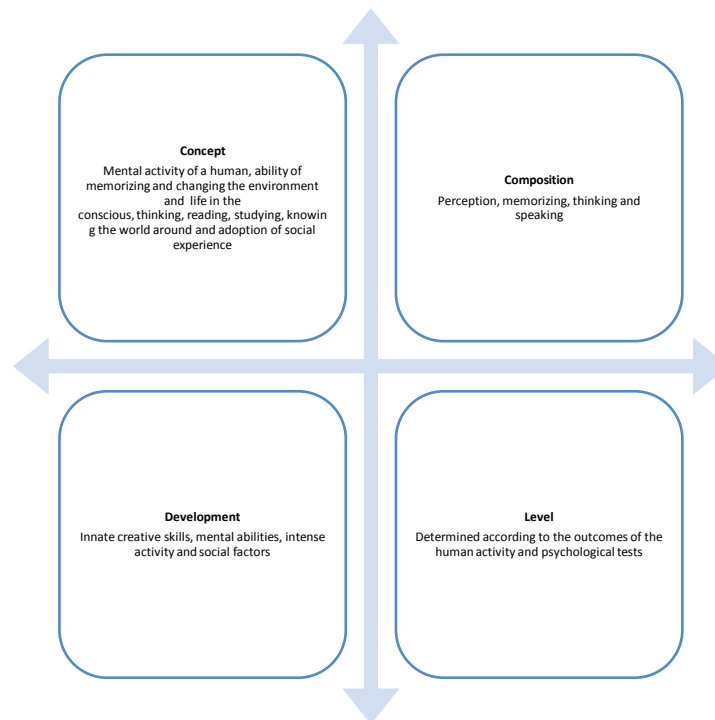
A number of efficient measures are being undertaken in Uzbekistan to shape the intellectual property ecosystem. In particular, in the Innovation Development Strategy of the Republic of Uzbekistan these measures include improvement of the intellectual property assessment mechanisms and raising the amount of the public expenses on the R&D. In 2021 this indicator is expected to account for 0,8 per cent in the Gross Domestic Product (GDP) and by 2030 the share of the expenses on the R&D will amount to 1-1,5 per cent, the share of expenses on the activity of scientists and researchers will constitute 0,4 per cent, and the share of the expenses on the research made in the business sector will amount to 50-55 per cent.

From this point of view, creation and development of the intellectual property ecosystem is the most urgent and top-priority task for the sustainable innovative development of our republic.

### **Intellectual property and the ways of its creation**

When perceiving the nature of the intellectual property ecosystem, first of all, it is important know what intellectual property is. Currently the economic concepts of "intellectual property", "intellectual asset", "intellectual capital", "intangible asset" and "insignificant or secret items" have various interpretations in different literary sources. In this regard there is the question which concept should be prioritized. It should be noted that scholars and experts demonstrate different approaches to this category and in the statutory acts it is also treated differently. Thus, currently there is no perfect definition of these concepts. The reason for this is there is no limit for the concept of "intellectual" and it is not subject to any standard. In addition, it is a complicated task to determine their value (price) for the goods (which can be sold in the market).

Therefore, there is no precise set or limit in this regard. The technique which is currently considered to be correct, is being applied. In the economic literary sources the word "*intellect*" originated from the Latin word "*intellektus*" which means "to know, to understand, to perceive". In the broad sense of this word this term means "human's mental activity, life, and environmental consciousness, as well as the ability to reflect, change, think, read, learn, know the world, and adopt social experience. In this regard intellect includes with such psychological processes as perception, memorizing, thinking, expressing ideas, speaking and can be connected with such social factors as creative skills, mental abilities, intense activity and life experience (Figure 1).



**Figure 1. General composition of the “intellect” concept.**

### 2.1. International recognition of the intellectual property

The World Intellectual Property Organization (WIPO) determines the concept of “Intellectual property” as follows: intellectual property refers to creations of the mind: inventions; literary and artistic works; and symbols, names and images used in commerce. Intellectual property is divided into two categories: Industrial Property includes patents for inventions, trademarks, industrial designs and geographical indications”. Various economists define “intellectual property” in the different ways, for example, in the opinion of A. Stewart, intellectual property is the knowledge embodied in a more tangible form than an idea. He approached this concept in terms of production and considers it as the inherent useful knowledge. In this regard intellectual property is a kind of useful values in a certain form: a list of facts, database, which, in case of their discovery, can turn into the intellectual property. This means that as a result of useful knowledge there are various insignificant properties but which can create a certain value.

K. Sveiby considered the concepts of intellectual property and intellectual capital and in his model he divided a company’s intangible assets (intellectual property) into three groups: external structure (trade mark, image of the company and production recognition), competence of employees (education, intellectual knowledge, experience and skills), internal structure (patent, copyright, management systems, databases and scientific developments). As it is obvious from this model, intellectual property objects are represented only in the external and internal structures of the company. We do not fully agree with this model as it entirely covered intellectual property objects and approached thereto as intangible assets. If they were intangible assets, the K. Sveiby’s model would require a close (alignment) approach to accounting objects.

From the point of view of Thomas P. Carlin, intellectual property represents an ambiguous item in the balance which has a poor quality. In his research he made an emphasis on the value of intellectual property as a key component of intangible assets and justified an opportunity for their assessment. In our opinion, if intellectual property objects had more efficient opportunities for their use, it could be possible to turn into the most profitable asset item of the balance.

B. Leontyev refers intellectual property to the intellectual capital. In addition, he specifies that intellectual property consists of the value of all available assets, intellectual novelties, knowledge, opportunities, and consolidated base of knowledge.

L. Dontsova evaluates intellectual property as a depreciable property of a company from the point of view of economic analysis and considers that their composition includes exclusive rights to various scientific developments, computer programs, patents, copyrights, films, trademarks and service marks. Moreover, she highlights the importance of focusing on receipts (portion of intellectual property) or reducing business costs in determining the economic profit (income) of intellectual property objects and focuses on the analysis methodology for assessing long-term assets of the company. I. Ivanov considers the concept of intellectual property in terms of the exclusive right of a person to the results of intellectual activity and specifies that it consists of a trademark, a company name, a brand name, and a service mark. He summarizes his views and comes to the conclusion that intellectual property is a part of these intangible assets. In the opinion of I. Pokrovsky, it is possible to publish and duplicate works without the consent of the owner of intellectual property rights only with the aim of implementing achievements and technical inventions of each owner of the intellectual property (an author).

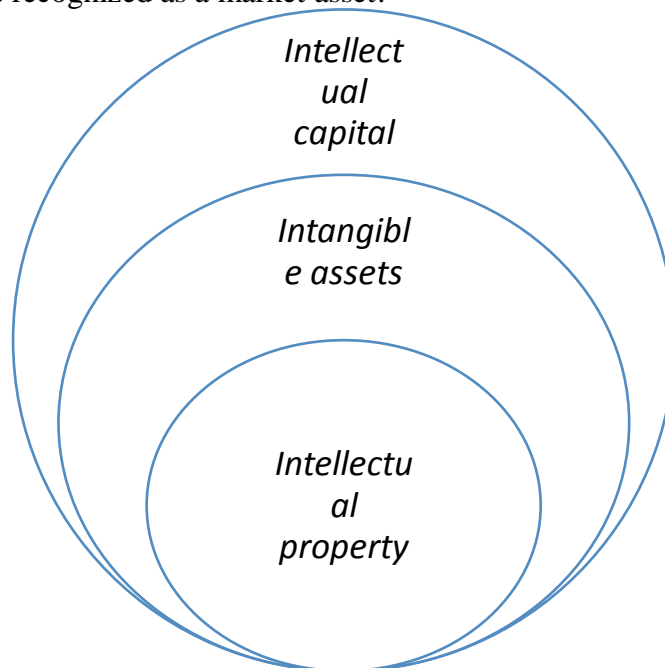
L. Lytneva evaluates intellectual property as a component of intangible assets and proposes to divide it into the following groups: industrial property objects, objects of copyright and tools for individualization of goods. This classification is practically close to international practice and is grouped according to the intellectual property used by companies.

According to the model of E. Brooklin, intellectual property constitutes an integral part of the company's intellectual capital (Figure 2). According to this model:

### **2.3. Intellectual property as the model and preliminary conclusions**

*Company's intellectual capital > intellectual property > patent, copyright, trade mark, know-how and service mark.*

As it is obvious from the model, intellectual property constitutes a part of intellectual capital by its objects. On the other hand, a trade mark related to the intellectual property object by E. Brooking is recognized as a market asset.



**Figure 2. Approaches of E. Brooking, A. Poltorak and P. Lerner to the intellectual property.**

Summarizing the above-mentioned statements, in our opinion, the category of intellectual property should be identified as follows: “*Intellectual property is knowledge acquired through the human’s mental capacity, which requires legal protection as knowledge or an object, or assets (funds)*”.

In our opinion, intellectual property objects demonstrate the following peculiarities:

*first*, in most cases, they come in the form of ideas or information;

*second*, intellectual property in the form of ideas or knowledge cannot be owned unlike owning something in the tangible form;

*third*, there is also possibility of unlimited use of these objects at any time;

*fourth*, ownership of intellectual property rights will be canceled after a certain period of time and soon after it will become a common property and can be used freely or without permission;

*fifth*, exclusive rights, not property rights are applied to intellectual property objects;

*sixth*, implementation scope of intellectual property is limited to a specific area;

*seventh*, there are also personal rights of the authors of intellectual property objects, and the users of these objects shall comply with these rights.

#### **2.4. Ecosystem as well as its structural composition and elements**

The “ecosystem” concept can be applied not only to nature but also to the process of creation and use of intellectual property. This concept originated from the Greek word *oikos* – housing, residence and system. At that meaning the concept implies organisms living together and a set of conditions in which they live. The term “ecosystem” was proposed by the plant biologist A. Tansley. In his opinion, in terms of ecology, the ecosystem is a natural unit on Earth that includes all physical organisms, including a set of physical factors, that is, a set of biomass factors (Ekotizim, 2019).

The concept of ecosystems can be applied to objects of varying complexity and size. The intellectual property ecosystem can be comprised not only of innovative products, but also of all technologies and capabilities available in every intellectual property.

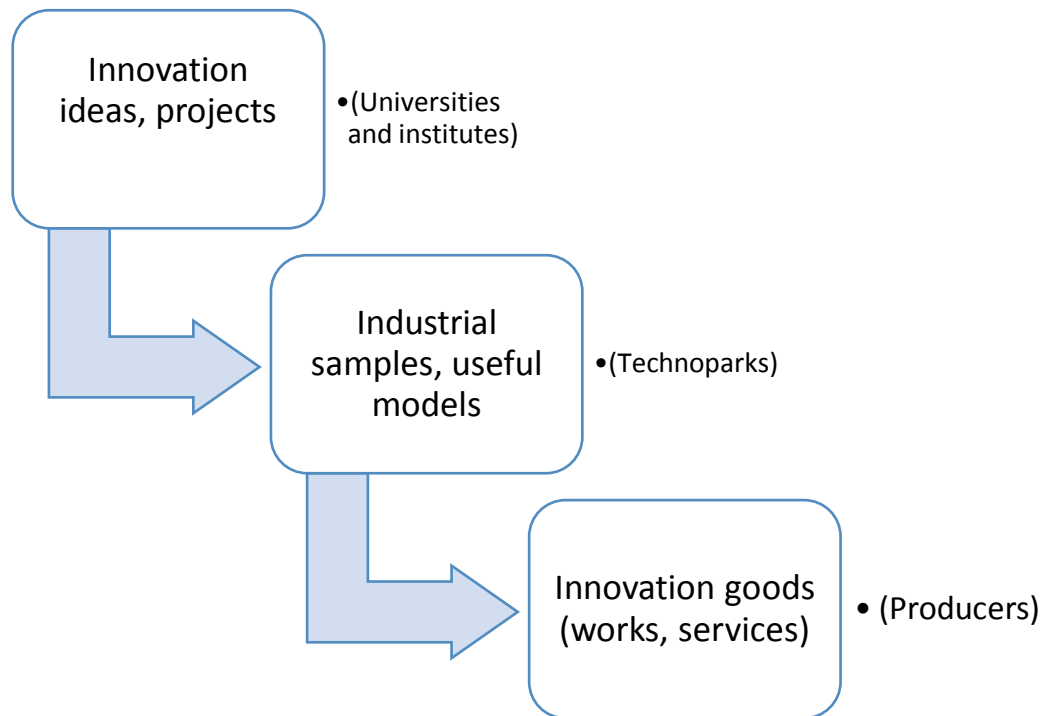
This article focuses on the application of this concept to the intellectual abilities of the person and the intellectual property created as a result of this mental activity. In this regard there can be the question about the appearance of the intellectual property ecosystem (who are its participants and what are its structural elements)?

In the world practice, the concept of intellectual property ecosystem includes owners of intellectual ideas, creators of intellectual property objects and series of manufacturers of innovation products. This concept can be expanded by the following statements:

first stage: creators of intellectual ideas or projects (institutes, universities). Projects and developments on the certain intellectual property object, as well as new formulas are created at this stage;

second stage: sample and form of intellectual property objects are created at this stage. For example, industrial samples (on spare parts of motor vehicles);

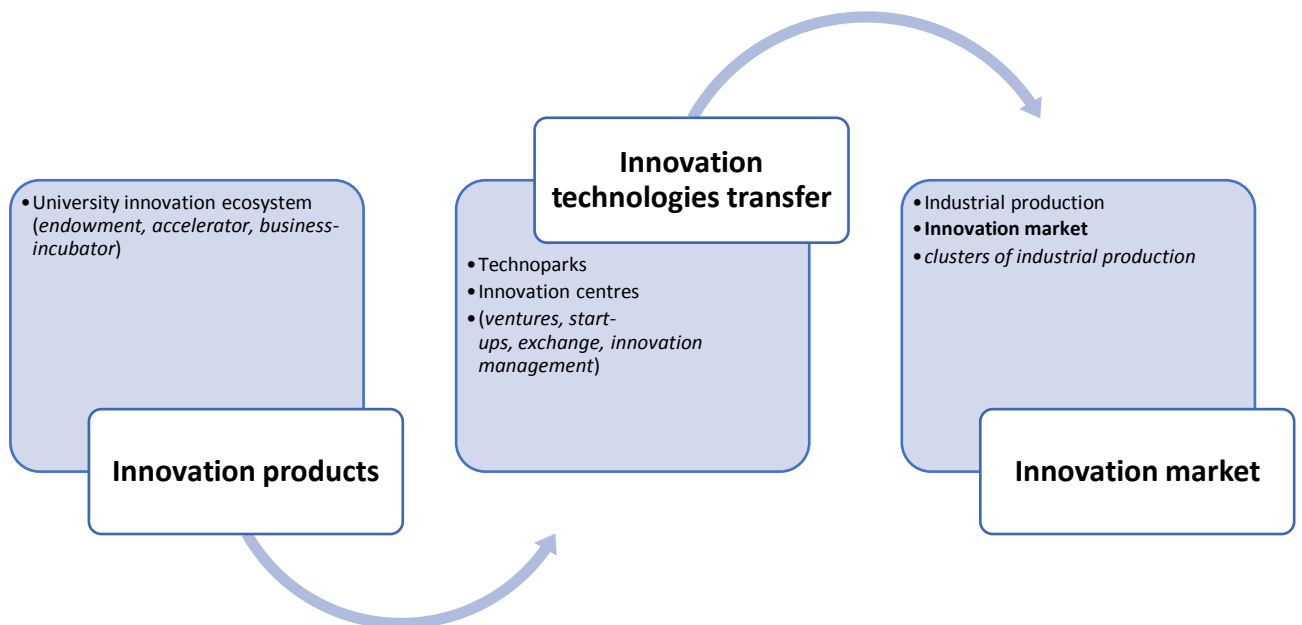
third stage: the sample of the intellectual property object undergoes through experimental testing (industrial samples, useful models and inventions). Then this processed is followed by the commercialization of this product. In particular, herein the industrial production of this sample starts. For example, the industrial sample on the spare part of the motor vehicle is purchased by the manufacturer.



**Figure 3. Composition of the intellectual property ecosystem.**

Universities and institutes are in the first stage of the intellectual property ecosystem.

Elsewise, intellectual property ecosystem is also called an innovation ecosystem. The innovation ecosystem is a set of human, financial and other resources aimed at enhancing the commercialization of innovation, optimizing and ensuring its efficiency in the process of commercializing ecosystem innovations and their interconnection.



**Figure 5. Element of the intellectual property system.**

It is obvious from these stages that the intellectual property ecosystem will provide an opportunity for innovative development of the industry in whatever area it is selected. In turn, it results in the increase in the volume of innovative products in the economy. This requires increasing the amount of public expenses on the R&D and costs on innovations.

### 3. Analysis and results.

#### 3.1. Analysis of the investment made in the intellectual property

Nowadays there is a tendency to create and develop an “intellectual property ecosystem” throughout the world. In the nearest future decade innovative globalization will lead to the development of the technologies applied to the qualitative changes around the globe. In addition, nowadays the tendency of the formation and development of the “intellectual property ecosystem” hasn’t been adequately developed yet. In this regard it is expected that within next decade huge amounts of investments will be made in such sophisticated technologies as Bio Robot Refrigerators, internet solar panels 5G (Project Skybender), 5D storage devices (Superman memory crystal), oxygen particle injection, underwater transport tunnels (Hyperloop), bioluminescence trees, folding TVs, biological lenses for unusual viewing, spray clothing, DNA-originated portraits, unmanned vehicles, a city under the dome (Mall of the World), carbon dioxide and solar-fueled artificial leaves, plasma area to protect against accidents, floating cities (Lilypad), 3D printed copies, bionic insects for human organ transplantation operations (BionicANT), search for a new life in a human being that can live 1000 years and another life in space (FAST), etc.

Meanwhile, the amount of expenses made on this sphere is also increasing (Table 1).

**Table 1**

**The share of regions in terms of expenditures on research activities in relation to the GDP**

*(as of June 1, 2019, UNESCO)*

<b>Regions of the world</b>	<b>Expenditures on R&amp;D in relation to the GDP, %</b>	<b>Share in relation to total number of researchers, %</b>
North America and Western Europe	2,4	39,7
East Asia and the Pacific	2,1	38,5
Central-Eastern Europe	1,0	10,6
Latin America and the Caribbean	0,7	3,7
The Arab countries	0,6	3,9
South - West Asia	0,5	1,9
Africa	0,4	1,1
Central Asia	0,2	0,6

In North America and Western Europe, the average amount of expenditures on creating intellectual property constitutes 2,4 percent in relation to the GDP, thus totaling 39,7 percent of researchers around the globe. It is also a high indicator in the countries of East Asia and the Pacific (2,1 percent) and covers 38,5 percent of researchers. However, this situation cannot be considered as positive in the Central Asian region, as the share of expenditure on R&D amounts to only 0,2 percent in relation to the GDP and the share of developers of innovation products accounts for 0,6 percent.

The analysis illustrates that the main part of expenditures in relation to the GDP refers to the business sector. It is obvious that expenditures directed to business development will be highly efficient. Among the analyzed countries we have the following

statistics in terms of creating intellectual property objects (innovation developments): South Korea 78,0 percent (or 57,2 billion UZS), Japan 77,5 percent (131,8 billion UZS), China 77,3 percent (286,5 billion UZS) and the USA 71,4 percent (340,7 billion USD).

**Table 3****Distribution of overall expenditures on innovation developments**

Countries	billion USD			
	Business sector	Public administration	Education system	Non-commercial sector
South Korea	57,2	8,2	6,6	1,1
Japan	131,8	14,1	21,3	2,2
USA	340,7	54,1	62,3	19,2
China	286,4	58,6	25,5	-
Russia	24,0	12,2	3,9	0,51
Great Britain	28,5	3,2	11,2	0,793
India	17,0	29,0	1,9	-
Germany	74,1	16,0	19,4	-
Sweden	9,5	0,531	4,1	0,34
France	38,5	7,7	13,4	0,915
Singapore	6,2	1,1	2,7	-
Israel	9,9	0,217	1,5	0,116
Kazakhstan	0,263	0,235	0,159	0,60
Uzbekistan	0,108	0,166	0,64	0,3

According to the data presented in Table 3 it is obvious that in terms of expenditures directed to the education system (universities) which represent the first stage of the intellectual property ecosystem, France is playing a leading role with 34,8 percent or 13,8 billion USD, then - Great Britain with 25,5 percent (11,2 billion USD) and Germany with 17,7 percent (19,4 billion USD). However, in terms of creating the innovation production to the public administration, the share of Russia accounts for 12,2 billion USD and the share of India amounts to 60,4 percent which equals to 29,0 billion USD.

In Uzbekistan the share of expenditures on the business sector amounts to 31,5 percent, on the public administration - 48,5 percent and on the education system - 18,7 percent, in Kazakhstan these indicators constitute 36,7 percent, 32,7 percent and 22,1 percent respectively. It should be noted, that from these figures it is obvious that the country focuses on innovation and makes huge investments in innovation developments.



Table 4

**Expenditure on R&D made by the world largest companies**

<b>Firm and companies</b>	<b>Expenses, billion Euro</b>	<b>Growth in % in 2018 in relation to 2017</b>
Samsung Electronics (Korea)	13,4	11,5
Google (USA)	13,3	18,4
Volkswagen (Germany)	13,1	-3,9
Microsoft (USA)	12,2	13,0
Huawei (China)	11,3	16,5
Intel (USA)	10,9	2,8
Apple (USA)	9,6	15,3
Roche (Switzerland)	8,8	4,8
Johnson & Johnson (USA)	8,7	16,5
Daimler (Germany)	8,6	15,0
Toyota Motor (Japan)	7,8	2,6
Novartis (Switzerland)	7,3	-2,3
General Motors (USA)	7,6	8,0

The EU Industrial R&D Investment Scoreboard provides statistic data in the form of rating on the expenses (in the amount of 736,4 billion Euro) made by over 2500 companies from 47 countries on the research and development. In particular, 778 US companies (37 per cent), 577 companies of the European countries (27 per cent), 339 Japanese companies (14 per cent), 438 Chinese companies (10 per cent) and 368 companies of other countries (12 per cent) invested free funds on the R&D.

As the data illustrates, the biggest part of investments in terms of budget in the amount of 13,3 billion Euro belongs to Korean company “Samsung Electronics” the US “Google” company is in the second place in the amount of 12,8 billion Euro and in German company “Volkswagen” this indicator constitutes 13,1 billion Euro. After top-three companies we can see the US company “Microsoft” (12,2 billion Euro), Chinese Huawei company (11,3 billion Euro), and one of the leading Japanese companies - “Toyota Motor” (7,8 billion Euro). Unfortunately, besides two Russian companies – “Kamaz” with 37,0 million Euro ranked 1956 and “Rosneft” with 31,6 million Euro ranked 2193 – none company from the CIS countries has not been included in this rating (Global -2500).

**According to the indicator of the property rights for the intellectual property objects, Asian companies are considered to be leading: “Huawei technologies co.,ltd” (5405 in 2018 / 4024 in 2017, growth by 134,3 per cent), “ZTE corporation” (2080/2965, growth by 68,9 per cent) and “BOE technology group co.,ltd” (1813/1818, growth by 99,7 per cent) in China, Mitsubishi electric corporation- 2812/2521, growth by 115,4 per cent, Sony corporation - 1735 in Japan, LG electronics inc - 1697/1945, growth by 87,1 per cent, Samsung electronic – 1997/1757, growth by 113,6 per cent - in Korea.**

According to “Madrid agreement” (*Madrid top 10 countries*) the number of applications submitted for registering trademarks in 2018 accounted for 61200 thousand, and the growth constitutes 108,8 per cent (in 2016 this indicator amounted to 56200 thousand). Among the biggest users it is possible to mention the USA, Germany and China and the highest growth of applications submitted for registering trademarks belongs to China (79,7 per cent), Russia (36,3 per cent) and Japan (29,1 per cent) (Table 8).

**Table 8**

**Applications submitted for registration of trademarks throughout the world**  
(Madrid top 10 countries)

Countries	2016	2017	2018	Growth in relation to 2016, %
USA	7730	7884	8825	114,1
Germany	7545	7316	7495	99,3
China	3838	5230	6900	179,7
Japan	2412	2495	3124	129,1
France	4214	4261	4490	104,7
Great Britain	3012	3292	3347	111,1
Switzerland	3069	3272	3364	109,8
Italy	3082	2878	3140	101,9
Australia	2060	2115	2074	100,4
Russia	1178	1460	1502	136,3

It should be noted that currently the interest of getting a patent for digital technologies in China and South Korea is rapidly increasing. In Germany, the transport sector is considered to be leading in terms of getting patents for digital technologies, but in the USA the leading role belongs to the IT industry. Japan (10,8%), Germany (9,9%) and Korea (9,3%) are dominating in the electric machinery and equipment and in the energy sector.

In 2018 throughout the world the volume of patents submitted for trademarks by technologies and research was the highest in the selected countries. Meanwhile, China (16,7 per cent) is dominating by trade marks in terms of trade, i.e. the trademark is the highest in the transport sector. Patent agencies in China, the USA, Japan, South Korea and Europe accepted 84 per cent or 3,1 million applications in terms of issuing patents for created industrial property objects. Herewith, China holds 43,6% of all patent applications. Moreover, China, the USA, Japan, Europe and India are considered to be leading companies with 58,0 per cent in terms of registering trademarks. In China (46,3%) the level of creating trademarks is not the matter of only firms and companies, and population of China makes a significant contribution thereto.

These figures justify the fact that consequently the firms and companies of the countries which pay a particular attention to the R&D, allocate huge volumes of investments on the R&D and thus obtain a good reputation and can get huge profits which are constantly increasing. Hence the expenses made on the R&D will definitely be beneficial. Such countries will raise their welfare not due to material assets, but due to intangible assets based on innovative ideas. And this is true. The urgency and significance of this issue has been emphasized by Sh. Mirziyoyev, the President of the Republic of Uzbekistan: "Currently we are shifting to the innovation development path aimed at the fundamental renewal of the state and society. This fact is definitely not without a reason. Because who will win in the current times of the rapid development? The state which owns a new idea, new thought, which relies on the innovations, will benefit".

As it has been mentioned above, Uzbekistan is trying to do it best to take its own place in the creation and development of the World Intellectual Property ecosystem.

One of the important issues on the development of the intellectual property ecosystem in the Republic of Uzbekistan is to strengthen the legal basis of the technologies of the nearest future. Currently economists, scientists, accountants and specialists are concerned with the question whether 3D model (CAD file) will be recognized as a separate object of the intellectual property or it will remain as a structural element of the software

for computing devices. From the point of view of other group of researchers, the problem is that by the legal protection of the intellectual property both 3D-printers and software programs have the same essence and should be protected as the work of authorship. At first sight it seems that there is no difference between the software for computing devices and 3D model (CAD file).

In our opinion, with the aim of further development of the legal bases for intellectual property ecosystem it is recommended to introduce the following articles of the Civil Code of the Republic of Uzbekistan:

*To article 1041: By "Copyright object": "Three dimension object (e-model)";*

*To article 1042: By the types of the copyright objects: "Special software, its electronic model (CAD file), printing device (3D printer) and three dimension form (3D object)";*

*To article 1050: By the protection signs of the copyright: "letter "D" in Latin alphabet inside a circle".*

Thus, 3D model (CAD file) proposed as an advanced technology for future is not considered to be a structural element of the software for computing devices, but as a new type of the object of the intellectual property ecosystem. This, in turn, enables to enhance the volume of innovation products.

#### **4. Conclusion and proposals.**

The following measures should be undertaken for developing the intellectual property ecosystem and innovation activity in the republic:

development of drafts of new statutory acts aimed at improving the competitiveness of the national innovation system;

bringing copyright protection legislation in compliance with the international standards;

creation of the national innovation system which absorbs the world scientific research innovations and possibilities for their implementation;

when financing research field, allocating funds to fundamental research areas and practical activities of the private sector;

improvement of mechanisms for commercialization of research results, providing appropriate incentives for the creation of innovative technoparks in the regions;

proceeding from the peculiarities of the national economy establishment of the innovation centres at the local level;

development of innovation determining standards with the account of the world standards;

encouraging establishment of research and project institutes at the branch enterprises and gradual application of international standards into the patenting system of the republic;

it is necessary to create a special "customer-researcher-investor" chain for commercialization of scientific research and to implement the mechanism encouraging introduction of scientific achievements in the economy.

Efficient criteria of the intellectual property ecosystem will be demonstrated in the following aspects:

*first*, it will be designed for commercialization of innovation products of the successful intellectual property ecosystem;

*second*, efficient intellectual property ecosystem will ensure constant change of existing and generating new ideas;

*third*, efficient intellectual property ecosystem represents a collaborative network of professionals who provide continuity in the creation of innovative products.

In conclusion it should be noted that by 2021-2030 Uzbekistan has been assigned the task to reach and be included in the list of international ratings and indices, such as Global

Competitiveness Index, World Economic Forum, Global Innovation Index, INSEAD International Business School, Cornell University, World Intellectual Property Organization (WIPO), Global Green Economy Index - Dual Citizen LLC, as well as Competitive Industrial Performance Index by the United Nations Industrial Development Organization, UNIDO.

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