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MODERN-DAY DRIFTS AND DIFFICULTIES IN THE DEVELOPMENT OF THE INTELLECTUAL PROPERTY MARKETS AT THE GLOBAL LEVEL

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Abstract

The study covers the dynamic processes of digitalization and the growth of the creative industries, which are forming new economic trends globally. Having the legal right to use intellectual property, especially the products of cutting-edge science and technology advancements in AI, blockchain, IoT, big data processing, quantum computing, cloud computing, etc. The prospects for intellectual property owners to participate in global value chains and the global economy are greatly increased by these advances. In addition to serving as the primary instrument for socioeconomic advancement, intellectual property also serves as a focal point for intense technological competition around the world and the right to own it, which is essential for winning geoeconomic contests. The primary long-term trend in the evolution of international markets for intellectual property is the explosive rise in trade in products and services that include IP, together with a notable expansion in the scope of the latter. The market for intellectual property is expanding faster than other real-estate sectors. For a considerable amount of time, the United States has held the top spot in terms of the quantity of active patents. Among the most significant technological developments is the growth of the intellectual property market in terms of auxiliary technologies, which enable the global manufacture of goods based on digital descriptions. Trade in licences occupies a significant portion of intellectual property markets. It is demonstrated that the movement of commodities containing intellectual property objects in the new technological mode, as well as the prospects for the successful and effective growth of intellectual property markets, must be taken into consideration.

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Introduction

Introduction Intellectual activity of people has always been an integral part of the life of human society. Its final result is the creation of new material and non-material values in art, literature, science and technology. Nowadays, the interest to the problems related to quick and relatively inexpensive access to the results of people's creative activity is conditioned by the understanding of the increasing value of intellectual activity. Access to the use of human creativity in the productive, service and cultural spheres makes it possible to create products in demand, to improve the efficiency of production processes, to better meet human needs for different experiences and leisure activities, and to play a key role in the dissemination of information and knowledge.[1]

The active processes of digitalisation and the development of creative industries, the basis of which are creative practices, are shaping new trends in the development of the global economy, creating new business models, new industries and markets, changing patterns of human interaction and communication, the human environment, human behaviour and psychology.

Ultimately, thanks to intellectual activity, production and consumption change and new general trends in the development of civilisations are formed.

Digitalisation has reinforced the importance of capital based on the results of intellectual labour, while creating a whole pool of serious new challenges in intellectual property (IP) markets, and the COVID-19 pandemic has accelerated this process. According to one estimate, the pandemic reduced the five-year progress to three months.

The use of the results of the latest scientific research and technological developments (especially in the field of artificial intelligence, Internet of Things, blockchain, processing of large databases, quantum computing systems, cloud technologies, etc.) significantly expands the opportunities of the IP rights holder in the global economy, its participation in global value chains, becoming not only one of the main tools of socio-economic development, but also a significant factor of success in geo-economic competition. High demand for access to the results of intellectual activity stimulates the interest of countries with high intellectual activity results in international exchange - commercial transactions with goods containing the IP object. IP markets are actively forming. At the same time, IP objects are becoming the centre of a global technological confrontation and a fierce struggle for the right to possess and use them.Obviously, India cannot stand aside from this most important trend in the development of the world economy.[2]

Peculiarities of global regulation of modern markets

Intellectual property markets (markets of goods, content of intellectual property objects) are a set of relations between intellectual property owners (right holders) and consumers (buyers), including commercial operations, processes and procedures of purchase and sale of

[1]David, M., & Halbert, D. J. (2017). Intellectual Property & Global Policy. Global Policy, 8(2), 149-158.

[2]Román, J. J., Obaidli, A. Q. A., Almuaini, A. H., & Cancino, C. A. (2023). Evolution and trends of intellectual property crime research between 1991 and 2020. *International Journal of Business Environment*, *14*(3), 370-394.

intellectual property rights. The World Intellectual Property Organisation (WIPO) provides a general interpretation of the term "intellectual property" from the perspective of international regulation of commercial transactions, defining IP in its documents as the result of human creativity that is used in commerce. The global regulation of IP markets is subordinate to the goal of creating an environment in which creativity is encouraged and innovation is valued. At the same time, there is still no common official terminology for IP trade, and this issue is particularly acute in the new environment, in particular the digital transformation.[3]

Among the trends impacting global IP markets, digitalisation is at the forefront. The development of new digital technologies and their adoption has become a steady trend, and the COVID-19 pandemic has had a significant impact on the pace of digital transformation. The most important actors of digital transformation (apart from the IT sector) are banks and financial organisations, housing and utilities, transport, telecom, insurance, oil and gas, etc. Digitalisation has encompassed all sectors of the global economy, opened new horizons, given many issues new perspectives and posed new challenges. Transforming global economic processes, international trade interactions and communication systems, digitalisation is penetrating deeper and deeper into all spheres of human life and activities, creating preconditions for changing the internal content of production processes, structure, interactions, value chains, monitoring systems, organisation of transport, distribution and consumption processes. All this creates new challenges in the IP markets.

International law defines IP as the object of legal protection of intangible rights, which are considered to be rights over creations of the human intellect, such as copyrighted works and industrial property.Regulatory documents define copyright and related rights as rights to works created by authors (literary, musical, artistic, scientific, cinematographic, computer programmes, databases, etc., as well as their performance and broadcasting).

Industrial property objects are of a technical nature. The aggregate of such objects is made up of:

- A patent is a document containing a description of an invention and granting its author (patentee) the exclusive right to choose its use (or non-use);
- Trade mark - a special designation to identify the goods or services of a company, distinguishing them from those of other companies;
- Industrial design - an artistic and aesthetic solution presented in three- or two-dimensional form (volumetric model or drawing);
- Geographical indication - appellation of origin of goods;
- A name used as a special characteristic of a product, giving it a certain reputation linked to the geographical location of its place of origin;
- Trade secret - information of any nature (technical, production, etc.) constituting confidential information to which there is no free access and the disclosure of which by

[3]Hamm, Ronda L., Anne Gregg, and Thomas C. Sparks. "Intellectual property in entomology: Analysis and perspective on recent trends in global patent publications." Pest management science 76.5 (2020): 1603-1611.

third parties without the consent of the owner is contrary to fair commercial practice and may cause damage to the latter.

At the same time, in the conditions of digital transformation, the list of IP objects needs to be expanded, as new markets and new problems requiring their solution are being formed.Intellectual property is present at all stages of not only the distribution of the product, but also the production process itself: almost all sectors of the economy and social sphere use intellectual property rights.[4] The legal protection of IP in the Internet requires special attention. Thus, IP as rights to the results of intellectual activity become an integral part of goods and services involved in international exchange: the term "goods containing IP objects" is used in commercial transactions.[5]

For legal understanding IP is the results of intellectual activity and equated means of individualisation of legal entities, goods, works, services and enterprises, which are granted legal protection. According to official regulatory documents, the objects of IP are: works of science, literature and art, programs for electronic computers (computer programs), databases, performances, phonograms, broadcasts of radio or television programmes (broadcasting by broadcasting or cable broadcasting organisations), inventions, utility models, industrial designs, selection achievements, topology of integrated circuits, production secrets (know-how), trade names, trademarks and service marks (including geographical indications), trademarks and service marks (including geographical indications).[6]

Thus, the category of IP includes heterogeneous objects representing the results of intellectual activity, the list of which may expand, which complicates both statistical accounting and a comprehensive study of the global IP market. The global IP market is determined by the state of national IP markets and is subject to the influence of conjunctural factors: a) general (cyclical fluctuations; b) specific (changes in environmental factors - political, economic, social, etc.).[7] All the processes typical of a market economy can be observed in the IP markets: expansion, diversification, emergence of niche markets, etc. Although the functioning of IP markets is regulated by international and national legal systems, there are often conflicts that require greater legal protection. The problem is particularly acute due to the development of new digital technologies, which have multidirectional and not always predictable consequences.

The analysis of such markets has shown that most countries, although to varying degrees, pay attention to the problems of cross-border movement of goods containing IP objects within the framework of the regulation of IP markets. The successful and effective development of IP markets requires: the development of new approaches and methods, taking into account the

[4]Siri, Jothiratna GS, Chakrawarthige AN Fernando, and Sembukuttige NT De Silva. "Nanotechnology and Protection of Intellectual Property: Emerging Trends." *Recent Patents on Nanotechnology* 14.4 (2020): 307-327.
[5]Siri, J. G., Fernando, C. A., & De Silva, S. N. (2020). Nanotechnology and Protection of Intellectual Property: Emerging Trends. *Recent Patents on Nanotechnology*, *14*(4), 307-327.
[6]Starling-Windhof, A., Srinivasan, A., Tomeo, T., Clark, A. M., & Mattei, P. (2020). Trends in the intellectual property (IP) landscape of drug delivery systems: 30 years of growth and evolution. In Nanopharmaceuticals (pp. 201-230). Elsevier.
[7]Mogol, N. (2022). Trends and Challenges of the Intellectual Property System in the Digital Economy. *Intellectus*, 51.

prospects of functioning of IP markets and the international movement of goods containing IP objects, international cooperation; solving problems related to new technologies within the framework of not so much the modern technological mode, but taking into account the principles of functioning in it.[8]

International and national legal systems are based on the fact that the owner (right holder) of IP is the author of the result of intellectual activity. In order to ensure a balance between the interests of society and the interests of authors, it is provided that the latter may dispose of the results of their intellectual activity and, if authorised, dispose of IP objects to a third party for remuneration.

An exclusive right to IP is a duly registered property right, which includes:

- the right to use the IP independently;
- the right to prohibit third parties from using the IP;
- the right to authorise the use of IP to third parties, up to and including the complete alienation of its own rights.

In international trade, the rights to use IP to third parties are realised through: a) a contract of assignment of the right to the IP object, which provides for the change of the right holder with the transfer of all the exclusive rights to the latter b) a licence agreement, under which one party-owner of the exclusive right to the IP object (licensor) grants the other party (licensee) the right to use the IP object within the limits stipulated by the agreement. It is also possible to transfer for use the complex of exclusive rights of the IP right holder on the terms of concession under a commercial concession agreement. In recent decades, the transfer of rights to use IP is determined by contracts with special conditions - franchising and leasing contracts.[9] The norms of international trade in IP objects, including the protection and recognition of rights to IP objects, are defined by one of the fundamental legal instruments of the World Trade Organisation (WTO) - the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), which defines general standards for the protection of IP rights, the procedure for their enforcement, as well as a number of important provisions of international trade in IP objects.[10] WIPO operates within the United Nations (UN) system of agencies to provide a balanced and effective IP system.

WIPO operates the PCT (Patent Cooperation Treaty), the Madrid System for the International Registration of Trade Marks and the Hague System for the International Registration of Industrial Designs. There are other international organisations in the field of intellectual property protection like Indian Patent office , such as the European Patent Office and the USPO.At the same time, it should be noted that there are significant violations of intellectual

[8]Durand, C., & Milberg, W. (2020). Intellectual monopoly in global value chains. *Review of International Political Economy*, *27*(2), 404-429.

[9]Son, K. B., & Lee, T. J. (2018). The trends and constructive ambiguity in international agreements on intellectual property and pharmaceutical affairs: implications for domestic legislations in low-and middle-income countries. *Global Public Health*, *13*(9), 1169-1178.

[10]Oldham, P. D. (2004). Global status and trends in intellectual property claims: microorganisms. *Available at SSRN 1331510*.

property rights around the world, which have an extremely negative impact on the development of IP markets. The main problem of the current documents is their "lagging".

Main trends in the development of the international market of IP-objects of industrial property

In recent decades, it is the new technologies that have become an integral part of the economy in both developed and many developing countries.

The main long-term trend in the development of global IP markets is the dynamic growth of commercial transactions with goods and services containing IP objects, with a significant expansion of the range of the latter. This is due to the increasing role of innovation as an important factor in ensuring the competitiveness of goods, services, firms and countries, which has become the most important trend in global development.[11]

According to current estimates, the IP market is growing at a rate higher than the growth rate of "material" markets. Different experts and organisations give different estimates, but most say it is growing at a rate of 10%. It has become a classic statement that the dynamics of GDP growth and global competitiveness indices of national economies directly depend on the results of intellectual activity involved in civil turnover, their value and speed of turnover. This is also reflected in various documents and programmes.[12]

In the era of digital economy under the influence of new business models, intensification of communication and information transfer processes, acceleration of innovation diffusion processes, the life cycle of goods is shortened, strengthening the importance of capital, which is based on IP, early access to new knowledge, the latest developments, the ability to use IP objects. The COVID-19 pandemic once again emphasised the importance of IP in human life.[13]

A study conducted by Singapore's Intellectual Property Office of Singapore (IPOS) revealed that about 60 per cent of global GDP will come from products, existing digitally in 2022. At the same time, up to 70 per cent of intangible assets became available on online platforms in the next ten years.

This strengthens the interests in the struggle for consumers to use the results of intellectual labour, research and development, primarily in the field of medicine and pharmaceuticals, shifting the centre of competition from the markets of finished goods to the IP markets. The use of industrial IP is particularly relevant for sectors such as engineering, construction, luxury goods, financial services, insurance, automotive (transport), retail, IT and pharmaceuticals.[14]

The study of industrial IP markets is based on patent statistics. In the world practice, along with long standing patents for invention, trademarks, industrial designs and, in some

[11]Plavčan, P. (2022). Substantiation of the role of intellectual property in creating competitive advantages in the international market. *Journal of Strategic Economic Research*, (2), 41-47.

[12]Maslak, M., &Pererva, P. (2023). Formation of economic and legal measures for the development of the market of intellectual property objects. *Eastern-European Journal of Enterprise Technologies*, *1*(13), 121.

[13]Svishchova, N. (2022). Development of the combined approach to the valuation of intellectual property objects. *Technology audit and production reserves*, *1*(4), 63.

[14]Bolatto, S., Naghavi, A., Ottaviano, G., & Zajc Kejžar, K. (2023). Intellectual property and the organization of the global value chain. *Economica*.

countries, utility models, which represent a special form of patent law, etc., are subject to registration and accounting. According to WIPO, before the pandemic there were 14.9 million invention patents, 5.6 million registered utility models, 58.2 million trademarks and 4.1 million industrial designs. The utility models segment grew the fastest, with an estimated annual increase of 18.1 per cent. Another actively growing segment of the global IP market is registered trademarks, with an estimated annual growth rate of 15.2 per cent. The growth of the market of active patents for inventions and registered industrial designs is slower and is estimated at 7 and 7.3 per cent respectively. The lower interest in patents is largely due to the shortcomings of the patenting system, the complexity of the patenting procedure itself, and, most importantly, its length compared to the simpler and less time-consuming utility model registration procedure.[15]

The speed of implementation of the results of intellectual activity in the context of the observed shortening of the life cycle of goods and the increasing rate of obsolescence of technology is becoming an important factor of success in the competitive struggle. However, not all countries register utility models, e.g. North American countries.

The United States has been the leader in the number of active patents for a long period of time. By 2019, it will own more than 20 per cent of this segment of the IP market. The main US competitors in this segment are China, with a share of about 18%, and Japan with 14%.

There is a long-term trend of growth in the global number of IP applications. For example, in 2019, the total increase in global patent applications compared to 2008 was more than 65% (from 1.9 million to 3.2 million), the number of trademark applications increased by 180% (from 5.5 million to 15.5 million) and the number of industrial design applications increased by 70% (from 0.814 million to 1.4 million).[16]

China's active development largely determines the state and trends in the development of IP market segments. For example, for the first time in ten years, the number of international patent applications filed in 2019 decreased by 3% year-on-year to 3.2 million applications, which was due to a decrease in the number of applications filed by Chinese residents.[17] Nevertheless, China has become the segment leader with twice as many international patent applications as its closest competitor, the US, despite a 4% increase in their activity.China significantly outpaces other countries in the number of applications for the international registration of trademarks and industrial designs with a share in each segment of more than 40% of the global total, having identified three potential priority areas for economic cooperation (infrastructure, high technology and green technology).[18] China was particularly successful in the segment of international applications for existing utility models (with a share of 90 per cent of the global total). In the absence of a serious competitor in this segment - the US - China is outpacing the growth rate of

[15]Ding, K., & Hioki, S. (2024). Intellectual property strategy and the governance of technological platform-driven global value chains: The case of Qualcomm. *Competition & Change*, *28*(1), 165-188.
[16]Durand, C., & Milberg, W. (2020). Intellectual monopoly in global value chains. *Review of International Political Economy*, *27*(2), 404-429.
[17]AlGhamdi, M. S., &Durugbo, C. M. (2021). Strategies for managing intellectual property value: A systematic review. *World Patent Information*, *67*, 102080.
[18]Ng Boyte, A. (2023). The Social Value of Intellectual Property. *IP Theory*, *12*(3), 1.

the utility model applications segment, with annual growth estimated at over 9%, reaching 2.3 million applications in 2019.For ten years, the steady upward trend in the global number of applications for the international registration of trademarks has not been interrupted, which totalled 5.9% of the previous year's level in 2019. 5.9 per cent of the previous year's level, reaching a level of 11.5 million applications (15.2 million classes).[19]

Of the 58.2 million registered trademarks in force worldwide, China has the largest number (25.2 million), with almost an order of magnitude fewer registered trademarks in the United States (2.8 million), India (2 million) and Japan (1.9 million). Brazil (22.3 per cent growth), Vietnam (19.3 per cent), the Islamic Republic of Iran (18.4 per cent), the Russian Federation (16.5 per cent) and Turkey (15.5 per cent) are showing growth in this segment.[20]

The global number of industrial design applications is growing at a lower rate. The annual increase in applications in this segment is estimated at 1.3%, and in 2019 their number reached the level of 1.4 million applications. The Russian Federation (22% growth in 2019), the Islamic Republic of Iran (19.3%) and Australia (10.3%) are highly active in this segment.Some 60,000 registered geographical indications were in force worldwide. Germany (14,289), China (7,834), the Czech Republic (6,494), Hungary (6,494) and Germany (6,071) had the most active geographical indications.[21]

Despite the relatively low number of applications for plant variety registration, this segment is growing dynamically, with an estimated growth of 8 per cent in the year before the pandemic, reaching a value of 21,430 applications with China's share of over 36 per cent. The impact of the global pandemic could not help but affect IP markets.[22] The Global Innovation Index (GII) 2021 shows that during the COVID-19 pandemic, public and private enterprises around the world increased investment in innovation and IP, further demonstrating the importance of new intellectual outputs. Despite the global pandemic since 2010, the worldwide upward trend in international patent and utility model applications under the PCT (Patent Cooperation Treaty) has continued.[23]

In 2020, about 275,900 international applications were filed, which is 4% more than in 2019. The largest number of PCT applications, as in the previous year, were filed by applicants from China, which accounts for almost a quarter of all patent and utility model applications filed (Table 1). China is followed by the United States, Japan, the Republic of Korea and Germany.

Table - 1

[19]Yang, G., Zhang, Y., & Yu, X. (2020). Intellectual property rights and the upgrading of the global value chain status. *Pacific Economic Review*, *25*(2), 185-204.

[20]Yuqing, X., David, D., & Bo, M. (2021). Trade in intangible assets along global value chains and intellectual property protection, 43-71.

[21]Tao, F., Sui, F., Liu, A., Qi, Q., Zhang, M., Song, B., ... & Nee, A. Y. (2019). Digital twin-driven product design framework. *International Journal of Production Research*, *57*(12), 3935-3953.

[22]Hapuwatte, B. M., & Jawahir, I. S. (2019). A total life cycle approach for developing predictive design methodologies to optimize product performance. *Procedia Manufacturing*, *33*, 11-18.

[23]Frizziero, L., Donnici, G., Liverani, A., Alessandri, G., Menozzi, G. C., &Varotti, E. (2019). Developing innovative crutch using IDeS (industrial design structure) methodology. *Applied Sciences*, *9*(23), 5032.

IP market leader countries in terms of the number of international patent and utility model applications filed under the PCT in 2020

Country	Number of submitted applications		Changes in 2020. in relation to the previous year, %
	2020	2019	
1.China	68720	59193	+16.1
2. US	59230	57499	+3.0
3.Japan	50520	52693	-4.1
4.RepublicofKorea	20060	19073	+5.2
5.Germany	18643	19358	-3.7
6.France	7904	7906	+0.02
7.UK	5912	5772	+2.4
8.Switzerland	4883	4627	+5.5
9.Sweden	4356	4202	+3.7
10.Netherlands	4035	4055	-0.5

Source: Compiled from WIPO data[24]

Japan, Germany and the Netherlands showed negative dynamics in the top ten countries. The decrease in international patent and utility model applications from Japan and Germany was -4.1 and -3.7 %, respectively. The decrease in applications from the Netherlands is insignificant and is estimated at -0.5 per cent.

The top ten countries accounted for 88.5 per cent of the total number of international patent and utility model applications under the PCT in 2020. A slight decrease from the level of the previous year (-0.6%) is demonstrated by the global indicator of the number of international trademark applications filed under the Madrid system.According to the results of 2020, the leaders were trademark applicants from the USA, Germany and China (Table 2).

Table - 2

IPmarketleadercountriesbynumberofinternationaltrademarkapplicationsfiledunderthe Madridsystemin2020.

Country	Number of submitted applications		Changes in 2020. in relation to the previous year, %
	2020	2019	
1. US	10005	10090	-0.8
2.Germany	7334	7699	-4.7
3.China	7075	6077	+16.4

[24]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

4.France	3716	4438	-16.3
5.UK	3679	3500	+5.1
6.Switzerland	3518	3719	-5.4
7.Japan	3117	3158	-1.3
8.Italy	2748	2652	+3.6
9.Australia	2130	2093	+1.8
10.Turkey	1682	1988	-15.4

Source: Compiled from WIPO data[25]

Despite a serious increase in the number of international trademark applications compared to other countries (16.4 % from the level of the previous year), China could not rise above the third position, retaining its place in the ranking. Italy and Australia showed a slight positive trend (3.6 and 1.8 % of the level by 2019, respectively). The rest of the top ten countries worsened their performance, with France and Turkey showing the maximum reduction in the number of applications (-16.3 and -15.4 % by 2019, respectively). However, this did not lead to a change in their position in the 2020 world ranking compared to the ranking in 2019.The top ten countries account for 71 per cent of the total number of international trademark applicationsunder the Madrid system in 2020.In 2020, there was a 7.3% increase in trademark applications compared to last year (93,926 vs. 87,509 applications, respectively). The COVID-19 pandemic had a negative impact on the international registration of industrial designs, with around 18,580 applications for the international registration of industrial designs under theHague Agreement procedure filed in 2020, 15 per cent less than in 2019 (Table 3).

Table - 3

IPmarketleadercountriesintermsofthe numberofinternationalindustrialdesignapplicationsfiledunderthedesignregistration procedureHagueSystemin2020

Country	**Number of submitted applications**		**Changes in 2020.**
	2020	**2019**	**in relation to the previous year, %**
1.Germany	3666	4511	-18.7
2. US	2211	1359	+62.7
3.Switzerland	1944	2180	-10.8
4.Republicof Korea	1669	2736	-39.0
5.Italy	1231	1995	-38.3
6.Netherlands	999	1391	-28.2
7.Japan	942	1151	-18.2

[25]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

8.France	936	1297	-27.8
9.China	826	672	+22.7
10.Turkey	524	389	+34.7

Source: compiled from WIPO data[26]

The US was the only country in the top five to show an increase in the indicator (63% of the previous year's level). This allowed the US to move up four positions to second place. Despite a decline in the number of design applications in 2020 (-18.7 % from the previous year's level), Germany, with 3,666 applications, became the top country in this indicator. Switzerland rounds out the top three with 1,944 design applications, but this represents less than 90 per cent of the international applications filed by the country in 2019.

At the end of 2020, the top ten countries accounted for 80 per cent of all international design applications under the Hague system.

These data are consistent with the GII 2021 data, indicating countries that consistently demonstrate a high level of innovative development. The leaders of the rating are traditionally developed countries: Switzerland, Sweden and the USA. Among the top ten countries are the UK, South Korea, the Netherlands, Finland, Singapore, Denmark, and Germany. This year China has also moved up two lines, coming in at the 12th position.

The impact of the pandemic was very unevenly distributed across industries. However, firms in software, communications technology and internet, industrial machinery and electrical equipment, and pharmaceuticals and biotechnology increased their IP investments.

An analysis of the number of international applications worldwide for patents for inventions and utility models in selected technological areas shows that in 2020, in the field of new digital communication technologies, the largest number of such applications is filed by applicants from China and the Republic of Korea.

For applicants from the US, the priority area remains computer technology, from Japan, electrical machinery and equipment, and for Germany, automobiles and transport.

Research and technology was the top priority for all applicants in the top five countries in terms of the number of international trade mark applications filed. The second place for applicants from three countries (USA, Germany, France) was occupied by the health-related field, while for the UK the education and leisure sector came second. For China, agriculture was the second and for France the third in terms of intensity of applications, while health care was in third place for Chinese applicants.

As in previous years, applicants from Germany filed the majority of industrial design applications in the field of transport, and from the Republic of Korea in the field of information and communications technology and audiovisual technology.

The textiles and accessories sector accounted for the largest share of applications from Switzerland and Italy. The largest number of applicants from the United States applied for the international registration of industrial designs in the field of packaging.

[26]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

In recent years, Asian countries have been very active in the IP market (Table 4), accounting for about 70% of all applications for patents, trademarks, industrial designs and utility models.

Table - 4

Regional structure of international IP applications, %

Type of Application	World Region					
	Asia	**North America**	**Europe**	**Latin America and the Caribbean**	**Oceania**	**Africa**
Patents	65.0	20.4	11.3	1.7	1.1	0.5
Trade marks	70.6	5.7	15.4	5.3	1.3	1.7
Industrial designs	68.4	4.2	24.3	1.1	1.3	0.7
Utility models	98.0	-	1.7	0.2	0.1	-

Source: Compiled from WIPO data[27]

Realising the value of IP, the benefits of its use and actively applying it in the competitive struggle, companies either form their own developer divisions (which is quite expensive but sometimes very effective) or acquire IP on the market.

Among the companies, the leader in filing international PCT applications in 2020 is the Chinese company Huawei Technologies (Table 5), followed by Samsung Electronics (Republic of Korea), Mitsubishi Electric (Japan), LG Electronics (Republic of Korea) and Qualcomm (USA). Thus, out of the top ten companies by the number of filed applications for international patents and utility models, eight are located in North- East Asia in China, the Republic of Korea and Japan.

Table - 5

Leading firms by number of applications international patents and utility models

Company	**Country**	**Number ofapplications forinternationalpatents anduseful models**
HuaweiTechnologiesCO.,LTD.	China	5464
Samsung Electronics CO.,LTD.	Republic ofKorea	3093
MitsubishiElectric CO.	Japan	2810
LGElectronics	Republic ofKorea	2759
QualcommIncorporated	U.S.A.	2173
TelefonaktiebolagetLMEricsson(Publ)	Sweden	1989

[27]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

Voe Technology GroupCO.,LTD	China	1892
Oppo MobileTelecommunicationLTD	China	1801
SonyCorporation	Japan	1793
Panasonic IntellectualPropertyManagementLTD	Japan	1611

Source: Compiled from WIPO data[28]

In terms of the number of international applications for trademark registration in 2020, Novartis from Switzerland came first, followed by China's Huawei Technologies and Shiseido from Japan (Table 6).

Table - 6

Firms - leaders in the number of applications for international trade marks

Company	**Country**	**Number of applications for the registration of international trade stamps**
Novartis	Switzerland	233
HuaweiTechnologiesCO LTD	China	197
ShiseidoLTD	Japan	130
ADPGauselmannGMBH	Germany	123
L'Oreal	France	115
NintendoCOLTD	Japan	90
Euro GamesTechnologyLTD	Bulgaria	84
AppleINC	U.S.A.	80
Syngenta CropProtectionAG	Switzerland	78
Rigo Trading S.A.SocieteAnonyme	Luxembourg	70

Source: Compiled from WIPO data[29]

In 2020, Samsung Electronics (Republic of Korea) is the leader among the companies by the number of applications for international registration of industrial designs (Table 7), the second position is occupied by P&G (USA) and the third by FonkelMeubelmarketing B.V. (the Netherlands).

Table - 7

Firms leading in the number of applications for the international registration of industrial designs

Company	**Country**	**Number of applications for the registration of**

[28]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).
[29]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

		international trade stamps
Samsung ElectronicsCo.,Ltd.	Republic ofKorea	859
Procter &GambleCO.	U.S.A.	623
FonkelMeubelmarketingB.V.	Nylerlands	569
VolkswagenAG	Germany	524
Beijing Xiaomi MobileSoftwareCo.,Ltd.	China	516
LGElectronicsINC.	Republic ofKorea	478
Koninklijke PhilipsElectronicsN.V.	Netherlands	463
Wenko-WenselaarGMBH&Co. KG	Germany	362
MagicLeapINC	U.S.A.	320
LampenweltGMBH	Germany	276

Source: Compiled from WIPO data[30]

In recent years, there has been a growing demand for IP in the field of digital, electronic and medical technologies. Developments in the field of artificial intelligence (AI) are of particular interest, with an exponential growth in the number of developments.

According to WIPO, 340,000 AI-related patent applications have been filed from the mid-1950s to today and more than 1.6 million scientific papers have been published, while one half were filed within 50-60 years, the other half in the last 10 years.

A new trend is the transition from theoretical research to active practical use ofAI technologies in various industries for commercial purposes, as well as in the sphere of social relations. The USA, China and Japan are the leaders, having filed the largest number of patent applications in the field of AI(78 per cent of the total number of patent applications worldwide). Of the 20 leading companies in the field of patenting AI inventions, 12 are Japanese companies, three are based in the US and two in China.

A development opportunity in terms of access to IP is the merger of companies. According to WIPO, 434 companies involved in new developments in AI have beenacquired since 1998. However, more than half of all deals (53 per cent) have taken place since 2016, with the number of such deals increasing annually in the AI sector.

The largest patent application portfolio in the field of AI belongs to IBM (8,290 patented inventions), followed by Microsoft (5,930 inventions). Toshiba (5,223), Samsung (5,102) and NEC (4,406) are also in the top five. In certain areas, companies with a high degree of specialisation and expertise in the field are the most active in patent filings, for example, Baidu is the most active in patent filings in deep learning. Universities and public research organisations play a leading role in inventions in specific areas of AI, such as distributed AI, some machine learning methods, neuroscience and neuro-robotics.

[30]WIPO IP statistics data centre. 2021. URL: https://www3.wipo.int/ipstats/index.htm (accessed on 27.12.2023).

The role of IP in the development of the digital ecosystem will become a key influencing factor in the very near future. The prerequisites for this are created by the development of global digital networks, more than 70 per cent of whose traffic is the movement of IP objects.

If at the beginning of the Internet development the main content was audio and video, today we can talk about the transmission of digital content for industrial production (three-dimensional models, digitised information on production methods, technologies, equipment, raw materials, Big Data transmission, etc.). Among the main technological trends we should highlight the development of the IP market in terms of AT (Assistive Technology) - assistive technologies that allow anywhere in the world to produce products according to a digital description.

According to the data presented, patent activity in the field of traditional technologies is almost 8 times higher than in the field of new assistive technologies: 117,209 patent applications versus 15,592. However,thenumber of applications for new assistive technologies is growing three times faster, with a compound annual growth rate (CAGR) of 17 per cent compared to6 per cent for traditional technologies. Large corporate players are leading the way in the development of assistive technologies. The main areas are "vision and hearing" (48 % of conventional and 60 % of new assistive technologies) [16]. Production organised in this way allows to avoid customs and logistics barriers, which, at the same time, poses very serious new challenges for the development of IP markets.

Trade in licences accounts for a large share of international trade in IP. The estimated value of products produced worldwide under foreign licences exceeds USD 500 billion per year, and high royalty rates have led to revenues growing atafaster rate(4.9percent).Thehigh royalty rates have led to royalties growing faster (4.9 per cent) than sales revenue (4.5 per cent).

As a general trend in the development of the world economy, IP has become concentrated in a few regions, so industrialised countries are leading the international trade in licences. They account for 80% of licence exports and more than 70% of the average estimated volume of total licence trade. As a consequence, there is an uneven distribution of payments for the use of IP objects in the world trade, which mainly goes to Europe, North America, East and South-East Asia (Table 8).

Table - 8

IP user fees by region of the world

Worldregion	**Amount,USDmillionUSD**
NorthAmerica	122787
LatinAmericaandtheCaribbean	1233
Europe	203667
Southern(Tropical)Africa	314
WestAsiaandNorthAfrica	6484
CentralandSouthAsia	945
EastandSouth-East Asia	72362
Oceania	1382

Forreference:G20countries	365835

Source: Compiled according to UNCTAD[31]

Payments for the use of IP in Europe and North America accounted for 80 per cent of the global total in 2019, with East and South East Asia accounting for around 18 per cent. The share of payments in the G20 countries is almost 90 per cent of all payments. The BRICS countries are very modest in this respect, with an estimated share of 2.3 per cent.

Conclusion

Intellectual activity is increasingly oriented towards material goods, and the uneven social, economic, scientific and technological development of countries, along with the widespread integration of digital technologies into people's lives and economic activities, stimulates the development of IP markets.

The main long-term trend in the development of global IP markets is the dynamic growth in the volume of commercial transactions involving goods and services containing IP objects, with a significant expansion of the range of the latter. The formation of the digital ecosystem remains a key process in the development of IP markets. In the new conditions of digital transformation, goods and services containing IP objects are becoming the centre of global technological confrontation and a fierce struggle for the right to possess and use them.

Inequality in IP markets is growing, with the top 10 countries accounting for 80 per cent of all international design applications under the Hague system. These data are consistent with those pointing to countries that consistently top global rankings of innovation and competitiveness.

A large share of international trade in IP objects is trade in licences.

The general trend in the development of the world economy is the concentration of IP in a few regions, with industrialised countries taking the lead in international trade in licences.

The development of global IP markets depends directly on the effectiveness of IP market regulation tools, which should be subordinated to the goal of creating an environment in which creativity is encouraged and innovation is valued. However, the main problem of regulatory instruments is their "lag": most countries solve the problems of regulating IP markets and cross-border movement of goods containing IP objects related to the use of new technologies within the framework of the modern technological mode. For the effective development of IP markets, it is necessary to take into account the prospects of functioning of IP markets for goods containing IP objects in the new technological mode.

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[31]Handbook of Statistics. URL: https://unctad. org/system/files/official-document/tdstat45_en.pdf (accessed on 27.12.2023).