

## THE INFLUENCE OF FOREIGN DIRECT INVESTMENTS ON ICT SECTOR DEVELOPMENT

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**Abstract:** The world is moving from resource-based economy to knowledge-based economy. Today, ICT is the key driver for economic growth in developed and developing countries. At the same time, the development of the ICT industry, the increase in the volume of products and services produced, it is impossible without attracting investments in the sector. The issues of attracting investment in innovative sectors of the economy are of particular importance in developing countries that are limited in their own resources. This paper deals with the main aspects of the evolution of FDI in the ICT sector at the global level and in European countries, including Republic of Moldova, and investigates the different effects of their involvement, such as: the dynamics of the volume of products and services produced in the industry, the dynamics of exports of innovative products and services etc. The obtained results suggest the perspectives of national ICT sector further development, based on increasing of FDI in it.

**Keywords:** ICT sector, foreign direct investment, knowledge-based economy

JEL Classification: F21, G15, O3

### 1. Introduction

The most important direction of the modern process of establishing a market economy is the transition to sustainable economic growth based on its innovative components. Therefore, the problem of developing the country's competitive technological and innovative potential is a key problem for each of the developing countries, including the Republic of Moldova. Digitalization has become an integral part of the development of the world economy and the economies of individual countries at the present stage. Being in essence a process of penetration of information and communication technologies into all areas of activity of economic entities, digitalization is directly related to the significant volumes of investment that are necessary for its implementation. As practice shows, such investments are made not only at the expense of the internal resources of states, but also by attracting foreign direct investment. The advantages of foreign direct investment are that they allow for sustainable economic growth, accompanied by the introduction

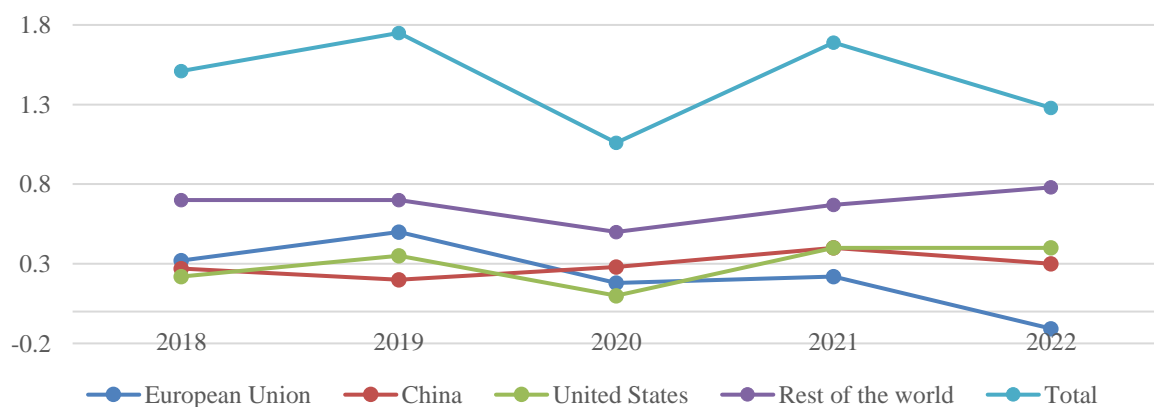
of not only technological innovations into the national economy, but also the development of human capital, access to management experience, skills and technologies, etc.

The *purpose of this article* is to analyze the evolution of FDI in the ICT sector at the global level and in European countries, including Republic of Moldova and to investigate their impact on the ICT sector output, dynamics of exports of ICT products and services etc.

## 2. Results and Discussions

### 2.1. FDI and ICT sector development at the international level

After falling in 2020 and recovering in 2021, global FDI fell 12% in 2022 to about \$1.3 trillion. The most significant decline was registered in developed countries, where it reached 37% and FDI volumes fell to \$378 billion. FDI to developing countries increased slightly by 4%, which was mainly due to several of the most rapidly developing countries in Latin America, the Caribbean and in the Asia-Pacific region, whilst FDI flows to less successful developing countries have declined (figure 1).



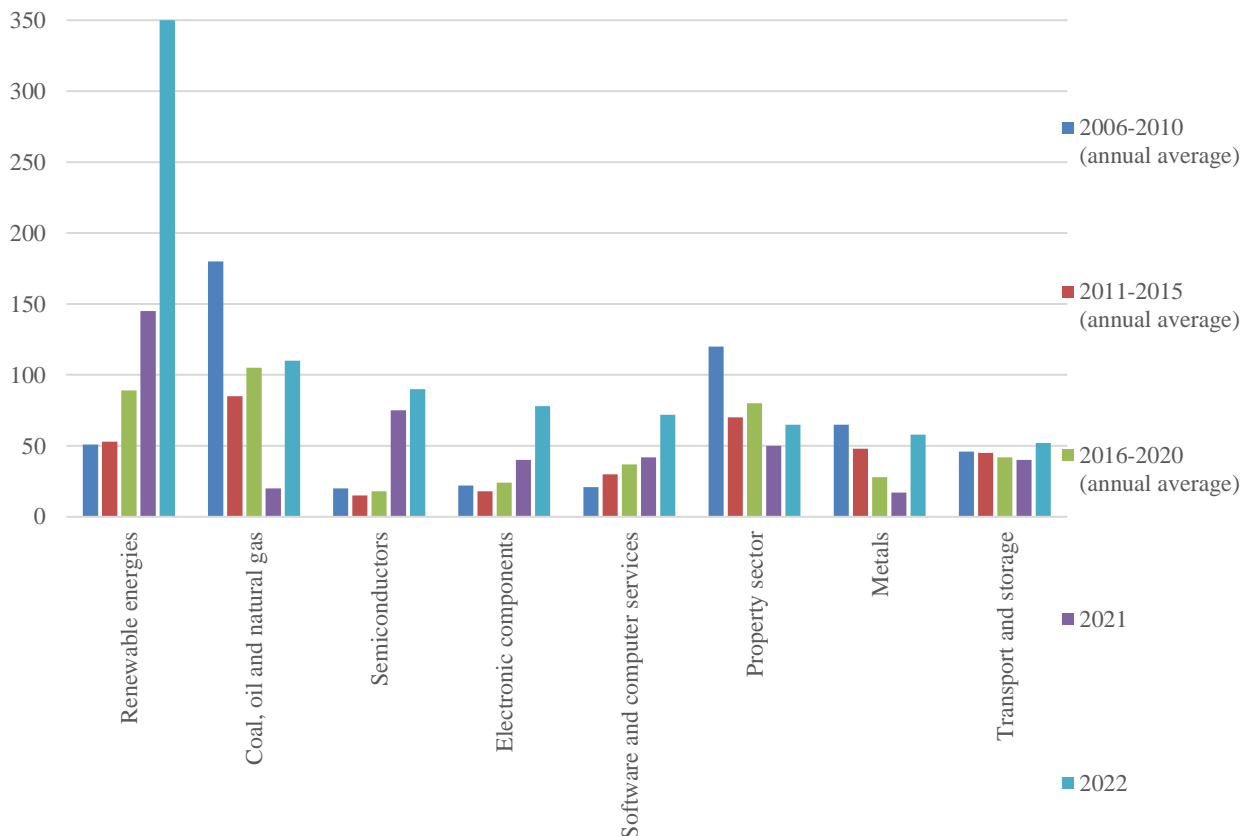
**Figure 1. Global FDI inflows (Trillions of dollars)**

**Source:** authors study based on UNCTAD. (2023)

The main reasons for the decline in FDI at the global level were the conflict in Ukraine, rising food and energy prices, problems in supply chains, and growing public debt in a number of countries. At the same time, in 2022 prospects for further FDI growth became real, since during this period the number of announcements for new investment projects increased by 15%, with growth registered in most regions and sectors (figure 2).

The analysis shows that at the global level, energy accounts for the largest share of future investment announcements among newly announced projects, with particularly strong growth recorded in 2022. The trend of increasing foreign direct investment in renewable energy sources in the world has been observed throughout the entire period under review, including the COVID-19 pandemic years. However, the highest annual growth (524%) was recorded in 2022 in the coal, oil and natural gas sector, whose growth prospects took second position. The semiconductor sector saw its second year of growth and increased by a further 9% in 2022, representing 8% of all future investment

announcements globally. The Electronic Components and Software industry and the Computer Services sector also recorded significant growth of 92% and 81%, respectively. The metals sector also saw sharp growth (218%), accounting for 5% of the value of FDI projects. A slight but stable increase was also recorded in announced projects in the Transport and storage sector.



**Figure 2. Global FDI project announcements, main sectors, 2006–2022 (Billions of dollars)**

**Source:** authors study based on ECLAC (2023)

In general, as noted by the International Monetary Fund (IMF, 2023), FDI flows are increasingly concentrated in geopolitically oriented countries, especially in strategic sectors such as semiconductors. It should also be emphasized that the second, third and fourth places in terms of volume and number of new announced projects at the global level were occupied by innovative industrial sectors, the products of which contribute to the further development of innovative sectors of the economy and the digitalization of the entire global industry. Combined, these three sectors place in leading position in terms of prospects for attracting foreign investment at the global level, second only to the Renewable Energy sector.

At the European level, the Software and IT services sector ranks first in terms of the number of new FDI investment projects announced and has shown steady growth in recent years (table 1).

**Table 1. Number of foreign investment projects by sector in Europe in 2020-2022**

Sectors	2020	2021	2022	2020/ 2021 Change	2021/ 2022 Change	Share of FDI, 2021	Share of FDI, 2022
Software and IT services	1046	1090	1182	4%	8%	19%	20%
Business services and professional services	691	557	765	-19%	27%	9%	13%
Transportation manufacturers and suppliers	305	503	470	65%	-7%	9%	8%
Transportation and logistics	217	425	418	96%	-2%	7%	7%
Machinery and equipment	425	384	368	-10%	-4%	7%	6%
Finance	285	277	292	-3%	5%	5%	5%
Agri-food	322	329	291	2%	-13%	6%	5%
Utility supply	145	203	277	40%	27%	3%	5%
Electronics	259	261	276	1%	5%	4%	5%
Chemicals, plastics and rubber	268	264	249	-1%	-6%	4%	4%
Other	1615	1584	1375	-12%	13%	13%	22%
<b>Total</b>	<b>5578</b>	<b>5877</b>	<b>5962</b>	<b>5%</b>	<b>1%</b>	<b>100%</b>	<b>100%</b>

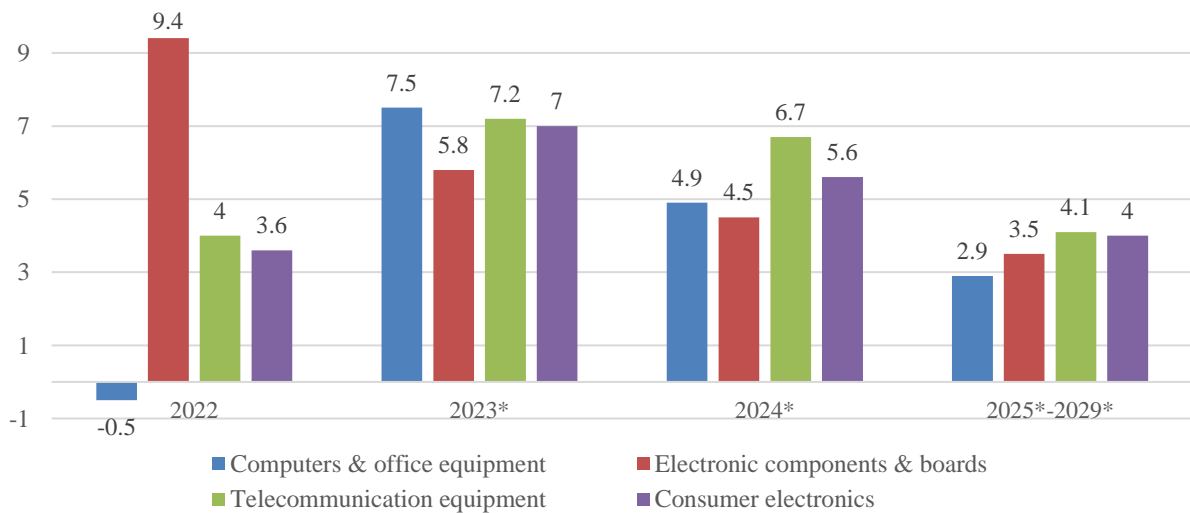
**Source:** authors study based on Ernst & Young (2022, 2023)

In 2022, its share in all announced international projects was 20%; the top ten fastest-growing industries attracting FDI for their development also includes Electronics, whose share in the total volume of announced projects with foreign financing was 5%.

Germany, Spain, Italy, France and the Netherlands were the EU countries that received the most inward FDI in 2022. The overall number of acquisitions in the ICT sector declined by 18.6% in 2022 compared to 2021. At the same time, the ICT sector is the leader in the implementation of acquisitions in the EU in 2021-2022 and the highest share of investment in acquisitions in 2022 (28%) belonged to the information and communication sector. Moreover, ICT grouped 19.4% of new greenfield investments in 2022, ranking second after Retail: ICT experienced a 17.6% growth in the number of greenfield investments in 2022 compared to 2021 (European Commission, 2023).

As a result of the mobilization of investment flows, including FDI, spending on hardware, software, services, and telecommunications in Europe increased from 923.5 bln USD in 2021 to 1.1 trillion USD in 2022, and is forecast to increase to 1.4 trillion USD by 2023. According to analysts, in 2022-2027 the growth of spending software and communication services in Europe will increase by 11.1% (International Data Corporation, 2023).

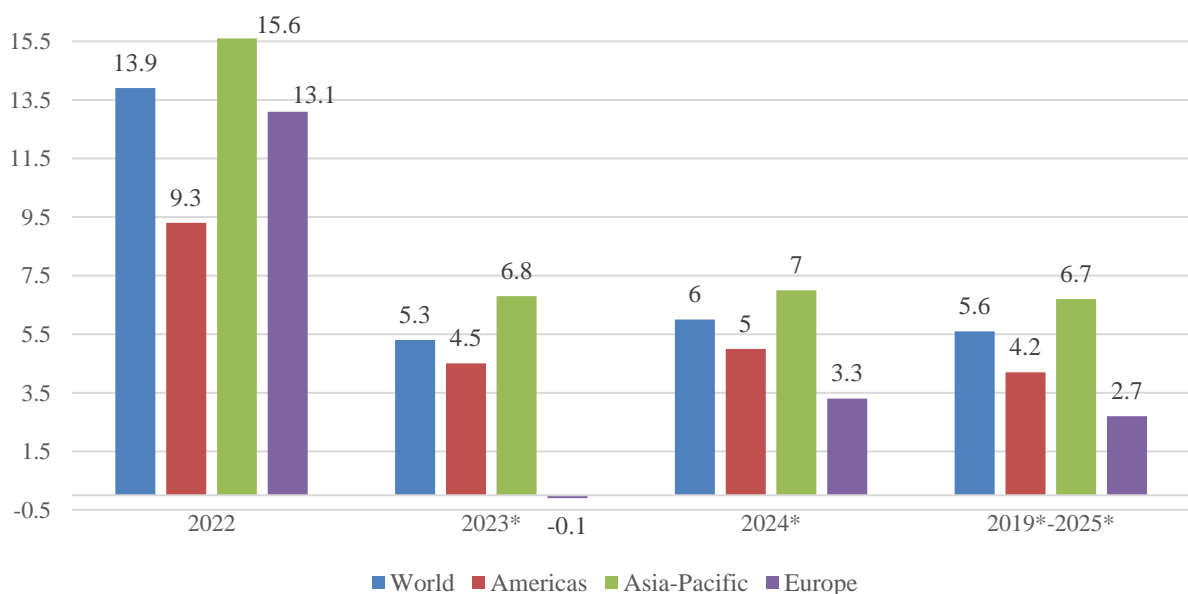
ICT businesses have significantly increased production and sales during the pandemic. Major ICT sub-sectors recorded significant output growth in 2021, with computer output up 14.2%, electronic components up 19.6% and telecommunications up 10.4%. ICT profitability has increased in many key markets. The chip shortage problem has largely ended as chip makers have increased supply. There is an increase in new investment projects and, accordingly, investments, including FDI, in further increasing chip production in 2024. Output growth in sectors with maximum chip consumption, such as computers, telecommunications equipment, consumer equipment and electronics, is accelerating in 2023 (figure 3).



**Figure 3. Global high-tech goods output and growth rates expected in the coming years, y-on-y, % change**

Source: authors study based on Atradius (2022)

On average, Electronics & computers output growth at the global level was 13.9%, the driver of this growth are Asian countries, where growth was 15.6%, the European region follows with 13.1% growth (figure 4). Even more significant growth rates in the EU are displayed by the Services ICT subsector, whose value added increased by 79% (European Commission, 2022).



**Figure 4. Electronics and computers output per region, y-on-y, % change**

Source: authors study based on Atradius (2022)

The growth in production of ICT sector, stimulated by an increase in FDI flows, in turn, initiated a significant increase in ICT service exports in many countries and regions. The most *remarkable* growth was recorded in developing countries (table 2).

**Table 2. ICT service export, bln USD, 2017-2022**

	2017	2018	2019	2020	2021	2022
<b>Austria</b>	6,53	7,76	8,51	8,96	9,7	10,04
<b>Belgium</b>	12,65	14,23	14,05	15,06	17,89	18,41
<b>Czech Republic</b>	3,84	4,26	4,6	5,24	6,3	6,88
<b>Estonia</b>	0,73	0,96	1,04	1,13	2,09	2,44
<b>France</b>	18,63	22,06	19,65	20,82	24,21	25,56
<b>Germany</b>	29,47	33,59	33,45	35,8	41,99	42,1
<b>Hungary</b>	2,44	2,81	2,82	2,88	3,1	3,12
<b>Italy</b>	9,13	9,41	8,97	8,84	9,31	9,59
<b>Poland</b>	6,39	8	8,61	9,43	11,58	13,4
<b>Republic of Moldova</b>	0,17	0,23	0,26	0,30	0,40	0,51
<b>Romania</b>	4,54	5,65	6,26	7,02	8,25	9,79
<b>Spain</b>	12,63	14,38	15,01	11,59	14,38	16,04
<b>United Kingdom</b>	30,91	34,11	32,9	37,15	42,65	42,55
<b>Euro Area</b>	205,36	253,86	277,69	310,39	381,01	381,69
<b>Central Europe and the Baltics</b>	23,0	28,7	30,31	33,44	40,74	46,43
<b>East Asia &amp; Pacific</b>	66,17	74,7	83,81	95,85	120,50	na
<b>Latin America &amp; Caribbean</b>	9,04	9,58	9,43	9,22	10,77	13,44

**Source:** authors study based on Worldbank (2023)

Among European countries, the best results in increasing ICT service exports were registered in Poland, Romania, Estonia and in the Republic of Moldova.

## **2.2. FDI influence on ICT sector development in the Republic of Moldova**

According to the UNCTAD, FDI inflows to Moldova amounted to USD 264 million in 2021, up from USD 150 million in the previous year. The total stock of FDI was estimated at USD 4.8 billion in the same year, around 35% of the country’s GDP. In 2022, FDI continued its growth and reached USD 590 million. The majority of FDI in Moldova inflows from European countries, particularly Romania, other FDI inflows come from Cyprus, Russia, Hungary etc. The study of consulting company Business Intelligent Services notes that foreign investors in Moldova reinvested their profits in the national economy (up 1.9 times). This resulted in foreign direct investment in 2022 growing by about 16% compared to 2019 (pre-crisis period). However, the volume of FDI in Moldova is still one of the lowest among the Eastern European countries – only \$1006 per capita for 2012-2022 (average in Eastern European countries – \$2455 per capita). At the same time, FDI has a significant positive impact on the economy of the Republic of Moldova, and while companies with FDI account for only about 15.4% of employees in all enterprises, they create 28.2% of sales revenue in the economy. They also make a significant contribution to Moldova’s budget – they account for 25.1% of income tax revenues. In addition, they own 24.2% of all fixed assets, both industrial and social (FIA, 2023).

The main sectors that attract FDI in Moldova are financial intermediation, manufacturing and trade. In recent years, there has also been a growing interest in the country's IT sector, which has the potential to become a key driver of economic growth and development. (figure 5).

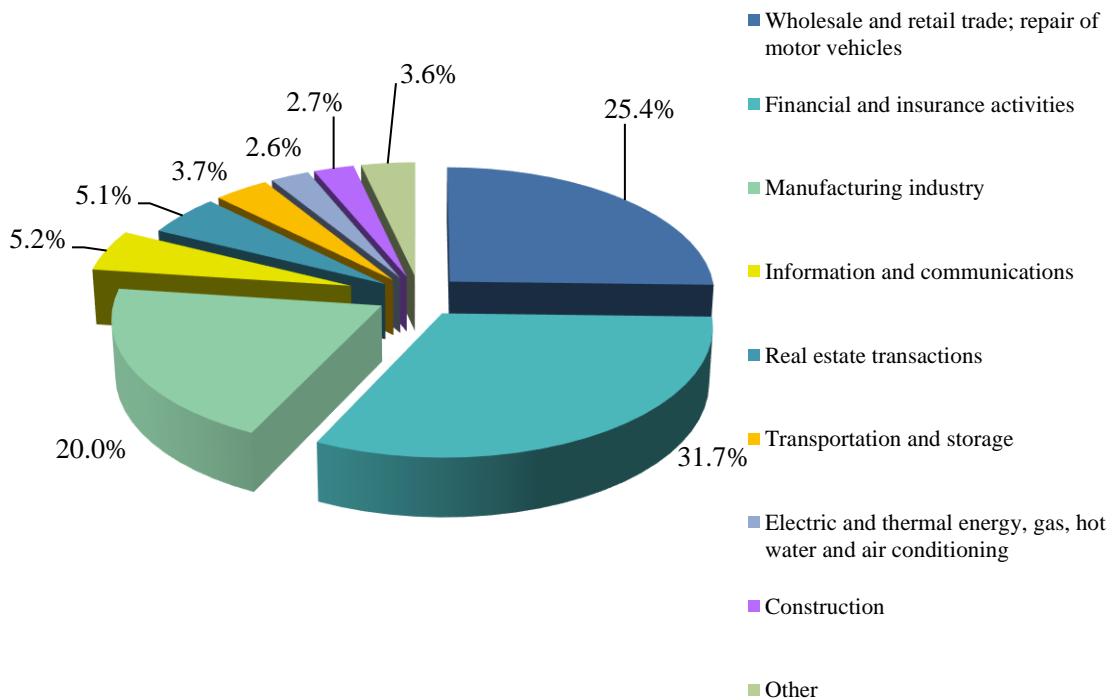


Figure 5. FDI in the Republic of Moldova, by industry, 2021, %

Source: BNM (2022)

In the structure of FDI in the Republic of Moldova the share of investments attracted in financial activities is 31,7%, the shares of foreign investments allocated in wholesale and retail trade as well as in manufactory are 25,4% and 20,0%, correspondently. The share of ICT industry in FDI in the Republic of Moldova is estimated as 5,2% or \$160 million.

Foreign investments in Moldova’s IT sector doubled during the 2018-2022 period and the number of companies with foreign capital increased to 207 (EU4Digital, 2023). The IT industry’s contribution to Moldova’s GDP increased to 10%. IT companies export about 80 percent of their total production (ITA, 2022). Major Moldovan partners are the United States, the UK, France, Germany, the Netherlands, and Romania. The National Strategy for Investment Attraction and Export Promotion identified seven priority sectors for investment and export promotion and some from the most important are information and communication technologies and machinery (GRP, 2018). During 2017-2022, due the efforts made, Turnover and Production value of Information and communication in the Republic of Moldova increased by 40%, but Turnover and Production value of Manufacture of computer, electronic and optical products decreased. The most significant growth was demonstrated by such Information and communication components as Computer programming, consultancy etc. and Information service activities, Turnover and Production value of which have increased 3 times over the past 5 years (table 3).

**Table 3. Indicators of enterprises activity in ICT sector in the Republic of Moldova, 2018-2022**

Types of enterprises activity	2018		2019		2020		2021		2022	
	Turnover, mln. lei	Production value, mln. lei	Turnover, mln. lei	Production value, mln. lei	Turnover, mln. lei	Production value, mln. lei	Turnover, mln. lei	Production value, mln. lei	Turnover, mln. lei	Production value, mln. lei
Manufacture of computer, electronic and optical products	461	436	529	482	453	425	381	397	357	362
Information and communication, including:	11818	10964	13225	12364	13587	12812	16808	15866	21684	20801
Publishing activities	529	536	640	650	765	796	738	753	1024	1032
Motion picture, video and TV production	107	106	126	128	100	100	146	150	225	227
Programming and broadcasting activities	193	206	364	397	174	205	236	247	146	176
Telecommunications	6765	6220	6691	6045	6677	5950	7095	6379	7599	6758
Computer programming, consultancy etc.	3447	3123	4540	4276	4764	4649	6856	6627	8596	8469
Information service activities	774	772	861	865	1105	1109	1734	1709	4092	4137

**Source:** authors study based on statbank.statistica.md (2023)

The significant growth in Turnover and Production value of Information and communication in the Republic of Moldova, in turn, initiated a significant increase in ICT service exports, which increased 3 times over the period 2017-2022 (table 2), and 10 times in the last 15 years, which has become one of the most successful progresses registered among European countries. The results have exceeded the forecasted 2018-2023 Strategy for the development of the information technology industry and ecosystem for digital innovation (GRP, 2018). The results of the analysis indicate that the successes achieved in ICT sector development were largely initiated by the increase in FDI in the industry.

### 3. Conclusion

Free migration of capital is an important part of international economic relations. Attracting FDI has a positive impact on the economy of the recipient country through the receipt of capital, transfer of the latest technologies and empirical developments. FDI flows at the global level are influenced by numerous factors, the main of which in recent years have been COVID-19, armed conflicts, increasing complexity of supply chains, rising prices for raw materials and energy resources, which in 2020 curbed the positive dynamics of their volumes observed before 2019, and after growth in 2021, a decrease in foreign investment inflows was recorded again in 2022. In 2006–2022, the leading positions in Global FDI project announcements belonged to the Renewable Energy sector and the Coal, Oil and Natural Gas sector, but such sectors as Semiconductors, Electronic Components and Software, as well as the Computer Services sector, also showed stable growth and were second in terms of FDI volume. The result of the attracted FDI was an increase in Global high-tech goods output and growth rates in Telecommunication equipment, Electronic components and boards, Consumer electronic, which indicates the sustainable positive impact of FDI on the development of ICT. At the European level, the maximum number of announced projects with the involvement of FDI relates to Software and IT



services, it shows an annual increase, which has a positive effect on the growth in the volume of services provided and the increase in export volumes of the ICT sector, which doubled in 2017-2022 in many European countries. In the Republic of Moldova, the share of ICT industry in FDI is estimated at approximately 5%. Foreign investments in Moldova's IT sector doubled during the 2018-2022. FDI had a significant positive impact on the national ICT sector, turnover and production value of Information and communication in the Republic of Moldova increased by 40%, and its subsectors Computer programming, consultancy and Information service activities improved their performance over the past 5 years by 3 times and the ICT industry's contribution to Moldova's GDP increased to 10%.

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