วารสารวิชาการผลประโยชน์แห่งชาติ
National Interest
ISSN (Online): 2730-2393

DOI: https://doi.org/10.14456/ni.2025.6

Ukraine's foreign trade with EU countries in telecommunications, computer and information services: analytical studies

Olesia Totska
Email: Totska.Olesia@vnu.edu.ua
Professor of the department of management,
Lesya Ukrainka Volyn National University (Lutsk, Ukraine),
Associate researcher,
French Research Center in Humanities and Social Sciences CEFRES,
UAR 3138 CNRS–MEAE (Prague, Czech Republic)

ABSTRACT

At the current stage of development of society, there is a significant expansion of the service sector both in terms of assortment and geography of sales. The purpose of the study is to analyze Ukraine's foreign trade with EU countries in services in the field of telecommunications, computer and information services. To achieve the goal, the following methods were used: analysis; cluster analysis (K-means method). An analysis of the dynamics of export and import indicators of ICT services between Ukraine and EU countries showed a decrease in 2022 compared to 2021, which is associated with russia's full-scale invasion of Ukraine, and then an increase in 2023. An analysis of the structure of export and import indicators of ICT services showed that the largest share was occupied by computer services – over 82 and 62%, respectively; the next largest were information services – over 9 and 22%, respectively; the smallest share belonged to telecommunication services – less than 8 and 14%, respectively. Using a cluster analysis of EU countries by indicators of trade in ICT services with Ukraine, the largest trading partners of Ukraine in this area were identified: Malta (by Ukrainian exports), Germany, Cyprus, the Netherlands, Belgium, Denmark, France, Ireland, Sweden (by exports and imports). In the future, the research can be continued in the following directions: 1) analysis of Ukraine's foreign trade in ICT services with EU countries in 2022–2024; 2) study of current trends in Ukraine's foreign trade in ICT services with other countries of the world.

KEYWORDS: telecommunication services, computer and information services, foreign trade, Ukraine, EU countries
Received: 14/01/2025
Revised : 06/02/2025
Accepted: 26/07/2025

1. Introduction. The Strategy for the Development of the Information Society in Ukraine states: "The global trend is the transformation of an industrial society into a post-industrial one, which occurs in the context of increasing globalization processes, the expansion of the service sector and intangible production as a result of scientific and technological progress, including large-scale, deep and dynamic

penetration of information and communication technologies into all spheres of life of an individual, society, business entities and the state" (Legislation of Ukraine, 2013). Given this trend, business entities of Ukraine can provide telecommunications, computer and information services not only to domestic but also to foreign business entities, as well as receive such services in the opposite direction. In the Classification of External Economic Services, Section 9, Services in the sphere of telecommunications, computer and information services (hereinafter referred to as ICT services), contains their list, which is shown in **Table 1**.

Table 1

Types of foreign economic ICT services according to the Classification of External Economic Services (State Statistics Service of Ukraine, 2022a)

Subsection	Class	Service name
09.01		Telecommunications services
	09.01.01	Public network services
	09.01.02	Services of licensees
	09.01.03	Services of mobile operators
09.02		Computer services
	09.02.01	Software development services
	09.02.02	Data processing services
	09.02.03	Database services
	09.02.04	Other computer services
	09.02.05	Computer and office equipment maintenance and repair services
09.03		Information services
	09.03.01	Information agency services
	09.03.02	Informatization consulting services
	09.03.03	Other information services

Foreign economic services are intangible transactions and therefore are not subject to customs procedures applied to material goods (State Statistics Service of Ukraine, 2024a).

2. Literature Review. By studying the foreign economic activity of Ukraine in general, and in the services sector in particular, over the past five years, scientists have obtained the following results: quantitative and qualitative indicators were analyzed to assess trends in the volume and structure of trade between Ukraine and EU member states (Antoniuk et al., 2021); an economic analysis of the dynamics of export-import of services in the economy of Ukraine and the geographical structure of service exports was carried out, the main features of foreign trade in services in the world and in Ukraine were highlighted (Bulyk & Havrylyuk, 2021); the influence of the main factors on the dynamics of exports of regions of Ukraine in the pre-conflict and conflict periods was studied (Horská et al., 2023); the dynamics of exports and imports of goods and services for the period 2016–2020 were analyzed, the commodity structure of exports and imports of goods and services and the most influential partner countries were determined (Iziumtseva & Korobka, 2021); it was substantiated that trade policy should be formulated

and implemented in such a way that Ukraine's foreign economic activity was more oriented towards services and a scientific and technical basis (Radziyevska, 2023); a comprehensive analysis and forecasting of export and import indicators of services between Ukraine and neighboring countries: Poland, Romania, Slovakia, the Republic of Moldova were carried out (Totska, 2022); the dynamics of financial indicators of export-import of tourist services between Ukraine and the EU were analyzed, their favorable trends in the short term were identified (Totska, 2023a); a comprehensive analytical assessment of international trade in services between Ukraine and the EU countries was carried out (Totska, 2023b); the contribution of cities of regional significance located in the western part of Ukraine to the development of export-import activities of the relevant regions was assessed, structural transformations in the export of goods and services in Ivano-Frankivsk, Chernivtsi and Rivne were analyzed (Zhabynets, 2020).

In addition, scientists have also investigated the field of information and communication technologies: the features of the use of ICT at Ukrainian enterprises in terms of types of economic activity were analyzed (Totska, 2024); the possibilities of using the Lardi-Trans transport exchange in the activities of road freight transport participants were studied (Totska & Prosvirnikov, 2024).

Given the insufficient study of Ukraine's export-import operations with EU countries in the field of telecommunications, we consider it appropriate to fill this gap.

3. Methodology. The purpose of the study is to analyze Ukraine's foreign trade with EU countries in telecommunications, computer and information services. To achieve this goal, the following methods were used:

1) analysis – to study the dynamics and structure of export/import indicators of ICT services in 2021–2023;

2) cluster analysis (K-means method) – to group EU countries by indicators of trade in ICT services with Ukraine in 2021.

The information base of the study is data from the State Statistics Service of Ukraine for 2021–2023.

It should be noted that after the start of the full-scale russian invasion of Ukraine in 2022, new data on the geographical structure of Ukraine's foreign trade in services with countries of the world are not published.

4. Results. In this article, we will focus on the following three indicators of Ukraine's foreign economic activity: exports of ICT services, imports of ICT services, and balance of ICT services. Note that exports of services are formed as the total value of transactions for the provision of services by a resident to a non-resident under agreements (contracts) or in the form of an oral agreement on the date of their actual provision on the basis of the accrual principle (based on invoices); imports of services are formed as the total value of transactions for the receipt of services by a resident from a non-resident under agreements (contracts) or in the form of an oral agreement on the date of their actual receipt on the basis of the accrual principle (based on invoices); the balance of services is formed as the difference between exports and imports of services (State Statistics Service of Ukraine, 2024a). **Table 2** shows the dynamics of selected indicators for 2021–2023.

Table 2

Structure of Ukraine's foreign trade in ICT services with EU countries (State Statistics Service of Ukraine, 2024b)

Service name	Exports		Imports		Balance
	thsd. USD	in % of total volume	thsd. USD	in % of total volume	thsd. USD
2021					
EU countries, total	4,494,202.7	100.0	3,232,785.0	100.0	1,261,417.7
Services in the sphere of telecommunications, computer and information services	1,254,682.6	27.9	375,212.5	11.6	879,470.1
Telecommunications services	54,654.7	4.4	34,708.2	9.3	19,946.5
Computer services	1,043,742.4	83.2	234,862.3	62.6	808,880.1
Information services	156,285.5	12.5	105,642.0	28.2	50,643.6
2022					
EU countries, total	3,438,343.4	100.0	1,717,598.7	100.0	1,720,744.7
Services in the sphere of telecommunications, computer and information services	1,177,340.7	34.2	231,743.5	13.5	945,597.2
Telecommunications services	87,518.7	7.4	31,406.1	13.6	56,112.6
Computer services	973,774.6	82.7	147,405.4	63.6	826,369.2
Information services	116,047.4	9.9	52,932.0	22.8	63,115.4
2023					
EU countries, total	3,618,105.7	100.0	2,340,600.0	100.0	1,277,505.7
Services in the sphere of telecommunications, computer and information services	1,254,986.5	34.7	274,529.6	11.7	980,456.9
Telecommunications services	69,782.6	5.6	24,712.8	9.0	45,069.9
Computer services	1,066,966.2	85.0	186,775.2	68.0	880,190.9
Information services	118,237.8	9.4	63,041.6	23.0	55,196.2

As we can see, ICT services account for a significant share of Ukraine's exports of services to the EU countries (approximately a third of the total), and this share has been growing annually. However, due to the war in the country, the amount of exports decreased from 4.5 billion USD in 2021 to

3.4 billion USD in 2022. Although a further increase in the amount of exports to 3.6 billion USD in 2023 is positive.

The import of ICT services had a similar dynamics: a decrease from 3.2 billion USD in 2021 to 1.7 billion USD in 2022 and an increase to 2.3 billion USD in 2023. The share of ICT services in the import of services to Ukraine from the EU countries fluctuated within 11.6–13.5%.

The balance during the analyzed period was positive and amounted to from 1.3 to 1.7 billion USD.

If we consider ICT services by division, then in both exports and imports, the largest share is occupied by computer services – over 82 and 62%, respectively. The next position is occupied by information services – over 9 and 22%, respectively. The smallest share belongs to telecommunication services – less than 8 and 14%, respectively.

Next, we turn to the cluster analysis of EU countries by indicators of ICT services trade with Ukraine. Cluster analysis is a set of methods for classifying multidimensional observations, the main goal of which is to divide input data into homogeneous groups so that objects within a group are similar to each other according to some criterion, and objects from different groups differ from each other. When using the K-means method, K random clusters are selected, located at the greatest possible distance from each other, and then the belonging of objects to them changes so as to: 1) minimize variability within clusters; 2) maximize variability between clusters. That is, it is necessary to specify in advance the number of clusters that we want to obtain (Totska, 2009). **Table 3** shows the necessary data for 2021.

Table 3

Ukraine's foreign trade with EU countries in ICT services in 2021, thsd. USD (State Statistics Service of Ukraine, 2022b)

EU country	**Exports**	**Imports**	**Balance (+/-)**
Austria	16,175.9	22,399.5	-6,223.5
Belgium	42,090.0	17,838.8	24,251.2
Bulgaria	8,996.8	861.2	8,135.6
Croatia	1,051.2	315.8	735.4
Cyprus	166,608.1	13,930.8	152,677.3
Czechia	20,685.7	12,492.7	8,193.0
Denmark	63,543.7	3,288.7	60,255.0
Estonia	32,318.0	13,372.3	18,945.7
Finland	12,413.9	9,827.1	2,586.8
France	90,898.2	29,010.7	61,887.5
Germany	173,170.0	93,847.1	79,322.9
EU country	Exports	Imports	Balance **(+/-)**
Greece	305.0	1,212.2	-907.1
Hungary	13,793.8	13,177.2	616.6
Ireland	65,845.1	7,856.8	57,988.3

EU country	Exports	Imports	Balance (+/-)
Italy	20,601.6	1,536.0	19,065.6
Latvia	2,964.0	10,034.8	-7,070.8
Lithuania	11,270.7	6,092.7	5,178.0
Luxembourg	19,290.0	5,398.7	13,891.4
Malta	229,970.9	5,854.1	224,116.8
Netherlands	131,984.9	36,455.3	95,529.7
Poland	38,680.1	19,914.9	18,765.2
Portugal	1,950.5	935.8	1,014.8
Romania	4,438.2	1,794.0	2,644.2
Slovakia	3,605.5	5,248.5	-1,643.0
Slovenia	1,254.5	1,972.0	-717.5
Spain	17,226.2	1,446.4	15,779.9
Sweden	63,549.9	39,098.5	24,451.4
Total	1,254,682.6	375,212.5	879,470.1

As we can see, in the analyzed period, the export of domestic ICT services to individual EU countries ranged from 305.0 thsd. USD (Greece) to 229,970.9 thsd. USD (Malta). Imports of similar types of services to Ukraine from individual EU countries ranged from 315.8 thsd. USD (Croatia) to 93,847.1 thsd. USD (Germany). In general, exports exceeded imports by 3.3 times. The balance was negative for only five EU countries (Austria, Greece, Latvia, Slovakia, Slovenia), and positive for 22 (all other EU countries), which confirms the high competitiveness of the domestic sphere of information and communication technologies in the EU market.

Next, we will apply the K-means cluster analysis method, dividing the EU countries into five groups. In our opinion, in this case, the positions of each cluster (from 1 to 5) can be given a concise name: high, above average, average, below average, low. The results obtained are displayed in **Fig. 1**.

Cluster 1	→	Malta
Cluster 2	→	Germany
Cluster 3	→	Cyprus, Netherlands
Cluster 4	→	Belgium, Denmark, France, Ireland, Sweden
Cluster 5	→	Austria, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain

Figure 1. *Cluster structure by indicators of foreign trade in ICT services with Ukraine*

Note. Created by the author.

That is, the clusters were formed as follows: the first and second – one country each; the third – two countries; the fourth – five countries; the fifth – 18 countries. Note that the position of the cluster according to different indicators of the value of ICT services may differ, as can be seen in **Table 4** and **Fig. 2**.

Table 4

Average values and positions of each cluster, thsd. USD (Created by the author)

Indicator	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Exports	229,970.9	173,170.0	149,296.5	65,185.38	12,612.32
	high	above average	average	below average	low
Imports	5,854.1	93,847.1	25,193.0	19,418.70	7,112.87
	low	high	above average	average	below average
Balance	224,116.8	79,322.9	124,103.5	45,766.68	5,499.45
	high	average	above average	below average	low

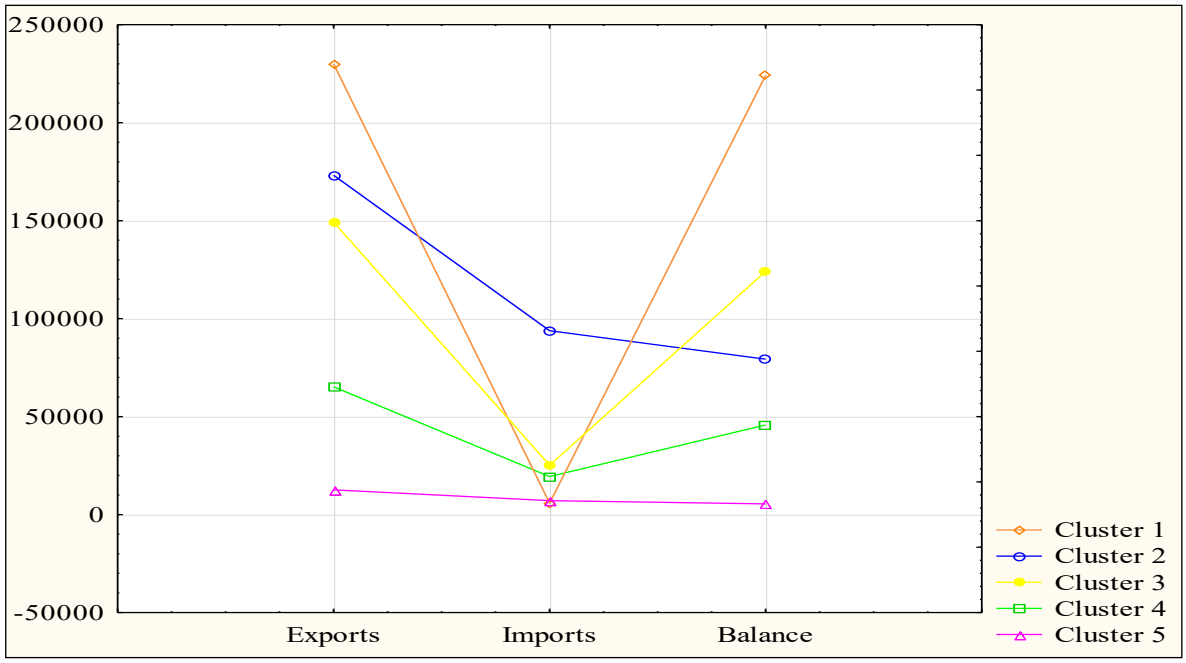

Figure 2. *Graph of average values for each cluster, thsd. USD*

Note. Created by the author.

Fig. 2 shows that the first cluster contains an object (Malta) in which the average values of two out of three ICT services indicators (exports from Ukraine and the balance) are significantly higher than in the other groups. The second cluster contains an object (Germany) in which the average value of one ICT services indicator (imports to Ukraine) is significantly higher than in the other groups.

5. Conclusions. In Ukraine's foreign trade in services with the EU countries, the sphere of telecommunications, computer and information services occupies a rather significant place. In particular,

during 2021–2023, their shares in exports amounted to 27.9–34.7%, in imports – 11.6–13.5%. The balance of export-import indicators was positive and amounted to 1.3–1.7 billion USD. The structure of export and import indicators of ICT services was as follows: the largest share was occupied by computer services – over 82 and 62%, respectively; the next largest were information services – over 9 and 22%, respectively; the smallest share belonged to telecommunications services – less than 8 and 14%, respectively. The dynamics of export and import indicators of ICT services decreased in 2022, compared to 2021, and then increased in 2023, which is associated with russia's full-scale invasion of Ukraine.

The dynamics of ICT services exports and imports were as follows: a decrease in 2022 (3.4 billion USD and 1.7 billion USD, respectively), compared to 2021 (4.5 billion USD and 3.2 billion USD, respectively), associated with russia's full-scale invasion of Ukraine. In 2023, there was an increase (3.6 billion USD and 2.3 billion USD, respectively).

A cluster analysis of EU countries by indicators of trade in ICT services with Ukraine indicates that the following countries trade most actively with Ukraine: Malta (by Ukrainian exports), Germany, Cyprus, the Netherlands, Belgium, Denmark, France, Ireland, Sweden (by exports and imports).

Thus, Ukraine has good potential for expanding trade in ICT services with EU countries. The main obstacle to the revival of export-import operations with European partners is the war in Ukraine, which is accompanied by the outflow of personnel abroad, the mobilization of workers in the Armed Forces of Ukraine, the closure of enterprises, etc. We believe that its completion will have a positive impact on the economic development of the state, in particular foreign economic operations. In addition, Ukraine can stimulate the training of information technology specialists by increasing the number of budget places in Ukrainian universities.

In the future, the research can be continued in the following areas:

1) analysis of Ukraine's foreign trade in ICT services with EU countries in 2022–2024 (after the publication of such information on the website of the State Statistics Service of Ukraine);

2) study of current trends in Ukraine's foreign trade in ICT services with other countries of the world, in particular G7 members – the USA, Canada, Great Britain, Japan.

6. Funding. The research was funded by the French Research Center in Humanities and Social Sciences CEFRES, UAR 3138 CNRS–MEAE, within the framework of the topic "Foreign Economic Cooperation of Ukraine and EU Countries: Modern Trends".

References

Antoniuk, K., Mokiy, A., & Antoniuk, D. (2021). Ukraine's foreign trade with the EU from the perspective of consumption security. *Zeszyty Naukowe Wyższej Szkoły Bankowej w Poznaniu, 92*(1), 51–59. DOI: 10.5604/01.3001.0014.9161

Bulyk, O., & Havrylyuk, I. (2021). Condition and prospects of foreign trade in services from Ukraine. *Economics & Education, 6*(3), 40–44. https://doi.org/10.30525/2500-946X/2021-3-6

Horská, E., Moroz, S., & Palkovič, J. (2023). Determinants of export activities in Ukrainian regions in the pre-conflict and the first-stage conflict periods. *Entrepreneurial Business and Economics Review, 11*(1), 181–198. https://doi.org/10.15678/EBER.2023.110110

Iziumtseva, N., & Korobka, V. (2021). Tendentsii rozvytku ZED v Ukraini na suchasnomu etapi [Trends in the development of foreign economic activity in Ukraine at the present stage]. *Financial and Credit Systems: Prospects for Development, 2*(2), 44–52. https://doi.org/10.26565/2786-4995-2021-2-05 (In Ukrainian).

Legislation of Ukraine. (2013). Pro skhvalennia Stratehii rozvytku informatsiinoho suspilstva v Ukraini: Rozporiadzhennia Kabinetu Ministriv Ukrainy vid 15 trav. 2013 r. № 386-r [On approval of the Strategy for the Development of the Information Society in Ukraine: Order of the Cabinet of Ministers of Ukraine dated May 15, 2013 No. 386-r]. https://zakon.rada.gov.ua/laws/show/386-2013-%D1%80#Text (In Ukrainian).

Radziyevska, S. (2023). State governance for Ukraine's growth and development: trade aspect. *Baltic Journal of Economic Studies, 9*(1), 135–145. https://doi.org/10.30525/2256-0742/2023-9-1-135-145

State Statistics Service of Ukraine. (2022a). Klasyfikatsiia zovnishnoekonomichnykh posluh [Classification of External Economic Services]. https://www.ukrstat.gov.ua/klasf/st_kls/op_kzep_2016.htm (In Ukrainian).

State Statistics Service of Ukraine. (2022b). Foreign trade of services with countries of the world (by the type of service). https://www.ukrstat.gov.ua/

State Statistics Service of Ukraine. (2024a). Metodolohichni poiasnennia. Zovnishnia torhivlia posluhamy [Methodological explanations. Foreign trade in services]. https://www.ukrstat.gov.ua/ (In Ukrainian).

State Statistics Service of Ukraine. (2024b). Structure of foreign trade (by types) services with EU countries. https://www.ukrstat.gov.ua/

Totska, O. L. (2009). Ekonomiko-matematychne modeliuvannia vypusku produktsii v kharchovii promyslovosti Ukrainy [Economic-Mathematical Modeling of Issue of Products in Food Retail Industry of Ukraine]. Editorial and publishing department "Vezha" of Lesya Ukrainka Volyn National University. https://evnuir.vnu.edu.ua/handle/123456789/13677 (In Ukrainian).

Totska, O. L. (2022). Finansovi perspektyvy zovnishnoi torhivli posluhamy Ukrainy z krainamy Skhidnoi Yevropy [Financial prospects of foreign trade in Ukrainian services with Eastern European countries]. *Socio-Economic Research Bulletin, 1–2* (80–81), 122–133. https://doi.org/10.33987/vsed.1-2(80-81).2022.122-133 (In Ukrainian).

Totska, O. (2023a). Determination of the probability of favorable trends in the export-import of tourist services of Ukraine with EU countries: financial background. *Scientific Papers. Series «Management, Economic Engineering in Agriculture and Rural Development», 23*(1), 837–844. https://managementjournal.usamv.ro/pdf/vol.23_1/Art88.pdf

Totska, O. (2023b). Ukraine-EU: analytical assessment of international trade in services. *Economics and Region,* 4 (91), 108–117. DOI: 10.26906/EiR.2023.4(91).3200

Totska, O. L. (2024). Vykorystannia informatsiino-komunikatsiinykh tekhnolohii na pidpryiemstvakh Ukrainy za vydamy ekonomichnoi diialnosti [Use of information and communication technologies at Ukrainian enterprises by type of economic activity]. In M. V. Dubyna (Ed.), *Rozvytok sfery finansovykh posluh v umovakh turbulentnosti natsionalnoi ekonomiky Ukrainy [Development of the financial services sector in the turbulent conditions of the national economy of Ukraine]* (pp. 147–157). National University "Chernihiv Polytechnic". https://evnuir.vnu.edu.ua/bitstream/123456789/24608/3/book_20.pdf (In Ukrainian).

Totska, O. L., & Prosvirnikov, M. V. (2024). Mozhlyvosti vykorystannia transportnoi birzhi Lardi-Trans u diialnosti uchasnykiv avtomobilnykh vantazhnykh perevezen [Possibilities of using the Lardi-Trans transport exchange in the activities of road freight transport participants]. In M. V. Dubyna (Ed.), *Rozvytok sfery finansovykh posluh v umovakh turbulentnosti natsionalnoi ekonomiky Ukrainy [Development of the financial services sector in the turbulent conditions of the national economy of Ukraine]* (pp. 157–169). National University "Chernihiv Polytechnic". https://evnuir.vnu.edu.ua/bitstream/123456789/24612/3/book_21.pdf (In Ukrainian).

Zhabynets, O. (2020). Foreign trade in goods and services in Ukraine and the EU: a comparative analysis. *Zeszyty Naukowe Wyższej Szkoły Bankowej w Poznaniu, 89*(2), 83–98. DOI: 10.26349/zn.wsb.w.poznaniu.0089.07