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DIFFERENTIATION OF THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES BY INDIVIDUALS IN THE EUROPEAN UNION COUNTRIES

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Purpose: The purpose of this article is to statistically assess the degree of use of Information and Communication Technologies (ICT) by individuals in the 27 countries of the European Union (UE) in 2024.
Design/methodology/approach: The objective of the article was realized through an empirical assessment of data obtained from the Eurostat database, presented in the form of twelve indicators. The data was analyzed using the Zero Unitarization Method (ZUM). This method was employed to determine the ranking of countries and their classification into groups based on the similarity of their ICT usage by individuals.
Findings: Countries exhibited significant disparities in individual ICT usage. The highest levels were observed in Finland, Denmark, the Netherlands, and Ireland, while Poland, France, Bulgaria, and Romania ranked among the lowest in this regard.
Research limitations/implications: The article presents the status of the 27 EU countries in terms of ICT usage by individuals in 2024. To observe changes and trends in this area, the time scope of the survey should be extended, i.e., a dynamic approach should be adopted. Another limitation of the study was its use of indicators measured only by Eurostat.
Practical implications: The research made it possible to identify the leaders and underdeveloped countries in terms of ICT usage by individuals, as well as the main reasons for the classification obtained. Their results can therefore help point out areas for improvement in this regard, providing support for decision-makers in designing development policies in terms of ICT usage.
Social implications: The study's results can inform actions in the area of ICT usage by individuals, thereby improving their quality of life.
Originality/value: The novelty of the presented research lies in the construction of a synthetic measure that provides a relatively simple way to assess the state of advancement of the EU countries in the field of ICT usage by individuals based on the most recent statistical data. The article is intended for researchers specializing in ICT usage as well as policymakers involved in shaping development strategies within the EU27".
Keywords: Information and Communication Technologies, Differentiation, Synthetic measure, EU 27 countries.
Category of the paper: Research paper.

1. Introduction

Information and Communication Technologies (ICT) have long been recognized as pivotal drivers of competitiveness (Flores et al., 2020; Hernandez-de-Menendez et al., 2020; Roztocki et al., 2019), economic growth (Toader et al., 2018), and development (Palvia et al., 2018; Wu et al., 2018; Yang et al., 2023; Zeng et al., 2020). Numerous studies have highlighted the significant positive impact of ICT on economic performance (Wu et al., 2018), particularly in developing countries (Bahrini, Qaffas, 2019). Moreover, the development of ICT, alongside artificial intelligence (AI), big data, cloud computing, the Internet of Things, and autonomous robots, is accelerating in achieving the Sustainable Development Goals within European Union (EU) countries (Asongu et al., 2018; Fura et al., 2025; Gössling, 2021; Ziemba, 2021).

Digital technology has also been a key priority for the EU for many years because it plays an important role in reducing poverty by creating new sources of income and new jobs, but also by reducing the cost of access to health and education services for the poor (Toader et al., 2018).

Assessing the usage of ICT constitutes a key strategy for evaluating the advancement of the information society. This topic has garnered significant scholarly interest in recent years. (Chądrzyński et al., 2022; Sołtysik-Piorunkiewicz, Zdonek, 2021; Ziemba, 2021). To capture both the extent of ICT development and the broader evolution of the information society, researchers have developed a range of composite indicators. Among the most prominent are:

- The ICT Development Index was published by ITU from 2009 to 2017. It was discontinued in 2018, owing to issues of data availability and quality (*The ICT Development Index*, 2017).
- The Digital Economy and Society Index (DESI) by the European Commission has been monitoring Member States' digital progress since 2014. As of 2023, and in line with the Digital Decade Policy Programme 2030. DESI is now integrated into the State of the Digital Decade report and used to monitor progress towards the digital targets.
- The Networked Readiness Index (NRI), was developed by the World Economic Forum (Dutta, Lanvin, 2024).

However, the multitude of available indicators creates significant challenges and difficulties in selecting those that most accurately reflect the relevant relationship (Palvia et al., 2018; Vărzaru et al., 2024). Despite the availability of these indicators, there are ongoing scientific debates regarding the selection and interpretation of indicators (Brodny, Tutak, 2023; Vial, 2019; Ziemba, 2021). Moreover, the degree to which ICT is used in different countries varies and is influenced by many cultural, economic, technological, and social factors (Asongu et al., 2018; Yang et al., 2023). Such variations can occur at multiple levels, including those of nations, regions, and smaller units (Wojnar, 2020).

Traditional measurement methods and indicator sets often fail to capture the dynamic nature of the evolution of the information society, thus limiting the ability to make comprehensive assessments. This highlights the need for continued exploration of new measurement methodologies and analysis of current data on ICT accessibility and use. Therefore, it seems essential to assess the current level of use of ICT by individuals in the 27 countries of the EU in 2024, which is the main objective of this article. Therefore, to achieve the aim of the article, the following research questions were asked:

RQ1: Which EU27 countries were the leaders in ICT use by individuals?

RQ2: Which EU27 countries demonstrated the least utilization of ICT tools by individuals?

RQ3: What were the disparities among EU27 countries concerning the extent of ICT use by individuals in 2024?

RQ4: What was the classification of EU27 countries into groups of similar countries in terms of ICT use by individuals in 2024?

The paper is structured as follows. After the Introduction, the paper presents a literature review focusing on the level of ICT usage by individuals in the EU. The next section presents the diagnostic variables and the method of their selection, as well as the basis for further statistical analysis. The section Results and Discussion is focused on the presentation of the research results and discussions. At the end of the paper is the Summary section with the conclusions and limitations of the study.

2. The level of ICT usage by individuals in UE

Digital technologies play a pivotal role in social and economic life and are indispensable for the advancement of both society and the economy (Pakkan et al., 2023; Rosário, Dias, 2022). This importance is reflected across a broad spectrum of literature, addressed by scholars (Briggs, 2020; Vial, 2019), practitioners (Sabatini et al., 2022) and policymakers (Grabowska, 2019; Wolniak, Jonek-Kowalska, 2021; Yang et al., 2023).

When conducting overall assessments of ICT utilization, researchers employ both simple methods based on single indicator values (Zečević et al., 2019; Ziemba, 2021) and more sophisticated, multidimensional methods, which allow the construction of their aggregate assessment metrics allowing the comparison of countries in terms of ICT implementation (Stec, Grzebyk, 2024; Varakamin, 2017; Vial, 2019). Beyond static analyzes that assess ICT use at a single point in time (Fura et al., 2025), researchers use a dynamic approach and analyse changes over a specific period, using panel data (Zoroja, 2015). Others apply principal component analysis and cluster analysis to uncover patterns and groupings in ICT deployment (Wojnar, 2020).

In the following article, the Zero Unitarization Method (ZUM) – which belongs to the group of multivariate comparative analysis methods – was used to assess the level of ICT use by individuals in the 27 EU countries. This methodology facilitated the development of a synthetic measure that allowed for the determination of this level in a straightforward manner. For the empirical analysis, the most recent statistical data was employed, i.e., data for 2024 measuring individual areas of ICT use by individuals. These data were retrieved from the Eurostat database. The selection of data for analysis was guided by substantive and statistical criteria.

The novelty of the presented research lies in the construction of a synthetic measure that provides a relatively simple way to assess the state of advancement of the EU countries in the field of ICT usage by individuals based on the most recent statistical data.

2.1. Access and frequency of Internet

The EU's vision for digital transformation (The European Declaration on Digital Rights and Principles) puts people at the centre, empowering individuals and fostering innovative businesses (European Commission, 2025). Digital transformation should contribute to a fair and inclusive society and economy in the EU. Wide access to the Internet is one way to measure this digital transformation and should be possible regardless of social status or geographical location.

According to Eurostat, the share of households (residents aged 16 to 74) in the EU with Internet access was 94% in 2024, up from 80% in 2014. The EU countries with the lowest household Internet access rates are Greece and Croatia (both 87%). The catch-up effect is clearly visible when comparing the rates in 2024 with those in 2014, a period of 10 years. The growth rates in Bulgaria (63%) and Romania (56%) reflect the leap forward made by these two EU countries, from less than 60% of households with Internet access in 2014 to rates above 90%. In 2024, Denmark and Luxembourg reported the highest percentages of people who used the Internet in the last three months before the survey, with figures above 99%. The percentage of people who had never used the Internet in 2024 was highest in Croatia (14%), Greece (11%) and Portugal (10%) (Eurostat, 2025).

2.2. Communication

Communication is a very important and probably the most basic and visible purpose of ICT. Moreover, mobile technology and social media (SM) have changed the way employees or project team members communicate and the way they are managed. This is especially true for teams working in remote conditions (Hysa, Spalek, 2019; Zdonek et al., 2017) or composed of people from the younger generation (Król, Zdonek, 2020), for whom SM options have become a natural channel for communication and collaboration (Lybeck et al., 2024).

The most common communication indicators measured by Eurostat are: the use of instant messaging (such as WhatsApp, Messenger, etc.) and participation in social networks (Facebook, Snapchat, etc.), as well as making phone calls and sending and receiving emails (*Database - Eurostat*, 2024). At the EU level, the percentage of people between the ages of 16 and 74 who sent or received e-mail was 80% in 2024 (Figure 1). The highest number of such people was in Finland, at 94%, and the lowest in Romania, at 44%. Participation in social networks (posting messages or other content on Facebook, X, etc.) at the EU level was 65%, with Italy 56% the least Slovakia 57%, and Denmark 90% the best (Eurostat, 2024).

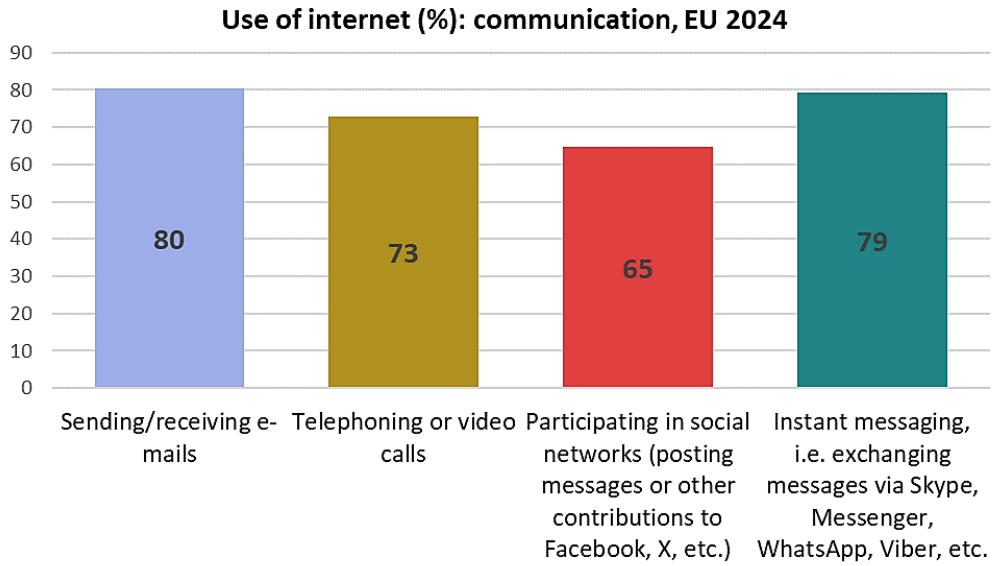

Figure 1. Percentage of individuals using the Internet for communication in the EU.
Source: own based on (*Database - Eurostat*, 2024).

2.3. Information access

Information affects all aspects of our lives, both political and economic. Therefore, access to information is of significant importance in our societies (e.g., giving or finding information about products and services, or those related to health). In the Eurostat 2024 study, 80% of people aged 16 to 74 have sent/received emails. When it comes to finding information about goods and services, the figure was 79% in the EU. The Netherlands (96%) and Denmark (94%) recorded the highest share among EU countries. The lowest share (56%) was Romania and Italy (58%).

In today's world, information is essential because it makes people's daily lives easier. In particular, the digital transformation of healthcare offers new opportunities to transform the way we receive and deliver healthcare services (seeking information and making appointments online, accessing medical records and tests online). Almost 60% of people surveyed in the EU searched for health information online in 2024, while 40% made an appointment with a doctor online. The percentage of people who accessed their health records online was 28% in 2024 in the EU (*Database - Eurostat*, 2024).

2.4. Economic transactions

A significant metric for evaluating the extent of ICT utilization within a societal context pertains to the range of online operations conducted by individuals. Transactional use splits into financial (online banking), commercial (selling goods/services), and labour‑market activities (job search). Digital payments have evolved into an indispensable service that allows consumers to make remote financial transactions. Individuals using the Internet for e-banking do online bill payments, transfers, and other bank services accessed via the web or apps. High uptake signals robust digital payment infrastructure, financial inclusion and user confidence in online security protocols (Ramayanti et al., 2024). Moreover, the practice of online shopping has become increasingly widespread among younger generations, and there has been a steady rise in its popularity among older users as well. A study by Deloitte found that 53% of the baby boomer generation prefers to shop online rather than in stationary stores (Deloitte Insights, 2018). Nevertheless, a breakthrough in the development of ICT in society seems to be indicated by the digital transformation of labor markets: online job-seeking and e-recruiting process (Alexander et al., 2019; Keppeler, Papenfuß, 2021).

In 2024, 72 % of EU adults bought or ordered online, while banking and job application rates similarly highlight the Internet's role in economic life. Online shopping continued to grow, with 75% of EU residents reporting purchases of goods or services online in 2023. The share of Internet users who bought goods or services online ranged from 54% in Bulgaria to 93% in both the Netherlands and Ireland (*Database - Eurostat*, 2024).

2.5. Civic participation

Political engagement online is measured by participation in e‑consultations or electronic voting. The impact of online media on political elections is indisputable in the current era. A significant number of individuals' opinions can be shaped, or at least influenced, by content that is disseminated online. Two indicators in the ICT survey by Eurostat address civic and political participation. The first of these is related to the political opinions expressed online via websites or social media. The second indicator is designed to measure individuals who have participated in online consultations or votes on political issues. Civic issues are matters of public concern that affect citizens and the community as a whole. Examples of civic issues include affordable housing, environmental protection, and city planning. The study of political issues encompasses the domains of governance, public policy, and the decision-making processes within a given society.

In 2024, 10% of EU individuals participated in online consultations concerning civic or political issues, while 16% expressed their opinions on such issues in the online sphere. In 2024, Slovenia and Cyprus had the highest percentage of individuals who had expressed their opinions on civic or political issues online. Specifically, 32% of individuals in Slovenia and 31% of individuals (Eurostat, 2024).

2.6. Education and digital skills

The European Declaration on Digital Rights states: "Everyone has the right to education, training and lifelong learning and should be able to acquire all basic and advanced digital skills (..)giving everyone the possibility to adjust to changes brought by the digitalization of work through up-skilling and re-skilling" (European Commission, 2025). Digital technologies have opened a new era in the domain of education by widening the horizon of possibilities in learning and teaching. E-learning is approached in the ICT survey through indicators that measure the percentage of individuals who completed an online course or who communicated with educators through digital tools (Eurostat, 2025).

In 2024, 17% of individuals aged 16-74 years had done an online course, and the same proportion interacted online with an educator or a learner. With 35%, Ireland reported the highest share of individuals having done an online course in 2024 (*Database - Eurostat*, 2024). The European Digital Compass indicates the digital goals that should be achieved by 2030, including an increase in digital skills, which 56% of adults currently have, with the aim of 80% (Eurostat, 2025; Fura et al., 2025). Digital skills (the Digital Skills Indicator) aggregate activities across five competence areas. To have at least basic overall digital skills, people must know how to do at least 1 activity in each of 5 different competence areas: information and data literacy (for example searching information online), communication (for example sending e-mails), digital content creation (for example writing programming code) safety (for example protecting personal data), problem-solving (for example installing software) (Eurostat, 2025).

In 2023, over 90% of people in the EU used the Internet at least once a week. However, only 58% had basic or above basic digital skills. Across the EU countries, the share of people with basic or above basic digital skills in 2023 was highest in the Netherlands (83%) and Finland (82%), ahead of Ireland (73%), Denmark (70%), and Czechia (69%) (Figure 2).

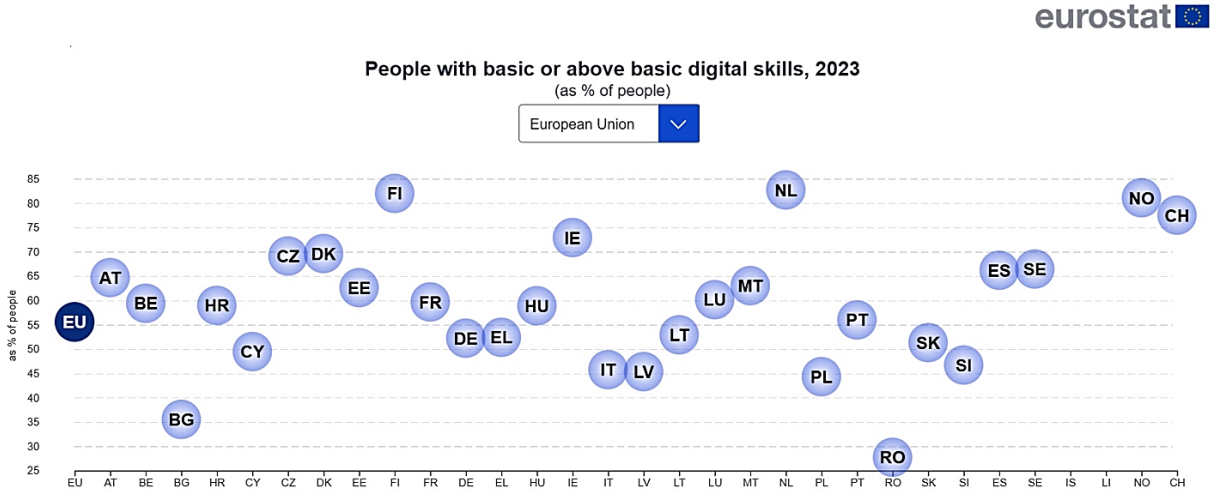

Figure 2. People with digital skills, 2023 in EU.

Source: own based on (*Database - Eurostat*, 2024).

In summary, based on a critical analysis of the literature, the following areas were considered relevant in assessing the use of ICT by individuals: access and frequency of the Internet (never used the Internet, daily access), communication (e‑mail, social networks), information access (goods/services info, health info), economic transactions (banking, selling goods/services, job applications), civic participation (online consultations/voting), education and digital skills (online courses, basic digital skills).

Despite the growing importance of artificial intelligence the authors did not include AI data in the analysis because it is currently only available to enterprises (Artificial intelligence by size class of enterprise*, Online data code:isoc_eb_ai)* not individual users.

3. Methods

3.1. Data

The article uses the values of 12 indicators (expressed as percentages) that measure the level of use of ICT by individuals in 27 countries of the EU. The indicators are as follows.

X1 – Internet use by individuals. Internet use: never.
X2 – Individuals frequently using the Internet. Frequency of Internet access: daily.
X3 – Individuals using the Internet for sending/receiving e-mails.
X4 – Individuals using the Internet for participating in social networks.
X5 – Individuals using the Internet for finding information about goods and services.
X6 – Individuals using the Internet for seeking health-related information.
X7 – Individuals using the Internet for Internet banking.
X8 – Individuals using the Internet for selling goods or services.
X9 – Individuals using the Internet for looking for a job or sending a job application (2023).
X10 – Individuals using the Internet for taking part in online consultations or voting.
X11 – Individuals using the Internet for doing an online course.
X12 – Individuals who have basic or above basic overall digital skills (2023).

The data source was the Eurostat database (*Database - Eurostat*, 2024). In the article, we used the latest statistics (for 2024) and for variables X9 and X12 for 2023. Among the variables, there are 11 stimulants (X2-X12) and 1 destimulant (X1).

3.2. Method

First, we statistically evaluated the diagnostic variables selected for the study. For this purpose, we determined the coefficient of variation. Variables for which the coefficient of variation did not exceed 10% were considered quasi-constant and were excluded from further analysis (Tarka, Olszewska, 2018). Then we used the evaluation of the correlation of variables.

For this purpose, we determined the Pearson correlation matrix and the inverse matrix. Following the established rule, which states that the main diagonal of the inverse matrix to the correlation matrix should not have values of 10 and above, we made a further selection of diagnostic variables (Młodak et al., 2016).

The values of the diagnostic variables were used to build a synthetic measure characterising the level of ICT use by individuals in the 27 EU countries. The synthetic measure was constructed using the ZUM, which is widely described in the literature (Kasprzyk, Wojnar, 2021; Kukuła, Bogocz, 2014; Stec, Grzebyk, 2024). The use of this method ensures that the synthetic measure values are in the range [0,1]. The closer the measurement values are to 1, the better the situation of the assessed object.

Based on the value of the synthetic measure, we created a ranking of countries and divided them into groups of countries similar in terms of ICT use by individuals in the countries studied. To distinguish groups of countries we applied the arithmetic mean and standard deviation of the synthetic measure values (Grzebyk, Stec, 2023; Kryk, Guzowska, 2023).

4. Results and discussion

We begin the presentation of the results with descriptive statistics of the variables analyzed (Table 1).

Table 1.
Descriptive statistics

Statistics	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Max	13.54	98.3	97.57	90.02	96.28	82.28	97.76	42.96	35.77	16.72	35.18	82.7
Min	0.35	78.79	44.12	55.96	56.28	31.53	27.72	6.32	5.74	5.63	3.17	27.73
Mean	5.34	88.72	80.23	70.4	78.64	60.38	71.68	22.69	17.27	10.77	17.87	57.63
CV	0.62	0.06	0.15	0.12	0.13	0.19	0.24	0.37	0.46	0.30	0.43	0.22

Max – maximum, Min – minimum, CV – coefficient of variability.

Source: own study.

The highest level of variability was observed for variable X1, and the lowest for variable X2. Variable X2 did not meet the condition of a sufficient level of variability. Therefore, it was removed from further analysis.

The correlation of the variables was further assessed. The highest correlation with the other variables was observed for variables X3 and X12. The variable X3 was first removed and then the variable X12. After their removal, the correlation and inverse correlation matrices were shown in Tables 2 and Table 3.

Table 2.
Correlation matrix

	X1	X4	X5	X6	X7	X8	X9	X10	X11
X1	1.00	-0.39	-0.48	-0.48	-0.61	-0.49	-0.44	-0.21	-0.56
X4	—	1.00	0.58	0.43	0.43	0.14	0.35	0.18	0.19
X5	—	—	1.00	0.87	0.82	0.55	0.58	0.15	0.66
X6	—	—	—	1.00	0.83	0.65	0.62	0.25	0.73
X7	—	—	—	—	1.00	0.63	0.59	0.43	0.69
X8	—	—	—	—	—	1.00	0.61	0.05	0.46
X9	—	—	—	—	—	—	1.00	0.38	0.63
X10	—	—	—	—	—	—	—	1.00	0.44
X11	—	—	—	—	—	—	—	—	1.00

Source: own study.

First, the presented correlation matrix confirmed the correct classification of the variables. Stimulants were positively correlated with stimulants and negatively correlated with destimulants (variable X1). The elements on the main diagonal of the inverse correlation matrix did not exceed the value of 10 (Table 3).

Table 3.
Inverse correlation matrix

	X1	X4	X5	X6	X7	X8	X9	X10	X11
X1	2.37	1.12	-1.11	-0.90	1.41	0.75	-0.24	-0.54	1.57
X4	—	2.53	-2.24	-0.43	0.58	0.95	-0.67	-0.58	1.78
X5	—	—	8.07	-2.92	-3.64	0.43	-0.31	2.07	-1.77
X6	—	—	—	6.65	-1.41	-1.43	0.15	0.12	-1.88
X7	—	—	—	—	6.71	-1.30	0.66	-2.21	0.61
X8	—	—	—	—	—	3.12	-1.46	0.77	1.06
X9	—	—	—	—	—	—	2.64	-0.66	-1.07
X10	—	—	—	—	—	—	—	2.25	-1.04
X11	—	—	—	—	—	—	—	—	4.31

Source: own study.

Based on the normalized values of the indicators (separately for stimulants and destimulant), the values of the synthetic measure were calculated. Table 4 shows the synthetic measure values and the ranking of the countries.

Table 4.
Synthetic measure values and the ranking

No.	Country	SM	Ranking	No.	Country	SM	Ranking
1	Austria	0.53	12	15	Italy	0.33	23
2	Belgium	0.56	9	16	Latvia	0.48	16
3	Bulgaria	0.18	26	17	Lithuania	0.51	15
4	Croatia	0.38	20	18	Luxembourg	0.55	11
5	Cyprus	0.56	10	19	Malta	0.61	6
6	Czechia	0.52	14	20	Netherlands	0.84	3
7	Denmark	0.86	2	21	Poland	0.25	24
8	Estonia	0.61	8	22	Portugal	0.41	17
9	Finland	0.88	1	23	Romania	0.16	27
10	France	0.24	25	24	Slovakia	0.36	21
11	Germany	0.41	18	25	Slovenia	0.38	19
12	Greece	0.34	22	26	Spain	0.61	7
13	Hungary	0.53	13	27	Sweden	0.64	5
14	Ireland	0.77	4	—	—	—	—

Source: own study.

The top three countries in the ranking were Finland, Denmark, and the Netherlands. The lowest-ranked countries were France, Bulgaria, and Romania, which ranked 25th, 26th, and 27th, respectively. The classification of countries into groups of countries similar in terms of the degree of ICT use is presented in Table 5.

Table 5.
Classification of countries

No.	Group	Countries
1	High level of ICT	Finland, Denmark, Netherlands, Ireland
2	Medium-high level of ICT	Sweden, Malta, Spain, Estonia, Belgium, Cyprus, Luxembourg, Austria, Hungary, Czechia, Lithuania
3	Medium-low level of ICT	Latvia, Portugal, Germany, Slovenia, Croatia, Slovakia, Greece, Italy
4	Low level of ICT	Poland, France, Bulgaria, Romania

Source: own study.

The group of countries with high levels of individual ICT (first group) use included Northern European countries, which had the highest stimulant values and the lowest destimulant values. The Netherlands recorded the lowest percentage of individuals who never used the Internet (0.35%, variable X1) and the highest percentage of individuals who used the Internet to send and receive emails (97.57%, variable X3). The Netherlands also had the highest proportion of individuals using the Internet for finding information about goods and services (96.28% – variable X5), the largest percentage of individuals using the Internet for seeking health-related information (82.28% – variable X6), the highest share of individuals using the Internet for selling goods or services (42.96% – variable X8). Denmark, on the other hand, recorded the highest share of individuals using the Internet for participating in social networks (90.02% – variable X4), the highest share of individuals using the Internet for Internet banking (97.76% – X7) and the highest share of individuals using the Internet for looking for a job or sending a job application (35.77% – variable X9). In contrast, the first-ranked Finland had the highest share of individuals using the Internet for taking part in online consultations or voting (16.73% – variable X10), and the fourth-ranked Ireland had the highest share of individuals using the Internet for doing an online course (35.18% – variable X11).

All countries in the first group are characterized by a high level of socio-economic development and a high quality of life for citizens. It is also worth noting that these countries belong to the so-called old EU.

There were 11 countries in the medium-high level of ICT (second group). This group included both old and new EU member countries. These countries were diverse in terms of their level of socio-economic development. They included the highly developed Luxembourg, Austria and Sweden, as well as the less developed island nations of Malta and Cyprus.

The third group, which represents individuals with a medium-low level of ICT use, also varied in terms of socio-economic development. As with group two, this group included both old and new EU member states. This group included economically strong Germany,

the backbone of the old EU. Germany's low position in the ranking was due, in part, to a lower-than-average value of variable X9 (8.08%) and variable X7 (66.92%).

The group of countries with the lowest level of ICT use by individuals (fourth group) consisted of four countries. It included France, the lowest-ranked highly developed country in the former EU, as well as three countries representing the "new" EU members: Poland, Bulgaria, and Romania. Romania, which was ranked lowest among the EU 27, had the lowest values for stimulants six times. These variables were X3 (44.12%), X5 (56.28%), X6 (31.56%), X7 (27.72%), X8 (6.32%), and X11 (3.17%). Variable X9 had the lowest value for Poland, which was classified in group one, at 5.74% and variable X4 had the lowest value for countries classified in group third, at 55.96%.

The presented research results are mostly consistent with the results examining the level of ICT usage by individuals, which is an important consideration in the field. In particular, a high level of consistency was observed concerning the leaders and countries lagging behind in ICT usage. The leaders in terms of ICT usage in Wojnar's (2020) research were: Finland, Sweden, Denmark, Estonia, Great Britain, and two Benelux countries: Luxembourg and the Netherlands (Wojnar, 2020). Conversely, Italy, Croatia, Greece, Portugal, Bulgaria, Romania and Poland were classified as the lowest. The differences in the results of the studies' comparisons resulted from different statistical methods and the time scope of the studies (2024 vs. 2017). Finland and the Netherlands are leaders in terms of the level of development of the information society. Bulgaria and Romania lag behind the most in this regard (Sarama, 2010). In 2014, Denmark, Finland, Luxembourg, and Sweden had the highest level of access to broadband Internet, while Bulgaria and Romania had the lowest (Kobylińska, 2016). Denmark, Sweden, Finland were the leaders, while the countries with the lowest rankings in terms of ICT use by enterprises were Bulgaria, Romania, Greece, and Latvia (Wieczorek, Frejtag-Mika, 2021).

5. Summary

Digital technologies are changing the world in which we live and work. They affect multiple aspects of our lives, from everyday activities such as communicating and shopping to the way businesses and public services work.

In 2024, the use of ICT by individuals in the 27 countries of the EU will continue to be high, with notable differences in digital skills and online activities (People Online in 2024, 2024) 80% of EU Internet users sent or received e-mails in 2024. 72% of EU Internet users ordered or bought services or goods online in 2024 (*Database - Eurostat*, 2024).

This study proposes applying the ZUM to assess ICT usage by individuals in the EU27 countries. The synthetic measure constructed using this method enabled a relatively straightforward evaluation of each country's level of advancement and facilitated their classification.

The analysis confirmed significant disparities among the EU27 countries in terms of ICT usage by individuals in 2024 (Eurostat, 2025). The greatest variation was observed in the use of the Internet by individuals. For instance, as many as 13.54% of individuals in Croatia had never used the Internet. Similarly high values were recorded in Greece (11.09%). In contrast, in the Netherlands, only 0.35% of individuals had never accessed the Internet. Finland, Denmark, the Netherlands, and Ireland – countries located in Northern Europe – ranked highest in the study. These countries exhibited the most favorable results across all analyzed dimensions, including access to and frequency of Internet use, communication, information access, economic transactions, civic participation, education, and digital skills.

Conversely, relatively low levels of ICT usage by individuals were recorded in Poland, France, Bulgaria, and Romania. These countries were characterized by lower Internet availability and usage frequency, limited use of the Internet for market transactions, and less engagement in online learning and skills development. Furthermore, citizens of these countries exhibited considerably lower digital skills compared to those in Northern Europe.

Countries classified in the lower-ranked groups (groups 3 and 4) included both “new” EU member states (e.g., Croatia, Slovakia, Poland, Bulgaria, Romania) and “older” member states (e.g., Greece, Italy, France).

The significant variation in the use of ICT by individual users across EU countries can be attributed to several interrelated factors:

- Digital infrastructure and Internet access: Western and Northern European countries typically have more advanced digital infrastructure, enabling higher Internet penetration and better connectivity, which promotes greater ICT use.
- Digital Skills and Education: ICT use strongly correlates with digital literacy levels. Countries with higher investments in education, particularly digital education and lifelong learning, tend to report greater individual ICT use. For example, Scandinavian countries consistently lead in digital skills indicators, while others show lower proficiency, especially among older or rural populations.
- Socioeconomic Factors: Income levels and employment structures influence ICT usage. In wealthier countries with higher GDP per capita and more knowledge-based economies, individuals are more likely to have access to digital devices and use ICT services.
- Government Policies and Digital Strategies: Countries with comprehensive national digital strategies, e-government services, and targeted digital inclusion programs show higher ICT adoption.

The findings of this study may support policymakers in designing effective development strategies in the field of ICT. They can also contribute to the implementation of targeted actions aimed at increasing ICT adoption in lagging countries, translating into an improvement in the quality of life of their citizens.

However, the presented analysis is not without limitations. One notable constraint is its static nature. Adopting a dynamic approach would allow for the observation of trends and changes over time, offering insights into the evolution of disparities among countries. Another limitation lies in the exclusive use of variables measured by Eurostat. Nevertheless, the choice was justified by the reliability, availability, and comparability of the data provided.

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