Digital skill-based centre-periphery differences in Europe, 2019

Balázs Tóth
University of Szeged, Department of Economic and Social Geography
Szeged, Hungary
E-mail: toth.balazs.geo@gmail.com

Gyula Nagy
University of Szeged, Department of Economic and Social Geography
Szeged, Hungary
E-mail:nagy.gyula.02@szte.hu

Digitalisation affects contemporary society in many respects: the economy, work, consumption, education, and even personal relationships. However, it should not be forgotten that not everyone has access to the virtual space, and that those who have are not equal in their abilities to utilise it. As a product and a means of production, in capitalism, the virtual space has an inherent function to reproduce uneven relations and deepen existing interdependencies. This study aims to present already-existing inequalities through an analysis of the socio-digital structure of European countries. First, the Central and Eastern European (CEE) region is identified as a periphery that shows further inner dividedness in terms of digital skills. Second, the study applies country-level economic and digital performance data on European Union (GDP). Third, factor analysis is conducted on all the indicators to identify those that behave similarly. Fourth, cluster analysis is performed on the same indicators to create country-based centre-periphery division alternatives.

Based on the data, the most important dividing factor is household income, which is also an entry threshold for ICT use. Meanwhile, further digital-skill development depends more on a country's economic performance, measured by the GDP. Despite low education and income requirements, many people remain excluded or cannot utilise the digital sphere, which is a key part of contemporary society, resulting in inequalities.

Keywords:
digital skill, centre-periphery, uneven development, inequality, digitalisation

Introduction

Digitalisation and the virtual sphere affect society through an organic development process. Events such as the COVID-19 pandemic, which accelerate digitalisation by changing where certain activities (work, consumption, and education) occur and social relations from the physical into the online space, restructure how work is organised and remain to be understood (Pouliakas–Branka 2020, Bacher-Hicks et al. 2021, Iivari et al. 2020, Papadopoulos et al. 2020, Quazi et al. 2020, Zsibók–Nagy 2020). The digital transition process has facilitated the digitalisation of work – both in the sense of digitalising traditional jobs and in the appearance of new digital jobs – and availability of various online services to the extent that they are effectively the same as explicitly online services. The digitalisation of social relations is also recognisable in international politics. The online or virtual space has the potential to influence democracy too, as articulated in the recent European Union (EU) democracy action plan.

The latest 2020 Action Plan published by the EU, titled the 'European Democracy Action Plan: making EU democracies stronger', focuses on the online space as a relevant factor in democratic processes (EC 2020b). The document mentions the 'Digital transformation of our democracies' and discusses digital technology, internet-based solutions, and information systems as tools for improving the integrity of elections and democratic participation. International political actors use the virtual space, especially social media platforms, as a major communication channel targeting different audiences (Stieglitz–Duang-Xuan 2014, Stier et al. 2018). However, an individual's digital-skill level (DSL) determines their ability to participate in the online world. Economic development and social processes are increasingly dependent on digital technologies, while different DSLs already contribute to the production of uneven social and centre-periphery (C-P) relations. Because the education level required for one to become an information and communications technology (ICT) user is relatively low, a primary school level can be sufficient; therefore, if the basic financial resources were available, a wide range of people could benefit from digitalisation. The problem of digital inequality is well known, while there are EU-level digitalisation directives aimed at improving the level of digitalisation and closing gender- and wealth-based digital gaps (EC 2020c, 2021).

The directives mentioned above are much needed because, even in the core EU countries, many people currently neither have internet access nor the required skills to utilise the internet, due to different social factors such as their age, education level, or disabilities (Dobransky–Hargittai 2006, Freese et al. 2006, Olatokun 2009, Scheerder et al. 2019a, 2019b). Such factors of deprivation are concentrated in Central and Eastern European (CEE) countries, which are in a peripheral position determined by their economic relations with the core EU and their connectivity to the global economy (Böröcz–Sarkar 2005). Disregarding these disadvantaged groups and

regions in policy making may increase polarisation on national and European scales, contributing to the reproduction of uneven C-P relations and increasing spatial injustices (Nagy 2021).

Although considerable research on the information society trends and developments in the digital divide has provided country-level data (EC 2015, 2018, 2020a, ITU 2018), the focus has mainly been driven by economic factors. This study examines countries' relations based on general digital factors and those that are not correlated with changes in the economy. This study hypothesises that the EU is digitally divided, and that CEE countries form a distinct group in terms of digital skills (DSs). The study aims to highlight the manifoldness and granularity of the traditional C-P models, and to underpin the claim that digitalisation and participation in the global virtual space (using online tools, the internet, and possessing DSs) reproduce and modify these relations. The study redraws the C-P map of Europe and shows the differences within the CEE countries.

To comprehend the levels of access and knowledge required to utilise the digital sphere, the study analyses different dimensions of the digitalisation of European countries and their C-P relations along DS dimensions. To answer the research questions, data on people's daily internet access and DSLs in the contexts of settlement type, household income, and education level are used instead of the more often applied, static, internet access data. The main research questions of the study are the following:

1. Do the CEE countries differ from the Western European countries in terms of digital skill structure (DSS)?
2. What socio-digital dimensions can be used to obtain a better understanding of their digital differences?
3. Are there further distinguishable groups amongst the CEE countries based on their socio-digital structures?

The next section begins with a short presentation of the theory of digitalisation and its connection to the C-P relations in Europe. The section that follows presents the datasets used, their limitations, and the methods applied. This is followed by the results section, which is divided into four parts: First, the selected EU countries are classified based on the gross domestic product (GDP) per capita values, and the process repeated for only the CEE countries. Second, the GDP component value is compared to daily internet access and the DS indicator to determine the digital dimensions that are connected to the economic-performance indicator. This is because indicators that are not linked to economic performance can provide more information on the DSS-based C-P relations. Third, the countries are classified based on different aspects of socio-digital skill indicators to obtain a better understanding of the actual number of people with different DSLs, while the number of people who are not in the virtual space in each country are calculated. Countries are classified by specific aspects of DSs (levels of education and income as well as settlement type) to

gain a deep insight into the DSS. Fourth, to explore the DS and social context indexes that behave similarly, a factor analysis of the DS indexes is performed. The final section of the paper summarises the findings and raises new research questions that could improve our knowledge of the digital dividedness of the EU.

Theoretical background

The dividing power of digitalisation

Digitalisation has an increasingly important role in the development of the contemporary, capitalist, information society and consequently the C-P relations. The virtual space as understood refers to the extension of traditional physical and social spaces, including a parallel sphere with independent dynamics existing on the interconnected ICT devices of the world, with hard connection requirements and soft-use value prerequisites (such as skill and connection speed). The virtual space as a product of capitalism – which is expanding in parallel with digitalisation – is thought to be fundamental in the production of social space. The presence of a virtual space as a product and a means of production on micro and macro scales predetermines its role in increasing spatial and social inequalities; therefore, it is crucial to have a better understanding of its users.

Digitisation is a process in which everything that was previously done and stored on an analogue system is now done and stored on digital ICT devices. Digitalisation is a broader term for performing tasks by digital technologies in ways that are not possible using an analogue process (Brennen–Kreiss 2016). Contemporary digitalisation is the expansion of digital technology in every aspect of social relations, moving towards a homogenous information society (Budai–Tózsa 2020, Castells 2009, Kincsei 2007, Zuti 2018). Digitalisation is embedded in everyday life, and affects the social relations through which people reproduce themselves (Castells 2009, Dudás et. al. 2018, Lefebvre 1991), as well as the science that is the foundation of a conceptual production of space (Jakobi 2019, Ságvári 2019). Internet access was even declared a human right by the United Nations in 2016 (Barry 2020). In addition to a micro or personal scale, digitalisation influences macro structures, the organisation of the global economy, and production, and consequently the C-P relations (UNCTAD 2018). The virtual space itself is a space of global capitalism (Turner 2006), and is essential both in the management and in the reproduction of capitalism (Bánhidi et al. 2020, Greene–Joseph 2015); it is also important in the organisation of the global, capitalist, accumulation processes through the global division of labour, the networked organisation of work, and making possible flexible ways of remote, part-time, or freelance work (Nagy et al. 2015). Thus, on the one hand, digitalisation has a homogenising effect, providing a macro-level platform for people. On the other hand, the quality of ICT supply and infrastructure is distributed unequally, since it is provided by profit-oriented private companies; thus, it will maintain the spatial

inequalities that are necessary for the reproduction of capitalism – for example, in the form of different levels of competitiveness of cities and regions (Bánhidi et al. 2020, Páger–Zsibók 2014).

C-P relations can be approached through digitalisation from two main perspectives. The first one is structural advantage, since actors from central countries are dominant in the construction of the digital space (digital systems, ICT research and development, platforms, digital common sense, and global cultural elements) and infrastructure (Fuchs 2018). The second is the readiness of the user base (digital literacy, innovation adaptation, and production capabilities) (Lupač 2018, UNCTAD 2018).

The internet could be a source of global emancipation (Castells 1996), and could reduce social and territorial inequalities; it should be used as a tool to act against misinformation and improve the quality of everyday life and human reproduction (Lefebvre 1991) through online access to information and services. However, with the growth of user-generated content based on WEB 2.0 platforms, there is a wide variety of uncurated content around which people can form international groups in the space of flows (Castells 1996). The large number of gathered people, in interaction with social media dynamics (Bapaye–Bapaye 2021, Gallifors–Furnham 2017, Rampersad–Althiybai 2020), can create opinion bubbles through their dialectic relationship with the platforms' algorithms, which only focuses on generating traffic (Nikolov et al. 2015, Seargeant–Tagg 2019, White–Boatwright 2020). Opinion bubbles based on false information can catalyse extreme situations such as protests or environmental damage (Groshek–Koc-Michalska 2017, Sindermann et al. 2020, Spohr 2017, Williams et al. 2015).

Due to the exponentially increasing prevalence of the digital sphere, the ability to use ICT will have a greater effect on social relations (Jakobi 2004), which can be captured by indicators of the connectivity prerequisites, internet-use habits, human-knowledge capital, integration of digital services, and availability and quality of digital public services (EC 2020a, Rosina–Hurbánek 2013, Tóth 2019). Although the EU has an action plan, the target contemplated in the plan is that 70% of those aged between 16 and 74 years should have at least basic DSs by 2025 (EC 2020c). This is likely to be distorted by lower rates among the older people and possibly lower rates in poorer countries and among disadvantaged social groups. Those who do not possess sufficient knowledge or devices and those places which lack the necessary infrastructure become even more disadvantaged (Budai–Tózsa 2020, Foth et al. 2015, Rosina–Hurbánek 2013, UNCTAD 2018). Therefore, the digital divide should be measured (van Dijk 2020) and studied in depth to understand its consequences in the rapidly changing, digital mode of capital accumulation and social relations (Fuchs 2020, Hudson 2016, Peck 2017). Additionally, there should be more emphasis on digitalisation in the discourse on uneven development and C-P relations.

C-P relations in Europe

Regional differences and C-P relations depend on various factors. Uneven development is affected by geographical location, accessibility, and historical development of urban functions. Geographical space and spatial inequalities also affect digitalism, communication, and the means of (im)mobility; accessibility exaggerates the struggle for power over space (Swyngedouw 1993). However, accessibility has also gained a new meaning with digitalisation: digital knowledge and access to and accessibility of digital infrastructure (Partridge et al. 2008). Therefore, there is an even greater need to understand spatial structures and the associated factors.

The spatial focus of this study is the EU, which is a heterogeneous organisation, both economically and socially, that creates uneven relations that affect the digitalisation process, which in turn produces new dependencies (Nagy–Timár 2017, Pogátsa–Fábián 2016). Based on the results of previous C-P studies, the periphery in the EU comprises CEE post-socialist countries (Bulgaria, Czechia, Croatia, Estonia, Poland, Latvia, Lithuania, Hungary, Romania, Slovakia, and Slovenia) and the European South, while the rest of the member states are considered as part of the core (Bohle–Greskovits 2007, Böröcz–Sarkar 2005, Müller-Frączek 2019).

Figure 1

The centre-periphery and transition alternatives in Europe according to Bohle and Greskovits, 2019

Post-socialist countries share the common historical element of state socialism, which entailed common structural problems (e.g. dependence on capital flows form core economies) and socio-cultural characteristics (Bodor et al. 2014). Bohle–Greskovits (2007) identified three models of transition (Figure 1): (A) the Baltic states,

which represented the most radical shift from state socialism and a rapid neo-liberalisation model of national economies; (B) the Visegrád countries relying on an 'embedded' neoliberal transition, i.e. compromises between marketisation and protectionist approaches; and (C) Slovenia, which entered a neo-corporatist transition that rested on an institutionalised balance between market-oriented and protectionist practice.

Following the incorporation of CEE economies into the global economy and European institutional structures, inequalities persisted, while new dimensions of unevenness were produced (Lang 2015, Ehrlich et al. 2012).

Further major differentiation continued after the 2008 global economic crisis, since there were no European-level crisis management strategies, while the national states acted as key agents for addressing social conflicts and economic recovery (Kocziszky et al. 2018, Vágh 2013). Since then, the paths and policies have entailed different development trajectories (Müller-Frączek 2019). However, the CEE economies' structural position as a semi-periphery in the global capitalist system remained, manifesting in their dependence on the global central countries (Gagyi et al. 2019). The EU founder countries and Denmark are in a dominant position due to the benefits of their colonialist history and role in global power relations, while the states that joined the EU after 1973 were predetermined to be the periphery (Böröcz–Sarkar 2005).

As described in the introduction, digitalisation is an important factor in countries' future development; thus, in the following, I present an examination of the socio-spatial differences in daily internet use and DS in Europe to corroborate the above hypothesis and highlight the C-P differentiation due to digitalisation. Countries can be classified by the level of digital divide based on people's readiness to participate in the online world, in which a good-quality, primary-level education has a key role (Alhendi et al. 2021) in subsequently determining the capacity of national economies to provide higher-quality digital jobs. According to this study's hypothesis, the digital divide is interrelated with the economic C-P relations. The digitalisation within the EU is dependent on the movement of capital, which is driven by the core countries' and ICT companies' investments in the peripheries (Nagy–Timár 2017, Páthy 2017, Salemink et al. 2015). If a peripheral country does not attract sufficient foreign investment, or does not pay specific attention to encouraging digitalisation, the digital divide will be great. The study measures the digital divide on two scales to highlight the inner structural differences: the C-P and within-the-periphery scales.

Data and methodology

A quantitative analysis of international statistical data is suitable for comparing countries in terms of economic performance through GDP data and nations' DSS in three social dimensions. To understand the concept of a digital divide and measure it,

Hilbert (2011) defines four key focuses: first, who the users are (individuals, organisations, communities, etc.); second, the users' characteristics (income, education, public or private organisation, urban, rural, etc.); third, how the subjects use ICT (access, skills, usage, etc.); and fourth, the type of technology they use (computer, internet, smartphone, digital TV, etc.). This study mainly focuses on the second and third points. Individuals' aggregated data are analysed based on some indicators in the Digital Economy and Society Index (DESI) (EC 2018) analysis methodology and following many previous studies (Bánhidi et al. 2020, EC 2015, Mirke et al. 2019, Nagy–Veresné Somosi 2022). To describe the DSS, DSL and daily internet access data on three aspects are used: income quartiles, education level, and settlement type. The available DSL data have limitations, and can be misleading in this generalised form because the DSL categories are close to each other, without practical boundaries.

The study is based on data from Eurostat (Eurostat, 2019a, 2019b, 2019c, 2019d). To describe the countries' economic situations, the analysis contains data from a long period (2000–2018) of GDP (in euro per inhabitant). Regarding digitalisation data, the most recent 2019 dataset available for each country is applied. The share of non-internet users from 2011 to 2019 is used to include national development paths. A considerable amount of data on Ireland and France is missing; thus these countries are excluded. Due to their distorting effects, Cyprus and Malta are also excluded. Italy and the United Kingdom are excluded in certain calculations due to missing data, and this is mentioned in the applicable cases.

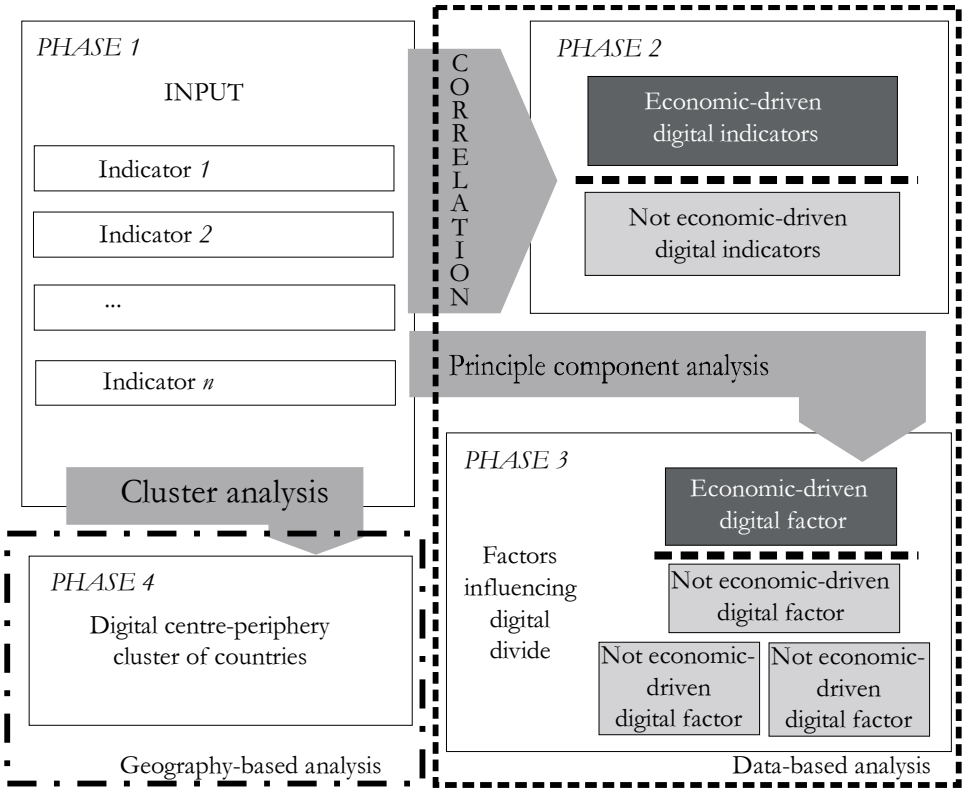
As Step zero, to present the traditional European C-P relations, the GDP data are analysed. A GDP performance index is created using principal component analysis based on 2000–2018 GDP data (Jokubaitis et al. 2021). The GDP data are values of the net GDP per capita in euros. To classify the countries, hierarchical clustering is conducted based on the factors created using the Ward linkage method; however, every clustering method yields almost the same results. Based on the same method, the CEE countries are also clustered to isolate the post-socialist countries with different paths.

In the first phase (Figure 2), a decision had to be made on which data to use to present the countries' C-P relations. A DS data analysis is performed based on the DSLs of groups with different social backgrounds, with a special focus on disadvantaged groups. Pursuant to the focus of the study, data on daily internet access (as an indicator of the possibility of constant internet use) and people's DSLs in the contexts of settlement type, household income, and education level (as indicators of their levels of DSs) are used. The income data are divided into quartiles, ranking them from poorest to wealthiest (1 being the poorest and 4 the wealthiest), with each quartile containing approximately 25% of the population. Eurostat defines the DS income basic levels. The overall DSs relate to five skill areas: information and data literacy, communication and collaboration, digital-content creation, safety, and

problem-solving. To have at least the basic overall DSs, people must know how to perform at least one activity related to each area.

Figure 2

The methodological approach



In the second phase, to determine the digital indexes that are related to the previously (Step zero) calculated GDP performance, a two-tailed Pearson's correlation analysis is performed on the data representing DSs and internet access. To highlight the connections, a correlation matrix is drawn between the different indicators. Two groups of indicators are defined: those that are correlated (average above 0.7) with the GDP performance index and those that are not. The former group is considered to represent the economic-driven digital indicators, while the latter group comprises the non-economic-driven digital indicators, since the digital divide is influenced by economic conditions and other social features.

In the third phase, to determine the internal correlations in the digital data, data reduction through principal component analysis is conducted to create a component including DSL and daily internet access data in different social aspects. The factors are created by their component value, which must be at least +/–0.6, the Eigenvalue, which should exceed 1, and the extraction value, which must be at least 0.25. To

understand why and how the countries group up by digital indicators (including internet use and DSL), five factors are created. During the principal component analysis, many variables are reduced into fewer numbers of factors that correlate, while their component values form their factor scores. For Factor No. 5, with low communality, component values with low similarity are excluded. Despite the general rule of principal component analysis that suggests that more than two indicators be included in a factor, we consider Factors No. 3 and No. 4 due to their importance in understanding education and income differences. The non-GDP-correlating aspects of DSL are used later to unveil differences in the countries' digitalisation. In an additional step, the number of people on different DSLs and number of those who are at risk of DS deprivation (have not used the internet in the last 3 months) are calculated for each country to obtain a better understanding of the digital division. Population data from 2019 are used to quantify DSL percentage values. The fourth phase of the methodology calculations focuses on the hierarchical clusters formed using the Ward linkage method, based on the DSL in respect of social indexes (Ogasawara–Kon 2020). The clustering method (Ahlborn–Wortmann 2018) minimises the total within-cluster variance, resulting in coherent clusters stratified in different social dimensions. The different clustering is conducted to understand the similarities and differences in specific groups' DSSs in each country. Figure 3 contains all the aspects used; later, in Table 6, separate clusters are presented. Last, the DSLs of the most disadvantaged social groups are separately analysed.

Analysis and results

GDP-based territorial differences in the EU

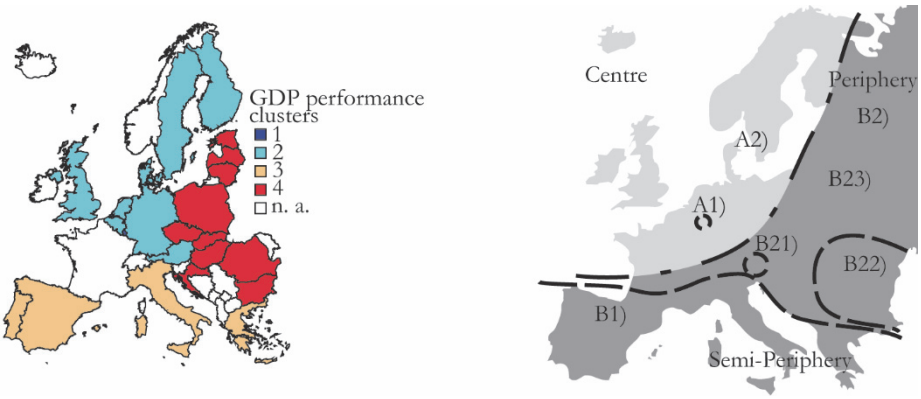
GDP is a commonly used index to measure development in separate central and peripheral regions (Lengyel–Kotosz 2018, Nemes Nagy–Tagai 2011). The cluster analysis of the GDP performance index forms two main clusters, which reflects the traditional C-P division in the EU. One of the clusters contains the core countries, which can be divided into two sub clusters. The richest, Luxemburg, creates a single-member sub-cluster (1, A1), while the second sub-cluster comprises Austria, Belgium, Denmark, Finland, Germany, Netherlands, Sweden, and the United Kingdom (2, A2). The second cluster is the periphery, which is also twofold: the first sub-cluster is the 'south' (3, B1), comprising Greece, Italy, Portugal, Spain, and Slovenia, while the second sub-cluster of the periphery (4, B2) comprises the rest of the CEE region – Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia.

In a separate classification of the CEE region, three sub-clusters are distinguished. Slovenia creates a single-member group (B21), which is the best performing country in terms of GDP, while Bulgaria and Romania create another group (B22), which is the worst performing group. The most diverse groups, in order of their 2018 GDP

per capita performance (B23), are as follows: Estonia, Czechia, Lithuania, Latvia, Hungary, Poland, Croatia, Romania, and Bulgaria (Figure 3).

Figure 3

The centre-periphery in Europe according to GDP performance, 2019



Notes: 1 – Centre-top, 2 – Centre, 3 – Southern periphery, 4 – CEE periphery, n.a. – not analysed.
Source: Edited by the authors, based on Eurostat (2019c) data.

The resulting clusters are representations of the different trajectories along which the CEE countries have developed. Economic performance is an important factor of development, including the process of digitalisation; however, it does not determine it. To obtain a better understanding of digitalisation, the next section examines socio-digital indexes.

Connections of digital indexes to GDP performances

The indexes that are not correlated with GDP performance relate to other dimensions of digitalisation, and unveil the effects of other factors. In this section, Italy and the United Kingdom are excluded because of a lack of household income-related data. Of the 44 indexes, 30 show medium ($0.5<r<0.7$) and strong correlation ($r<0.7$) (Table 1.) with the GDP data. In this analysis, medium and negative correlations are included because of their additional information on the relationship between GDP performance and DSS. The indexes that are not included in the following tables are not significantly correlated with GDP.

In the first group, the GDP performance index shows the highest correlation with the daily internet-access indexes of people with low or medium income, those with medium and high levels of education, and people living in rural and suburban settlements (Table 1). Daily internet access in the first two income quartiles is sensitive to GDP change; thus, its decrease carries a likelihood of digital polarisation.

The next-highest correlations of daily access are with indexes that represent people living in cities, third income-quartile households, and poorly educated people, whose daily internet use depends on other factors. The fourth income quartile, and thus the

upper class, only correlates at the level of 0.551. This suggests that the number of rich people who use the internet daily is not tied closely to GDP performance; they can connect to the internet despite a lower national GDP performance.

Table 1

Connection between daily internet access and GDP performance among different social groups* in Europe

Individuals' daily internet access… (2019, %)	Correlation of daily internet access rate and GDP/capita (Euro per inhabitant 2000–2018)
living in a household with income in first quartile	0.778
with medium formal education	0.731
living in towns and suburbs	0.729
living in a household with income in second quartile	0.725
living in rural areas	0.713
with high formal education	0.713
living in cities	0.690
living in a household with income in third quartile	0.641
with no or low formal education	0.628
living in a household with income in fourth quartile	0.551

* Cyprus, Malta, Ireland, France, Italy, and the United Kingdom are excluded.
Source: Edited by the authors, based on Eurostat (2019a, 2019c) data.

Table 2

Connection between digital-skill level and GDP performance stratified by income quartile* in Europe

Individuals living in a household with income in… (2019, %)	Correlation of income-based digital skill level rate and GDP/capita (Euro per inhabitant 2000–2018)
first quartile with above-basic overall DSL	0.709
second quartile with basic overall DSL	0.681
first quartile with basic overall DSL	0.679
third quartile with above-basic overall DSL	0.677
second quartile with above-basic overall DSL	0.608
third quartile with low overall DSL	–0.595
fourth quartile with above-basic overall DSL	–0.580
fourth quartile with low overall DSL	–0.534

* Cyprus, Malta, Ireland, France, Italy, and the United Kingdom are excluded.
Source: Edited by the authors, based on Eurostat (2019a, 2019c) data.

In terms of income-based DSL (Table 2), the proportion of people with above-basic and basic DSLs in the first two income quartiles, and that of those with above-basic DSs in the third income quartile correlate with GDP performance. The fourth income quartile, as in the case of daily internet access, only correlates at a moderate level of 0.580. However, the low DSL only appears in the case of the upper income half, with a negative correlation. This means that the higher a country's GDP, the

fewer the wealthy people who have a low DSL. The correlations show that active use of the internet, and at least basic DSs in the first three income quartile can improve quickly if a country has a higher GDP level. A decreases in a low DSL can indicate the same process of migration to a higher DSL.

The highest correlation between GDP and settlement type (Table 3) is observed in the data on people with above-basic DSLs living in rural areas and cities. This correlation may be due to the process of urbanisation and a lower level of digitalisation in rural areas (Tóth–Papp 2020). People with higher DSLs are concentrated in the cities due to better education, high-quality jobs, functions, services, and capital (Bontje et al. 2013, Pénzes et al. 2018). Meanwhile, in economically better-performing countries, rural areas are also more developed; thus, they will have more people on above-basic DSLs too, due to more equal education, infrastructure, and job opportunities.

Table 3

Connection between digital-skill level and GDP performance stratified by type of habitat* in Europe

Individuals living in… (2019, %)	Correlation of settlement type-based digital-skill level rate and GDP/capita (Euro per inhabitant 2000–2018)
rural areas with above-basic overall DSL	0.695
cities with above-basic overall DSL	0.683
rural areas with basic overall DSL	0.610
towns and suburbs with above-basic overall DSL	0.603

* Cyprus, Malta, Ireland, France, Italy, and the United Kingdom are excluded.
Source: Edited by the authors, based on Eurostat (2019a, 2019c) data.

Table 4

Connection between digital-skill level and GDP performance stratified by education level* in Europe

Individual with … level of formal education (2019)	Correlation to GDP/capita (Euro per inhabitant 2000–2018)
Medium formal education with above-basic overall DSL	0.635
Medium formal education with basic overall DSL	0.606
No or low formal education with low overall DSL	0.601
No or low formal education with basic overall DSL	0.576
High formal education with above-basic overall DSL	0.568
Medium formal education with low overall DSL	–0.567

* Cyprus, Malta, Ireland, France, Italy, and the United Kingdom are excluded.
Source: Edited by the authors, based on Eurostat (2019a, 2019c) data.

GDP performance correlates with education-based DSL indexes only on a moderate level (Table 4), which indicates a similar trend to that with the income-based correlation. The better a country's economic performance, the more the people with higher education levels will have at least a basic DSL. Moreover, uneducated people

are also more likely to have at least a low DSL or even higher. However, unlike in the case of income, here, the lowest education group paired with a low DSL has a medium level of correlation, which means that an improvement in GDP means more of the least educated people becoming low- or even basic-level ICT users. This indicates that national economic performance is not the first determining factor for the lowest social groups to become ICT users.

Joint analysis of daily internet access and DS data

The first step in understanding why the countries group up in the manner above is to conduct principal component analysis on the DSL indexes. Five factors are formed, representing social groups described by similarly-changing DSL variables (Table 5). The fifth factor is irrelevant and not considered for analysis due to the low correlation of its components. Italy and the United Kingdom are excluded from this part due to missing data.

The first factor is described on a high positive level by indexes of people with good DSLs, those with good DSLs despite their lower-class social backgrounds, and those with good DSLs by every settlement type. The digitalisation of those represented by this factor – where the share of people in most of the basic and above-basic DSLs is higher and the share of those on low DSLs is lower because they developed to higher DSLs – may be driven by national economic performance and represents the main-stream trend of global digitalisation. Socially marginalised groups (first income quartile and those with low levels of education) are excluded from this mainstream process of DS development from low DSLs.

The second factor is described by data relating to wealthier and more educated people with basic and low DSLs. People in this group are possibly on lower DSLs than their social backgrounds suggest. This group possibly comprises the combined group of working, middle-aged or old middle classes, who require some DSs.

The third factor is described by indexes representing people with low DSLs who live mainly in rural areas and have no or low formal education. This indicates a difference in the digitalisation process at low DSLs between the poorer and wealthier halves of populations. The first factor shows that on higher DSLs the data on income groups change in correlation with GDP performance. These groups are less likely to become ICT users on their own, and are usually dependent on national redistribution policies (social benefits, better public education, and encouraging digitalisation) (Lupač 2018).

The fourth factor defines people with medium or high formal education who have low DSLs. This indicates a specific process in which people who are well educated learn informatics to high levels but remain on low DSLs. This factor indicates that the required educational-entry threshold for participating in the virtual space is low, and indeed lower than the threshold for personal income because ICT is inclusive and relatively cheap.

Table 5

Created principal components and their values, in Europe

Individuals… (2019)	Component value	Factors
living in towns and suburbs who have basic overall DS	0.425	1
who have basic overall DS	0.428	
with medium formal education who have basic overall DS	0.508	
with daily internet access living in a household with income in fourth quartile	0.538	
living in rural areas who have basic overall DS	0.633	
with daily internet access living in a household with income in third quartile	0.642	
with daily internet access with high formal education	0.679	
with no or low formal education who have basic overall DS	0.681	
with daily internet access with medium formal education	0.685	
with high formal education who have above-basic overall DS	0.690	
living in a household with income in first quartile who have basic overall DS	0.707	
living in a household with income in second quartile who have basic overall DS	0.711	
with medium formal education who have above-basic overall DS	0.715	
with no or low formal education who have above-basic overall DS	0.770	
with daily internet access living in a household with income in second quartile	0.771	
living in a household with income in fourth quartile who have above-basic overall DS	0.800	
living in towns and suburbs who have above-basic overall DS	0.802	
with daily internet access living in rural areas	0.811	
with daily internet access living in towns and suburbs	0.813	
living in rural areas who have above-basic overall DS	0.828	
with daily internet access	0.839	
living in a household with income in second quartile who have above-basic overall DS	0.842	
with daily internet access living in a household with income in first quartile	0.843	
living in a household with income in first quartile who have above-basic overall DS	0.845	
with daily internet access with no or low formal education	0.848	
living in a household with income in third quartile who have above-basic overall DS	0.850	
who have above-basic overall DS	0.857	
with daily internet access living in cities	0.880	
living in cities who have above-basic overall DS	0.902	
with high formal education who have basic overall DS	0.315	2
living in a household with income in fourth quartile who have low overall	0.579	
living in a household with income in third quartile who have low overall DS	0.704	
living in a household with income in third quartile who have basic overall DS	0.713	
with daily internet access living in a household with income in third quartile	0.742	
living in a household with income in first quartile who have low overall DS	0.764	
living in a household with income in second quartile who have low overall DS	0.798	
living in a household with income in fourth quartile who have basic overall DS	0.800	
with daily internet access of living in a household with income in fourth quartile	0.805	
living in cities who have low overall DS	0.386	3
who have low overall DS	0.484	
living in towns and suburbs who have low overall DS	0.488	
living in rural areas who have low overall DS	0.492	
with no or low formal education who have low overall DS	0.502	
with medium formal education who have low overall DS	0.489	4
with high formal education who have low overall DS	0.481	

Source: Edited by the authors, based on Eurostat (2019a) data.

The defining indexes for the factors described above group up by specific combinations of DSL and social features. Settlement type, since it does not define a factor, is less important, possibly due to the socio-economic characteristics of settlement. The general trend in global digitalisation, which is driven by national economic development, is indicated by the above-basic DSL in almost every respect. The development process for people with low DSLs and income and education levels is different from that for the mainstream. Moreover, there are people whose DSLs are not driven by their relatively good social backgrounds, but by the general need to participate in the digital sphere to some extent. Presumably, after meeting the requirements for the basic costs of living and necessary knowledge to participate in ICT, the DSL possibly depends more on personal interest, evident benefit, necessity, or mainstream consumption patterns (Ahn–Jung 2016, NMHH 2021). Cyberspace inequalities amplify inherited inequalities: Poor or lower educated people with less stable economic backgrounds can be burdened by the digital divide.

C-P cluster variations, the unequal distribution of DSL

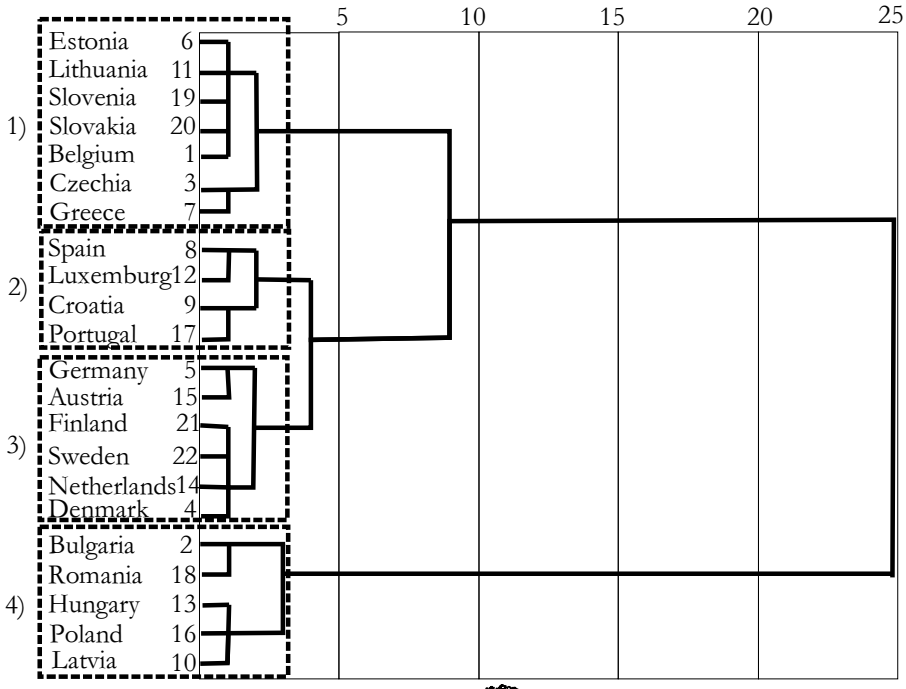
After exploring the connections among the digital indexes and GDP performance as a commonly used indicator of C-P relations, the first step is to understand the spatial patterns of digitalisation. Clusters are formed based on every DSL in every social context, for each country (Figure 4). The digital periphery group is smaller, comprising only five countries. The southern periphery blends the CEE middle and top performers with the lower tier of the core European countries. The most developed core countries are also distinct. In the following sections, I present a separate analysis of the DS data to understand the differences between the clusters.

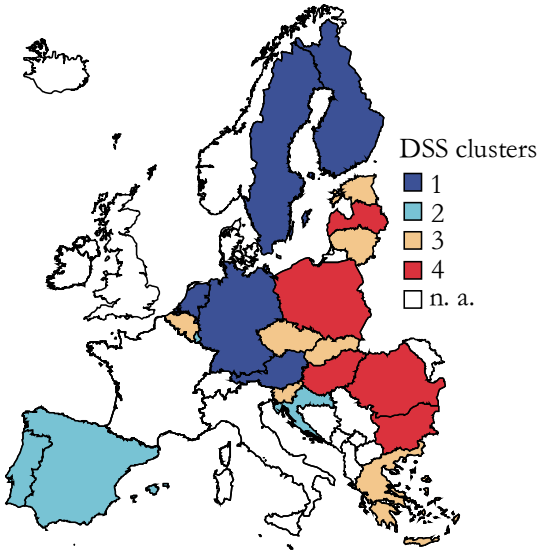
Before the cluster analysis of the DSS, it is important to determine how many people are represented by the DSL percentages. In 2019, there were approximately 70 577 000 people in the EU who were excluded from the online world (did not use the internet in three months). Moreover, 1-3% of each country's population should be considered to not have had any DS – based on survey results – and approximately 144 165 000 people to have been on low DSLs. Most of the 214.7 million (34.8% of the population of Europe) people live in Romania, Italy, France, Germany, Poland, Spain, and the United Kingdom (Eurostat 2019a, 2019b, 2019d). These numbers are extremely high, especially against the backdrop of dominant narratives on the rapid and overall digitalisation of the world (Fuchs 2010).

Figure 4

Digital-skill structure in Europe, 2019

(Cluster analysis based on DSL shares on different education levels, household-income quartiles, and settlement type using the Ward Linkage Dendrogram)





Notes: 1 – Centre-top, 2 – Centre, 3 – Southern periphery, 4 – CEE periphery, n.a. – not analysed.
Source: Edited by the authors, based on Eurostat (2019a) data.

As previously discussed, the DSL dimensions do not match the GDP-based C-P division, while there is no exact borderline in the digital C-P division: The different DSL and social-factor aspects often redraw the border. The clusters in Table 6 (based on daily internet use, DSL, income, education, and settlement type) help us to understand how the countries relate to one another in different aspects. The columns represent the sub-groups, displayed by the dendrograms, during the cluster analysis process, while the displayed percentages are the average percentages of the data on the countries for certain features during the time period examined, which were also used in the cluster analysis process. The following figures are based on the cluster division in Table 6; each case represents the average values for the given DSL and social aspect.

Table 6

The centre-periphery divisions of Europe based on the indicated aspects of digital skills

(%)

Periphery			Centre	
Never used internet, 2011–2019				
Bulgaria (35)	Croatia (27)	Hungary (21)	Austria (14)	Denmark (3)
Greece (32)	Italy (28)	Latvia (19)	Belgium (12)	Finland (5)
Romania (35)	Lithuania (24)	Slovenia (15)	Czechia (15)	Luxemburg (4)
	Poland (25)	Spain (19)	Estonia (12)	Netherlands (5)
	Portugalia (29)		Germany (10)	Sweden (4)
			Slovakia (15)	United Kingdom (6)
Low digital skills, 2019				
Latvia (42)	Bulgaria (38)	Belgium (29)	Croatia (26)	Austria (21)
Romania (43)	Poland (35)	Denmark (27)	Czechia (24)	Finland (19)
		Estonia (28)	Greece (24)	Germany (22)
		Hungary (31)	Lithuania (25)	Netherlands (16)
		Italy (32)	Sweden (24)	Portugalia (22)
		Luxemburg (30)		United Kingdom (20)
		Slovenia (28)		
		Slovakia (29)		
		Spain (31)		
Basic digital skills, 2019				
Denmark (21)	Lithuania (24)	Estonia (25)	Luxemburg (29)	Czechia (36)
Spain (21)	Slovenia (24)	Austria (26)	Netherlands (30)	
Romania (21)	Hungary (23)	Finland (26)	Germany (31)	
Bulgaria (18)	Poland (23)	Sweden (26)		
Croatia (18)		United Kingdom (25)		
Italy (19)		Belgium (27)		
Latvia (19)		Greece (27)		
Portugalia (20)		Slovakia (27)		

(Table continues on the next page.)

(Continued.)

(%)

Periphery			Centre		
Above basic digital skills, 2019					
Bulgaria (11) Romania (10)	Czechia (26) Slovakia (27) Italy (22) Poland (21) Latvia (24) Hungary (25) Greece (23)	Lithuania (32) Portugalia (32) Slovenia (31) Germany (39) Austria (39) Belgium (34) Croatia (35) Spain (36) Luxemburg (36) Estonia (37)	Denmark (49) United Kingdom (49) Netherlands (50) Finland (50) Sweden (46)		
Digital skills by settlement type, 2019					
Bulgaria (22) Romania (25)	Hungary (27) Italy (24) Latvia (28) Poland (26)	Czechia (29) Greece (24)	Belgium (30) Croatia (27) Estonia (30) Lithuania (27) Portugalia (24) Slovakia (28) Slovenia (28) Spain (29)	Austria (29) Germany (31) Luxemburg (32)	Denmark (32) Finland (32) Netherlands (32) Sweden (32) United Kingdom (31)
Digital skills by education level, 2019					
Bulgaria (22) Latvia (27) Poland (26) Romania (25)	Greece (25) Hungary (26) Italy (26)	Czechia (28) Estonia (30) Lithuania (26) Slovakia (26) Slovenia (27)	Croatia (25) Portugalia (27) United Kingdom (28)	Belgium (30) Luxemburg (32) Spain (30)	Austria (28) Denmark (32) Finland (31) Germany (31) Netherlands (32) Sweden (32)
Digital skills by income quartile, 2019					
	Bulgaria (20) Hungary (21) Latvia (27) Poland (26) Romania (23)	Czechia (27) Greece (25) Slovakia (27)	Belgium (29) Estonia (29) Lithuania (27) Portugalia (23) Slovenia (27) Spain (30)	Austria (29) Denmark (32) Germany (30) Netherlands (32)	Croatia (29) Finland (32) Luxemburg (32) Sweden (33)
Digital skills by no or low education and first income quartile, 2019					
	Bulgaria (11) Hungary (15) Portugalia (17)	Croatia (19) Greece (17) Romania (17)	Czechia (22) Estonia (26) Latvia (22) Lithuania (22) Poland (20) Slovakia (22) Slovenia (21)	Belgium (25) Luxemburg (30) Spain (26) Germany (28) Netherlands (30) Sweden (30)	Austria (25) Denmark (31) Finland (30)

Notes: The columns within the centre and periphery represent the distribution of the countries on each dendrogram (United Kingdom and Italy do not have data on DSL by income quartile).

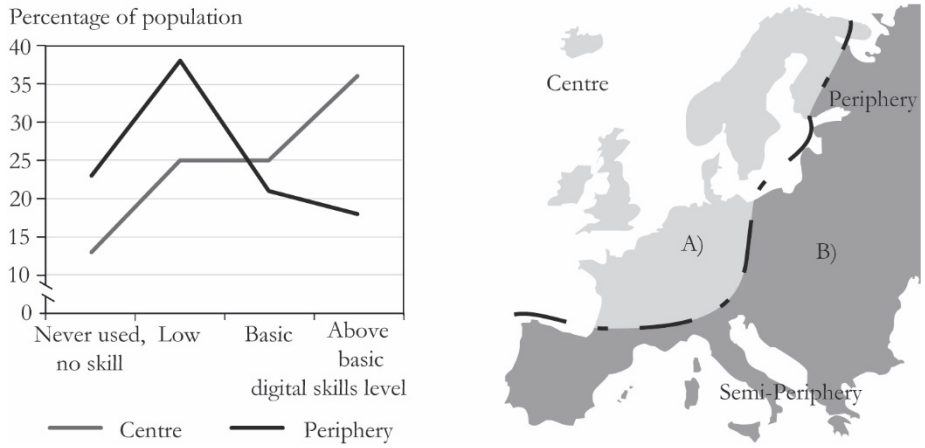
Source: Edited by the authors, based on Eurostat (2019a, 2019d) data.

The first classification aspect entails the annual percentages (2011–2019) of people who have never used the internet. The peripheral countries lag behind despite their improvement. The worst performers are Bulgaria, Greece, and Romania. There is a shift during the period of 2011–2019: Greece, Bulgaria, Italy, Croatia, Spain, Portugal, Lithuania, and Poland have improved by 2019. Estonia, Slovakia, and Slovenia developed the most in the CEE region, decreasing their shares of non-internet users to between 7% and 13% by 2019. The wealthiest countries decreased the percentage of non-internet users to between 3% (Sweden) and 11% (Germany), reaching 2–5% by 2019.

The DSL structure shows a clear difference between the centre and the periphery (Figure 5). In the centre, there are a very low percentages of non-internet users and those with low DS levels, despite the high share of the elderly population. The turning point is the basic level, from where the centre excels on the above-basic level. In the periphery, there are more non-internet users and individuals on low DSL levels than there are on the basic and above-basic DSLs. Therefore, the first task for the periphery is to provide internet access to all and encourage them to use the internet.

Figure 5

Digital-skill level share in Europe within the population in central and peripheral countries, 2019



Source: Edited by the authors, based on Eurostat (2019a) data.

This classification shows that the basic DSL is the least differentiating index and has the lowest variance. The centre has two subgroups: the first, with the best DSL values, containing a high share of people on above-basic DSL, and the second with a more even distribution of people on basic and above-basic DSLs. Both subgroups have only a low percentage of people on a low DSL.

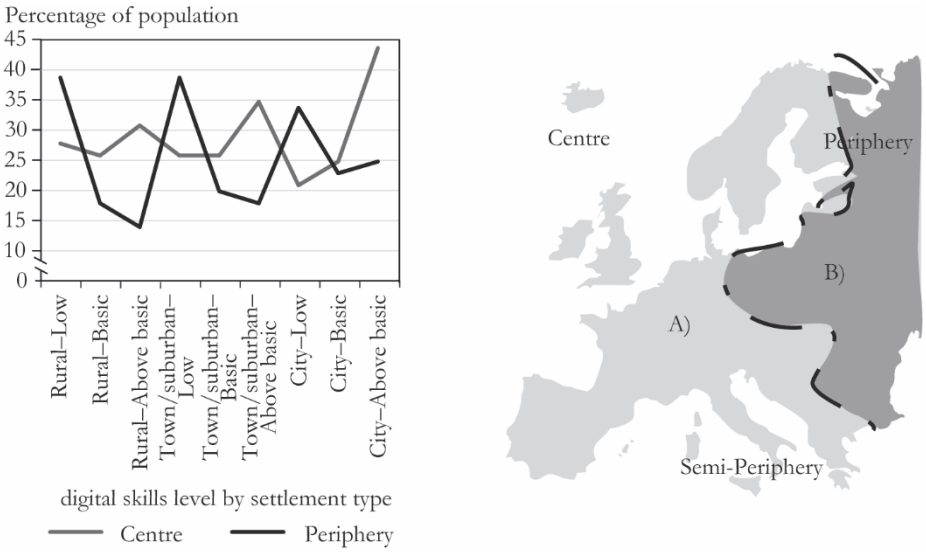
The periphery has three major subgroups. The first is the upper half, close to the central countries in terms of above-basic DSL, comprising Croatia, Czechia, Estonia,

Lithuania, Slovakia, and Slovenia. The middle part of the periphery, featured by better performance on basic and low DSLs, comprises Hungary, Latvia, and Poland. Finally, the worst group comprises Bulgaria and Romania, with high percentages of non-internet users and individuals on a low DSL, and by far the lowest share of people on an above-basic DSL.

The settlement type-based C-P division shows an almost mirrored pattern (Figure 6). In the periphery, the low DSL has the highest share, which declines towards the city but stays high, mostly to the advantage of the above-basic DSL. This indicates greater spatial DS inequality on the periphery. The trend is mirrored in the central countries, where the distribution of DSL in rural areas is evenly sound, with an increasing above-basic DSL towards cities, paired with a decreasing low DSL. The above-basic DSL increases everywhere from rural areas towards cities, which is a general trend, reflecting the effect of settlement hierarchy (Bontje et al. 2013) and, in the case of possible positive exceptions, depending on local features (Lengyel et al. 2016, Zdanowska et al. 2020).

Figure 6

Digital-skill level share in Europe within the population by settlement type, 2019



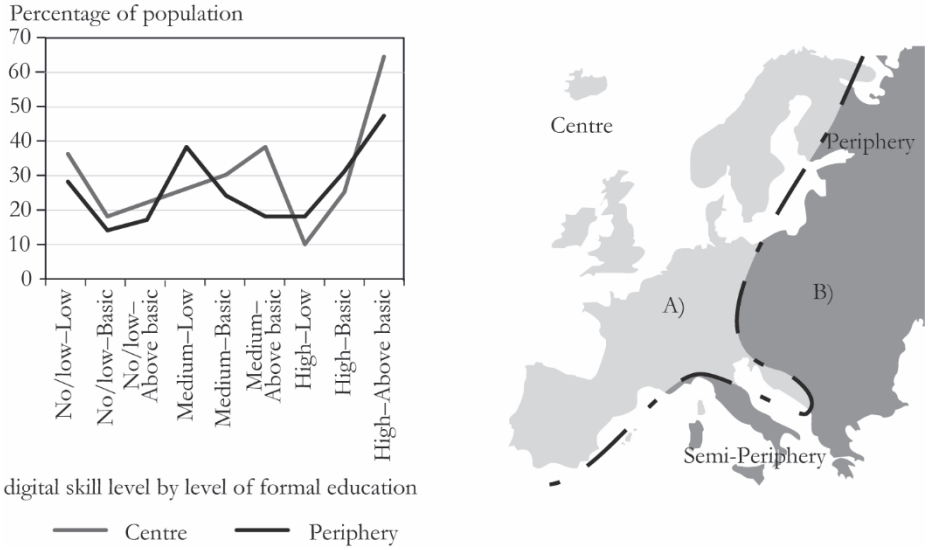
Source: Edited by the authors, based on Eurostat (2019a) data.

The effect of education level on DSL is straightforward: the higher the education level, the higher the DSL (Figure 7). The centre has a structure similar to that of the periphery; only the basic DSL acts as turning point between the centre and the periphery on the basic and above-basic DSLs. On no or low level of formal education, there is no DSL trend change, merely a difference in the even share between the DSLs. This shows that a low level of education is necessary to participate in the online

world, regardless of the C-P differences. The significantly higher above-basic DSL of highly educated people in the centre shows a meaningful disparity, which strengthens the C-P differences because even the intellectuals in the periphery – who are crucial actors in social and economic development (Szakálné Kanó et al. 2017) – cannot keep up with their peers in the centre. Finland, Denmark, and Estonia have much higher shares of above-basic DSLs on all education levels than in the rest, which indicates better policy approaches in education and digitalisation support.

Figure 7

Centre-periphery division of digital-skill level and education level in Europe, 2019



Source: Edited by the authors, based on Eurostat (2019a) data.

The C-P difference in income-based DSL is sharp, similar to the settlement type-based differentiation. The reason is that settlement type often also means income-based differentiation since wages in cities are higher than in rural areas. This also demonstrates that it is not settlement type that is the determining factor but the local characteristics of a settlement.

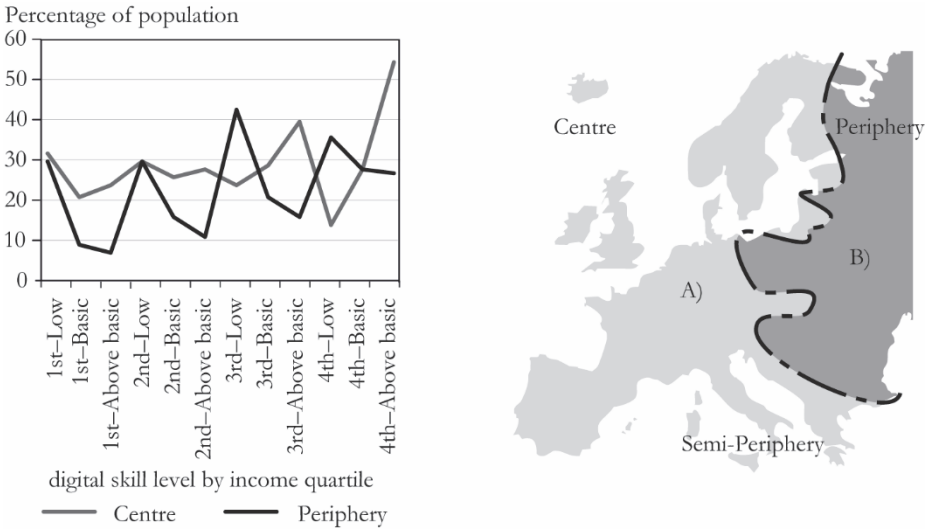
The biggest differences are on the low DSL, except in the first quartile. In the periphery, there are significantly more people on the low DSL than in the central countries in the last three quartiles, which shows that regardless of income, there is a large percentage of people on the low DSL in the periphery, which could be the result of a lack of personal motivation and/or a malfunctioning education system (Figure 8).

The periphery comprises the worst performers (Table 6); however, the bottom half of the central countries shows a similar distribution in DSS to that in the periphery. The lower half of the centre differs from the best performing central countries in its higher share of non-internet users. The cause of peripheral countries' worse performance may be that, in the peripheral countries, the populations are

homogenously in a worse financial position, and thus harder to develop. Meanwhile, in the central countries, the lower income groups are richer, although the upper income group is fairly wealthier and has the means for self-development and lifelong learning to acquire higher skills, generally, as well as a higher digital skill level (Boyadjieva–Ilieva-Trichkova 2018).

Figure 8

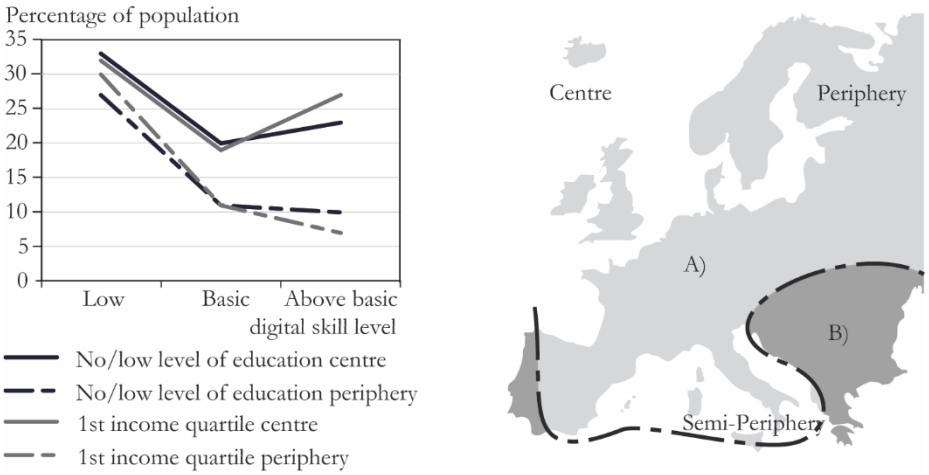
Centre-periphery division of digital-skill level and income quartile in Europe, 2019



Source: Edited by the authors, based on Eurostat (2019a) data.

Figure 9

Digital-skill level divide in Europe among the lowest education and income groups, 2019



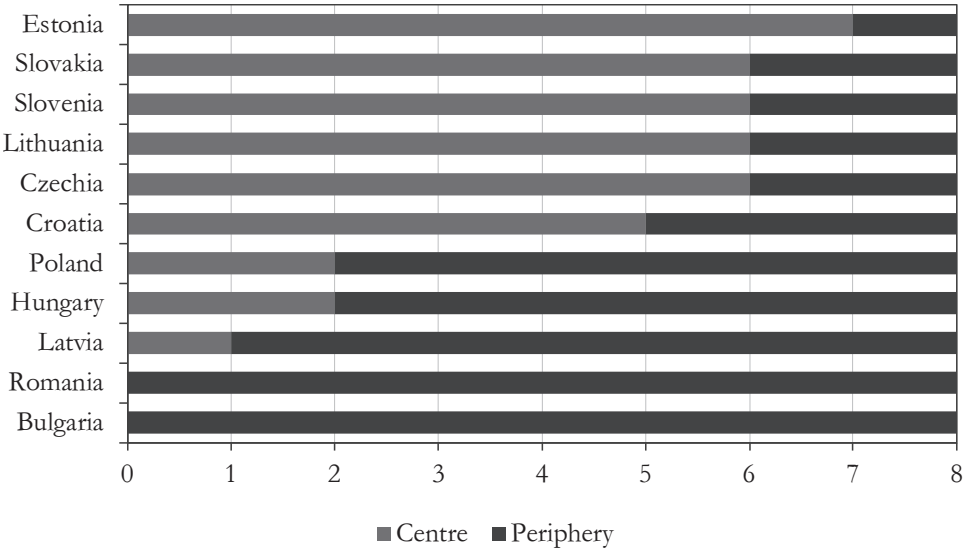
Source: Edited by the authors, based on Eurostat (2019a) data.

Finally, the analysis focuses specially on the DS of the socially most disadvantaged groups (Figure 9), where the centre and the periphery present similar patterns. There are two main differences: First, central countries' above-basic DSL is higher than the basic DSL. Second, with a low level of education in the centre, one has a much higher probability of having the above-basic DSL than in the periphery. Meanwhile, in terms of low-income people's DSL, the centre and periphery are closer to each other, despite the fact that the first income quartile means less income in the periphery than in the centre, and that more people are affected by material deprivation (Dudek–Sedefoğlu 2019) in the periphery, which decreases the likelihood of participating in the online world.

Focusing on the CEE region, the countries are analysed in terms of how many times they are categorised as periphery or centre based on the different aspects (Figure 10). The results show strong distinctions among the CEE countries examined.

Figure 10

Centre-periphery category occurrences of digital skill of the CEE countries, 2019



Source: Edited by the authors, based on Eurostat (2019a) data.

Bulgaria and Romania have the worst DSS in the CEE region in almost every sense. In Hungary, Latvia, and Poland, the low DS is relatively high within the society. The other countries show a better structure by having better values in basic and above-basic DSLs than the average of the countries, or by having fewer people on the low DSL and more on the above-basic DSL within the poorly educated group; moreover, they have a higher DSL than the average value amongst CEE countries in

the first income quartile. The core countries are mostly homogenous, with Belgium being the weakest performer.

Conclusions

Economic performance-based C-P relations have attracted a wide range of research studies; however, these studies do not explain specific aspects and causes of these relations. The relevance and importance of the digital skill-based approach in C-P research stems from the fact that we live in a global information society in which it is crucial to understand spatial differences in people's DSLs. This study presents a digital skill-based C-P division, and reveals valuable information on different aspects of the DSS divide in European countries; it helps in understanding countries' readiness for the challenges of digitalisation.

The traditional C-P model is increasingly less productive because the map is more granular, while there are enormous differences within a country. There is a need to consider data that predict future trends. A DS analysis helps to identify important features of digital development trends. The novelty of this study is that it adopts a different approach to examining the data by focusing on the digitally worse performers. The study can help to measure disadvantaged groups' digital transition and virtual space, which can reveal new insights into their digital potential. The study also considers the proportion of non-internet users, and not merely internet users' DSs, because the latter is insufficient for understanding the differences. This approach leads to findings based on DSS and DS development.

Furthermore, it is important that the study does not only examine the digital disadvantages and DS differences between developed and developing countries, as in the *Measuring the Information Society Report 2018*, but also within the developed Europe. The delimitation and analysis of the C-P in Europe and the CEE region help to identify the differences in the European regions' human capital-based digital readiness.

The analysis identifies two types of DSSs and two stages in the development of DSs, depending on whether a country is central or peripheral. The first structure in the periphery comprises many more people who have never used the internet and have low DSLs and above-basic DSLs. The second structural group, the centre, comprises only a small proportion of non-internet users and many more people on above-basic DSLs. The percentage of people on basic DSLs is relatively even both in the centre and in the periphery. The inequality manifests in the extremes of the features examined. The periphery features a high share of people without or on low DSLs; meanwhile, the centre is positively unequal, with a high share of people on above-basic DSLs and without many non-internet users (UNCTAD 2018).

In terms of the digitalisation process, there are two stages: The first is transformation from a non-internet user to a user on a low DSL. This is recognisable

in the peripheral countries, where the better the GDP performance, the lower the share of non-internet users, while the share of low DS stagnates or rises among the poorer halves of the populations. The second stage can be observed in the core countries, where people develop mostly from low to basic and/or above-basic DSLs, with a stagnating, buffer like, share of basic DSL. This means that in richer countries, the proportion of people with low DSs is declining, while the share of above-basic DS people is rising.

The increase in people on low DSLs means new ICT users, while the increase in basic and above-basic skilled people means a migration between the groups due to human development. The entry depends more on household income than on national GDP performance or education. The low level of education required in becoming an ICT user is due to the increasing intuitiveness and affordability of ICT, which indicates the potential for wide spread digitalisation. A further DS development depends more on the general economic performance and education level induced by adopting the current consumption patterns of an information society. Settlement type is the least determining factor, although the socio-economic context of a settlement is important because the diffusion of ICT infrastructure and use is hierarchical (Zdanowska et al. 2020). This decline is high in countries with great internal C-P gaps. These results support the claim that differences in digitalisation cannot be measured only by internet access rates or economic performance.

The first research question was as follows: Do the peripheral (CEE) and central (core EU) countries differ from each other in terms of DSS? The CEE countries do differ from the core, and their unbalanced DSSs may strengthen the uneven C-P relations (UNCTAD 2018). In the periphery, almost a quarter of the population first must become internet users and acquire a low level of DS, as Step zero, while in central countries more than half of the populations are already at least on a basic DSL.

The second research question was as follows: Which dimension of DS data best describes the digital C-P divide? First, there are aspects of DSS – settlement type, highest education level, and highest two income quartile-based above-basic DSLs – that are in parallel with GDP-based differentiation. Second, there are indexes that vary independently of GDP performance. A meaningful non-GDP-based DS indicator for classification is the above-basic DSL of the least educated group. This indicator shows that the northern countries and Germany are the most digitally developed, while the others perform worse in various ways. The data regarding the least educated and poorest social groups can also reveal domestic C-P differences and a digital divide.

Finally, the last research question was about the possibility of forming subgroups in the CEE region. The CEE region is clearly not uniform in terms of DSS. Three sub groups are outlined in terms of the indexes of the percentage of non-internet users, people in the first income quartile, and people without any or a low level of education, which indexes are relevant in terms of digital equality. Bulgaria, Hungary, and Romania are the worst of the CEE countries in terms of DSS. Croatia, Latvia,

Slovenia, Poland, and Slovakia are in a better position, with high numbers on low DSLs and average values on basic and above-basic levels. Finally, Estonia, Lithuania, and Czechia perform the best on low DSLs, which pairs with a high percentage on above-basic DSLs in the poorly educated group and a relatively low share of non-internet users.

The study raises new questions that could improve our knowledge of the digital dividedness of the EU. The first question relates to the data source, and asks how the countries compare in terms of the share of professional, digitally skilled people, for a comparison with more advanced digital actors. The second question asks how the skill levels compare to data on national redistribution and education spending, to reveal quantitative information on their possible effects. Finally, the last question asks what the DSL is of people migrating to central countries to work, thus adding value to those economies, to establish whether there is any sign of a digital brain drain too, or whether staying in their home countries is a viable option for people with higher DSs in a world of increased online presence and increasing remote work opportunities.

Overall, there are C-P relations in the practical aspects of digitalisation. Central countries are in a better situation, both in terms of an internet user base and of the DSS of ICT users. Both the southern and eastern peripheries lag behind, and have a large share of people excluded from the digital sphere. Meanwhile, due to a low entry threshold, there are sound digitalisation practices and highly skilled digital professionals in the peripheries, which indicates that the development to a basic level is a matter of policy.

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