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# The Domain of Social Services in the Twenty-First Century: Digital Transformation and Innovative Development Within New Paradigms

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## ABSTRACT

### BACKGROUND

The innovative potential and level of digitalization in social work across European Union (EU) member states have gained importance due to the growing need for systematic implementation of digital innovations. These include the automation of routine processes, new approaches to needs assessment, service delivery, and virtual client interaction. Despite the relevance of digital tools, their integration into social work remains uneven and underresearched.

### MATERIALS AND METHODS

This study employed a literature synthesis method to identify the main benefits and challenges of digital transformation in social work, along with systematization to organize findings from previous research. The generalization method was used to develop recommendations for digital policy in the field. Quantitative analysis was conducted using a sample of EU and European Economic Area countries. Statistical analysis was carried out in Jeffreys's Amazing Statistics Program (JASP), applying correlation and cluster analysis to assess the relationship between levels of digitalization and social sector investment.

### RESULTS

Cluster analysis revealed three distinct groups among the countries studied. The first cluster comprises nations with a high level of digitalization and substantial expenditures on social services. The second cluster includes countries with moderate levels of both digitalization and social investment. The third cluster is characterized by low digitalization levels and minimal investment in social services. These distinctions highlight significant disparities in the adoption and integration of digital tools in social work systems across Europe.

### CONCLUSION

Digitalization presents considerable opportunities for enhancing the efficiency and accessibility of social work services. However, its effective implementation requires a comprehensive evaluation of national contexts and influencing factors. Tailored strategies that align with specific social, economic, and technological conditions are essential for ensuring successful digital transformation in the social sector.

**Keywords:** Digital social work, E-government development index, Social protection expenditure, Cluster analysis, Digital divide

### Highlights

- Digitalization enhances the efficiency, accessibility, and inclusiveness of social services in the EU.
- Innovative tools and online platforms improve client assessment and service delivery.

- Key challenges include digital adaptation, data privacy concerns, and reduced personal interaction.
- Strategic investment in training and education supports sustainable digital transformation.
- Future efforts should focus on evaluating digital tools and ensuring ethical, inclusive practices.

### Introduction

Innovations and digital technologies are increasingly transforming the social service delivery system, affecting both the organization of social work and the professional competencies of specialists. The use of digital technologies in this area contributes to improving the quality of social services, expanding access to them, optimizing resources, and creating new models of interaction between social workers and beneficiaries. At the same time, the digitalization of social work is both a purely technical process and a complex social phenomenon that transforms the paradigm of social protection (SP) and requires scientific understanding. At the macro level, the digital readiness of the social support system and the financing of social institutions have a direct impact on social stability and the overall effectiveness of welfare policy. According to Berzin et al.,<sup>1</sup> the introduction of digital technologies has the potential to improve access to services, as well as to change the role of social workers in the provision of assistance, which can contribute to new approaches in social support policy. Therefore, the formation of a modern strategy for innovative development in social work requires an adequate digital maturity assessment system that identifies existing barriers and potential opportunities. Mitchuk et al.<sup>2</sup> emphasize the need for such a system that will not only ensure the effective implementation of technologies but also identify areas for further development and improvement, in particular, in the context of the need to take into account the specifics of social groups in need of assistance. In this context, it is important to take into account the dynamics of financing social services, which allows assessing the effectiveness of the implementation of digital tools in practice (Figure 1).<sup>3</sup>

According to the above data, during the Coronavirus Disease 2019 (COVID-19) pandemic and other global challenges, there has been an increase in funding for social services, which indicates that in times of crisis, European Union (EU) member states' governments recognize the importance of investing in innovation to ensure the continuity of social assistance. In particular, the allocation of additional funds for digital tools has allowed not only to adapt more quickly to changes in the way services are provided but also to maintain

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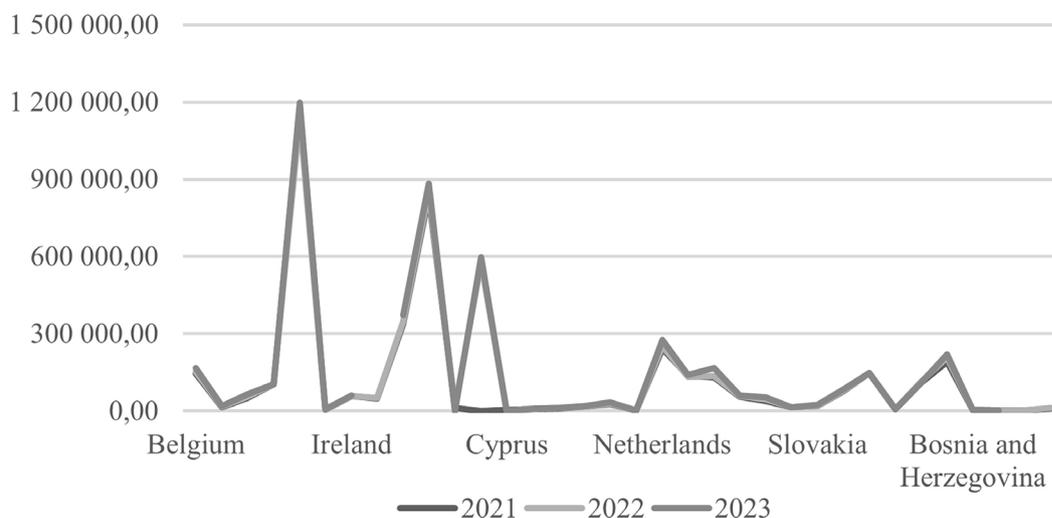
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**Fig 1 | Dynamics of state budget expenditures on social work in EU member states in 2021–2023**

Source: Eurostat<sup>3</sup>

the accessibility and effectiveness of SP for the most vulnerable.<sup>4</sup> For example, in 2023, France allocated 31.5% of its Gross Domestic Product (GDP) to social spending, the highest among EU countries, while actively developing digital infrastructure to support online social services; and Italy, with a similar figure of 30% of its GDP, is integrating digital tools to modernize its social security system.<sup>5</sup> The Scandinavian countries, including Denmark, Norway, and Sweden, also combine high levels of social spending with developed e-governance, which ensures the effective use of digital solutions in social work.<sup>6</sup>

The relevance of the topic is emphasized by the need for systematic implementation of digital innovations in social work practice, which involves not only automation of processes but also the formation of new approaches to assessing needs, providing services, and interacting with clients in a virtual environment. In this context, e-social work encompasses the use of digital technologies in social work—from online counseling and distance learning to digital monitoring of programs and research in a networked environment—and appears not only as a new specialization but also as an interdisciplinary field that transforms all levels of professional activity.<sup>7</sup> At the same time, compliance with ethical standards and ensuring digital justice remains an important task,<sup>8</sup> especially in the context of the use of algorithmic solutions and artificial intelligence (AI).

However, a review of previous scientific developments reveals several unresolved aspects. Firstly, while many studies explore the general benefits and challenges of digitalization in social work, there is insufficient empirical evidence on how digital maturity correlates with social service funding across EU member states. Secondly, the ethical implications—such as digital inequality, privacy risks, and the humanization of automated services—are often acknowledged but rarely examined through a systemic or policy-focused lens. Thirdly, current literature tends to lack a typological analysis of countries by both digital capacity and

SP financing, which would allow for deeper insights into differentiated models of digital transformation. These gaps highlight the need for a comprehensive and contextualized study that integrates both quantitative and qualitative perspectives.

The purpose of this research article is to study the role of digitalization and innovation in the transformation of the social work system, in particular, to analyze the opportunities and limitations of integrating digital tools into social practices in the context of EU member states. The article aims to quantify the nature and strength of the relationship between the level of digitalization and expenditures on social services and social policy in EU member states.

### Literature Review

In today's context, social transformations caused by the development of information technology necessitate an innovative rethinking of approaches to social work. Studies by Berzin et al.,<sup>1</sup> Mitchuk et al.,<sup>2</sup> and O'Sullivan and Walker<sup>9</sup> show that digitalization is increasingly penetrating the practice of social services, transforming both the forms of service delivery and methods of interaction with clients. In general, social work is an activity that combines the promotion of social well-being, helping vulnerable populations overcome individual problems they face, advocating for social and economic justice for members of diverse communities, and adhering to the principles of a code of ethics for social work.<sup>8</sup> In the modern sense, social work also includes the use of digital and innovative technologies to improve the efficiency of service delivery, increase access to social support through online platforms, and introduce innovative tools for assessing needs, monitoring outcomes, and ensuring communication between professionals and clients in a digital environment.<sup>10–12</sup>

In the era of digital transformation, social media interventions create synergistic dynamics that multiply opportunities to improve the quality of people's social relationships, thereby increasing their social support by

increasing their connections, their personal networks, and their support systems, while promoting activities to enhance human potential.<sup>13-15</sup> Vašková and Lovašová<sup>16</sup> use the more established term “social work in a virtual environment.” Pink et al.<sup>17</sup> have developed a mixed approach to understanding the essence of modern social work, which involves the use of the term “digital social work.” Markovič<sup>7</sup> discusses the transformation of social work in the context of digitalization, and the author analyzes the concepts of e-social work and digital social work, defining them as new areas of professional activity that have emerged in response to the needs of clients in the digital environment. In turn, Castillo de Mesa<sup>18</sup> noted that digital social work is a catalyst for change that provokes a digital breakthrough in social work using a transdisciplinary vision. Thus, the digitalization of social work, or the practice of digital social work, can be defined as the use of new information and communication technologies (ICTs) in social work practice, which includes a wide range of technologies and activities, such as digital contact with clients and the implementation of a digital administrative system.<sup>19</sup>

Global challenges such as the COVID-19 pandemic, localized armed conflicts in Europe, and increased geopolitical instability have catalyzed digital transformation, necessitating rapid ICT adoption to ensure the continuity of social services in times of crisis and instability.<sup>20</sup> Despite the lack of formal training, both social workers and clients have been largely positive about digital tools, recognizing their usefulness and convenience.<sup>21</sup> Misuraca and Rossel<sup>22</sup> emphasize that digitalization opens up new horizons for social innovation, in particular by optimizing service delivery mechanisms and improving the overall efficiency of SP systems. In this context, social workers are not only users of digital solutions but also active actors in the innovation process, who, based on an understanding of the needs of vulnerable groups, contribute to the development of the latest technological approaches.<sup>23</sup>

Mialkovska et al.<sup>24</sup> conclude that digitalization is accompanied by challenges related to the digital divide, data protection, and the need for cultural and linguistic adaptation for effective intercultural interaction. In another paper, Mialkovska et al.<sup>25</sup> point out that digital transformations and reforms in European countries have not yet been sufficiently assessed in terms of their impact on quality management and management of educational processes, including social work education. In addition, considerable attention in the scientific discourse is paid to other risks of digitalization: personal data security, digital inequality, and problems of emotional distance in virtual interaction.<sup>11,26,27</sup> Some researchers, such as Ardaillon et al.,<sup>28</sup> Nikitenko et al.,<sup>29</sup> Prem,<sup>30</sup> insist on the need to maintain a balance between technological solutions and humanistic principles of all parties involved in social work. Given the urgency of the challenges for the digitalization of social work, the analysis of scientific sources demonstrates the growing relevance of integrating fundamentally new technological solutions in this area, while emphasizing the importance of an interdisciplinary ap-

proach that combines technological innovations with ethical, psychological, and legal aspects, and takes into account the need for their quality integration and adaptation period. The aim of the study is to conduct a systematic analysis of the impact of the level of digitalization of public administration on social expenditures in the EU member states and to identify mechanisms for the transformation of the social work system under the influence of digital innovations. The inquiry centers on the degree to which the volume of social expenditures in EU countries is influenced by the level of digitalization of public administration and the ways in which digital innovations affect the functioning of the social work system. Thus, this gives rise to several research hypotheses:

**Hypothesis 1:** The level of digitalization is a factor that influences the efficiency and accessibility of social services through the integration of digital technologies into social work practice, improving the quality of service and responsiveness.

**Hypothesis 2:** There is a positive correlation between the level of digitalization (E-Government Development Index [EGDI], Online Service Index [OSI], and Telecommunication Infrastructure Index [TII]) of public administration and social expenditures in EU countries, i.e., a higher level of digital integration contributes to an increase in the financing of social services.

**Hypothesis 3:** The level of digitalization of social work does not have an unambiguous linear relationship with social financing, as there are different models of combining digital development and social policy, which form cluster groups of countries with different profiles.

## Methods

The main ethical consideration in this study was ensuring responsible and accurate use of secondary data. All sources were properly cited and referenced, and the data was used in a way that respected intellectual property and data protection regulations.

## Qualitative Analysis

The following methods were used in the research process:

- The synthesis of literature sources was used to identify key benefits, challenges, and obstacles to the process of innovation and digital transformation of social work;
- The systematization method was used to organize and structure the available data and findings from previous studies, which allowed us to create a generalized picture of the state of digitalization in the social sphere; Thus, the literature synthesis helped to identify key factors and themes that formed the basis for the selection of indicators for further quantitative analysis;
- The method of generalization was used to draw general conclusions from the current scientific

literature, which helped to formulate recommendations for the development of a policy of digital transformation of the social sector.

This study uses secondary data obtained from official international sources, including the United Nations (UN) statistics and Eurostat databases, which ensures the reliability and relevance of the information. The choice of EU countries is based on their institutional similarities, which allows for a comparable analysis of the level of digitalization and SP expenditures. The selection of literature sources considered scientific publications, analytical reports of international organizations, and policy documents covering the last 15 years and having a clearly defined methodology. Thus, the qualitative literature review defined the structure and direction of the quantitative research. To minimize the influence of internal bias of the sources, the analysis involved verification of information from several independent sources, comparison of different scientific approaches to the digitalization of the social sphere, and critical review of materials prepared by government agencies or intergovernmental structures.

**Quantitative Analysis**

The baseline data for the study was selected to analyze the relationship between the level of development of digital governance and the scope of SP in European countries. To achieve scientific validity of the sample, the countries of the EU and the European Economic Area (in particular, Iceland, Norway, and Switzerland) were selected because they operate in a comparable institutional environment, which allows for a more accurate comparison of their digital, social, and economic characteristics.

The data was collected from official international sources, including UN statistics<sup>31</sup> and Eurostat databases,<sup>32</sup> which guarantees their validity and relevance (Table 1). This combination of digital and social indicators makes it possible to assess how the level of digital transformation of public administration correlates with government efforts in the field of SP and to identify patterns for further formulation of recommendations for the digitalization of social policy.

Based on the initial data, the JASP statistical analysis program (Descriptive Statistics tool) calculated the basic descriptive characteristics of the variables under study, including the arithmetic mean, median, standard deviation, and minimum and maximum values, which allowed us to form a general idea of the variability and distribution of indicators in the sample of countries.

To assess the relationship between the level of digitalization and expenditures on social services and social policy in the analyzed countries, a correlation analysis was conducted using the data in Table 1. This analysis was conducted on the basis of the raw data in the JASP program using the Correlation Matrix tool. The correlation analysis is aimed at identifying possible statistically significant relationships between the level of SP and digital development indicators—EGDI, OSI, and TII.

**Table 1 | Baseline data for the quantitative research**

Country	SP	EGDI	OSI	TII
Denmark	19.5	0.9847	0.9992	0.9966
Estonia	13.5	0.9727	0.9954	0.9731
Iceland	10.8	0.9671	0.9076	0.9983
Finland	23.4	0.9575	0.9097	0.9791
Netherlands	16.2	0.9538	0.9212	0.9715
Germany	19.7	0.9382	0.9238	0.9236
Sweden	18.7	0.9326	0.8836	0.9868
Norway	17.5	0.9315	0.9117	0.9654
Spain	18.5	0.9206	0.9054	0.9603
Ireland	8.1	0.9138	0.8768	0.9599
Lithuania	14	0.911	0.8839	0.9631
Austria	21.4	0.9065	0.8383	0.981
Switzerland	13.1	0.9004	0.8408	0.9576
Malta	9.7	0.8886	0.8749	0.9747
Latvia	13.5	0.8852	0.8092	0.966
Croatia	13	0.8818	0.8735	0.918
Slovenia	17	0.8759	0.864	0.9107
France	23.4	0.8744	0.844	0.9228
Greece	18.5	0.8674	0.8145	0.8657
Poland	16.9	0.8648	0.8037	0.9603
Luxembourg	20.2	0.8466	0.7555	0.9888
Portugal	16.6	0.8415	0.7878	0.8979
Italy	21.1	0.8356	0.7624	0.9017
Czech Republic	13.5	0.8239	0.7006	0.9204
Bulgaria	13.8	0.8145	0.7727	0.9171
Belgium	20.1	0.8121	0.7224	0.8698
Hungary	12.3	0.8043	0.7144	0.8282
Slovakia	17.6	0.8021	0.7097	0.8985
Romania	12.8	0.7636	0.6548	0.8922

Source: Compiled by the author based on Eurostat,<sup>32</sup> United Nations.<sup>31</sup>

The next step in identifying similar groups of countries by various indicators (EGDI, OSI, TII—indices characterizing the level of digitalization and innovation by country; SP—public administration expenditures on SP, as a % of GDP) was a cluster analysis using the k-means method.

For each indicator value (for example, EGDI), the normalized value is calculated using the Z-score formula:

$$Z_{EGDI} = \frac{X_{EGDI} - \mu_{EGDI}}{\sigma_{EGDI}} \tag{1}$$

where  $X_{EGDI}$  is the value for each country (for example, EGDI for country  $i$ );

$\mu_{EGDI}$  is the average value for all countries for EGDI;  
 $\sigma_{EGDI}$  is the standard deviation across all countries for EGDI.

Similar formulas are applied to the other variables (i.e., OSI, TII, and SP).

Next, the number of clusters was chosen ( $k = 3$ ), where the initial cluster centroids are three randomly selected countries. The centroids are written as vectors of normalized variable values for each cluster:

$$C_1 = (Z_{EGDI,1}, Z_{OSI,1}, Z_{TII,1}, Z_{SP,1}) \tag{2}$$

$$C_2 = (Z_{EGDI,2}, Z_{OSI,2}, Z_{TII,2}, Z_{SP,2}) \tag{3}$$

$$C_3 = (Z_{EGDI,3}, Z_{OSI,3}, Z_{TII,3}, Z_{SP,3}) \tag{4}$$

$$C_3 = \left( \frac{1}{n_3} \sum_{i \in \text{Cluster 3}} Z_{EGDI,i}, \frac{1}{n_3} \sum_{i \in \text{Cluster 3}} Z_{OSI,i}, \frac{1}{n_3} \sum_{i \in \text{Cluster 3}} Z_{TII,i}, \frac{1}{n_3} \sum_{i \in \text{Cluster 3}} Z_{SP,i} \right) \tag{9}$$

where  $C_1, C_2,$  and  $C_3$  are the centroids for clusters 1, 2, 3, respectively.

The number of clusters ( $k = 3$ ) was chosen based on a commonly used typology that distinguishes between developed, developing, and transition countries. This division reflects significant differences in the levels of digitalization and investment in social policy, making it a theoretically sound basis for clustering.

The next step is to calculate the Euclidean distance to each of the three centroids for each country in the sample. The Euclidean distance between two points  $X = (X_1, X_2, X_3, X_4)$  and  $C = (C_1, C_2, C_3, C_4)$  in a multidimensional space is calculated by the formula:

$$d(X, C) = \sqrt{(X_1 - C_1)^2 + (X_2 - C_2)^2 + (X_3 - C_3)^2 + (X_4 - C_4)^2} \tag{5}$$

where  $X_1, X_2, X_3,$  are  $X_4$  are the values for the countries (normalized indicators);  $C_1, C_2, C_3,$  and  $C_4$  are the centroid values for the corresponding cluster.

The Euclidean distance is calculated for all three clusters for each country, and then the cluster with the minimum distance is selected for each country. The following rule was used to assign a country to a cluster:

$$\text{Cluster}_i = \min (d(X_i, C_1), d(X_i, C_2), d(X_i, C_3)) \tag{6}$$

where  $X_i, C_j$  is the distance between country  $i$  and the centroid  $C_j$ ; min refers to selecting the minimum distance that determines the closest cluster.

In this case, country  $i$  is assigned to the cluster for which the distance is minimal. Once countries are assigned to clusters, new centroids for each cluster need to be calculated. This is done as the average of the normalized values of all countries belonging to a particular cluster:

$$C_1 = \left( \frac{1}{n_1} \sum_{i \in \text{Cluster 1}} Z_{EGDI,i}, \frac{1}{n_1} \sum_{i \in \text{Cluster 1}} Z_{OSI,i}, \frac{1}{n_1} \sum_{i \in \text{Cluster 1}} Z_{TII,i}, \frac{1}{n_1} \sum_{i \in \text{Cluster 1}} Z_{SP,i} \right) \tag{7}$$

$$C_2 = \left( \frac{1}{n_2} \sum_{i \in \text{Cluster 2}} Z_{EGDI,i}, \frac{1}{n_2} \sum_{i \in \text{Cluster 2}} Z_{OSI,i}, \frac{1}{n_2} \sum_{i \in \text{Cluster 2}} Z_{TII,i}, \frac{1}{n_2} \sum_{i \in \text{Cluster 2}} Z_{SP,i} \right) \tag{8}$$

where  $n_1, n_2, n_3$  are the number of countries belonging to each cluster.

Next, the iterations were repeated until stability, i.e., after updating the centroids, new distances to the centroids were calculated and the clusters were reassigned. To ensure stability, four iterations were performed, after which the assignment of countries to clusters did not change. All of the above calculations were performed using the statistical program Excel. The result of the quantitative study is the cluster assignment of each country after the iterations are completed. Thus, the results of the cluster analysis were verified through multiple iterations until stability was achieved, which increased the reliability of the classification of countries by digital and social characteristics.

The results obtained are based on a combination of qualitative literature analysis and quantitative analysis of statistical data, which allowed us to identify stable links between the level of digitalization and social costs. The use of a wide range of general scientific research methods made it possible to identify typical models of digital development of the social sphere in European countries. To reduce the risk of bias, the results of the study were verified by repeated calculations, which strengthened the validity of the conclusions. Thus, the generalizations made are based on both empirical data and a conscious consideration of possible limitations, which allows us to formulate reliable recommendations for further digital transformation of social policy.

## Results and Discussion

### The Role of Digitalization and Innovation in the Transformation of the Social Work System in EU Member States

Modern social work is undergoing a fundamental transformation under the influence of digitalization and innovative technologies, driven by the need to respond quickly to new social challenges, increasing data volumes, changing client needs, and increasing demands for service delivery efficiency. In the global context, digital tools, AI, automated case management systems, and mobile applications are increasingly being integrated into social work practices, transforming not only the forms of interaction with clients but also the very nature of social intervention. Therefore, digital technologies and innovative solutions as a tool for modernizing social services have been systematized by key areas of their impact on social work practice (see Table 2).<sup>1,8,11,12,14,19-21,23,29,33-52</sup>

The above systematization of innovative approaches allows us to state the main vectors of social work transformation in the context of digitalization

**Table 2 | Innovations in social work**

Social Innovation Direction	Authors	Description and Examples of Implementation
Codesigning services	Bromark et al.; <sup>33</sup> Masterson et al. <sup>34</sup>	Participatory approach, where social workers work together with service users and partners to develop and evaluate services. For example, the Australian project Australian Research Alliance for Children and Youth (ARACY) focuses on involving young people in the development of health services tailored to their needs <sup>35</sup>
Social entrepreneurship	Nouman and Cnaan <sup>36</sup>	Innovative activities at the intersection of social work and business that solve social problems. For example, the creation of a women's cooperative initiative in India (Tata Water Mission) to produce sanitary products in low-income communities <sup>37</sup>
Digital innovation	Anastasiadou et al.; <sup>20</sup> Jansen et al.; <sup>23</sup> Jacob and Souissi <sup>38</sup>	Using digital platforms and technologies to improve the accessibility and quality of social services. For example, in Canada, the online platform 10C Shared Space is used to support isolated individuals by engaging volunteers <sup>39</sup>
Telehealth and teletherapy	Alston et al.; <sup>40</sup> Gbadamosi and Ajewumi <sup>11</sup>	Provide remote access to therapy, reducing barriers for people with limited mobility or isolation; guarantee confidentiality and convenience due to flexible scheduling
Electronic health records	Guevara et al.; <sup>41</sup> Snow et al. <sup>42</sup>	Increase coordination between medical institutions and social workers, provide access to complete medical information of the client
Mobile applications for mental health (mobile apps)	Khattab and Richter <sup>43</sup>	Apps such as Calm, Headspace, Talkspace, BetterHelp promote meditation, maintain therapeutic communication, and track client progress
Community-led innovation	Manthey; <sup>44</sup> Miller et al. <sup>45</sup>	Developing initiatives based on the active involvement of local communities in solving their own social challenges
Peer learning networks	Miller et al.; <sup>46</sup> Osian-Gabrie, <sup>12</sup> Racovita et al. <sup>47</sup>	Social workers share their experiences in communities such as LinkedIn or professional forums; share resources and increase engagement
Policy innovation	Handrian et al.; <sup>48</sup> Berzin et al. <sup>1</sup>	Introducing new regulatory and organizational solutions that change approaches to social security and social justice
The potential of machine learning and AI	Islam <sup>8</sup> ; Nikitenko et al.; <sup>29</sup> Reamer; <sup>49</sup> Santhi and Veeranjanyulu; <sup>50</sup> Rodríguez and Ferreira <sup>18</sup>	Creating professional networks of social workers, sharing innovative approaches, using AI to analyze client needs and adapt services. For example, since 2016, the Science for Social Good initiative at IBM Research has been operating in the United States as a way to solve social and humanitarian problems using data and AI <sup>51</sup>
Client management systems	Zenarolla; <sup>21</sup> López Peláez and Kirwan <sup>19</sup>	Systems such as Apricot and Casebook allow organizing data, scheduling meetings, and effectively monitoring client dynamics
Data analytics tools	Khattab and Richter; <sup>43</sup> Kumar and Suthar <sup>52</sup>	Statistical Package for the Social Sciences (SPSS), Statistical Analysis System (SAS), and other systems help identify trends, evaluate programs, and allocate resources efficiently

Source: Compiled by the author.

phenomena—from changing the formats of interaction with clients to the formation of new organizational models and policies. At the same time, there is a need for a comprehensive understanding of the benefits, risks, and limitations associated with the introduction of innovations in social work. The dialectical coexistence of new opportunities and challenges outlines areas for further research and requires the development of adaptive strategies to ensure the effectiveness and ethics of the digital transformation of social work (Figure 2).<sup>7,14,21,23,29,36,46–56</sup>

At the same time, there is a need for a comprehensive understanding of the ethical, practical, and structural implications associated with the introduction of digital innovations into social work. That is, while digital tools increase efficiency and reach, they also raise concerns about equity, justice, and professional accountability. These include issues related to digital surveillance, unequal access to online services (especially among older people, rural residents, and economically disadvantaged populations), and the reduction of interpersonal connections that are often vital in social work contexts. The “algorithmization” of decision-making further risks reproducing bias, especially if data sets are not representative of different populations.

Based on the synthesis of the scientific literature, the benefits of digitalizing social work include, first of all, improving the quality of services by providing timely information and reducing bureaucratic delays and improving communication between service providers

and recipients, providing better coordination of services by integrating a unified information system into the institutions that provide social services.<sup>55</sup> Second, the benefits highlighted by Afrouz and Lucas,<sup>53</sup> Alazam et al.<sup>57</sup> are worth noting, including partnerships with technology developers that align digital tools with social work ethics and values, and the use of digital tools that promote wider outreach, allowing services to reach a larger population, overcoming geographic barriers, and making social work more inclusive. In addition, the integration of digital technologies allows social workers to optimize their work (by automating routine tasks), automate the management and document management process, and gain quick access to important information, which ultimately leads to increased organizational efficiency.<sup>56</sup> In turn, the effectiveness of the spread of digitalization phenomena in the field of social welfare lies in the possibility for social workers to acquire technical and communication skills to work with new technologies and innovative tools to adapt to digital tools.<sup>38</sup> And, while digitalization offers significant benefits, it also raises concerns about privacy, professional boundaries, and the potential for resistance among social workers who may view technology as a threat to traditional practices.<sup>38</sup>

The issue of digital transformation of social work is multidimensional and is widely discussed in the scientific literature, in particular against the backdrop of global crises and geopolitical challenges. The digital transformation of social work, like all other spheres of social activity, is occurring at a rapid pace,

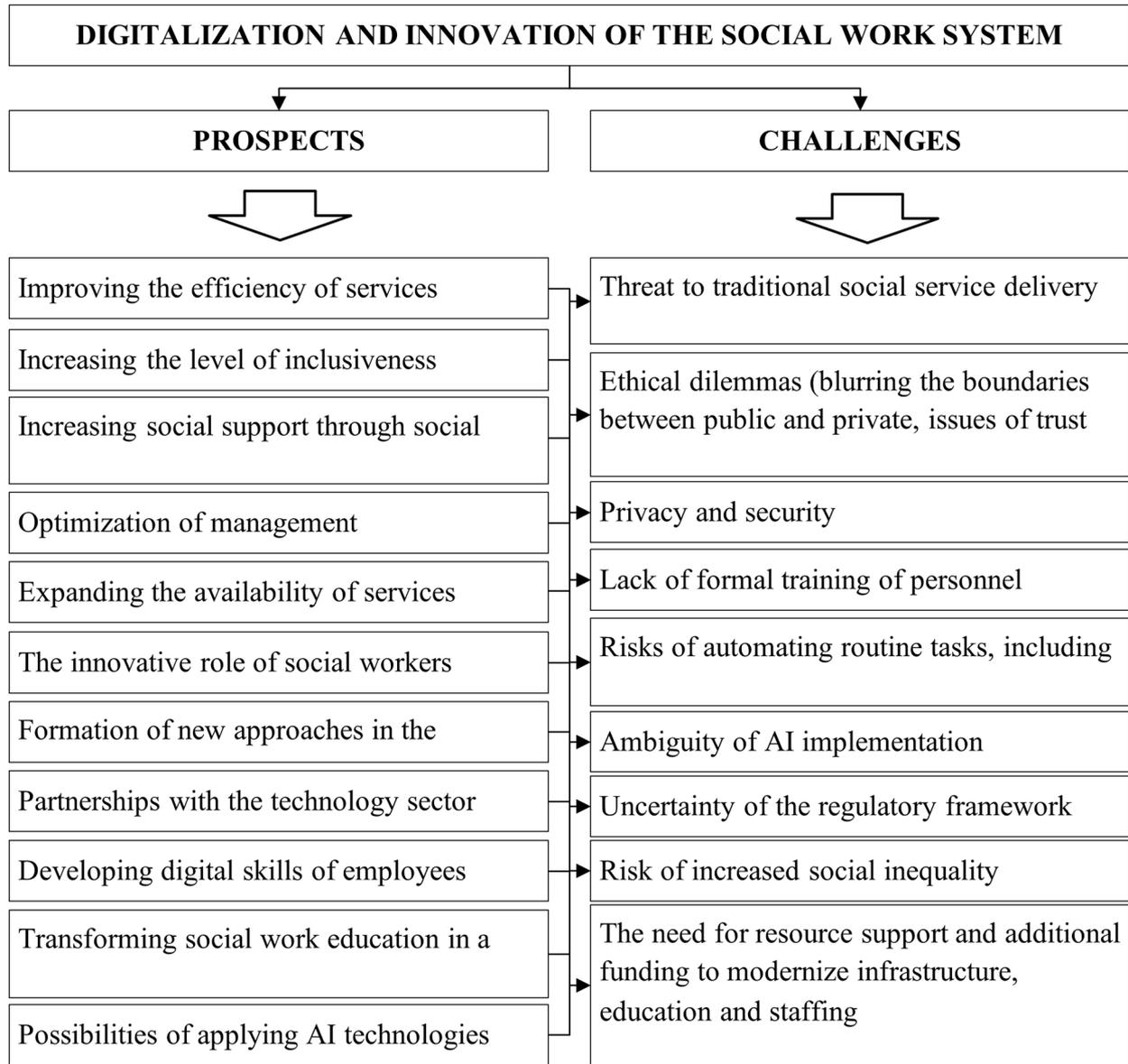


Fig 2 | Dialectic of prospects and challenges of digitalization and innovation of social work

Source: compiled by the author based on Afrouz and Lucas;<sup>23</sup> Bengtsson and Bønnhoff;<sup>24</sup> Danyliuk and Mandzyuk;<sup>25</sup> Jacob and Souissi;<sup>26</sup> Jansen et al.;<sup>27</sup> Marković;<sup>7</sup> Nikitenko et al.;<sup>28</sup> Reamer;<sup>49</sup> Rodríguez and Ferreira;<sup>28</sup> Santhi and Veeranjanyulu;<sup>50</sup> Vdovina et al.;<sup>56</sup> Zenarolla<sup>21</sup>

leading to the displacement of jobs traditionally held by low-skilled workers. According to the McKinsey Global Institute,<sup>58</sup> by 2030, due to automation, up to 375 million workers worldwide may need to change their profession or learn new skills to keep their current jobs. Therefore, addressing the challenges in the field of social work in the context of digitalization requires investing in education and retraining with a focus on developing both digital and interpersonal skills, as well as strengthening SP to prevent deepening social inequalities.<sup>12</sup> There are also many ethical issues related to digital practices, such as the blurring of privacy between public and private boundaries and “disembodied” communication in digital space.<sup>54</sup> Digital skills and knowledge are becoming a cross-cutting specialization as much of public administration has been digitized and customer interactions are becoming

increasingly digital.<sup>19</sup> However, despite the possibilities of using AI technologies to conduct risk assessments, support people in crisis situations, identify systemic biases in the provision of social services and provide social work education, among others; the increase in its application in social work can also jeopardize the safety, confidentiality, and physical and mental health of people, and therefore requires reflective implementation and use.<sup>49</sup> Therefore, in the current scientific discourse, it is believed that there is no clear algorithm for actions to combat such ethical consequences of using digital technology practices.<sup>24,29,59</sup> It should be noted that in the context of ensuring the confidentiality of personal data of employees and recipients of social services, the most effective innovations are encryption, multilevel authentication, regular system updates, regular security audits, and data backups.<sup>50</sup> In turn, the

digitalization of social work education, especially in the post-COVID-19 period, has transformed approaches to teaching and learning, highlighting the need to integrate digital skills into curricula with social justice and human rights principles, and drawing attention to the digital divide that limits access to education for vulnerable groups.<sup>47</sup> At the same time, there is a structural problem of insufficient funding for digital transformation in the field of social work, which makes it impossible to fully implement ICTs, modernize technical infrastructure, and systematically train specialists. Despite the potential of digitalization to improve the effectiveness of SP, its implementation requires stable financial support.<sup>22</sup> Therefore, digital inequality is both a technological and an economic barrier that hinders institutional modernization and creates disparities in access to quality social services, especially in times of crisis and instability.<sup>24</sup>

**Investigating the Nature of the Relationship Between the Level of Digitalization and Expenditures on Social Services and Social Policy in EU Member States**

In the context of current prospects and challenges caused by the digital transformation of all spheres of social activity, including social work, the issue of the relationship between the level of digitalization of public administration and the amount of funding for SP is of particular relevance. The purpose of this study is to quantify the possible correlations between the EGDI, its components (OSI and TII), and the level of social spending in European countries. The analysis is aimed at finding out whether digital tools are a catalyst for more effective social policy or, on the contrary, their impact is limited or indirect.

In this context, the calculation of descriptive statistics is a necessary stage of primary data processing, which allows for a general characterization of the sample and an assessment of the variability of key indicators, which creates the basis for further analysis of the relationships between variables and the formation of interpretive conclusions about the nature of these interdependencies within the sample. Descriptive Statistics, the results of which are presented in Table 3, demonstrate the generalized characteristics of the key variables that were the subject of the analysis.

The mean value of SP expenditures is 16.359, which indicates a fairly high level of social security in most

countries in the sample. At the same time, the standard deviation is 3.992, indicating a significant differentiation between countries in this parameter. In comparison, the EGDI has a smoother profile (mean value of 0.885 with a standard deviation of 0.058), which indicates a relatively homogeneous level of digital maturity of public administrations in European countries. In turn, OSI and TII show similar trends, with average values of 0.837 and 0.940, respectively, indicating a relatively high level of digital provision and institutional support. The variability of the OSI and TII indicators is insignificant, suggesting that there is no significant gap between countries in the field of digital services. Taken together, these characteristics outline a general picture of a high level of digital transformation against the background of significant inequality in social finance.

The next step in assessing the relationship between the level of digitalization and expenditures on social services and social policy in the analyzed countries was a correlation analysis, the results of which are presented in Table 4.

The results of Pearson’s one-factor correlation analysis revealed linear relationships between the level of SP and indicators of the level of digitalization (EGDI, OSI, TII) of the EU member states. The obtained coefficient values are low and statistically insignificant ( $P > 0.05$ ), which indicates that there is no direct correlation between the studied variables. In particular, the correlation coefficient between SP and EGDI is only 0.075, which does not allow us to conclude that there is at least a weak positive relationship. Even lower values are observed in the cases of OSI ( $r = 0.050$ ) and TII ( $r = -0.003$ ), the latter of which generally shows a tendency to be inversely related. That is, it can be argued that the level of digital development of administrative processes in this set of countries is not a determinant of the level of social financing. This suggests the existence of other indirect or contextual factors that should be taken into account in further research. In this regard, it was advisable to use cluster analysis, which allows us to identify heterogeneous groups of countries with similar profiles based on a combination of several indicators, even in the absence of a linear relationship between them. The process of calculating the values for the three centroids for clustering the EU

**Table 3 | Descriptive statistics of indicators of digitalization and the level of financial support for social work in a sample of EU member states**

Descriptive Statistics	SP	EGDI	OSI	TII
	Valid	29	29	29
Missing	0	0	0	0
Mean	16.359	0.885	0.837	0.940
Std. Deviation	3.992	0.058	0.087	0.044
Minimum	8.100	0.764	0.655	0.828
Maximum	23.400	0.985	0.999	0.998

Source: Compiled by the author.

**Table 4 | Correlation analysis between the level of SP expenditures and digital transformation indicators**

Correlation		
Pearson’s Correlations		
Variable		SP
EGDI	Pearson’s <i>r</i>	0.075
	<i>P</i> -value	0.651
OSI	Pearson’s <i>r</i>	0.050*
	<i>P</i> -value	0.602
TII	Pearson’s <i>r</i>	-0.003
	<i>P</i> -value	0.495

Source: Compiled by the author.  
 Note. All tests are one-tailed, for negative correlation.  
 \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ , one-tailed.

**Table 5 | Clustering of EU member states by the level of digitalization and funding of social work**

Country	Centroid 1	Centroid 2	Centroid 3	Cluster
Denmark	8.151271	7.609587	7.805057	2
Estonia	7.744707	7.862537	7.684929	3
Iceland	7.66239	8.074156	7.73712	1
Finland	8.57389	7.629832	8.062274	2
Netherlands	7.909602	7.727581	7.718266	2
Germany	8.196317	7.635074	7.842621	2
Sweden	8.105443	7.649598	7.79688	2
Norway	8.007852	7.683096	7.754912	2
Spain	8.090902	7.657505	7.791597	2
Ireland	7.649452	8.346282	7.857282	1
Lithuania	7.794843	7.855391	7.710857	3
Austria	8.370546	7.629289	7.942927	2
Switzerland	7.762439	7.921472	7.723028	3
Malta	7.66216	8.19044	7.791236	1
Latvia	7.785421	7.899698	7.726342	3
Croatia	7.761986	7.932949	7.727513	3
Slovenia	7.992934	7.723645	7.764411	2
France	8.6008	7.659639	8.091059	2
Greece	8.124078	7.692503	7.826429	2
Poland	7.988862	7.728881	7.765184	2
Luxembourg	8.269875	7.653788	7.895368	2
Portugal	7.982079	7.756047	7.773175	2
Italy	8.70402	7.662898	7.957523	2
Czech Republic	7.816679	7.929402	7.758145	3
Bulgaria	7.821896	7.902854	7.748367	3
Belgium	8.285826	7.68357	7.917236	2
Hungary	7.782845	8.027884	7.783552	3
Slovakia	8.07148	7.735772	7.816193	2
Romania	7.806797	7.995232	7.782848	3

Source: Compiled by the author.

member states by the level of digitalization and social work funding is presented in Table 5.

The results of the cluster analysis, which was carried out to typologize countries by the parameters of digitalization and social spending, were obtained by calculating the values for the three centroids representing the digital indicators on the basis of which the clustering was carried out. Thus, three clusters of countries were identified: (1) high level of digitalization and moderate social expenditures, (2) medium digital development and high expenditures, and (3) low EGDI and limited social financing. The findings suggest that the impact of digitalization on social policy is multidimensional and not linear.

The quantitative study identified three clearly defined clusters. The first cluster (Cluster 1) unites countries with a high level of digitalization (especially high OSI values) and moderate social costs. This group includes, in particular, Iceland, Ireland, and Malta. Similar conclusions were reached by Bánhidi and Dobos,<sup>60</sup> who applied cluster analysis based on the parameters of the digital economy and society index and found that Ireland and Malta consistently belong to clusters characterized by advanced digital public services. Similarly, studies on the development of e-governance in the EU, in particular Halaskova,<sup>61</sup> Lnenicka et al.,<sup>62</sup> Doran et al.,<sup>63</sup> emphasized that Malta has achieved

significant improvements in all EGDI sub-indices, including OSI, which positions it among the EU countries with the highest performance in the provision of digital public services. Furthermore, the identified synergy between high levels of digitalization and moderate social spending is consistent with the findings of Behrendt et al.,<sup>64</sup> who argue that in countries with advanced digital systems, technological infrastructure often precedes, but does not automatically ensure, comprehensive investments in social welfare.<sup>64</sup> And Cepiku and Mastrodascio<sup>65</sup> also note that such states often prioritize the efficiency and speed of services over broad social redistribution, confirming our observation of moderate social spending in highly digitalized environments such as Iceland and Ireland.<sup>65</sup>

The second cluster (Cluster 2) represents the largest group of countries characterized by an average level of digital infrastructure and rather high SP expenditures. These include France, Italy, Germany, the Netherlands, and the Scandinavian countries. This cluster reflects a balanced model of combining digital development with a socially oriented policy. In 2023, France allocated 31.5% of its GDP to social payments, the highest share among EU countries, while Italy allocated 30% of its GDP to such expenditures.<sup>5</sup> The Scandinavian countries, known for their comprehensive social security systems, also maintain high levels of social spending. In 2021, Denmark, Norway, and Sweden collected significantly higher shares of GDP from individual taxes (from 19.7% to 24.7%), mainly through personal income taxes and social contributions, compared to 17.5% in the United States.<sup>6</sup> That is, according to the statistics, countries belonging to Cluster 2 prioritize social welfare, but also recognize the importance of digitalization to improve the efficiency and accessibility of public services. The integration of digital tools into social work practice has been proposed to improve the organization and efficiency of social services. To solve this problem, Mitchuk et al.<sup>2</sup> proposed an algorithm for improving the efficiency of organizing and conducting social work through social communications and a methodology for calculating the effectiveness of social work, which can be conveniently implemented digitally. Osian-Gabrie<sup>12</sup> notes that the challenges associated with the digital divide for social inequality (in particular, the digital divide, exclusion from digital services, and displacement in the labor market) are primarily related to the effectiveness of social workers in mitigating these problems by promoting digital literacy programs, promoting equitable digital policies, and implementing innovative service delivery models. In turn, Ardailon et al.<sup>28</sup> prioritize individual needs, quality of life, and social inclusion over technological attractiveness, emphasizing the need to maintain human-centered approaches alongside technological progress.

The third cluster (Cluster 3) includes central and eastern European countries with relatively lower EGDI levels and limited resources for SP, such as Romania, Bulgaria, Latvia, and the Czech Republic. This typology allows us to conclude that the impact of digitalization on social policy is multidimensional and nonlinear;

and, therefore, different trajectories of digital development and social finance can coexist within the same region, demonstrating that digital transformation alone does not guarantee social efficiency of public policy. It is worth noting that Androniceanu and Georgescu<sup>66</sup> conducted a comprehensive analysis of EU countries and found that countries such as Romania, Bulgaria, Poland, the Czech Republic, and Hungary are located in the bottom quadrant of the biplot, indicating a digital divide between these emerging economies and more developed countries in western Europe. This positioning reflects the lower level of digitalization and e-government development in these countries. In addition, despite the fact that Estonia is also included in Cluster 3, a study by Bánhidi and Dobos<sup>60</sup> indicates that Estonia, although not usually classified as a leading country, is consistently among the most or second most developed group of countries (cluster) in terms of digitalization and can serve as an example of best practices, especially in terms of digital public services. At the same time, existing challenges, such as the lack of structured and systematic training in digital skills, pose a significant obstacle to the full integration of digital tools into daily social work practice.<sup>21</sup> In his research, Korkmaz<sup>67</sup> emphasizes the need to develop specialized educational programs that would provide social workers with relevant competencies to work effectively in a changing digital environment.

### Conclusion

This study set out to examine the role of digitalization and innovation in transforming the social work system within EU member states, with a specific focus on the relationship between the level of digitalization and expenditures on social services and social policy. The findings underscore that digital transformation has a measurable and multifaceted impact on both the organization of service delivery and the evolving competencies required of social work professionals.

Digital tools (such as online platforms, automated needs-assessment systems, and communication technologies) are significantly enhancing the efficiency, accessibility, and responsiveness of social services. These innovations contribute to more tailored interventions and timely support, especially crucial in the context of fiscal constraints and the rising demand for social services across the EU.

However, the integration of digital technologies also introduces important limitations and ethical considerations. These include disparities in digital access (which may further marginalize vulnerable groups), concerns about data privacy and informed consent, the erosion of face-to-face professional relationships, and the potential depersonalization of care. Moreover, the reliance on algorithmic decision-making raises questions about transparency, accountability, and bias in service delivery.

The study confirms that the success of digitalization in social services hinges not only on technological readiness but also on strategic investments in human capital—particularly the education and retraining of

social workers to competently navigate and ethically apply digital tools. This is especially urgent during periods of geopolitical instability and global crises, where continuity and adaptability of service delivery become paramount.

Given these insights, the conclusions support the original purpose of the study by highlighting a clear, empirically supported link between the degree of digital integration and patterns of social expenditure. This relationship points to the need for national and EU-level policies that prioritize balanced digital development, ensuring that innovation enhances—rather than undermines—social inclusion.

Future research should focus on further improving models of digital social work, exploring how the latest technologies can be integrated into different social contexts, taking into account the specifics of vulnerable populations. It is especially important to develop methods for evaluating the effectiveness of digital tools in social work, as well as to analyze the ethical, legal, and social implications of digitalization in this area. In turn, a deeper understanding of digital social work will allow for the development of comprehensive strategies aimed at ensuring digital equity and social inclusion in the context of rapid technological evolution.

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