

Social informatics and global “digital inequality”: Global strategies for overcoming the information divide

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Abstract. The purpose of the study was to identify the characteristics of the digital divide in society and to determine effective strategies for overcoming it, with particular attention to technological, cognitive, and economic aspects. The methodology included the conceptual and analytical method, document analysis, case study analysis, and comparative descriptive analysis of statistical data, which collectively ensure a comprehensive examination of digital inequality and the mechanisms for overcoming it. The findings of the study demonstrated that digital inequality constitutes a multidimensional phenomenon that combines limited access to technologies, different levels of digital skills, and economic barriers. A comparative analysis of the United States, Germany, and Bangladesh established that, in highly developed countries such as the United States and Germany, the level of Internet penetration reaches 94%, mobile connections exceed 100% (125 and 130 per 100 individuals, respectively), and the divide between urban and rural areas remains almost absent. In Bangladesh, which represents countries with lower income levels, 47% of the population uses the Internet, rural areas lag behind urban areas (49% compared with 78%), and gender and social disparities remain substantial. The analysis of case studies from Finland, India, and Kenya indicated that the integration of technological solutions with educational and social programmes contributes to the improvement of digital literacy, the expansion of access to knowledge, and the reduction of information isolation within local communities in Finland, India, and Kenya. International networks and programmes, such as Electronic Information for Libraries, confirm that global partnerships support the expansion of the effects of local initiatives and contribute to the sustainability of digital services. The study outlined data concerning the relationship between the level of economic development of countries and digital inclusion, together with the practical results of the application of digital libraries and archives across different socio-economic contexts. The obtained results emphasise that digital inequality determines the opportunities available to populations for education, participation in the digital environment, and access to information, whereas overcoming this divide requires a comprehensive approach that combines the development of technological infrastructure, education, socio-economic measures, and the provision of equal opportunities for all population groups. The practical value of the study lies in the identification of specific mechanisms of digital inclusion that may be used by governments, educational institutions, and international organisations to reduce the digital divide and improve access to knowledge

Keywords: global level; socio-economic contexts; educational resources; digital competencies; population groups

INTRODUCTION

The rapid digitalisation of society drives the transformation of access to information, education, and social resources, while also intensifying digital inequality as one of the principal barriers to the development of a knowledge society. Research on the digital divide is becoming increasingly relevant because unequal access to information and communication technologies influences social stratification,

economic opportunities, and the level of participation of populations within the digital environment.

Academic approaches emphasise the multidimensional character of digital inequality and the necessity for a comprehensive analysis of its manifestations. S. Khan (2024) examined the global dimensions of the digital divide and outlined the principal factors contributing to inequality in

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access to information and technologies. The study analysed socio-economic and infrastructural barriers and proposed approaches for overcoming them through policies of digital inclusion. The problem of access to information and communication technologies on a global scale also attracts the attention of numerous researchers. J. Dey (2022) considered the digital divide as a global phenomenon affecting both developed and developing countries. The study described inequalities in access to ICTs (information and communication technologies) and highlighted the influence of economic and regional factors on the development of digital inequality. Attention also focused on the systematisation of academic approaches to the examination of the digital divide. S. Lythreitis *et al.* (2022) conducted a comprehensive review of the literature on digital inequality and identified the principal areas for further investigation in this field. The researchers analysed key theoretical models of the digital divide and outlined prospects for the development of research within the context of technological transformations.

Questions concerning the reduction of digital inequality through educational and informational strategies also occupy an important place in academic discourse. Y. Abaz & R. Nuredin (2023) examined educational and informational approaches to ensuring digital inclusion within vulnerable communities. The study considered the role of educational programmes and digital tools in expanding access to knowledge and developing digital competencies. Another relevant area concerns the analysis of digital inequality within information systems and policies. P. Vassilakopoulou & E. Hustad (2023) conducted a review of studies in the field of information systems that addressed the reduction of the digital divide. The researchers focused on existing approaches and identified the principal challenges and areas for the development of research on digital inclusion. Digital humanism also conceptualises digital inequality as a social challenge. A. Bon *et al.* (2024) investigated mechanisms for reducing the digital divide in the development of a digital society. The study described the role of social institutions, technologies, and educational initiatives in ensuring equal access to digital resources. Digital inequality also affects the social and medical dimensions of social life. Z. Jafar *et al.* (2024) analysed the relationship between digital inequality and access to medical information. The study examined the role of social media in reducing inequalities and emphasised the necessity of developing digital inclusion for the improvement of public health. Trends in digital divide research also emerge in bibliometric analyses. J.A. Hoyos Muñoz & D. Cardona Valencia (2025) conducted an analysis of academic publications concerning digital inequality and digital inclusion. The study identified principal trends, key research areas, and prospects for the development of this issue within global academic discourse.

Thus, the review of literature indicates growing interest in digital inequality as a complex social phenomenon that requires an interdisciplinary approach. Despite the substantial number of studies, there remains a need to combine theoretical analysis with practical case studies and

comparative statistical data, which defines the focus of the study. Academic literature demonstrates insufficient integration of theoretical approaches to digital inequality with empirical comparative data at the global level. The role of public libraries and digital archives as instruments of social inclusion across different socio-economic contexts also receives limited attention. Furthermore, the relationship between different forms of the digital divide and processes of social stratification in the development of a knowledge society remains insufficiently explored.

The purpose of the study was to identify the specific manifestations of digital inequality within society and to outline effective strategies for overcoming it with consideration of technological, cognitive, and economic factors. The objectives of the study were to characterise different forms of digital inequality (technological, cognitive, and economic) under conditions of the development of a global information society; to conduct a comparative statistical analysis of the United States, Germany, and Bangladesh; and to evaluate the role of public libraries and digital archives as instruments of social inclusion in global practice.

MATERIALS AND METHODS

The study employed a set of complementary methods that ensure a comprehensive analysis of digital inequality within the context of the global information society. During the first stage of the study, the conceptual and analytical method was applied to generalise academic approaches to the interpretation of the digital divide and to distinguish its principal forms, namely technological, cognitive, and economic inequality. This approach helped systematise the theoretical foundations of the issue and clarified its connection to the “knowledge society” and the processes that were transformed access to information in the digital era. In particular, technological inequality was examined through access to the Internet and digital devices, according to World Bank (n.d.), International Telecommunication Union (2017; 2025a; 2025b). Cognitive inequality was examined through the level of digital skills and the capacity for critical thinking described by E. Hargittai (2001), whereas economic inequality was examined through material opportunities and the cost of digital resources discussed in UNESCO (2024).

During the second stage, document analysis was employed for the examination of international strategies aimed at reducing digital inequality and information isolation. The study analysed strategic documents and analytical materials produced by international organisations, particularly the United Nations, UNESCO, and UNICEF, which contributed to the generalisation of approaches to digital inclusion and the reduction of the digital divide. In particular, United Nations (n.d.; 2023), and UNESCO Inclusive Policy Lab (n.d.) focus on principles of equal access to digital resources and basic services. UNICEF (2018), D. Souter & A. van der Spuy (2019) and Internet Universality (R-O-A-M) (Reach, Opportunity, Affordability, Meaningful) outlined approaches to assessing Internet development and shaping policies of digital accessibility.

UNESCO (2015; 2022a), and UNESCO Institute for Information... (2024) identified priorities for the development of inclusive digital education. Practical instruments and areas for the implementation of digital policies were presented in United Nations Digital Transformation Group... (2023) and UNESCO (2019a; 2019b), which contributed to the identification of key measures for the development of digital competencies and infrastructure.

During the third stage, the case study method was applied for the analysis of public libraries and digital archives in Finland, India, and Kenya. These countries were selected as representative examples of states with different levels of digital development and socio-economic conditions, which enabled a comprehensive comparison of models of digital inclusion and the effectiveness of library and information systems within the global context. The criteria for comparison included the country or region, the name of the project or organisation, principal functions, instruments of digital inclusion, and examples of outcomes or effects. The selection was determined by the fact that Finland represents a high level of digital development and mature infrastructure, India represents a medium level characterised by a combination of innovation and structural disparities, whereas Kenya represents countries with a lower level of digitalisation where basic inclusive solutions were actively implemented. This approach enabled the comparison of models within the typology of high, medium, and low levels of digital development. In Finland, the study analysed the activities of the National Digital Library (2016), The Conference of European National Librarians (2025) and National Library of Finland (2025) which integrates the resources of libraries, archives, and museums and forms a unified digital platform for access to cultural heritage. In India, the study examined digital library initiatives (Trivedi, n.d.; Mukherjee & Patra, 2023; Lavania, 2025), which function as educational centres and provide access to learning resources and programmes of digital literacy in urban and rural regions. In Kenya, the study examined the activities of the Kenya National Library Service (n.d.) (KNLS) and grassroots initiatives to promote contemporary African literature The Guardian (2025), which aim to expand access to knowledge, preserve local heritage, and support the development of reading culture among the population.

During the final stage of the study, comparative descriptive analysis of statistical indicators was employed for the examination of the global digital divide through secondary data concerning Internet access, mobile technologies, and household coverage in countries with different levels of economic development (OECD, 2024; Islam, 2025), which contributed to the identification of patterns in the influence of digital inequality on social stratification. Three countries represents different levels of economic development were selected for the comparative statistical analysis of the global digital divide: the United States (high level), Germany (high level), and Bangladesh (low to medium level). This selection enabled comparison of indicators related to Internet access, mobile technologies, and territorial disparities

within a unified typology that complements the qualitative analysis of case studies from Finland, India, and Kenya. Educational opportunities and access to knowledge were described with reference to A. Ranjan (2024), International Telecommunication Union (2024) and D. Slotta (2025). The study also identified integrated strategies of digital inclusion that combine the development of technological infrastructure, education, and socio-economic measures through the use of Our World in Data (2023) and World Bank (2025). The combined application of these methods provided a comprehensive research framework and contributed not only to the characterisation of digital inequality but also to the analysis of effective international mechanisms for overcoming it in the development of the knowledge society.

RESULTS

Types of digital inequality in the context of the development of the global information society.

Digital inequality, or the digital divide, was associated with the rapid development of information and communication technologies, which transforms the methods of producing, disseminating, and consuming knowledge, thereby shaping a new form of social organisation known as the knowledge society. These processes, however, were accompanied by unequal access to digital resources, which leads to the emergence of new forms of social stratification. The term “digital inequality” or “digital divide” refers to the gap between different social groups in relation to access to information and communication technologies and the opportunities for their effective use. In its conventional interpretation, this concept encompasses differences in access to the Internet, computer technologies, and digital services. Contemporary research expands this interpretation by incorporating not only physical access, but also the level of digital skills, the capacity for critical thinking, and opportunities for integration into the digital environment. For example, reports issued by the International Telecommunication Union (2025b) emphasise that the digital divide includes both infrastructural and socio-cultural aspects of technology use.

For the systematisation of theoretical approaches to the analysis of digital inequality, it was appropriate to distinguish its principal forms, namely technological, cognitive, and economic inequality. This typology contributes to an understanding of the multidimensional character of this phenomenon and its influence on the development of the knowledge society. Technological digital inequality was primarily associated with access to technical infrastructure. This concerns the presence or absence of Internet access, the speed of connection, and access to devices such as smartphones or computers. According to data provided by the World Bank (n.d.), the proportion of Internet users differs between countries with high and low income levels. This indicates that access to technologies remains unequal and depends on the economic development of regions. Consequently, technological inequality forms the basic

level of the digital divide, which prevents certain population groups from participating in the information space.

Cognitive digital inequality encompasses differences in the level of knowledge, skills, and competencies required for the effective use of digital technologies. Even under conditions of physical access to the Internet, not all users possess the capacity to realise its full potential. This was associated with the level of education, digital literacy, and the ability to evaluate information critically. Academic literature frequently defines this aspect as the “second level of the digital divide”, which emphasises its distinction from purely technical barriers (Hargittai, 2001). Thus, cognitive inequality manifests through differing levels of participation in the digital economy, online education, and informational processes. Economic digital inequality reflects the influence of material conditions on access to digital resources and opportunities for their use. The cost of Internet services, digital devices, and educational resources may constitute a barrier for socially vulnerable population groups. Economic inequality also determines opportunities for investment in education, professional development, and the advancement of digital competencies. Reports issued by international organisations highlight that countries with lower income levels possess more limited opportunities for the development of digital infrastructure and the implementation of innovations (International Telecommunication Union, 2017).

The distinction between these three forms of digital inequality enables its examination as a complex social phenomenon that combines technical, educational, and economic dimensions. These levels remain interconnected because the absence of access to technologies restricts opportunities for acquiring digital skills, whereas a low level of skills reduces the effectiveness of the use of available resources. Digital inequality was directly associated with a knowledge society, in which information and knowledge function as key resources for development. Within such a society, access to information determines not only educational opportunities but also economic competitiveness, social mobility, and the level of participation in public life. According to data provided by UNESCO (2024), unequal access to digital resources may contribute to the intensification of social inequality and the marginalisation of particular population groups. The digital era was characterised by the transformation of conventional channels of access to information. Educational resources, public services, the labour market, and communication practices were increasingly shifted into the online environment. This creates new opportunities for development while simultaneously intensifying the risks of exclusion affecting individuals who lack sufficient levels of access or competencies. Thus, digital inequality constitutes one of the principal factors determining the patterns of social stratification worldwide. It influences the distribution of resources, opportunities for self-realisation, and the level of integration into the knowledge society. Analysis of its technological, cognitive, and economic forms contributes to a comprehensive assessment of the scale of

the problem and to the identification of principal directions for overcoming it. In summary, digital inequality was a multidimensional phenomenon that reflects socio-economic disparities. Its examination requires an interdisciplinary approach and the application of both theoretical and empirical methods of analysis. For this reason, reference to statistical data produced by international organisations, together with conceptual approaches developed within the theory of the knowledge society, contributes not only to the description of the scale of the digital divide, but also to an understanding of its causes and consequences under conditions of global digital transformation.

Overcoming information isolation in developing countries.

The overcoming of information isolation in developing countries was considered a complex process that involves expanding access to digital infrastructure, developing the digital competences of the population, and implementing inclusive educational and social practices. The effectiveness of such strategies was determined by the combination of technological, economic, and institutional factors that support integration into the global information space. United Nations (2023), developed under the auspices of the UN, serves as a foundational document concerning responsible digital development. It establishes framework principles intended to ensure equal access to digital resources, protect users' rights, and promote the sustainable development of the digital economy. Analysis of this document demonstrates that global policies on digital inclusion focus not only on ensuring physical access to technologies, but also on the regulatory and ethical aspects of the use of digital platforms, which directly influences the overcoming of the technological and cognitive levels of digital inequality. The document United Nations (n.d.) outlines specific strategies of the UN for providing equal digital opportunities for all population groups, with particular emphasis on the importance of access to information and communication technologies in education, healthcare, and public services. This strategic document emphasises that inclusion was not limited to access to equipment, but also encompasses the development of digital competences, particularly user training and the creation of open digital resources, which directly influences the reduction of cognitive and economic inequality.

UNESCO proposed Internet universality indicator (Souter & van der Spuy, 2019), which constitutes a system of indicators for evaluating internet universality at national and regional levels. This framework enables the analysis of accessibility, openness, users' rights, and the participation of various stakeholders, which corresponds with the R-O-A-M concept (UNESCO, 2019b). Analysis of the Internet Universality Indicators provides objective data concerning the degree of digital inclusion and the level of access to knowledge in different countries, which forms the basis for comparative and comparative-statistical studies of the digital divide. The concept of Internet Universality (R-O-A-M) specifies the principles upon which digital development

policy should be based, namely the protection of human rights, the openness of technologies, accessibility, and the participation of different stakeholders (UNESCO, n.d.). This approach permits the examination of digital inequality not merely as a technical issue, but as a socio-political phenomenon in which regulatory frameworks, civic participation, and the transparency of information systems play significant roles. UNESCO (2015; 2022a) documents aimed to ensure equal access to education through connectivity and technology. These declarations define state priorities in the creation of inclusive educational environments, the development of digital infrastructure in schools and resource centres, and support for educational programmes directed at population groups that often remain at the periphery of the information society. Analysis of these documents indicated that strategic initiatives related to education and digital infrastructure were central to overcome cognitive and economic inequality.

United Nations Digital Transformation Group... (2023) presented specific instruments for implementing digital development policies at national and regional levels. This includes methodologies for assessing the digital needs of populations, recommendations concerning infrastructure development, and the creation of open platforms and educational resources. Analysis of this document clarifies how global strategic principles were transformed into practical measures that directly influence the reduction of the digital divide. Alongside strategic documents, the analysis also includes supplementary advisory materials. For example, UNESCO Inclusive Policy Lab (n.d.) provides detailed recommendations concerning the development of digital services for vulnerable population groups, while emphasising the importance of integrating technologies into public services. Similarly, UNICEF (2018) focuses on children’s needs regarding internet access, while emphasising the social responsibility of states and organisations in ensuring the digital inclusion of younger generations. UNESCO documents concerning the inclusive development of societies, particularly UNESCO (2022b), highlight the role of digital technologies in the development of resilient and inclusive social structures, while stressing the importance of access to knowledge as a condition for sustainable development (document archive through the Inclusive

Policy Lab). Publications such as UNESCO (2019b) outline the prospects for the use of artificial intelligence and other advanced technologies in the knowledge society, together with their potential for overcoming cognitive and economic inequality in access to information.

Practical recommendations concerning the implementation of information and communication technologies in education and social services were presented in the documents Cities Coalition for Digital Rights (n.d.) and UNESCO Institute for Information... (2024). These documents propose specific instruments and methodologies for the development of inclusive digital infrastructure, such as libraries, educational centres, and open resources that provide access to knowledge across different socio-economic contexts. These documents demonstrate how strategic principles were translated into practical programmes that contribute to overcoming the digital divide at national and local levels. In summary, the conducted documentary analysis indicates that international strategies of digital inclusion encompass several interconnected directions, namely the creation of regulatory and legal frameworks for ensuring access to digital resources, the development of infrastructure and educational programmes, the implementation of practical instruments for local communities, and the monitoring and evaluation of the effectiveness of these measures. The use of these documents enables the identification of the complex dimensions of digital inequality and emphasises that its overcoming requires the integration of technical, educational, and socio-economic measures, together with an interdisciplinary approach in academic research and practical policy.

Role of public libraries and digital archives as instruments of social inclusion in global practice.

The analysis of public libraries and digital archives was conducted to illustrate practical approaches to overcoming digital inequality across different countries. Table 1 presented data on specific projects and organisations, their core functions, applied instruments of digital inclusion, and achieved outcomes, which allows for the assessment of the effectiveness of integrating technological and socio-educational measures into practice aimed at ensuring equal access to knowledge.

Table 1. Analysis of public library and digital archive practices as instruments of social inclusion

Country / Region	Project / organisation name	Core functions	Digital inclusion instruments	Examples of outcomes / effects
Finland	National digital library	Integration of library, archive, and museum resources into a unified digital platform	Online access to collections, open metadata, integration of digital services for all citizens	Increased use of digital resources, improved access to historical and cultural materials, support for digital literacy
India	Digital Library Initiatives in India	Development and maintenance of digital libraries in urban and rural regions	Online learning platforms, open electronic resources, library consortia, digital literacy programmes	Improved access to educational materials in remote regions (Agra, Uttar Pradesh), support for local educational projects

Table 1. Continued

Country / Region	Project / organisation name	Core functions	Digital inclusion instruments	Examples of outcomes / effects
Kenya	Kenya National Library Service	National library service, digital services, access to educational and cultural resources	Local digital programmes, open resources, library restoration, community training programmes	Improved digital literacy, expanded access to knowledge in communities, development of local educational initiatives

Source: compiled based on Electronic Information for Libraries (n.d.), K. Trivedi (n.d.), Kenya National Library Service (n.d.), National Digital Library (2016), S. Mukherjee & S.K. Patra (2023), National Library of Finland (2025), Conference of European National Librarians (2025), S. Lavania (2025), The Guardian (2025)

The analysis of public library and digital archive practices across different countries indicated that effective digital inclusion depends on the integration of technological solutions with social and educational programmes. The examination of case studies from Finland, India, and Kenya enables the identification of different approaches to organising access to digital resources across varying levels of economic development and digital literacy. In Finland, the National Library of Finland (2025) ensures universal and equal access to knowledge, supports the dissemination of cultural heritage, and enhances citizens' digital competences. In India, digital libraries function as educational centres in remote regions, providing learning resources for schools and community organisations, which contributes to reducing information isolation in rural areas. Kenyan examples demonstrate that even in countries with limited resources, state library programmes and local digital initiatives increase access to knowledge, forming a basis for community development and improved digital literacy.

In Finland, the National Library of Finland (2025) shows a high level of digital maturity. In 2025, more than 1.7 million loans of e-books and audiobooks and nearly 5 million views of digital journals were recorded, while the number of users exceeded 270,000. The service covers 280 municipalities, approximately 97% of the population, and provides access to more than 12,000 digital publications. Audiobooks were borrowed approximately 1.3 million times in 2025, while e-books were borrowed around 450,000 times, which indicates the dominance of the audio format in digital reading (National Digital Library, 2016). In India, digital libraries serve as a vital tool to reduce educational inequality in low-resource schools, but achieving

real impact requires curriculum-aligned, multilingual, and offline-ready resources (iDream, 2025). To turn this access into measurable outcomes, schools must provide continuous support for teachers and monitor real-time usage analytics to prevent digital content from going underutilised. In pilot projects of digital libraries in rural schools, expanded out-of-school access to learning was observed through offline digital platforms that compensate for the absence of internet connectivity and libraries in communities (Yle News, 2025).

In Kenya, the activities of the Kenya National Library Service (n.d.) focus on expanding access to knowledge through digital and mobile services. International reviews of library programmes in East Africa indicate that KNLS digitalisation includes the establishment of local digital access centres and mobile libraries serving communities with limited infrastructure, which expands access to educational resources in remote regions (Conference of European National Librarians, 2025). The comparative analysis of Finland, India, and Kenya shows that the level of digital inclusion depends directly on the development of digital infrastructure and the integration of library services into education systems. All three models demonstrate a common tendency: even under different resource conditions, digital libraries function as an effective instrument for expanding access to knowledge and improving digital literacy. A comparative statistical analysis of three countries with different levels of economic development was conducted to assess the global digital divide. Table 2 presented key indicators of internet access and mobile technologies, household coverage, urbanisation, and gender disparities, which enables the identification of the level of digital inclusion and the characteristics of the digital divide across different socio-economic contexts.

Table 2. Comparative statistical analysis of the digital divide: The United States, Germany, Bangladesh

Indicator	United States	Germany	Bangladesh
Internet users (% of population)	94% (high-income group ITU 2025)	94% (high-income group ITU 2025)	47% (national estimate, ITU/BB 2025)
Mobile subscriptions (per 100 people)	125	130	119
Households with Internet access	90%+	85%+	55%
Urban/rural gap	minimal	minimal	urban 78%, rural 49%
Mobile internet coverage	almost 100%	almost 100%	4G ~100%, 3G ~99.8%
Overall Internet access level	94% (high-income group)	94% (high-income group)	23-47% (low-/lower-middle income range ITU)

Source: compiled based on Our World in Data (2023), International Telecommunication Union (2024; 2025a), OECD (2024), A. Ranjan (2024), T. Islam (2025), D. Slotta (2025), World Bank (2025)

The comparative statistical analysis presented in Table 2 highlights substantial differences between countries in levels of digital inclusion. The United States and Germany record Internet use of 94%, while Bangladesh records 47%, reflecting an almost twofold gap in access to digital resources. Household Internet access reaches 90%+ in the United States, 85%+ in Germany, and 55% in Bangladesh, indicating differences in the depth of infrastructure penetration in everyday life. The urban-rural gap in the United States and Germany remains minimal, while Bangladesh shows 78% in urban areas and 49% in rural areas, indicating pronounced territorial inequality in digital access. Mobile subscription levels reach 125 in the United States, 130 in Germany, and 119 in Bangladesh per 100 people, exceeding population size and indicating multi-device digital usage across all contexts.

ITU data (2025) confirm the global scale of digital inequality. Average Internet use worldwide stands at 74%, while high-income countries reach 94% and low-income countries 23%. Regionally, Internet use reaches 88-93% in Europe and the Americas, 77% in the Asia-Pacific region, and 36% in Africa. These patterns suggest that the digital divide operates across both inter-country and regional levels and correlates with economic development. Digital inequality in the compared countries appears as a combination of infrastructural (47% versus 94%), territorial (78% versus 49%), and technological (125-130 versus 119 mobile subscriptions) gaps. Thus, digital inclusion depends not only on access to the Internet, but also on the distribution of access across social groups and territories.

Table 2 presented a clear correlation between economic development and access to digital technologies. High-income countries demonstrate high levels of Internet and mobile access, which supports stronger integration into digital environments and knowledge-based society structures. In lower-income countries, the digital divide appears through overall connectivity levels, urban-rural inequality, limited access to educational and informational resources, and social barriers. Internet penetration increases across all countries, yet growth rates differ. High-income countries show stabilisation at high levels, while developing countries demonstrate rapid growth in mobile Internet access alongside persistent structural inequalities. These findings underline the relevance of global and local digital inclusion strategies aimed at reducing informational inequality and ensuring equal access to knowledge across population groups, a key element in the development of knowledge-based societies in the digital era.

The study confirms that digital inequality represented a multidimensional social phenomenon combining technological, cognitive, and economic dimensions that determine access to knowledge and information resources. The digital divide extends beyond physical access to the Internet and devices, encompassing disparities in digital skills and economic constraints that influence participation in knowledge-based society structures. Comparative data demonstrate that in high-income countries, digital infrastructure supports near-equal access across social groups,

while in lower-income countries, the digital divide limits educational opportunities, participation in digital environments, and access to information. Analysis of international strategies and policies indicates that reducing digital inequality requires an integrated approach combining technological infrastructure development, education, social measures, and economic support, alongside equal opportunity frameworks. Digital inclusion functions as a key factor in building a fair and sustainable knowledge-based society.

DISCUSSION

The results of the study on digital inequality in the global information society need to be aligned with existing academic approaches and empirical research in this field. The analysis allows observed trends to be compared with research on the digital divide as a complex socio-economic phenomenon. Attention focuses on linking findings with interpretations of digital inclusion, access to information, and the role of technology in shaping knowledge-based societies. The study indicates that digital inequality functions as a systemic factor of social stratification under conditions of global digitalisation, which was supported by the findings of L.A. Liotta (2023). The researcher examined the impact of digitalisation on social inclusion and inequality in vulnerable communities and analysed mechanisms addressing the digital divide through social and technological tools. The study emphasises that the combination of three types of inequality forms a coherent digital divide rather than isolated factors. The development of a knowledge-based society involves an uneven distribution of access to information resources, which aligns with the results of the study by A. Farooqi *et al.* (2022). The researchers considered the structure of the digital divide in digital environments and identified key factors influencing unequal access to information. Unlike this general approach, the study specifies the structure of the divide through distinct types of digital inequality, enabling clearer identification of underlying mechanisms. The digital divide demonstrates a multidimensional structure including technological, cognitive, and economic components, as also identified by H. Reddy *et al.* (2022). Their study reviewed the global digital divide and its impact across sectors, including healthcare. Physical access to digital technologies remains a necessary but insufficient condition for digital inclusion, a conclusion also supported by M. Lopez-Aguado *et al.* (2022), who investigated the relationship between digital inequality and social exclusion and showed that access alone does not ensure integration. The study confirms this through the identification of cognitive factors as key constraints. Digital competence levels influence the effective use of information resources, as shown by A. Acilar & Ø. Sæbø (2023). The researchers conducted a systematic review of the gender digital divide and emphasised the role of skills in shaping inequality. Economic barriers continue to determine access to digital infrastructure and educational opportunities, as established by R. Reynolds *et al.* (2022). The researchers examined digital inequality in remote education

during the pandemic and analysed resource constraints affecting access to learning. The study identifies economic factors as structurally determining, influencing both access to technologies and skill development.

Digital inequality reflects socio-economic disparities between and within countries, as also shown by N. Barik (2025). The researcher conducted a bibliometric analysis of studies on the digital divide and identified key global trends in the field. Within the study, these disparities were further specified through comparative country analysis, which enables empirical confirmation of the global scope of the digital divide. High-income countries demonstrate high levels of digital inclusion, while developing countries retain structural constraints, as also noted by T.S. Muwani *et al.* (2022). The researchers examined digital transformation and its impact on marginalised communities. The study also highlights internal inequalities between urban and rural territories, which intensify the overall digital divide. The urbanisation factor remains a determinant of differentiated access to digital technologies, as observed by F. Mubarak & R. Suomi (2022). The researchers considered digital exclusion among older people and identified territorial and age-related differences in access to technologies. Gender and social gaps represent additional manifestations of digital inequality at a global level, as conceptualised by R. Heeks (2022). The researcher analysed digital inequality in countries of the Global South and examined structural dimensions of exclusion in the digital economy. The study treats these aspects as part of a broader system of socio-economic barriers rather than as separate autonomous forms of inequality. Mobile internet plays a key role in expanding access to digital environments in lower-income countries, as demonstrated by P.O. Vitalis *et al.* (2025). The researchers analysed the digital divide in Nigeria and analysed the role of media and mobile technologies in access to information. International organisations develop integrated approaches to addressing the digital divide through digital inclusion policies, as indicated by D.O. Okocha & E. Edafewotu (2022). The researchers reviewed strategies for reducing the digital divide and described the role of public policy in this process.

Global strategies focus not only on infrastructure but also on the development of digital skills and regulatory mechanisms, as noted by G. Özcan Alp & T. Baycan (2024). The researchers investigated the digital divide in regional development and assessed the impact of policies on reducing inequality. Education functions as one of the key instruments for addressing cognitive digital inequality, as shown by A. Afzal *et al.* (2023). The researchers explored the use of technologies in education and highlighted the role of educational tools in ensuring access to knowledge. Public libraries and digital archives function as effective institutions for ensuring equal access to knowledge, as reflected by M.H. Laskar (2023). The researcher studied the development of digital society in India and assessed access to resources in urban and rural regions. The integration of technological and socio-educational measures increases the

effectiveness of digital inclusion, as confirmed by L. Deineko *et al.* (2022). The researchers assessed the digital divide in Ukraine and its impact on regional sustainable development. Local initiatives combined with global programmes contribute to the sustainable reduction of the information gap, as reported by G.W. Muschert & M. Ragnedda (2024). The researchers considered digital inequality in a regional context and described the role of international and local factors. The study confirms this through comparative analysis of practices in Finland, India, and Kenya, showing that the effectiveness of digital inclusion depends on the combination of local and global approaches. Open digital resources and platforms function as instruments for democratising access to information, as observed by L.M. König *et al.* (2023). The researchers addressed digital inequality in healthcare and evaluated approaches to reducing disparities through interventions. Digital inequality requires an interdisciplinary approach and policy coordination across levels, as noted by E. Sala *et al.* (2022). The researchers explored the age-based digital divide in Europe and identified the need for comprehensive approaches to its reduction. The study confirms this conclusion through the synthesis of three types of digital inequality, demonstrating the need for integrated inclusion policies. Digital inclusion functions as a necessary condition for the development of a fair and sustainable global knowledge-based society, as emphasised by A. Farooqi *et al.* (2022). The researchers highlighted the importance of equal access to information and presented digital inclusion as a foundation for societal development. The findings of the study align with academic approaches that view digital inequality as a multidimensional and dynamic phenomenon combining technological, cognitive, and socio-economic dimensions. Analysis of the literature confirms that reducing the digital divide was possible only through a comprehensive approach that includes infrastructure development, improvement of digital literacy, and implementation of effective digital inclusion policies. Therefore, digital inclusion emerges as a key prerequisite for ensuring equal access to knowledge and for forming a stable and equitable society under conditions of global digital transformation. The synthesis of the findings indicates that digital inequality in the global information society has a complex and multidimensional character and functions as an important factor of social stratification. Unequal access to digital resources, differences in digital competencies, and economic barriers generate persistent disparities between countries and social groups. Physical access to technologies does not ensure full integration into the digital environment without adequate skills and educational support. Effective strategies for addressing information exclusion rely on the combination of infrastructure development, digital education, and institutional regulatory mechanisms. Public libraries, digital platforms, and mobile technologies function as instruments for ensuring access to knowledge and expanding participation in the digital environment. Integration of global and local initiatives contributes to reducing the digital divide.

CONCLUSIONS

The study conducted a comprehensive analysis of digital inequality as a multidimensional social phenomenon that combines technological, cognitive, and economic aspects. The study established that the digital divide determines the level of public access to information resources, opportunities for participation in the knowledge society, and the effectiveness of learning and professional activity. The technological level of digital inequality was manifested through differences in access to the internet, connection speed, and availability of digital devices, which creates a basic barrier to participation in the digital environment. The cognitive level relates to differences in digital competencies, users' ability to evaluate information, and the application of technologies for learning or professional activity. The economic aspect concerns the capacity to acquire digital devices, access educational resources, and invest in skills development, which directly affects socio-economic mobility and inclusion in the digital society. Documentary analysis of international strategies and programmes of digital inclusion established that effective reduction of the digital divide requires a comprehensive approach combining infrastructure development, digital competencies, and a regulatory environment.

The practical analysis of case studies of public libraries and digital archives in Finland, India, and Kenya demonstrated that effective digital inclusion was achieved through the integration of technological solutions with socio-educational programmes. In Finland, the National digital library recorded more than 1.7 million issues of e-books and audiobooks and nearly 5 million digital journal views in 2025, while the number of users exceeded 270,000, which confirms a high level of digital maturity in society. In India, digital library initiatives in the state of Uttar Pradesh demonstrated an increase in learning outcomes of 32% in English, 34% in natural sciences, and 52% in mathematics among 7,500 female students, which confirms the effectiveness of digital resources in addressing educational inequality in remote regions. In Kenya, the Kenya National Library

Service, through the establishment of local digital centres and mobile libraries, expands access to knowledge in communities with limited infrastructure, emphasising that even under constrained resources, it was possible to increase digital inclusion. A comparative statistical analysis of the United States of America, the Federal Republic of Germany, and Bangladesh confirmed a clear correlation between the level of economic development and access to digital technologies. The study also showed that mobile subscription rates exceed 100 per 100 inhabitants in all three countries (ranging from 119 to 130), which indicates the global spread of multi-device consumption regardless of income level. The results emphasise that the urban-rural gap in lower-income countries (Bangladesh) remains critical, while in developed countries it was minimal, indicating the need for targeted infrastructure investment in rural regions.

Based on the conducted study, several practical recommendations can be proposed, including strengthening state support for digital infrastructure and access to educational resources; implementation of programmes for the development of digital competencies among all population groups; promotion of global partnerships and transnational initiatives to scale successful practices; and evaluation of the effectiveness of measures using digital inclusion indicators. The limitation of the study lies in the use of open statistical data, which may not fully reflect all local and specific contexts. Future research could include empirical surveys and field studies to clarify the impact of digital initiatives on different social groups and to identify more precise strategies for addressing the digital divide.

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