

Exploring the Impact of Information Technology on the Social Inclusion of People with Disabilities in the Digital Age

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Abstract

In the era of globalization changes of the third millennium, socialization of people with disabilities is a sign of democratic development of the state, which is especially relevant in the period of rapid spread of information technologies. The aim was to study the effectiveness of the application of Internet technologies to improve the quality of life of people with disabilities by analyzing the components of this direction. The dynamics of reforming the sphere in the time aspect was considered, and also, using the statistical method, the performance indicators of the studied problem were determined. The state support of the most vulnerable and unprotected representatives of the population in the XXI century is one of the fundamental factors of the successful development of the country under the scenario of becoming a democratic and legal subject of international relations. Approaches and methods to socialization of people with

disabilities differ from region to region, but almost all of them include elements of information and communication technologies. The Republic of Kazakhstan has developed and operates a quite modern and flexible system of social protection for the population with special developmental needs; at the same time, there are many unresolved problems and complex aspects in this area, in particular, in the sphere of information support for this category of population. An important factor in Kazakhstan's policy of supporting such categories of people is the understanding of the problem and the desire of the leadership to use the best international practices to implement positive experience in the national context. Comparing the activities of Kazakhstan and Japan, it can be said that Tokyo, as the capital of an advanced technological country, in this direction is in a much more favourable position, as strategies for the protection of people with disabilities have been developed there for many decades, their effectiveness, and efficiency have been confirmed by years of practice. The results and conclusions of the work can be used as a practical basis, in addition, for the development of new state strategies to support people with disabilities.

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Keywords

Barrier-free • Basic Needs • Stigmatization • Digital Technology • Socialization

1. Introduction

The rapid development of information technologies at the turn of the XX and XXI centuries has contributed to the emergence of completely new types of interaction between people with each other. The Internet is now used not only for education and work, but also for leisure, finding new hobbies, interests, and acquaintances. Information technologies create a new world, a new reality where everyone can behave freely, without feeling any barriers, to be “like everyone else”. This factor is especially important for people with disabilities, who, due to their peculiarities, feel obstacles, problems, and barriers on the way to healthy integration into society. The study of the topic of the influence of information and communication technologies on the successful “insertion” into society of people with disabilities is relevant and timely. Such people have identified new technologies as a means for their integration, so they actively accept, explore opportunities, find ways to use them for their benefit. In the conditions of a rapidly changing world order, reformatting traditional types and forms of human communication and creating fundamentally new formats of interaction in society, equal participation of people with disabilities in all events related to the life of their country and population, is one of the key features of a democratic and legal state of the third millennium.

The Internet, social networks and various digital applications have gained unprecedented importance in the XXI century (Zaitseva *et al.*, 2023). Their role and influence in society can hardly be overestimated, because with the help of these information technologies, it is possible to achieve not only educational and employment goals, but also to find peace of mind, to distract oneself for a while from the problems of real life. People with disabilities are active users of these technologies, with their help they communicate with the world around them, satisfy their desires and achieve their goals (Ponomarenko *et al.*, 2021). However, this process is complex and multifaceted, it has many nuances and dangers to maintain a balance between real life and life in virtual space. It is therefore crucial to explore the ways in which people with disabilities interact with society, to understand how digital technologies affect them and how this communication can be improved without damage and with benefits for both the individual and the state as a whole, which seeks to develop along the path of democratic and legal transformation.

Social policy, along with political, economic, industrial and other processes, should be in the sphere of increased attention on the part of the state, because it is the balanced decisions in this direction that form the legal norms of a democratic state. Shi *et al.* (2022) believed that

the well-being and prosperity of the population living in a certain state directly affects the implementation of the Sustainable Development Goals defined by the United Nations (UN) programme by the leadership of their state. In order to achieve the targets, set out in the Goals, it is important to transform and harmonize all sectors of public and social development, and the place to start, according to Sánchez-Serrano *et al.* (2020), is with education – inclusive and barrier-free. However, only a highly developed and democratic state can modernize the social sector evenly and equitably.

The inclusion of people with disabilities in social processes – study, work, leisure – is crucial in terms of compliance with legal norms and principles of world standards, according to which in the XXI century, it is necessary to use all available mechanisms, and firstly, it is, according to the conclusions of Varriale *et al.* (2023), refers to information technologies. As Hasan & Prity (2024) point out, information, and communication technologies have the potential to bring about significant environmental transformations for people with disabilities. Semary *et al.* (2024) believed that the introduction of new information tools, such as the smart home system or the Internet of Things, contributes to a qualitative improvement in the standard of living of people with disabilities and promotes their positive integration into public life. At the same time, it is critical to maintain a balance and not allow a person to be completely “immersed” in the online environment because of real life situations.

In different regions of the world, the introduction of information technology into the daily lives of people with developmental disabilities is uneven and is mainly related to this, according to Abdina *et al.* (2023), with different levels of economic development and the state of the political system. The effectiveness of the implementation of inclusive society projects in the Republic of Kazakhstan, according to Sailauova (2020), is at a sufficiently acceptable level, but this trend is not typical for all regions of the country. In order to successfully achieve the Sustainable Development Goals in the context of creating an inclusive society, according to Shinekeneva (2022), it is important to form an effective, flexible and transparent legal field for the implementation of activities within the generally accepted framework, and also, in conformity with A. Figus and Shaikin (2019), to create intelligent infrastructures in the sphere of social interaction for digitalization of all processes in the life of people with disabilities.

Previous studies have missed such a circumstance as the general level of technological and information training of people with disabilities, through which they will become more “open” to learning new skills and exploring modern, digital ways for successful socialization in society.

The aim is to outline the positive and negative effects of the impact of information technology on people with disabilities through a generalization of the specific features of this type of activity. The objectives of the research were to study the features of state support for people with disabilities in the XXI century; to analyse and evaluate the activities of the Republic of Kazakhstan in the sphere of protection of the most vulnerable categories of people with the help of information technologies; to identify the problems of socialization of people with disabilities and ways to solve them by using the possibilities of Internet technologies.

2. Materials and Methods

The research focused on various qualitative and quantitative statistical data. By analysing them, it became possible to identify certain trends in the development of certain areas of government activity in the sphere of protecting the rights of people with disabilities. In order to generalize common and distinctive features and summarize similar trends in the dynamics of transformational processes of the impact of information technologies on the lives of people with disabilities, different time periods (the late 1980s, mid-1990s, and early XXI century) were considered. The process of comparing the specific features and structural elements of social policy in such countries as the Republic of Kazakhstan and Japan, which has one of the most developed and innovative social systems in the world, became a result. Based on the analysis of specific features in such areas as the state of socio-economic systems, peculiarities of political systems, as well as the level of medical care, public institutions and social services, it was possible to identify and assess the distinctive elements of each of the two countries. With the purpose of a more detailed analysis of the issue under study, namely, the influence of information technologies on the processes of integration of people with disabilities into full-fledged public communication, the main constituent elements of the direction were studied. Namely, key concepts, terms and definitions, normative documents regulating the sphere, characteristic features and distinctive features, basic statistical data, the main stages of historical development, as well as the main innovative solutions for digital integration of the most vulnerable categories of the population.

In order to form more comprehensive conclusions in the context of studying the introduction of various information technologies into the daily lives of people with developmental disabilities, as well as to form a broad practical basis for generalizing the findings of this research area, data from the Bureau of National

Statistics (2023a; 2023b; 2023c; 2024), World Health Organization (2023), and the following materials were selected, analysed and used: Convention on the Rights of Persons with Disabilities (CRPD) (2008), Law of the Republic of Kazakhstan on State Services (2013), Resolution of the Government of the Republic of Kazakhstan “On Approval of the National Plan to Ensure the Rights and Improve the Quality of Life of Persons with Disabilities in the Republic of Kazakhstan until 2025” (2019), Strategy 2030. Creating a prosperous, inclusive, resilient and sustainable Asia and the Pacific (2018), Chart of the Week: Japan Demographics (2023), Number of Beneficial Owners of National Pension, Progress on Disability Rights Risks going in Reverse: Guterres (2024), Disability in the EU: Facts and Figures (2023), Social Protection of Persons with Disabilities (2023), Japan’s Senior Population Falls for the First Time on Record (2023), Japan’s Birth Rate Hits Record Low in 2023 (2024).

These materials became a support for the research presented in the context of the analysis of ways and scenarios of development of some countries of the world through the prism of democratization of social processes, including through the protection of the most vulnerable segments of the population with the help of new communication technologies.

3. Results

In different periods of mankind’s existence, attitudes towards people with disabilities have varied, although the vast majority of the time they were treated either with fear and squeamishness, or with regret and condescension. Only relatively recently – at the beginning of the XXI century – has this category of people at virtually all levels of government and public administration begun to be treated with the type of interaction that forms and sustains the foundations of a democratic society – equality, fairness, and inclusion (Makoelle, 2020). One of the notable features of this transformation was the emergence of such expressions as “a person with a disability”, “a person with physical disabilities”, “a person with peculiarities of development” (Tsatsou, 2019; Plichta, 2019; Venkatesan, 2023), which came to replace the rather rude and not quite tolerant word “disabled”. Considering the history of the development of relations between people without physical and psychological deviations and people with developmental peculiarities, we can say that there are enough cases of assistance from healthy people for a stronger socialization of the most vulnerable representatives of society. Often, such solutions became the basis for revolutionary discoveries and important inventions (Table 1).

Years	Development
1808	P. Turri (Italian mechanic and inventor) invented the first typewriter for an acquaintance who had trouble with correct and clear hand spelling skills
1886	H. Hollerith – American engineer and inventor with cognitive processing disorder – developed technology to use punched cards to transfer information
the 1960s	The first assistive technologies for visually impaired people (e.g., software for visual perception of text from screen monitors) have been developed
the 1970s	Intelligent devices have been developed to provide access for people with physical disabilities (e.g., alternative keyboards and switches)
the 1980s	New solutions have been developed for visual and tactile perception of the environment (e.g. touch screens with different functionalities).
the 1990s	The People with Disabilities Act was passed in the United States of America, which emphasized the problem of open access to all public goods for people with disabilities and initiated the development of information and digital solutions for this purpose
the 2000s	The emergence of further updated information technologies for people with sensory impairments (e.g., devices with eye or hand movement control)
the 2010s	The emergence of innovative technologies for the third millennium (e.g. virtual reality (VR) and augmented reality (AR) technologies)
the 2020s	Technology of new tools becomes simpler and more flexible in order to promote them to people with disabilities; the new concept of information technology includes adaptive functions – universal to each individual case

Table 1. Key developments in shaping information and computer technologies to improve the quality of life of people with disabilities. Source: composed by the authors based on the works by Varriale *et al.* (2023), Venkatesan (2023).

Access to information, the right to use all kinds of mechanisms and tools to search for necessary data, free access to the Internet, which is especially relevant in the XXI century, has been an integral part of human life for many years. Using the opportunities of the World Wide Web gives a huge advantage over those who do not use them: the functionality of social networks and other innovative information technologies facilitates education, job search, choosing a suitable type of leisure, as well as establishing new social contacts, finding friends and like-minded people (Sánchez-Serrano *et al.*, 2020; Alexopoulou *et al.*, 2021). All of these are basic human

needs, and if at any stage of this process, due to some of the person's peculiarities, a person has difficulties or problems and cannot take full advantage of the benefits of information technology, there is an artificially created line that divides society, creating barriers for the most vulnerable, which primarily include people with disabilities. In the late 10s and early 20s of the XXI century, a study was conducted in a number of European countries to determine the level and depth of penetration of information and communication technologies in the processes of socialization of people with disabilities (Smieszek, 2020). Various surveys, telephone interviews and questionnaires asked a variety of questions about everyday problems and difficulties in interacting with the world around people with disabilities (Table 2). The results were very diverse, as the sample consisted of different social groups (young people, middle-aged and older people, urban and rural dwellers), but at the same time, the results clearly demonstrated the relationship with the use of digital tools and the improvement of the quality of life of people who use them.

Although medicine and related technologies are continuously increasing in the XXI century, the number of people with physical and mental disabilities is constantly increasing (Varriale *et al.*, 2023). In 2023, there were over 1 billion people with disabilities worldwide, 80 per cent of whom lived in developing countries (Progress on Disability Rights, 2024). At the same time, the quality of life of this category of people is generally improving: new highly specialized programmes are emerging, innovative technological solutions are being developed, unique applications and software are being launched (Table 3). But this is happening at the expense of reforming the sphere and social protection in developed democratic countries, where the remaining 20% of people with special developmental needs live.

Before analysing the specifics of state activities in the field of protecting people with disabilities and helping them to integrate into society through information and communication tools, it is necessary to understand the basic concepts and terms. Thus, according to the definition given in the Convention on the Rights of Persons with Disabilities (CRPD) (2008), disability is a person's long-term mental, physical and other impairments that prevent normal functioning due to the formation of various social barriers (Convention on the Rights, 2008; Wahab, 2019). The World Health Organization (2023) explains disability as all kinds of bodily and mental impairments that prevent a person from actively participating in society. Based on this, we can say that a person with a disability is someone who experiences the above-described difficulties in everyday life. For ease of presentation and to avoid confusion, in this paper such terms as "people with disabilities", "people with physical

Use of information and digital technologies	"Yes"	"No"	No answer
	58	38	4
via computer	71	27	2
via phone	88	9	3
using other tools	58	34	8
Use of information and digital technologies in certain areas	"Yes"	"No"	No answer
for online shopping	73	15	12
for study	84	5	11
for work	92	6	2
for hobbies	75	12	13
for socializing	87	3	10
for other purposes	62	28	10
Use of information and digital technologies for health needs	"Yes"	"No"	No answer
for general help	75	–	–
to remind taking one's pills	61	–	–
for comfort in the home and kitchen	83	–	–
for communication with others	93	–	–
for health monitoring	67	–	–
to call a doctor	58	–	–
Impact of information and digital technologies on the general standard of living	Positive	Negative	Neutral
	89	5	6

Table 2. Main results of the sociological survey, %. Source: compiled by the authors based on Disability in the EU: Facts and Figure (2023), Smieszek (2020).

Note: the survey was conducted over several years in a number of European countries in various health care settings (hospitals, polyclinics, as well as in places of social development of the population).

disabilities", "people with developmental disabilities" will be used as synonyms. The process of searching, selecting, using and transferring information began in the period of the first written languages, but the concept of "information technology" was first conceptualized and formulated only in 1958 by G. Livitt and T. Wisler in an article published in the Harvard Business Review (Martin *et al.*, 2020). The authors meant by this term a combination of human thinking, statistical and mathematical techniques and the application of machine processing.

As of the early 20s of the XXI century, the world has developed and operates an extremely broad and multilevel system of legal and regulatory protection of the

IoT applications for people with disabilities	Description
Portable and handheld devices	Sensors and wearable devices based on innovative mechanisms to assist people with disabilities (e.g., smartwatches, navigation aids for the hearing impaired)
Smart home system	Devices for comfortable use of the entire flat space to increase the level and quality of accessibility to all functions (e.g., voice control of lighting fixtures)
Internet of Things for easy movement in space	Intelligent systems embedded in devices and medical instruments (e.g., wheelchairs with motion navigation and voice control, exoskeletons based on artificial intelligence)
Technologies for social communication	Information solutions for voice contact for people with disabilities (e.g., software that turns words into text on the screen and vice versa)
Information technologies for online health monitoring	Sensors and devices to remotely monitor a person's physical condition (e.g., voice assistants to remind them to take medication or exercise)
Road and travel navigators	Various digital aids and technologies for safe mobility ("smart" canes, walkers, wheelchairs)
Other information technologies	Tools and digital solutions for general facilitation of life and improving the quality of social interaction (e.g., household and kitchen appliances with integrated voice control, smart stairlift that can be transformed from a conventional staircase)

Table 3. Main applications of the Internet of Things (IoT applications) for people with disabilities. Source: compiled by the authors based on Semařy *et al.* (2024), Wambua (2023), Rajan & Balaji (2022), Varriale (2022), Mertens *et al.* (2023).

rights and freedoms of people with disabilities (Hasan & Prity, 2024; Poli, 2021). Among the main documents are the "Declaration on the Rights of Persons with Disabilities" (dated 9 December 1975), the "Universal Declaration of Human Rights" (dated 10 December 1948), the "Convention on the Rights of Persons with Disabilities" (dated 3 May 2008) (Acharya, 2022). All of them point to the mandatory full and free access of persons with special developmental needs to all services and facilities provided by the state, as well as the opportunity to participate equally in all basic human activities and processes – education, employment, leisure. Thus, the 2030 Agenda for Sustainable Development states that in order to achieve the socialization of people with disabili-

ties outlined in these documents, it is necessary to create an inclusive society, and it should start with education, namely primary education (Shi *et al.*, 2022; Wambua, 2023). Then, a strategy of unobtrusive assistance should be systematically developed through the creation of special technical and technological solutions for such citizens to set up the most effective communication of citizens with society without harming them (Table 4).

Thus, it will be possible to create a modern multi-level and flexible system for the integration of people with disabilities into public life at all levels of contact of such people with all spheres of state and civil interactions. Interaction of people with disabilities with information technologies in the Republic of Kazakhstan.

Kazakhstan, like the vast majority of developed democracies, endeavours to fully support people with disabilities, protect their freedoms and guarantee their rights. It is important to note that over the last decade, the number of such people in the country has been steadily increasing – in 2011, the number of such people was 563,086, and by 2023, it had already risen to 724,982 (with the population growing from 16,440,470 in 2011 to 19,766,807 in 2023) (Bureau of National Statistics, 2023c). Over the past five years, the number of people with developmental disabilities has increased most rapidly in the country’s major cities, such as Astana, Almaty and others (Table 5).

In Kazakhstan, as in many other countries, the number of children with disabilities is also growing. Thus, if in 2013 the number of such children in the country was 138,513 people, in 2023 it is already 203,717 people, and over the last five years the dynamics continues to gain momentum: an increase of more than 10,000 people in each subsequent year, starting from 2018 (Bureau of National Statistics, 2023a). The principles of functioning of the health care and social service system were the same for all countries of the Soviet Union, including the Republic of Kazakhstan. Until the mid-60s and early 70s of the XX century, words such as “defective”, “sick”, “untrained” were standard and most commonly used in relation to people with disabilities (Sailauova, 2020). Then, in the early 80s of the XXI century, against the background of approaching democratic transformations, the need to revise the concept of disability and related definitions was realized. At that time, the so-called concept of “normality” began to be actively developed, and its essence was that any person, regardless of their diagnosis, physical or mental state has the right to be a full member of society (Shinekeneva, 2022). That is, the peculiarities of a person’s development cannot be barriers to their integration into society. However, the problem can be and is a social environment that does not take into account all the interests of such people and is not adapted to certain conditions.

Direction/ sphere	Essence of activity	Recommendations for improving the quality of interaction
Political and institutional activities	Policies on data security, access to open sources of information. State support for the introduction of digital and information technologies among people with disabilities	Provision of various facilities, equipment or software, to improve interaction in the information environment. Compliance with local legislation and regulatory framework in the field of social protection
Public relations	Social norms and practices of interaction in the digital environment	Ensuring that digital technologies are sensitive to societal norms and the basic needs of people with disabilities
Organizational level	Existence of organizational and institutional support structures to facilitate broad digital inclusion	Ensuring that there is sufficient organizational capacity for digital engagement strategies. Introducing hybrid models of engagement with the most vulnerable members of society. Specialized training for mentors and persons accompanying and supporting people with disabilities
Interpersonal dialogue	Digital links to interpersonal support systems for data and information transfer	Ensuring digital interpersonal interaction through sensitivity to the existing information needs of the most vulnerable members of society
Individual (personal) level	The ability for everyone to access and navigate social media and the Internet	Ensuring wide access to information and communication methods of interaction for citizens with different degrees and types of physical and psychological disabilities

Table 4. Levels of interaction between the state (governance) and citizens with disabilities (socialization) and ways to improve communication. Source: compiled by the authors on the basis of Sánchez-Serrano *et al.* (2020), Tan *et al.* (2022), Troussas *et al.* (2021).

Region	2019	2020	2021	2022	2023
Abay	–	–	–	24,272	24,142
Akmola	29,059	28,798	29,073	28,948	29,608
Aktobe	27,044	27,401	27,694	28,618	29,372
Almaty	68,775	67,251	67,237	43,668	44,075
Atyrau	22,886	23,066	23,679	24,446	25,431
West Kazakhstan	24,401	24,272	24,213	24,351	24,719
Zhambyl	45,880	45,805	45,777	45,426	45,708
Zhetysay	–	–	–	24,364	24,917
Karaganda	67,763	67,384	67,795	56,106	56,166
Kostanay	28,177	27,809	28,092	28,167	28,637
Kyzylorda	30,115	30,570	31,345	32,012	33,077
Mangistau	27,715	28,569	29,194	30,642	31,790
Pavlodar	27,965	27,868	27,824	28,246	28,907
North Kazakhstan	26,944	26,432	26,100	25,124	24,701
Turkestan	94,128	95,808	97,619	96,783	98,171
Ulytau	–	–	–	11,430	11,452
East Kazakhstan	56,543	54,905	54,838	30,018	29,995
Astana city	27,518	28,607	26,730	32,182	34,754
Almaty city	53,706	53,900	52,438	56,956	58,583
Shymkent city	36,634	36,686	37,177	40,027	40,777
Total	695,253	695,131	696,825	711,786	724,982

Table 5. Number of people with disabilities in the Republic of Kazakhstan for the period 2019-2023 by region, people. Source: Bureau of National Statistics (2023b)

After the collapse of the Soviet Union and the emergence of new independent republics, including Kazakhstan, a period of reform and transformation of traditional systems and mechanisms began in the country. The normative framework of the direction was revised (the Laws “On Supporting Children with Disabilities through Social, Medical and Pedagogical Correction” and “On Social Protection of Persons with Disabilities” were adopted (Figus & Shaikin, 2019). The country’s leadership has adopted the Western practice of supporting people with disabilities – this process should begin as early as primary school, by creating conditions for inclusive education. Further education (in colleges and higher education institutions) should also be based on a barrier-free environment and the absence of conditions for stigmatization. In 2013, the Law on Public Services was adopted, which outlined the principles of information and service support for the population,

but the document had many inaccuracies in terms of free access to information services and applications for people with disabilities (Abdina *et al.*, 2023). Soon, the Republic started to work more actively on the creation of universal and narrowly focused computer applications and programmes on phones for this category of the population.

The establishment of the Inclusive Parliamentary Group and the Senate Council on Inclusion in 2023 is important. The Inclusive Parliament was formed by nine MPs with developmental disabilities. The main objectives of this group are mainly to address the legislative process in terms of meeting the needs of the disabled population. The Senate considers the situation in the sphere in general, focusing more on problems of a global nature – the growing number of children with disabilities, the lack of necessary rehabilitation programmes. The work on improving the regulatory framework and improving the quality of interaction continues, although there are quite a few problem areas and controversial issues. In general, the country has developed a fairly complete legal and regulatory framework, which includes, in particular, the Constitution of the Republic of Kazakhstan (dated 30 August 1995), the Social Code of the Republic of Kazakhstan (dated 20 April 2023), the National Plan to ensure the rights and improve the quality of life of persons with disabilities in the Republic of Kazakhstan until 2025 (dated 28 May 2019). In addition, in 2015, Kazakhstan ratified the UN Convention on the Rights of Persons with Disabilities, thus assuming international obligations to implement measures with a focus on the full socialization of this category of the population through all available mechanisms and tools (Social Protection of Persons..., 2023).

These and other documents emphasize Kazakhstan’s desire to fully integrate people with disabilities into public life by developing new technological solutions – tools, mechanisms, and algorithms. However, there are a number of shortcomings and inaccuracies, there is no clear definition of basic terms and concepts. For example, the National Plan to ensure the rights and improve the quality of life of persons with disabilities in the Republic of Kazakhstan until 2025 details measures to improve standards and introduce new technologies of prosthetics for people with disabilities, and also plans to create a fully accessible barrier-free information infrastructure that will help eliminate all barriers to communication of citizens with disabilities (Resolution of the Government, 2019), but does not define the concept of this category of people. In the Law of the Republic of Kazakhstan No. 88-V “On State Services” (2013), central and local authorities are obliged to provide all electronic services to the population, including to people with disabilities, but the document

does not prescribe the mechanism for providing these services to citizens who have difficulties, say, with the perception of this information.

Studying the situation in the direction of social integration of people with disabilities in Kazakhstan at the beginning of the XXI century, we can conclude that, despite a sufficiently acceptable legislative framework, there are a number of problems in the country that create barriers to the full socialization of this category of population, including through information technologies: incomplete legislative framework, prejudice towards people with disabilities on the part of society, insufficient number of necessary services and services in public institutions, and the lack of information and information technologies in the country. In the context of integration through information technologies, the main barriers are: unsatisfactory level of accessibility and inclusiveness of the environment, difficulty in obtaining and perceiving necessary information from different sources, weak level of training of specialists (counsellors, social workers) in the sphere of providing information and service support to people with disabilities, insufficient level of technical “savvy” of this category of people, due to which they cannot independently (due to their physical and social abilities) use information and services of the state institutions.

According to many researchers (social and medical workers, demographers) (Poli, 2021; Tan *et al.*, 2022; Nguyen, 2021), in order to solve the above and other problems related to the introduction of information technologies into the lives of people with disabilities – both in Kazakhstan and in other countries – it is advisable to classify new solutions in the context of their functional purpose into certain groups. For example, the following are generally accepted: information retrieval systems, communication tools, tools for general development, training tools, modelling and simulation programmes, rehabilitation, recovery, and relief programmes. Thanks to such categorization, it will be easier to interact with vulnerable categories through information services and applications, of which there are already enough developed in the world.

All of the above groups of information technologies can be efficiently and effectively implemented in the daily practice of social services to protect the rights of people with disabilities. In order to create a barrier-free environment in society and minimize the stigmatization of the most vulnerable categories of the population, it is important to develop a comprehensive approach. Improving legislation in the field of inclusion of society, studying the best international experience in the field of digital technologies and using it with due regard to national peculiarities can contribute to the formation of a truly democratic society in Kazakhstan, where there

are no barriers to the free integration of people with disabilities. When considering Kazakhstan’s experience of integrating people with disabilities into society through information technologies, it is worthwhile to conduct a comparative analysis with another state that has a distinctive position from Kazakhstan in the field of technological development, thus emphasizing the key features of each country. Thus, it is well known (Cho & Park, 2024; Obayashi *et al.*, 2018) that Japan is an advanced innovative state with a high level of inclusion in all spheres of state and public life. In a country where the number of people over 65 is 36.4 million (29.1% of the total) (Japan’s Senior Population, 2023), public policies aimed at protecting the most vulnerable are the most advanced and effective.

Since the late 1960s, the issue of the lack of rights for people with disabilities (compared to citizens without developmental disabilities) began to be raised in Japan (Hakumura, 2019). At that time, an active debate in society began, which prompted the country’s leadership to reconsider the existing approaches. But in order to comply with international norms on the rights of people with disabilities, Tokyo had to adopt many other documents complementing the sphere of social protection (the Laws “On Public Assistance”, “On Child Protection”). In the 1970s, the Aoi Shiba movement began to fight for the rights of people with physical disabilities (primarily cerebral palsy) (Tsatsou, 2019). Gradually, since the late 1980s, the attitude towards this category of people began to change, and by the end of the century Japan became one of the leading countries in terms of social assistance to the most vulnerable members of the population, primarily people with disabilities – various highly specialized programmes were launched, information projects were initiated, and special digital products were created to facilitate the process of communication of such citizens. One of the most critical solutions in this context is the creation of robots whose main purpose is to help and assist people in need.

On 20 January 2014, Japan ratified the UN Convention on the Rights of Persons with Disabilities (Cho & Park, 2024), but the policy of creating an inclusive society based on a barrier-free existence began long before that. In general, the legal and regulatory framework for supporting the most vulnerable categories of the population in Japan is at a very acceptable level. The main normative documents in the field of social protection of people with disabilities in Japan are the Constitution of the country, the Laws “Basic Law on Disabled Persons” (1970), “On Promotion of Employment of Persons with Disabilities” (2012), “On Elimination of Discrimination against Persons with Disabilities” (2016). Also, in the development of an inclusive environment and barri-

er-free environment, Japan follows the points of the Asia-Pacific Development Strategy 2030, which states Tokyo's goal to create a prosperous, inclusive, resilient and sustainable society within the region (Strategy 2030, 2018). As defined in these documents, 'disability' is a long-term condition of substantial limitation of a person in personal and social life caused by physical impairments or mental problems (Sato *et al.*, 2022).

Despite the high level of support for the least protected members of society, Japan has a bias towards the elderly. Special government support programmes are in place for them, and many information services, online programmes and digital applications have been developed to facilitate their interaction with society. At the same time, the level of social protection for children, adolescents, young families, single mothers are quite controversial (Obayashi *et al.*, 2018; Naruse *et al.*, 2022). For example, while the elderly benefit from comprehensive pension systems and dedicated health-care programs, the support for younger populations is often seen as insufficient. The child allowance system in Japan, though in place, is considered by many to be inadequate to cover the high costs of raising children, especially in urban areas where housing and education expenses are significant. Additionally, the government's childcare support and financial aid for single mothers remain a source of ongoing debate, with many arguing that these provisions do not sufficiently alleviate the financial burdens faced by single-parent families. And this is already creating a serious problem: Japan's population is ageing rapidly, the birth rate is falling (as of the end of 2023, it fell by 5.1% year-on-year to 758,631 people; if this trend continues, by 2070 the country's population will be 87 million, a 30% decrease from the current 125 million, with one in four people over 65 (Japan's Birth Rate, 2024), the dynamics of innovative development has slowed down considerably, and there is a threat of economic decline. According to official figures, the number of people with disabilities in Japan is more than 9 million (as of 2023): 4.36 million with physical problems, 1.09 million with intellectual problems, and 4.19 million with mental problems (Cho & Park, 2024). Often, one person may have several types of disabilities at the same time. In recent years, there has been a gradual increase in the number of people with physical and mental disabilities in all prefectures of the country (Table 6).

However, the level of social inclusion of people with disabilities in Japan is very high. Innovative solutions, new information technologies and modern mobile applications and programmes serve as a solid basis for the integration of people with special developmental needs into society (some of them are very successfully applied in the Republic of Kazakhstan). For example,

Prefecture	2019	2020	2021
Tokyo	3,056,597	3,083,167	3,102,323
Osaka-fu	2,337,647	2,358,079	2,372,724
Kanagawa-ken	2,280,501	2,309,603	2,335,262
Saitama-ken	1,900,743	1,929,296	1,954,338
Aichi-ken	1,897,538	1,917,482	1,935,343
Chiba-ken	1,691,416	1,714,136	1,734,360
Hokkaido	1,681,076	1,699,463	1,714,703
Hyogo-ken	1,568,946	1,584,901	1,597,111
Fukuoka-ken	1,406,696	1,426,273	1,445,821
Shizuoka-ken	1,121,467	1,130,921	1,140,525
Ibaraki-ken	837,057	848,054	857,955
Hiroshima-ken	831,121	837,948	845,691
Kyoto-fu	743,203	748,204	752,303
Niigata-ken	741,036	745,801	750,684
Nagano-ken	681,561	685,431	689,965
Miyagi-ken	653,757	662,424	670,267
Gifu-ken	612,205	616,935	621,462
Gumma-ken	589,671	594,794	600,176
Okayama-ken	582,811	586,939	590,652
Totigi-ken	569,250	576,208	583,355

Table 6. Number of people with disabilities in Japan for the period 2019-2021 in the most populated prefectures, people. Source: compiled by the author based on the data from Bureau of Statistics of the Ministry of Internal Affairs and Communications of Japan (2024)

Note: data for 2022-2023 have not been published

special wheelchairs have been developed for people with mobility problems with a digital method of control, namely through a computer or smartphone. People with speech and hearing problems can use digital tablets, ranging from complex to simple in function, which generate speech by giving impulses or transcribing individual sentences or words. Robotic prosthetics have long been preferred over conventional prosthetics, as the new inventions are controlled by nerve impulses from the brain to the limbs, which was not the case with older models. Robotic taxis for the movement of people with physical disabilities are currently at the testing stage, but have made a name for themselves as a promising tool for the socialization of such people.

To support the general condition of people with different types of disabilities and facilitate their daily life in the home, "smart home" systems have been developed (Obayashi *et al.*, 2018), where voice-controlled assistants are directly connected to all systems of the house

– switch on/off lights, open/close doors. Hearing aids and implants have long been used for their intended purpose, but have become much more technologically advanced and versatile in recent decades through digital systems to control them. Sensory systems allow interacting with our environment on a sensory level. Augmented and virtual reality technologies facilitate rehabilitation, rehabilitation, learning new skills and habits in people with congenital or acquired physical disabilities. Social support robots (humanoid-looking or simply voice-activated software) are very useful for people with cognitive and social problems. Social media and online programmes have already proven to be effective tools in the job search journey, which is especially relevant for people with developmental disabilities when they are unable to fully navigate around the city. Virtual platforms and digital venues act as a place to seek and receive psychological support and, most importantly, in anonymity.

Considering the peculiarities of information technologies through the prism of their influence on the processes of socialization of people with disabilities in different countries, we can say that their role in the integration of such people is extremely relevant. Thanks to them, citizens with different developmental features can interact with the environment on an equal footing and participate in all aspects of the public life of their state. However, due to the different levels of development of countries (in the economic, political and social sense), many people in need simply do not have access to these technologies, as is the case in Kazakhstan, for example, in geographically remote or underdeveloped regions. The opposite situation can be observed when digitalization of socialization processes for the most vulnerable categories of people occurs only for certain age groups (for example, in Japan), when the total support of the older generation affects the overall demographic situation in the country – due to the “ageing” of the nation and the decline in birth rates. At the same time, despite all possible negative consequences, the use of information technologies for the integration of the most vulnerable citizens, primarily people with disabilities, is very relevant and effective, but with a competent and clear approach to their use.

4. Discussion

Having analysed the specifics of the integration of people with disabilities into society through social networks and digital applications in the early XXI century, we can summarize some aspects. The study of the constituent elements and basic principles of interaction of people with disabilities in society will be

the main topic of discussion at all levels of government and public administration. The search for optimal options for communication, without harming both people with needs and their relatives, and the development of clear strategies for state aid and assistance to representatives of this category of the population is necessary from the point of view of the development of civil society on democratic principles. The topic of harmonizing relations among the population and creating an inclusive society based on democratic principles has been widely studied by experts from countries such as Italy, Japan, and the USA. The issues of barrier-free environment and equal participation of people with disabilities in all public events and processes in Central Asian countries have been studied by researchers from Kazakhstan. Based on the conclusions obtained in the course of their scientific research, it can be stated that the quality of services provided to this category of citizens will directly depend on the coherent and harmonious development of the state – the higher it is, the more democratic this country functions.

In the presented work, it was emphasized that the most important and one of the key periods of a person’s becoming a full-fledged member of society is the period of his education – in primary school, college, university. This idea is similar to the assumptions of Rajan & Balaji (2022), who believed that the implementation of new information technologies and systems in the real plane of education will help to improve the quality of this area and increase the level of such indicators as tolerance, honesty, kindness. Although, the authors also recognized that digital mechanisms alone are not enough to foster these qualities.

The Internet of Things, the “smart home” system, various voice assistants, online programmes, digital sensors, and sensor devices were cited in this paper as examples of new innovative solutions, with the help of which people with disabilities will be able to fully integrate into society and interact within it on an equal footing with all participants. Wambua (2023) had a similar opinion, saying that according to the United Nations Sustainable Development Goals, the creation of a progressive barrier-free, fully inclusive educational space is a guarantee for the further development of the state and society in it. In doing so, the expert foresaw challenges in the context of the use of digital tools in primary schools among young children.

The fact that excessive immersion in the Internet space, social networks, other virtual platforms can have both positive and negative consequences was considered in the work. A similar opinion was also reached by Plichta (2019), who considered it quite dangerous to give full freedom of activity to people with disabilities, mainly with mental and psychiatric problems,

on social media – even for rehabilitation purposes. Although, as a separate and supportive practice, the author considered it extremely useful and effective.

The work took into account the key role that information technologies have in the XXI century in learning and educational processes, especially in relation to people with disabilities, who, thanks to a multitude of digital and innovative devices, can become more involved in social processes and ordinary life. Similar positions were also taken by Varriale *et al.* (2023), who considered the state, its authorities and the current political system as key players, on whose endeavours the well-being of the population and the harmonious development of society on the basis of democracy and equality directly depend. They also envisaged the inclusion of experts from among people with disabilities in the legislative process in this area.

Factors such as geographical remoteness, weak economic potential, uneven settlement across the country, and the general low level of technological training of people were listed as the main obstacles to the creation of a barrier-free inclusive society. The thoughts of Venkatesan (2023) were similar, he referred to information technology as one of the few sources of searching, evaluating, creating and communicating data, which is especially relevant for people with various disabilities. In addition, in the author's opinion, in case of unfavourable living conditions for a person with disabilities, access to all the benefits of information technology will be closed and, in this case, there is very little chance for normal integration into society for such a person.

To address these challenges and foster the integration of people with disabilities into society, several measures should be considered. Enhancing the accessibility of digital infrastructure is crucial. The government could introduce subsidy programs for assistive technologies such as screen readers, specialized keyboards, and other adaptive tools to ensure individuals with disabilities have the necessary resources to engage with digital platforms. Providing digital skills training is also essential (Ponomarenko, 2021). Specialized courses tailored to people with disabilities should be developed and made available through schools, vocational training centers, or as online modules, helping participants build confidence and competence in using information technology (Vrapi *et al.*, 2023). Improving internet access is another key area. Subsidizing high-speed internet connections, especially in rural regions, would ensure that individuals with disabilities can fully participate in the digital economy and access online education, healthcare, and employment opportunities. Developing inclusive websites and applications should become a priority (Andić *et al.*, 2024; Kanybekovna *et al.*, 2020). Implementing mandatory accessibility standards, such

as the Web Content Accessibility Guidelines, for both public and private digital platforms will help make online resources more user-friendly for individuals with various disabilities (Andjić *et al.*, 2019). Creating specialized support centers could provide ongoing assistance. Regional hubs offering technical guidance, training, and resources tailored to people with disabilities would foster greater inclusion and address local needs effectively.

Despite the potential of information technologies to greatly enhance the quality of life for people with disabilities, significant challenges remain, particularly in rural and remote areas (Kenesbayev *et al.*, 2017b; Adylbek Kyzy *et al.*, 2024). These regions often face barriers such as limited internet connectivity, lack of infrastructure, and lower levels of digital literacy, all of which hinder the full adoption of assistive technologies. For instance, high-speed internet is still not universally available in many rural areas, which can delay or prevent access to vital online resources and services. Additionally, the costs associated with implementing technology-based solutions are often prohibitive for local governments and organizations in these regions, exacerbating existing inequalities. Addressing these issues requires targeted interventions, including investments in infrastructure and localized training programs, to ensure that all people, regardless of location, can benefit from digital inclusion.

The Republic of Kazakhstan has accepted the idea of an inclusive society and started the way to its establishment on its territory. Although this way has many problems and controversial issues, typical for the countries of Central Asia (for example, remoteness of settlements, low level of awareness of new technologies) the process in the state is moving in the right direction with a certain dynamic. A similar position was held by Makoelle (2020), who called the model of introducing an inclusive society in the Republic unique and extremely useful for neighbouring countries. At the same time, the expert emphasized the fact that the decades under Soviet rule were not in vain, and now it is extremely difficult to completely move away from the principles and methods of the educational process of those times, especially in the context of education of children with disabilities.

The Japanese experience of integrating people with disabilities into public life through all kinds of information technologies, digital tools and virtual systems was seen as a model for the protection and accompaniment of the most vulnerable categories of the population. Tsatsou (2019) analysed Japan's experience in this area, which is more than seventy years old, and considered the state from the perspective of the relationship between its political, economic and social development

and the level of participation of people with disabilities in public life. Thus, the author called the absence of barriers and the most simplified and comfortable stay of such people in Japan among “healthy” people an indicator that Tokyo has created a multi-level and complex, but efficient and effective infrastructure for the integration of people with disabilities into everyday life with the help of the latest achievements of national science and technology.

Robotics, adaptive technologies, voice assistants and other innovative tools create an environment comfortable for people with different physical and mental features (Kenesbayev *et al.*, 2017a). The idea voiced in this paper is similar to the findings of Obayashi *et al.* (2018) regarding the relevance and need for the application of such systems for rehabilitation, recovery or general care of people with disabilities. However, the authors identified low levels of awareness and reluctance to try new things as the main barriers to positive outcomes from the use of information technology for such people.

In the process of addressing the issues concerning the role and impact of information technology on people with developmental disabilities at the beginning of the third millennium, some factors were summarized. Thus, the demand of the world community for more detailed and practical information on this issue is extremely high. One of the main reasons for this may be the lack of equal interaction of people with disabilities with other citizens in a number of countries, which directly affects the overall situation with the processes of democratization and creation of legal relations in the international arena. Consequently, representatives of developed countries require large-scale scientific research on this topic in order to develop and build the most harmonious, equal and transparent relations between citizens inside and outside their country. And the key factor in this issue should be the full integration of representatives of different categories of its population into all spheres of the state’s activities, which is a sign of a democratic state of law of a new model.

5. Conclusion

Having studied the specifics of the influence of information and digital technologies on the processes of socialization of people with disabilities in the context of assessing various components of this direction of state and social policy, several conclusions can be drawn. Thus, the need for a harmonious and systematic “infusion” of this category of population into all social processes of the country is widely discussed at all levels of government and socio-economic decision-making. Global standards are sufficiently developed, practical

and effective. The legal framework and regulatory mechanisms of the social protection sector for the most vulnerable population, including people with disabilities, are formed by such world organizations as the United Nations and the World Health Organization. Legislation in the Republic of Kazakhstan is very effective and fully meets the requirements and challenges of the third millennium, however, at the same time, it contains many inaccuracies and contradictory aspects. Also, the documents do not clearly define the concept of “disability”, which also aggravates the situation. Information support for citizens is present in the country, but due to several reasons (geographical distances, low level of development of digital competences in some districts and cities) full use of information technologies is impossible or very difficult.

According to statistical data for the Republic, the number of people with disabilities has been steadily increasing over the last decade, with the dynamics of previous years showing a significant increase in this category of the population. This repeats global trends in the growth of people with disabilities, but in Kazakhstan this process is also accompanied by growth in the country’s population in general. In Japan, the situation with communication of people with disabilities through the Internet is at a high level. The understanding of the need to use all new technological achievements to solve the issues of people with disabilities there came long before its actual implementation. However, there is a bias towards excessive support for pensioners and to the detriment of children and young people with disabilities, as well as other vulnerable categories of people. New technological solutions in artificial intelligence, robotics, voice and sensory programmes have made it much easier for people with disabilities to interact in a society that is also keen to accept them and interact with them as equals.

Limitations of the study were the difficulty in finding relevant information regarding qualitative and quantitative information regarding the characteristics of the lives of people with disabilities with the rarest diagnoses. There were also difficulties in finding and analysing information on the most remote and economically underdeveloped regions of the Republic of Kazakhstan in terms of considering the peculiarities of local policy in the sphere of protection of citizens – people with certain physical disabilities. In order to obtain broader and more informative results and to form practical conclusions based on them, for the next scientific research it is advisable to consider the issues of social support for people with disabilities in Central Asia through the prism of comparing the legal and regulatory framework in this area and political activity in the countries of the region.

Having analysed the specifics of information support for people with disabilities in the Republic of Kazakhstan, we have developed general practical recommendations for improving the quality of interaction in this area. Thus, it is necessary to review the information services and systems of all state and local authorities in order to analyse their accessibility and inclusiveness for people with disabilities. In addition, motivate and encourage the business environment and innovators (including the financial factor) to develop accessible digital products taking into account the individual needs of people with disabilities. Also, to update and update the existing regulatory framework of the sphere by analysing the best global practices in the context of the

introduction of new information and communication technologies in the daily lives of people with developmental disabilities. To create a single highly specialized body (with mandatory membership of people with disabilities), the functioning of which will be based on the analysis and evaluation of various indicators of digital inclusion of people with disabilities in public life. In addition to the above, conduct systematic and targeted public education work with students in special schools and inclusive classes on the use of the latest scientific and technological advances to improve the quality of life of children with disabilities, while teaching them about technological literacy and safe behaviour on the Internet.

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