

Addressing the Optimization Techniques for Future Smart City Planning Aligned with the Requirements of Individuals with Disabilities

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Abstract. This article provides an overview of ideal concepts for future smart city development that are centered on the requirements of disabled people. The research's goal was to look at the existing state of smart city development in regard to the requirements of handicapped people and make recommendations for improvement. The study investigates existing concepts and frameworks for urban design that stress accessibility for the disabled, as well as theoretical and normative elements of handicapped individuals and urban planning. An investigation of the situation revealed various flaws in present legislation, and the ideas section proposes solutions to these flaws. The proposals are backed up by relevant research, underlining the necessity of taking into account the requirements of disabled people in smart city development. Cities may develop more inclusive and accessible settings that accommodate to the different needs of all inhabitants, including handicapped persons, by implementing these recommendations. As urban development's affect the impaired population's everyday life, it is critical to stay positive and hopeful about the future development of disabled persons in major cities.

Keywords: Smart city, handicapped people, accessibility, urban planning, digital inclusion, inclusive infrastructure, mental health.

1. Introduction

The concept of smart cities has garnered widespread global popularity, promising to revolutionize urban life through seamless technological integration and data-driven solutions. However, amidst the relentless drive towards intelligent urban development, the needs of disabled individuals are sometimes disregarded, leading to a lack of inclusion and equitable access to vital urban resources and services. This research aims to bridge this essential gap and elevate the future of innovative city development by strongly emphasizing understanding and addressing the requirements of persons with disabilities.

Urbanization is an evident trend, with more people migrating to cities for more significant opportunities and improved living standards. This phenomenon and rapid technological advancement have given rise to the futuristic notion of intelligent cities, leveraging data and innovation to enhance urban living experiences. While the potential of these transformations is undeniably positive, they also present challenges, particularly in ensuring that no segment of society is excluded or left behind. Disabled individuals constitute a substantial portion of the population and face unique challenges in urban areas, ranging from physical barriers to limited access to essential services. It is of utmost importance to identify and address these problems as they play a crucial role in promoting a city's future that is both inclusive and sustainable. This has led to a greater understanding of the significance of inclusion in urban design, resulting in a surge of research interest in developing innovative cities [1,2].

However, the concerns and perspectives of disabled individuals have received inadequate consideration in the mainstream discourse surrounding intelligent city development. Existing research predominantly focuses on technological aspects, infrastructure, and governance, often overlooking the critical social factors of inclusion and accessibility for disabled individuals. This research aims to contribute to the current knowledge base by centering on the experiences and needs of disabled individuals, aiming to enrich and revolutionize the intelligent city development paradigm.

Therefore, the fundamental objective of this research is to advocate for inclusive urban development that leaves no one behind. The aspiration is for smart cities to become beacons of inclusivity, valuing the integration of opinions and needs from the disabled population, ushering in a new age of urban living characterized by diversity and accessibility.

This research will pave the way for a transformative shift in the discourse of innovative city development, adopting a human-centric strategy that caters to the diverse requirements of every individual, regardless of physical limitations. The research will be divided into two sections: the first will look into the concept of handicapped persons and the guidelines set for them in urban planning and development. This article provides an overview of ideal concepts for future smart city development that are centered on the requirements of people with disabilities. In contrast, the second will analyze how innovative city policies fulfill these needs. A literature review strategy will be employed to obtain valuable insights from academic sources and reports. By delving into the unique needs and challenges that disabled individuals encounter in urban planning and construction, this research seeks to identify and address the existing gaps in innovative city development. The ultimate aim is to provide informed recommendations for establishing more inclusive and accessible urban settings.

2. Definitions

2.1. The Definition of Disability

The U.S. Department of Health and Human Services further defines this concept, stating that disability is attributed to various factors such as physical, emotional, and environmental influences [3]. The World Health Organization also mentions that a person's functioning and disability arise under the influence of the natural and social environment [4]. It has been proven that when such a person interacts with his or her environment, he or she reacts to the connections of the surrounding community to varying degrees due to the limitations of the individual's physical or social functioning, which in turn corroborates the fact that the individual and his or her environment influence each other [5].

2.2. The Definition of Urban Planning

Urban planning is one of several classifications for types of spatial planning that include how things like land utilization, spatial morphologies, and allocation of resources where could be managed and controlled. The profusion of qualifying words for "planning" reflects the broad breadth, diverse aims, and shifting responsibilities of spatial planning in various fields and across time. In practice, the word urban planning is frequently pushed to serve the "public interest," a nebulous word that has come to stand for a changing set of economic, social, and environmental goals [6].

3. The Urban Theories

By analyzing the situation in a theoretical way, it is clear that different types of disabled people have different living needs, and based on this can provide an excellent opportunity for the development of urban space planning and construction so that the space becomes more suitable for disabled people [7]. Simultaneously, it is essential to classify individuals with disabilities using diverse criteria. By considering functional limitations as a basis for categorization, urban planners can customize the design and placement of neighborhoods more effectively. Additionally, this classification enables communities and professionals like architects to better understand and address the specific needs of disabled individuals, ensuring their care and support.

However, it does not mean that disabled people do not have to do anything. People with disabilities also need to work with their or neighboring communities mutually. Because humans, being social organisms, require communication with their surroundings to satisfy their individual and societal requirements. Certain researchers argue that an increasing consensus exists that individual with

disabilities, much like any other members of society, possess the fundamental right to life and the opportunity to fully develop their skills and abilities [7]. As demonstrated above, the most essential thing is that persons with disabilities be regarded as part of the community that utilizes these facilities. As a result, it is critical to construct an open and inclusive city that allows all people, including individuals with disabilities, to live peacefully from the theoretical core of urban planning [8]. Not only does it mean that these urban spaces and facilities can provide their services to everyone who lives in the city, but they also can be used to satisfy individuals' different needs, such as staying for a short time or using the space.

An instance highlighting this is the explicit emphasis placed by the United Nations Convention on the Rights of Persons with Disabilities on the utmost respect for the freedom of individuals with disabilities to make their own life choices. Moreover, it calls for a culture of tolerance and acceptance, recognizing and appreciating individual differences. Everyone should recognize people with disabilities as individuals and assist them in wholly and efficiently integrating into society [9]. The formation of such a convention allows nations to incorporate local policy variations and adopt more optimum life policies for the groups of disabled people who live there. At the same time, it allows urban academics to apply "smart city planning." It also gives the notion of "how to create a suitable living space for people with disabilities" a more precise growth direction.

4. Problem Analysis

According to Deakin University experts, despite the fact that there are laws specifically stating the rights of individuals with disabilities in their communities, construction planners do not have an adequate understanding of the complexities of human beings and the specific mobility needs of disabled people [10]. In busy and crowded cities, people with disabilities encounter various difficulties and challenges in their daily lives due to their physical disabilities, and they are being cut off from the fast-developing modern society. They are becoming an isolated, invisible, and disadvantaged group whose needs are not emphasized. A team of researchers conducted a nationwide survey targeting individuals with disabilities, aiming to gain insights into the challenges they face and the support they receive when utilizing public transportation. Additionally, they examined how these factors influenced their engagement in community activities. The findings revealed that a majority of the participants encountered difficulties while using public transportation. Moreover, non-regular community events were found to be more susceptible to disruptions caused by concerns related to public transportation. Individuals with blindness or limited eyesight, mental illnesses, chronic health issues, or multiple impairments had more difficulty participating in community activities utilizing public transit [11]. This study showcases not only the negative effects that obstacles to public transportation can have on the lives of individuals with disabled people within their communities but also exposes the lack of inclusivity in the city's infrastructure towards people with disabilities.

German researchers used questionnaire responses to examine the handicapped population in Tehran. Their findings revealed that all research participants experienced several barriers when participating in urban areas [12]. Academics in Australia interviewed persons with intellectual impairments, service managers in Melbourne, and a team of intellectual disability research consultants. Their findings imply that certain parts of digital living can make city life more straightforward for persons with intellectual impairments who have access to technology and the ability to utilize it. However, this new technology can potentially increase the isolation of other persons with intellectual impairments [13]. Therefore, it is evident that the digital divide is creating a double disadvantage for individuals with disabilities. Those who have access to and can effectively use advanced technology will be able to stay updated with the advancements of our era. In contrast, this fast-developing society will neglect those who do not have such ability in terms of their need for convenience in life and will be pulled away from the rest of the population. The digitized life will exacerbate, to a certain extent, the inequality that the disabled population is now experiencing.

In addition to improving daily accessibility, the future development of smart cities can also improve on the urban landscape to serve the disabled population in need and improve their mental health. Some academics have proposed in the last five years that green urban environments might give mental health advantages and lessen mental disease risk. They discovered that children who grow up in surroundings with the least amount of green space had half or more the chance of developing mental illness, based on the results of a countrywide survey including over 900,000 people [14]. Simultaneously, fast, uncontrolled urbanization in many emerging nations exacerbates these issues. According to some research, low- and middle-income nations would be worst hit by urbanization and the expected rise in the prevalence of mental diseases. Many low- and middle-income nations do not emphasize mental health in their national health budgets or strategies [15]. Due to the neglect of mental health requirements for disabled people in major urban areas, and the prevalence of disability is rising concurrently with rapid urbanization. This troubling situation proves unfavorable for individuals with disabilities, as the outward signals of distress they send progressively disappear. The consequences of this neglect are numerous. Therefore, it is the lack of consideration for the psychological well-being of individuals with disabilities in urban planning that results in their isolation and exclusion.

5. Suggestions

To summarize, this article will discuss the concerns highlighted in the preceding paragraphs and provide recommendations focused on enhancing the daily experiences of individuals with disabled people in urban settings. Initially, it is crucial to prioritize and enhance the inclusiveness and accessibility of transportation and mobility in urban planning to address the restricted mobility experienced by individuals with disabilities in their everyday routines. This goes beyond providing ramps or elevators for wheelchairs. It requires a holistic approach that considers the diversity of disabilities and provides tailored solutions to meet their specific needs. Drawing from certain research findings, it has been observed that compact urban design can exhibit characteristics such as local walkability and efficient land use, creating areas with enhanced street connectivity. This is particularly advantageous when streets are organized in a grid pattern, resulting in higher levels of connectivity and continuity. This design creates quick, direct pathways between several locations. As a result, when diverse land uses are integrated, walkability improves. This is very beneficial for people who need a wheelchair or other assistive device to help them move around. Accessible infrastructure, such as wide pathways and ramps, not only allows wheelchair users to navigate the city independently but also saves them time and energy by eliminating the need for additional public transportation. This increased accessibility enhances their overall mobility and encourages their active participation in the urban environment.

Furthermore, with the inevitable trend of life becoming increasingly digitalized in the future, it becomes even more crucial for cities to be planned and designed with a focus on the needs of individuals with disabilities. This includes promoting comprehensive digital inclusion to the highest degree possible. According to some of the study results, more than ninety percent of volunteers who are disabled are favored the employment of assistive technology with electronic devices in everyday life. According to researchers, deploying such technology will boost accessibility and expand the presence of persons with disabilities in cities [1,14]. In this case, by combining with current technology, the convenience of life for persons with disabilities will be improved, especially for those who want to reintegrate into society. It is essential to ensure that technology is user-friendly, inclusive, and supports the principles of person-centered services to maximize its positive impact on the lives of disabled individuals. Cities have the opportunity to use technology to create an environment that is more accessible and enhances the general standard of life for individuals with disabled people.

Third, throughout the planning and design phase, it is vital to integrate urban design strategies that aid in the emotional well-being of disabled people. This may involve optimizing the presence of green spaces within urban areas and implementing new policies or organizations aimed at providing support

and assistance to disabled individuals. According to Swedish researchers, including the natural environment in urban design is a viable method to promote mental health and lower the rising worldwide burden of mental disease. Rooftop gardening has been shown in several studies to improve the life standards for those with intellectual disabled people or mental health issues. These studies have examined the benefits of evaluating rooftop gardens and involving volunteers with disabilities in gardening activities. By allowing individuals with disabilities to actively participate as gardeners, they not only experience an enhanced quality of life but also develop valuable skills in communication, collaboration, and creativity. Furthermore, other interesting efforts are emerging, such as enhanced access to green areas in urban contexts, the provision of emergency psychiatric treatment, and the creation of new urban-adapted mental health services [12,13,15]. It can be seen that to effectively serve the mental health of the disabled population, injecting natural vitality into the city would be a perfect choice. The government should also assist the mental health of people with disabilities and provide them with official assistance at the macro level of society.

6. Conclusion

The study's findings provide insight on optimization tactics for future smart city development, with a particular emphasis on addressing the requirements of handicapped citizens. The report extensively examined the existing state of smart city development in terms of its concern for handicapped people and gave useful ideas for improvement.

First, the article has developed a theoretical framework for understanding the relevance of addressing the requirements of handicapped persons in smart city design through the theoretical and standards sections. The study has underlined the importance of inclusion and accessibility in smart city development by defining handicapped persons and urban planning in the context of their requirements and evaluating existing theories and frameworks adapted to them.

Second, the problem analysis segment found a number of difficulties that impede the inclusiveness and accessibility of smart cities for handicapped people. These include a lack of inclusive infrastructure, a digital gap that limits their access to smart technology, and a failure to consider their mental health while developing smart cities. These findings highlight critical areas for future planning improvement. Third, the ideas section gives real recommendations to solve the identified problems based on the study. Improving and modifying inclusiveness and accessibility in urban infrastructure design is prioritized to guarantee that handicapped people may easily navigate the city. Additionally, adopting municipal policies to bridge the digital gap and promote digital inclusion, as well as improving the urban environment to provide a friendly and inclusive environment for handicapped persons, is advocated.

As demonstrated above, these proposals are backed up by relevant research, underlining the need of include the needs of handicapped people in smart city development. Implementing these recommendations will result in more inclusive and accessible settings that meet the unique needs of all inhabitants, including disabled people. Implementing these procedures would not only improve the life standards for disabled people but will also substantially impact the intelligent city's overall sustainability and well-being.

The findings in this study have important implications for future research. Further research might look at particular techniques and technology that can be used to improve inclusion and accessibility in smart city design for handicapped people. Furthermore, investigating the social and economic advantages of include handicapped people's demands in smart city development might give useful insights for politicians and urban planners. Nonetheless, the influence of additional social variables such as age and cultural variations on the urban experiences of individuals with disabled people was not considered in this study. It is critical to recognize that different locations and countries may have diverse issues that necessitate distinctive responses. As a result, future research should delve deeper into how regional cultural differences impact the daily lives of disabled people in big cities.

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