CONSTRUCTION OF THE MODEL AND ANALYSIS OF THE SUITABILITY OF THE URBAN ENVIRONMENT IN THE CITY CENTER OF CELJE IN CONNECTION WITH PEOPLE WITH MOBILITY DISABILITIES

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Abstract

Enabled access and mobility for people with disabilities are crucial for a customarily developed society. Violation of fundamental human rights in the 21st. century is by no means out of the question, and only as a society do, we show an attitude towards those who are due to incapacity and limited to normal movement. The European Union talks a lot about equality, the rights of all residents. The legislation is clear, but not all of these regulations governing accessibility and other people's issues with disabilities are fully implemented in practice. In the article, the accessibility of disabled people with limited mobility was analyzed in Celje, Slovenia. In the research paper, the current legislation and regulations were analyzed. Based on the obtained data, a model was defined with which later the real suitability of access to buildings and public areas was checked. These includes banks, post offices, the municipality, educational institutions, bus and railway infrastructure, ATMs, and footpaths in the city center. It was founded that access in the urban area is still poorly regulated and not following the European Union's regulations and the Republic of Slovenia. It was also founded that to solve the mentioned problems, the main paths, which would enable people with reduced mobility to access more critical buildings, would have to be arranged. It would also be essential to set or inspect the ramps' slopes, access to sentences, and toilets for people with reduced mobility. It is also advantageous that all of the above can also be used by the elderly and mothers with prams. No similar research was founded in the Republic of Slovenia, nor there is a model that would allow logical verification of legislation during the construction of

areas that are in line with the prescribed access for the disabled. To facilitate and better understand the importance of landscaped areas, facilities, and paths, it is necessary to include in the research of the existing situation all the previously listed stakeholders and experts who are closely related to the topic of any disability. For further research focus on transport, public or private, could be checked and all the necessary elements that people with disabilities need to cover distances smoothly and safely.

Key words: suitability, disability, mobility, urban

1. INTRODUCTION

Unhindered movement, sports, dancing, visiting a museum or library can enrich every individual's life. Every step that a person can do without pain, troubles, and tools is invaluable. While a visit to an administrative unit, a school, or a park presents a healthy daily treatment, which does not pay special attention to it, the same visit to mobility-impaired disabled is an issue and, ultimately, an insurmountable obstacle. A barrier that can cut off and finish the intended trip, thus disabling an individual and depriving him of the benefits that healthy people receive in their everyday lives. Due to the growing number of people, disability is recognized as an essentially political issue connected with the guarantee of universal human rights. With the development of technology, the possibilities for a better life for people with disabilities are also evolving. It will be easier for people with disabilities to overcome distances and perform daily activities in the future. However, despite the continuous improvement of such technologies, we can stop access to public buildings, and an even bigger problem is the accessibility of people to other facilities, shops, cafeterias, etc. It is also worth mentioning the high level of urbanization, which according to the Sze&Christensen (2017) could affect the quality of life of the individual, but the currently built urban environment and access to essential facilities is not always favorable to the needs of vulnerable groups, including the elderly and disabled. According to Rudwiarti et al. (2021) urban public space should be designed and used for all. Urban area needs an inclusive and accessible design and needs to offer aspects of safety and security. It must be a people friendly design for all.

The Law in European Union dictates that every disabled person has the right to unimpeded access, entry, and use of buildings in public service and multi-apartment facilities (European commission, 2020). However, even during a walk through major Slovenian cities, it is noticed that this is not the case.

In the European Union, disabled people represent at least 17 % of the working population's total population. In 2012 there were 70.0 million people with disabilities aged 15 and over. More than 45 million European Union inhabitants have long-standing health problems as disabled persons (Sendi et al., 2015). According to Eurostat (2018), around 60.9 %, people with disabilities in the EU said that their

disability restricted their participation in leisure pursuits, with this share reaching just above 52.9 % for mobility. The share of people with disabilities reporting a disability for three other life areas was nearer to one in three. Those areas are employment (38.6 %), accessing buildings (37.0 %) and transport (31.7 %). Approximately one in four people with disabilities reported a disability concerning education and training (25.6 %) and paying for the essential things in life (22.7 %). One in five people with disabilities felt unfairly treated because of their basic activity difficulty and long-standing health problem. The two living areas least commonly reported by people with disabilities were the use of the internet and social contact, reported by 4.6 % and 2.0 % respectively of people with disabilities as areas where they faced barriers. The World Health Organization (WHO) estimates that there are more than a billion people with special needs globally, and up to 190 million have major functioning problems (World Health Organization, 2011). According to Patterson, Darcy, & Mönninghoff (2012), this number is increasing because there is a causal link between aging and the onset of disability limiting normal movement. The rights of people with disabilities in the modern world receive much attention in the United Nations and other international organizations dealing with human rights and the issues of people with disabilities. The Universal Declaration of Human Rights speaks about the freedom of every human being who has the same dignity and equal rights (United Nations, 1948). The trend in the incidence of disability is similar in Slovenia as elsewhere in the European Union. In Slovenia, the status of a disabled person is between 160,000 and 170,000 people (Čuk, 2014).

The ability to move in urban areas is the foundation of a progressive society that also includes people with disabilities. There are also many studies on the mobility of people with disabilities and the factors that affect their mobility. To ensure the sustainable and reliable movement of goods and people, especially in transportation and urban space planning is fundamental right (Azevedo et al., 2021). Pearson and Joost (1983) researched the evacuation capabilities of disabled people in an urban environment, which included wheelchair bound. Also of interest is a study by Sime and Gartshore (1987), who examined the evacuation rate of disabled people in wheelchairs from multistorey buildings without assistance. Rubadiri et al. (1997) introduced a method for assessing the success of evacuation and the accessibility of people with disabilities with three factors covering construction design. Jiang, Zheng, Jia, Zhan, & Wang (2012) successfully tested the speed in the movement of disabled people whose mobility was reduced in horizontal corridors of different widths and uphill on the ramps along the stairwells. The WHO further recognizes that poorly planned access hinders their full and effective participation in society. Many studies have also identified barriers in the tourism context as one of the many reasons why participation rates and tourism experience characteristics are lower in larger urban areas than in the general population (Buhalis & Darcy, 2011).

The fact is that people with disabilities arise in any public place, and the proportion of disabled people in the community will increase the proportion of disabled people in the trial population. People with disabilities are more at risk due to

impaired mobility. In public places with a relatively high population density, although it is more difficult for disabled people to evacuate without assistance in emergencies, the presence of a large number of disabled people will complicate the evacuation process more. Access problems also occur (Jiang, Zheng, Jia, Zhan, & Wang, 2012). Mobility-impaired disabled persons face discrimination and barriers that restrict them from participating in society on an equal basis with others every day. They are denied their rights to be included in the general school system, to be employed, to live independently in the community, to move freely, to vote, to participate in sport and cultural activities, to access justice, to choose medical treatment, to enjoy social protection and to enter freely into legal commitments such as buying and selling property (Bachelet, 2018). Sendi et al. (2015) state that disabled people, despite their relative abundance, are exposed to various forms of obstruction. Most often, there are obstacles in the urban environment and obstacles to the accessibility of information and communications.

Countries of the European Union have adopted several measures in this area, relevant legal acts, and by-laws, but the adopted legislation, strategic documents, and the ratification of international conventions do not yet represent the real situation in practice (Uldry, 2016). European countries implement the adopted laws inefficiently and poorly. Control over implementation is imperfect and incomplete. According to Manyanye (2015), public toilets accessible to people with disabilities constitute the biggest problem. Public restrooms are arranged irregularly.

When we come out of the law, we can quickly find that the statutory regulations clearly state that every disabled person has the right to unimpeded access, entry, and use of facilities in public service and multi-apartment buildings. However, in practice, in many cases, it turns out compliance with legislation is ineffective or is a significant deviation between the legal basis and the real situation. With the help of statutory regulations, the state's commitment represents only the first step towards improving the actual situation. The second step is the effective implementation of commitments and their consideration in the environment in which we live.

By using the established model for checking access to buildings of a public character, based on legal regulations related to disabled persons, the analysis of the suitability of the urban environment in the city center of Celje will be performed.

1.1. Definition of Mobility-impaired disabled persons

When talking about people who have a mobility or physical impairment, the talk is about people with reduced ability to move or control movement. As a rule, these people need adjustments or help at every step. Types of defects vary in both origin and consequence, and persons can be classified into (Disabled persons and persons with reduced mobility in public passenger transport [Handbook for Carriers], 2014):

- **persons with spinal cord injury**: they have suffered a spinal cord injury due to an injury or illness, resulting in a partial or complete loss of all motor and sensory functions. Most of these people can only move around with a

wheelchair. Paraplegics - persons with spinal cord injury lower than the neck level, have untouched upper limbs and can use a hand-operated trolley for movement. Persons with damage to the cervical spinal cord - tetraplegics, which have chromium upper and lower limbs, or the upper limbs can move only partially in the shoulder and elbow, can only be moved by a hand-held cart to another person or using an electric carriage.

- **persons with neuromuscular disorders**: these are people who have suffered from the loss of muscular strength of all firm muscles, limited flexibility in the joints, and deformations of the spine. As a rule, there is a relatively well-preserved fine hand finger motor with these people, so they can perform minimal activities by hand, provided the objects are within range. The critical limitation of this group is moving with an electric wheelchair.
- **persons with multiple sclerosis**: this disease of the central nervous system causes motor damage, which is seen as muscle weakness, an increase in muscle tone (spasticity), a disorder of coordination of movement, and a sensor is also affected. People who suffer from multiple sclerosis move with a disability trolley (manual or electric), but their movement is more obtrusive because of the nature of the disease. Minimal activities with upper limbs are collected, but sufficient finger hand motility is usually low.
- **persons after a head injury or after having a stroke**: this disease of the central nervous system causes motor damage, which is seen as muscle weakness, an increase in muscle tone (spasticity), a disorder of coordination of movement, and a sensor is also affected. People who suffer from multiple sclerosis move with a disability trolley (manual or electric), but their movement is more obtrusive because of the nature of the disease. Minimal activities with upper limbs are collected, but sufficient finger hand motility is usually low.
- **persons with cerebral palsy**: cerebral palsy is a central nervous system disorder (the brain - most often it involves bleeding into the brain) that occurred before, at, or in the early postpartum period. The motion is damaged (it is a spasmodic paralysis of all four or only the lower limbs or half of the body); however, there may be additional sensory impairments (vision and hearing) and malfunctions of higher nervous activity. People with cerebral palsy can be moved by berthing or walking or a wheelchair depending on the degree of disability. The severely affected persons with cerebral palsy cannot independently control the wheelchair; therefore, they need an escort, control, and protection.

The following chapter shows the degree of physical disability. These rates can be classified into four categories. Logaj and others (Logaj, Zadnik, Korenčan, Banko, & Antosiewicz, 2014) define the degree of physical impairment on the level of disabled people of the first level, representing the lighter mobility of people with disabilities. The second level represents a group of people with a moderate mobility

disability; disabled people in level three represent a group of people with severe physical disabilities. Level four represents a group of people with severe mobility impairment.

1.2. Level of mobility impairment

The levels of mobility impairment are divided into four categories, which will be presented below. The authors of the publication entitled educational program for physically challenged children and adolescents in the daily form of training, describe these categories as follows (Logaj, Zadnik, Korenčan, Banko, & Antosiewicz, 2014):

- **Level I - mild mobility impairment**: movement disorders cause mild functional impairment. They also walk longer distances independently; they may have difficulty running and walking longer on uneven terrain. They are independent in all daily activities, except for those that require the excellent skill of both hands. They do not depend on accessories, and they need minor adjustments (chair, table, dress).
- **Level II - moderate mobility impairment**: movement disorders cause mild functional impairment. They walk shorter distances independently; some use aids (special shoes, orthoses, crutches). They have problems on uneven terrain and stairs where they are slower as they need control or grip. They can use an active wheelchair or orthopedic bike for longer distances or help and supervise another person for longer distances. Fine motor skills are not significantly disrupted. For more demanding daily activities, they need supervision and support. They manage any incontinence on their own without any interventions; they just need control.
- **Level III - severe motor impairment**: movement disorders can cause more severe functional impairment. Walking short distances without aids is not possible or. Not functional. Some use orthoses and stilts for shorter distances part of the day. For most of the movement indoors and outdoors, they need a hand-powered wheelchair or. An orthopedic bicycle or the assistance of another person. Walking up the stairs is very difficult or not possible. Fine motor skills are impaired and interfere with useful hand function. They regularly need partial help with daily activities. Likely, incontinence is regulated by self-squeezing of the bladder or intermittent self-catheterization.
- **Level IV - severe motor impairment**: very severe movement disorders cause complete functional dependence. They are not capable of independent movement or. They only move with an electric wheelchair. They need specially adapted accessories for sitting. They are capable of little functional hand movements. Some need special feeding adjustments (probe, gastrostomy) or respiratory support (tracheostomy, assisted ventilation through a tracheostomy or nasal mask, oxygen). They depend on outside help for all their daily chores, some of which feed themselves in part.

Possible incontinence is severe and requires catheterization or editing with the help of another person. "

1.3. Review of legislation and definition of criteria in EU

The main instruments for assessing the accessibility of publicly owned facilities are the rules, regulations, and standards that specify the requirements for ensuring barrier-free access. In the Republic of Slovenia, the area is managed by the Equalization of Disabled Persons Act, the Rules on minimum technical requirements for providers of social security services, the Rules on the equipment of railway stations and stops, the construction legislation, the Rules on the Requirements for Providing Unauthorized Access, Entry and Use of Facilities in Public Use and Multi-buildings, rights and obligations of persons with reduced mobility in rail traffic, rights and obligations of persons with reduced mobility in bus and coach transport, and the Road Transport Rules. In the following paragraph a clear table of the laws and critical regulations related to physically disabled persons will be presented. According to Sendi et al. (2015) accessibility is necessary and enables the integration of disabled people into the family, working, and broader social environment. Therefore, accessibility is essential from the point of view of social inclusion and a prerequisite for promoting political and civil rights. Table 1 below presents a set of all legal acts, regulations and instructions that are present in the territory of the European Union and the Republic of Slovenia.

Table 7. Set of legal acts, regulations, and instructions

Legislation, regulations, acts, ISO	Focus	Detailed regulation
• Rights of Persons with Disabilities (CRPD) • EU directive 2016/2102 on the accessibility of website and mobile applications of public sector bodies • European accessibility act, EU directive 2019/882 • EU directive 2000/78/EC establishing a general framework for equal treatment in	• Prohibition and elimination of discrimination against persons with disabilities in the way of equal opportunities • Prohibition of discrimination in the access of people with disabilities to facilities in public use (urgent adjustment) • Allowed access to various services	• Surface suitable for disabled person (length 1,50 m, width 1,20 m, height 1,50 m) • Cross slope 3 % • An appropriate slope angle with respect to its length, the maximum recommended inclination is 8.3 % and 1:12 • A ramp of at least 1200 mm width, between the

employment and occupation • European Pillar of Social Rights • European Semester • EU disability card • EU parking card • EC 1107/2006 • Zakon o izenačevanju možnosti invalidov (ZIMI) • Zakon o uresničevanju načela enakega obravnavanja (ZUNEO) (Uradni list RS, št. 93/2007) • Zakon o delovnih razmerjih (ZDR-1) (Uradni list RS, št. 21/2013) • Zakon o zaposlitveni rehabilitaciji in zaposlovanju invalidov (ZZRZI-UPB2) (Uradni list RS, št. 16/2001) • Zakon o preprečevanju nasilja v družini (ZPND) (Uradni list RS, št. 16/2008) • Zakon o urejanju prostora (ZureP-1) (Uradni list RS, št. 110/2002) • Zakon o prostorskem načrtovanju (ZPNačrt) (Uradni list RS, št. 33/2007) • Odločba o razveljavitvi 4. člena iz pravilnika 97/2003	• Respect for human rights • Exercising the right to technical assistance • Accessibility of goods and services • Fines in relation to regulatory violations • The inclusion of disabled people in education • Access to information for people with disabilities • Access to cultural goods and cultural heritage • The right of people with disabilities to public passenger transport • Co-financing specific social programs for the integration of people with disabilities into society • Dimensioning the surfaces • Obligatory design of objects on the way of smooth movement of physically disabled persons • Precisely defined technical requirements, conditions, and norms in relation to disabled persons	handrails, must be at least 1000 mm • Contrast colors of the edges and platforms of the ramp • From 3 % to 6 % of the longitudinal slope, at a distance of up to 30 m, an adequate resting point of 3 m in length and a 1.5 % inclination • Footpaths without communication and built-in obstacles • Mandatory direct connection to the level of the sidewalk and the edge of the road • Recommended width of the access path 1800 mm • A solid and non-slip road • Marked change in the width of the sidewalk • Deep sidewalk to the level of the road • Deepening the sidewalk at the pedestrian crossing • Reserved parking spaces within a distance of 50 m • Parking place width 3900 mm and length 5400 mm • Properly marked parking space

(Uradni list RS, št. 77/2009) • Odločba o razveljavitvi 4. člena iz pravilnika 97/2003 (Uradni list RS, št. 77/2009) • Pravilnik o projektiranju cest (Ur. l. RS, št. 92/1999) • Zakon o prostorskem načrtovanju (ZPNačrt) (Uradni list RS, št. 33/2007) • Pravilnik o zahtevah za zagotavljanje neoviranega dostopa, vstopa in uporabe objektov v javni rabi ter večstanovanjskih stavb ((Uradni list RS, št. 97/03, 33/07 – ZPNačrt, 77/09 – odl. US in 61/17 – GZ) • Pravilnik o minimalnih tehničnih zahtevah za izvajalce socialnovarstvenih storitev (Ur. L. RS, št. 36/04) • Pravilnik o opremljenosti železniških postaj in postajališč (Ur. l. RS, št. 88/07). • Uredba (ES) št. 1371/2007 Evropskega Parlamenta in Sveta z dne 23. Oktobra 2007 o pravicah in obveznostih potnikov	• Enabled access to public spaces • The adequacy and availability of sanitary facilities • Defined surfaces along the road • SIST ISO / TR 9527 • Access path • Entrance to the building • Parking • Sanitary facilities • Rampage • Vertical and horizontal communications • The land configuration according to availability for physically impaired persons • Observes the law on the construction of buildings • Infrastructure: Defined parking space for disabled persons, Intended access for disabled persons • A customized place to buy a ticket • An arranged route to the platform (ramp, stairs, lanes, elevators and lifting platforms) • Standard SIST EN 81-40	• The parking height is between 800 and 1100 mm • Main entrance without obstacles • The aligned threshold in front of the main input height up to 20mm • Recommended door width between 900 mm and not less than 850 mm • Flat staircase frame • The minimum width of the steps is 1200 mm • Width between the holders 1000mm • Step height max. 150mm, stair depth at least 300mm • Holder height min. 850 to max 1000mm • Stairs to the max. 16 • Good lighting on the stairs • Elevator: minimum cabin size 1100 x 1400 mm, if only one elevator is installed in the building • Lift minimum size of at least one cabin 1100 x 2100 mm, if at least two lifts are installed in a building above 8 floors • The width of the entrance to the

v železniškem prometu • Uredba (EU) št. 181/2011, katera obravnava pravice invalidov in oseb z zmanjšano mobilnostjo • Uradni list RS, št. 82/13 • Slovenski standard SIST ISO 21542:2012, Gradnja stavb – Dostopnost in uporabnost grajenega okolja (v času priprave priročnika dostopen le v angleškem jeziku) • Strategija o dostopnosti Slovenije. Nacionalne usmeritve za izboljšanje dostopnosti grajenega okolja, informacij in komunikacij za invalide • Akcijski program za invalid 2014–2021	• Accessories for wheelchair access and exit • Elevator • The defined path to the platform for physically disabled people • Defined information and accessibility of these • Defined liability and liability of carriers • Definition of rights, protection, and assistance to persons with disabilities (Station assistance, train assistance, conditions for providing assistance, right to transport, information, accessibility) • General rules on the enforcement agent • Compensation for mobility equipment and other special equipment • The right to transport • Exceptions and special conditions • Accessibility of information • Determination of stations • The right to assistance • Conditions for providing assistance	elevator cab is 900 mm and must not be less than 800 mm • The length of time for opening the door for a safe and smooth transition • A horizontal holder in the cabin at a height between 800 and 950 mm • Control panel in the elevator from 900 to 1200 mm • The appropriate spatial arrangement of the lifting platform at or on the stairwell, if it is not possible to mount a ramp or elevator to overcome the level differences • Sufficient space for maneuvering from access to the lifting platform or descending from it • Clear and simple instructions for the use of the lifting platform together with information on assistance • The appropriate height of the bell to call the assistance when using the lifting platform • Minimum platform size 1100 mm x 1400 mm for safe use with hand and

	• Training • Defined compensation for wheelchairs and other equipment • Definition of beneficiaries for issuing a parking card for the disabled • Definition of parking lots • Definition of access to buildings • Definition of path width • Defining the ramp • Elevator definition • Hall	motorized wheelchairs • Easy use of the lifting platform and its controls • Sufficient space for maneuvering before and behind the information desk (minimum 1500 mm x 1500 mm, recommended 1800 mm x 1800 mm) • The appropriate height of the counter is between 740 and 800 mm or at least 1/3 of the counter at this height • At least one adapted sanitary space with the appropriate marking of the route and the door with the international symbol • Recommended door width 850 mm, but not less than 800 mm • The doors are opening outwards from the room • Door locking system from the inside • The horizontal handle on the inside of the door at a height of 700 mm for easy closing

		• Sufficient sanitary space for wheelchair maneuvering (minimum width 1700 mm and depth 2200 mm, in case of corner sanitary space • A sanitary bowl at a height between 400 and 480 mm • An empty space with at least one side of a toilet bowl with a width of 1200 mm • Console washbasin at a height of 750 to 850 mm from the ground • A tilt mirror with a lower edge at a height of 900 mm from the ground • A hanger at a height of 1050 to 1400 mm from the ground

2. METHODOLOGY

The research was conducted with cooperation with Laboratory for sustainable logistics and transport, as well as prior cooperation with the Institute Vozim and the Society of Paraplegics of the South-East Steyer region. In the research's theoretical part, firstly, scientific literature was reviewed. Carefully the legislation, regulations, and regulations governing the rights of people with disabilities were studied. A set of critical legal regulations (Table 1) was prepared, which allow normal movement of physically disabled persons with wheelchairs. Based on legal regulations and ISO standards, Model 1 was designed (Figure 1) to check the appropriateness of public institutions' adjustment and access to disabled people. The research was limited to the city center municipality of Celje (MOC). Also, model POM was used. With a set of crucial regulations from a predefined model, and POM survey a map and a rating sheet was prepared and later performed

a snapshot of a restricted area. Based on the obtained data, the data was analyzed that was subsequently interpreted and graphically displayed in the continuation of the research.

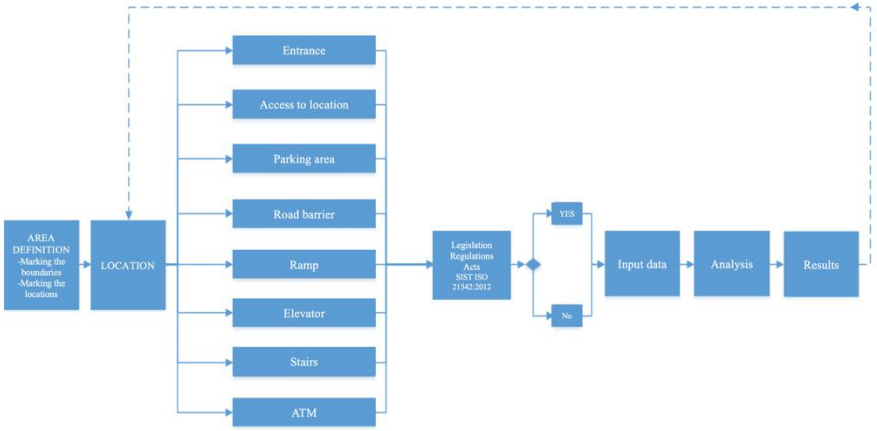
A descriptive research method was used. The research approach is quantitative empirical research. An assessment table was created to assess accessibility. The evaluation table was formed based on the requirements previously established by reviewing legislation and regulations. The rating table evaluates eight accessibility elements. Individual accessibility elements were assessed numerically with YES (accessible) and NO (inaccessible) ratings. Ratings are provided with descriptive criteria for each accessibility element. In addition to the evaluation table, orientation questions to help with observation and evaluation were also compiled. The objectives of the study were to determine do the selected public buildings in the city of Celje have adapted: accesses to the buildings themselves (path to the entrance to the building, parking lot), adapted entrances to the building, accessible and adapted elevators, accessibility, and adapted toilets. It was also determined which elements of accessibility of selected public buildings in the City of Celje are the most suitable or the least appropriate and are following the law.

Model 1 development

The scenario is crucial for building a model. Knowledge of the types of entities and phenomena in the model is presented as sample fragments. The model scenario consists of the appropriate fragments that define the process. The model must contain the contents of the scenario and the task limit (Forbus, 2008).

Based on the abovementioned facts, the development of the model was undertaken systematically. The legislation's scope was studied and the key parameters that were structurally classified in the database were defined (Table 1). After determining a database (regulations, regulations, ISO, and laws), the scenario has been modeled. The model itself is based on the definition of an area where, using a map, the area's boundaries to be studied were accurately determined. When a space was defined, the points that has been check below were determined. In our case, public buildings, museums, music schools, parks, access roads, parking lots, ATMs were scoped. After selecting a point, the focus was on checking the situation using specific basic parameters. The basic parameters are related to the database of theoretical data (prescribed criteria in the field of regulations, legislation, acts, regulations, ISO standards in the area of physically impaired persons). After reviewing the base and the real state at a predetermined point, the decision model was used (Is compliant - YES, not compliant - NO), comparing the record's natural form with the static state from the base data. Based on the obtained result, the analysis of data was performed, and the results were given.

Figure 12. Model 1



Sampling procedure according to model 1

The research and test of the model was limited to the area of the city center of Celje. The city core was divided into four areas, as shown in Figure 2, 3, 4, 5. Collected data for each area were merged into a table using the Excel software tool. In the end, the obtained information was analyzed and interpreted and the results were graphically shown. Below is a list of all the locations that were analyzed. The points below are shown (Figure 2, Figure 3, Figure 4, Figure 5), which were carefully studied using pre-set criteria and parameters.

Figure 2 Area 1

Figure 3 Area 2

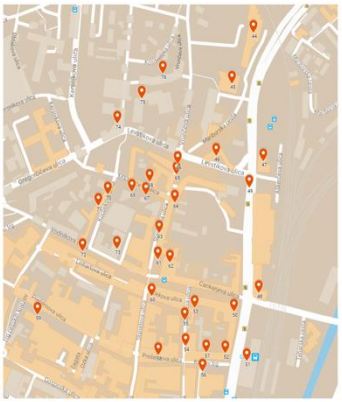


Figure 4 Area 3

Figure 5 Area 4

Model 2 development

Next method used in this research was POM (problem-oriented method) method. According to Shahraki (2020), this method is used in many studies in the field of urban planning. Thus, as part of the research, 40 public buildings out of all observed buildings were analyzed.

With the help of the mentioned method, the real situation and suitability can be determined, which refers to the accessibility of the disabled. Thus, according to the standards and regulations, a questionnaire was compiled, which was filled out by disabled people from the Association of Paraplegics who were present at the research. Based on the model, many possibilities can be assessed and at the same time many criteria can be considered. The model thus provides a comparative technique for

comparing buildings with the optimal structure. The model is based on the following equation (Shahraki, 2020):

$$\mathrm{Bi} = \sum_{j=1}^{n} \mathrm{w_j} a_{ij} \qquad i = 1,2,3, \ldots\ldots, m \quad (1)$$

WBS represents the sum of the building weights. The criteria for the detailed assessment were presented with the measurements performed and the personal experiences of the disabled. In Equation 1, the number of buildings (m) was quantified, the standard (n) was determined by measuring, and then whether the building met the needs of the disabled was decided. The building is most suitable when it reaches the highest weight rating. Number 1 was assigned as the lowest weight (does not meet standards) and 10 the highest weight (meets all regulations and standardization). It was also emphasized that Wj represents the standard weight Sj and that aij is the executive coefficient in evaluating and scoring Bj according to the standard Sj. The sum of the weighted significance of Bi is determined by the following equation (Shahraki, 2020):

$$\mathrm{B}_i(\mathrm{T}) = \sum_{j=1}^{n} W_j a_{ij} \qquad i = 1,2,3, \ldots\ldots, m \quad (2)$$

To build the model, 40 buildings as a sample community for measurement were used and are represented by Table 2. In the following Table 3 six indicators (Si) are presented. The sum of the indicators is 100 %. Table 4 shows 40 buildings with defined index groups. In this matrix, the weight of each group of indicators is determined for each building based on the ideas of the transponders. The right column of Table 4 calculates the total weight of each building as follows (Shahraki, 2020):

WS of B0 = (16 x 0,16) + (18 x 0,18) + (18 x 0,18) + (17 x 0,17) + (17 x 0,17) + (14 x 0,14) = 16,78 (3)

WS of B1 = (8 x 0,16) + (8 x 0,18) + (10 x 0,18) + (7 x 0,17) + (10 x 0,17) + (10 x 0,14) = 8,81 (4)

WS of B2 = (4 x 0,16) + (6 x 0,18) + (3 x 0,18) + (7 x 0,17) + (2 x 0,17) + (8 x 0,14) = 4,91 (5)

…

WS of B40 = (4 x 0,16) + (5 x 0,18) + (7 x 0,18) + (8 x 0,17) + (5 x 0,17) + (0 x 0,14) = 4,91 (6)

Table 2. Analyzed buildings

Address of building	**Symbol**	**Address of building**	**Symbol**
Oblakova ulica 1	B1	Mariborska c 2	B21
Ljubljanska c. 12	B2	Mariborska c 7	B22
Ljubljanska c. 14	B3	Kosovelova ul. 4	B23
Gregorčičeva ul. 2	B4	Kosovelova ul. 1	B24
Gledališki trg	B5	Kosovelova ul. 2	B25
Trg Celjskih knezov	B6	Prešernova ulica 27	B26
Trg Celjskih knezov 8	B7	Prešernova 18	B27
Prešernova ulica 22	B8	Miklošičeva ul. 4	B28
Stanetova 13a	B9	Prešernova ul. 20	B29
Stanetova ul. 3	B10	Prešernova ul. 23	B30
Muzejski trg 1a	B11	Jurčičeva ul. 6	B31
Slomškov trg 10	B12	Razlagova ul. 14	B32
Krekov trg 4	B13	Mariborska c. 3	B33
Slomškov trg 2	B14	Aškerčeva ul. 20	B34
Ulica XIV divizije 12	B15	Stanetova 15	B35
Gubčeva ulica 1	B16	Cankarjeva 1	B36
Krekov trg 1	B17	Krekov trg 3	B37
Krekov trg 6	B18	Aškerčeva 12	B38
Prešernova ulica 8	B19	Vodnikova 4	B39
Krekov trg 9	B20	Krekov trg 7	B40

Table 3 shows indicators and assigned weights, which were taken into account when using the POM methodology Numerical weight of indices (%).

Table 3. Numerical weight of indices in connection with indicators

Indicators	S1 (%)	S2 (%)	S3 (%)	S4 (%)	S5 (%)	S6 (%)	WS (%)
Numerical weight of indices (%)	16	18	18	17	17	14	100

3. RESULTS

In the chapter of results, data were analyzed from the obtained from field monitoring with help of model 1 and model 2. Current status of the inspected locations in the field was checked, using a predetermined legend. The following properties were observed:

- entrance to the building,
- access to the entrance,
- parking,
- road obstacle,
- ramp,
- stairs,
- elevator,
- ATM.

Firstly, the data obtained from the performed snapshot of model 1 was analyzed. The city of Celje was divided into four areas. Each area's data were merged using the Excel software tool. With the help of the analysis Chart 1 was generated.

Chart 1. Percentage display of the landscaped area

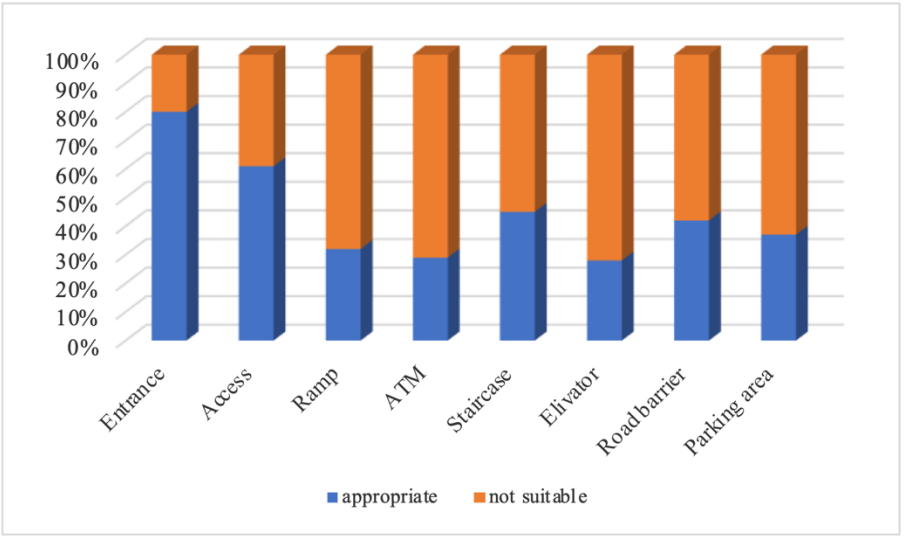


Chart 1 shows the percentage display of the arrangement of the examined area. Out of all selected locations, which were 76, 56 sites were able to handle and observe the entrances. According to the given criteria, it was estimated that there are 45 sites or 80 % of the locations, a well-arranged entrance, suitable for entry for persons with reduced mobility. In contrast, 11 places, 20 % of places have no regulated entrance, suitable for reduced mobility. It was also discussed whether the area is accessible for

people with reduced mobility. It was dealt with a total of 69 locations. It was founded that 42 sites or 61 % of the places are regulated access, while 27 sites, or 39 % of them have nothing to do with it. The situation, in this case, is significantly worse than at the entrances. It can be said that about 20 % more are unregulated access compared to unregulated inputs. The graph also shows the percentage of the slopes' arrangement and disorder in 63 locations that were discussed. 20 places out of 76 rated or 32 % have an appropriately raised ramp for physically disabled people. 43 locations or 68 % of observed sites do not have a proper ramp. ATMs among the selected areas were also included. The total number of ATMs counted was 7. Only 2 or 29 % ATMs have regulated access and adjusted height, the other 5 or 71 % do not have proper arrangements. The graph also shows the number and percentage of the stairs' arrangement and disorder in all 76 selected locations. Among all selected sites, 49 locations have stairs at the entrance to the building. More than half of the observed sites, i.e., 55 % or more. 27 places have no arranged staircase for convenient access and entry into the building for physically disabled persons. 22 sites or 45 % have a stairway put. The graph shows the percentage of lifts present in selected places. All the locations that were dealt with are 54. 39 places or 72 % does not have an elevator while 15 sites or 28 % of them have the elevator. In 62 places, out of a total of 76 locations, car parks designed for people with disabilities were observed. Only 23 sites or 37 % have a parking lot for persons with disabilities; 39 locations or 63 % do not have a suitable car parking area.

The next step shows the results obtained using the POM **model 2**. Based on the selected model, it was founded that all 40 selected buildings (Table 4) according to the alternative curve are not entirely suitable for the disabled. However, it should be noted that the assessed buildings have varying degrees of suitability. The following Table 4 shows the results, which were performed with the help of a snapshot of the real situation and were assessed by disabled people with the regulatory data considered. This is how the ratings are shown. Based on the use of the POM methodology, the calculated WS data are also shown, which also considers the weights.

Table 4. Matrix 40 buildings and 6 standards

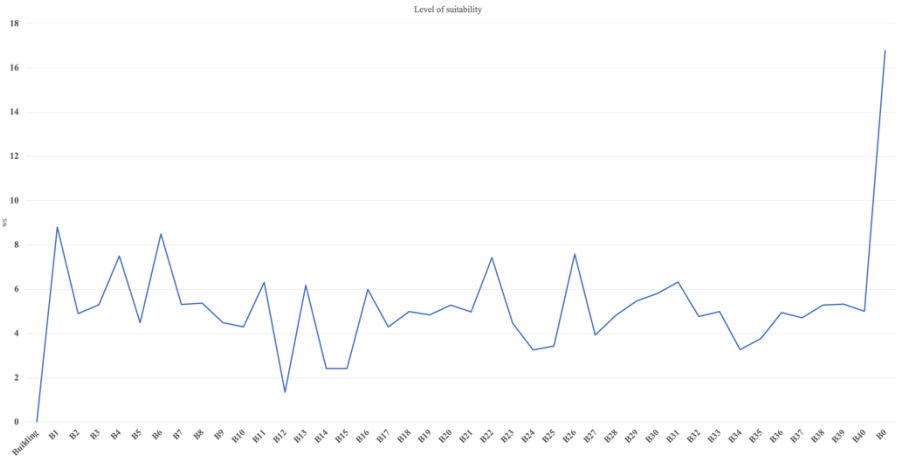
Indicator building	S1	S2	S3	S4	S5	S6	WS
B1	8	8	10	7	10	10	8.81
B2	4	6	3	7	2	8	4.91
B3	8	6	3	6	4	5	5.30
B4	8	7	8	8	7	7	7.51
B5	4	4	5	4	5	5	4.49
B6	10	7	10	8	8	8	8.50
B7	4	4	5	8	5	6	5.31
B8	8	8	2	8	3	3	5.37
B9	5	5	7	3	6	0	4.49

B10	6	6	5	3	5	0	4.30
B11	8	2	4	10	5	10	6.31
B12	2	2	0	4	0	0	1.36
B13	6	7	6	7	5	6	6.18
B14	2	3	4	2	3	0	2.43
B15	3	4	3	2	2	0	2.42
B16	8	2	6	3	8	10	5.99
B17	5	4	6	8	2	0	4.30
B18	6	6	7	3	7	10	5.00
B19	4	4	6	4	6	5	4.84
B20	6	6	3	6	5	6	5.29
B21	6	6	5	6	6	0	4.98
B22	8	8	8	7	4	10	7.43
B23	6	6	4	6	4	10	4.46
B24	4	4	3	4	4	0	3.26
B25	4	5	3	4	4	0	3.44
B26	7	7	7	7	8	10	7.59
B27	2	2	3	5	6	6	3.93
B28	3	5	6	4	5	8	4.83
B29	6	7	4	4	6	8	5.48
B30	6	8	6	4	4	7	5.82
B31	7	7	5	6	7	8	6.33
B32	3	4	4	5	6	7	4.77
B33	5	6	5	6	7	0	4.99
B34	3	4	3	5	4	0	3.27
B35	3	4	3	6	6	0	3.78
B36	6	2	6	7	8	0	4.95
B37	4	4	3	5	5	8	4.72
B38	4	5	4	6	6	7	5.28
B39	5	6	5	7	8	0	5.33
B40	4	5	7	8	5	0	5.01
B0	16	18	18	17	17	14	16.78

As you can see from Table 4, however, the total weight of each building is low between an average of 8 and 2. Consider 16.78 as the total weight of an ideal building suitable for the disabled. Figure 6 illustrates this fact graphically. The last dot on the right side of Figure 6 shows the curve of the optimal number 16.78 (B0).

The curve in Figure 6 shows that all buildings are lower than the optimal number. There are many differences between the 40 buildings. Some are far from capable and stand at a minimum point of about 1 weight. Some show up to about 8, which is 50 % of the desired number. The curve generally shows that the studied buildings do not meet the needs of the disabled.

Figure 6. Assessment of the building according to the POM model



As an example, building B1 is one of the more organized and disability-friendly health facilities and is rated with an average score of 8.81. Due to the location itself, the building has remote packing areas, some ramps are not entirely suitable or is too much inclination. In the building, certain front doors do not open well. Toilets and elevators are suitable.

The health facilities also include the B4 building, which has an average rating of 7.51. Here it was possible to notice that the toilet contains handles, which prevents access for people with reduced mobility on wheelchairs. It was also founded that the elevator could be wider. Access, entrance, and ramp are appropriate, but the regulations dictated by law are not fully complied with. There are deviations.

The public buildings were also observed. Building B2 represents the Police Office and has an extremely poor entrance to the building, an unsuitable ramp, too far a parking space, an unsuitable toilet, and a narrow elevator. Thus, the average score building is 4.91. Building B3 has a score of 5.3. In this case, the toilets and ramp are very poor. Buildings B5, B6, B7, B8 are below average. Church B14, B29, Museum B30, B32, B35, B37 and B38. The lowest rated is building B12, which represents spiritual care. Access is almost impossible here due to the granite base, unsuitable ramp, no adequate toilet, no elevator, and there is also an unsuitable parking space that is too narrow. A very low standard is achieved by building B34 (public passenger transport), which has extremely poor access, and access to the toilet was denied during the observation, despite requests. The building does not have an elevator, the entrance to the building is narrow. Among all the observed buildings, the mentioned building represents one of the least arranged buildings of public character.

Business buildings B10, B15, B16, B17, B18, B19, B28, B30, B33 according to the criteria also achieve a below-average rating, which ranges from an average rating

of 5. In most cases, access to buildings is poor, ramps are not made according to the criteria, security fences are missing, buildings have narrow entrances and unsuitable toilets, which are otherwise intended for the disabled, but do not meet the prescribed criteria. Among all the observed buildings, the B26 building, which has average access, has a slightly steep slope, and in other criteria it achieves an average rating, but the mentioned building has the only elevator that meets all the prescribed criteria.

An assessment of Educational Institutions marked with B21, B22, B23, B24, B25, B27, B36 was performed. It was founded that the buildings are rated with an average rating of 6.23. The B22 building has the best rating, namely 7.43. Which represents one of the higher grades than all the assessed buildings. It was found that access to buildings, entrance width and unsuitable ramps are largely a problem with selected buildings. It was also found that buildings have toilets intended for the disabled, but toilets are not built entirely according to regulations dictated by law.

4. DISCUSSION

In the first phase of research, physically disabled persons and the degree of their disability were identified. It was found out that physically disabled persons are classified into four groups, from minor motion disorders (Level I) to those who are utterly incapable of movement (Level IV). The forms of disability were briefly summarized. In the second phase of the research, a review was performed in this field of legislation. It was discovered that legislation in this area is well defined by the European Union and the Republic of Slovenia. It can be concluded that all citizens have the same rights, which means that all have the right to unimpeded access, entry, and use of facilities in public service and multi-apartment buildings. The problem often arises in the enforcement of laws, so contractors must subsequently correct completed construction projects, which increases costs.

A snapshot was also performed in the core of the town of Celje. The previously defined area from the roundabout on XIV Street Divisions, past the train station to the Faculty of Logistics and then past the General Hospital Celje and the MOC embankment were examined. 40 locations of a public character were checked. On each of the identified locations, the entrance, accessibility to the building, possible loggia, elevator, toilet, and parking were examined.

It was found out that only one of the observed points is completely adapted for the movement of physically disabled people. All other locations are inappropriate or partially inappropriate for the movement of physically disabled persons. According to the recording of the condition of the regulation of buildings in the MOC, it can be argued that the main problem lies in the public institutions responsible for the issuance of new building permits, any renewal of public institutions, and supervisory services (inspections) whose main task is to review plans following the defined laws of the Republic of Slovenia, as well as the European Union. According to the current situation, it was estimated that the current state of accessibility of physically disabled

persons in the MOC is not satisfactory or is not following the prescribed laws, regulations, acts, and ISO standards. The routes to the city center of Celje are poorly regulated, and the entry and exit from them are hindered or impaired. In other words, they are too harsh. Paths that are paved additionally make it difficult to overcome the route to the desired location and back.

The research results showed that access to buildings is best adapted for public buildings, followed by entrances to buildings, then the interior of facilities and toilets proved to be the least adopted. The architectural barriers most encountered in accessing buildings were different height differences (e.g., stairs, too high curbs, shallow sidewalks, steep slopes). Also, some parking lot facilities did not have properly arranged accessible parking spaces or did not have enough of them. At the entrances to the buildings, the buildings' entrance doors, which were either too difficult to open, too narrow, or had the hook placed too high for a person in a wheelchair to reach, often proved to be unsuitable. Stairs and too high thresholds and the lack of space in front of the entrance door for maneuvering with a wheelchair also often proved to be an architectural obstacle at the entrance. Inside the buildings, the biggest problem is the stairs between the floors or the elevator's absence.

Since several types of public buildings were included in the research, point of interest was also to find out whether individual types of buildings differ in terms of accessibility. An analysis of the results showed that the answer to this question is yes. In terms of arithmetic mean, buildings for trade and services and facilities for healthcare proved to be the most accessible, followed by office buildings, entertainment buildings, and educational buildings, while structures for transport and communications proved to be the least accessible. These results are consistent with the surveys conducted by Sendi et al. (2012) with persons with disabilities. Namely, they feel the least built obstacles in health and social care (hospitals, health centers, homes for the elderly), while in the field of public transport, they feel many obstacles, especially in intercity passenger transport.

To conclude, it is necessary to regulate the main routes in the future, which would allow physically disabled persons to access public buildings easier. It is also essential to arrange or inspect slopes of slopes, accessibility to buildings, and toilet facilities, as they do not comply with the prescribed standards.

Due to time constraints, only the existing situation in the center of Celje was checked. At the same time, only a public character, including the bank, the post office, the municipality, the schools, the museums, the hospital, the railway station, the bus station, the ATMs, and some sections of the footpaths were considered. For further research in the mobility of people with disabilities, it would be suggested that the research focus on other forms of disability or other restrictions. For further research it is recommend that, blind and visually impaired, deaf, and deaf-blind people could identify accessibility problem using the model. It is suggested that an overview of the remaining infrastructure and facilities, such as shops, shopping centers, parks, or the city's broader area, and others not so often visited, are nevertheless essential objects, is made. To facilitate and better understand the importance of landscapes, facilities,

and routes, all the stakeholders above should also be included in the survey of the current status and have other experts closely related to the topics of any disability. It could also be focused on the means of transporting itself in the sense that all the necessary elements that disabled persons need to check for the smooth and safe overcoming of distances either of their means of transport or public transport. As an option for further research, it would be interesting to include facilities from other regions and to check the differences between individual parts. It would also be interesting to analyze the impact of legislation regulation on the actual situation regarding accessibility. Many problems stem from legislative shortcomings that need to be addressed to improve practice. It would also be interesting to expand the research to cover a wider outdoor built environment. One of the key elements in all this is undoubtedly the voice of people with special needs, so it would make sense to include more of them in researching the accessibility of the built environment.

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