Disability and Rehabilitation: Assistive Technology

ISSN: 1748-3107 (Print) 1748-3115 (Online) Journal homepage: https://www.tandfonline.com/loi/iidt20

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To cite this article: A. Nilay Evcil (2009) Wheelchair accessibility to public buildings in Istanbul, Disability and Rehabilitation: Assistive Technology, 4:2, 76-85, DOI: 10.1080/17483100802543247

To link to this article: https://doi.org/10.1080/17483100802543247

Disability and Rehabilitation: Assistive Technology, March 2009; 4(2): 76–85

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RESEARCH PAPER

Wheelchair accessibility to public buildings in Istanbul

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Accepted 9 September 2008

Abstract

Background. Accessibility to public environment is the human right and basic need of each citizen and is one of the fundamental considerations for urban planning.

Purpose. The aim of this study is to determine the compliance of public buildings in central business districts (CBD) of Istanbul, Turkey, to wheelchair accessibility to the guidelines of the instrument and identify architectural barriers faced by wheelchair users.

Methods. This is a descriptive study of 26 public buildings in CBD of Istanbul. The instrument used is the adapted Useh, Moyo and Munyonga questionnaire to collect the data from direct observation and measurement. Descriptive statistics of simple percentages and means are used to explain the compliance to the guidelines of the instrument and wheelchair accessibility.

Results. The descriptive survey results indicate that wheelchair users experience many accessibility problems in public environment of the most urbanised city (cultural capital of Europe in 2010) in a developing country.

Conclusion. It is found that the major architectural barrier is the public transportation items with the lowest mean compliance (25%). Beside this, the most compliant to the instrument is entrance to building items with 79% as mean percentage. It is also found that there is an intention to improve accessibility when building construction period is investigated. This article describes the example of the compliance of public buildings accessibility when the country has legislation, but lacking regulations about accessibility for the wheelchair users.

Keywords: *Wheelchair accessibility, public buildings, urban planning and design*

Introduction

Accessibility to built environment, especially for wheelchair users, is one of the major concerns of urban planning and design. An urban space can be a successful public place if accessibility is provided. Besides this, a public place should provide accessibility to everyone, regardless of physical abilities or financial resources [1,2], because 'accessibility is the freedom and the ease of individuals to decide to participate in different activities' in urban areas [3, p. 200]. Actually, accessibility is often promoted in present cities, but it is generally poorly designed [4].

The aim of this study is to evaluate accessibility for wheelchair users' into public buildings in Central Business District (CBD) of Istanbul and to identify architectural barriers faced by them in these buildings. İstanbul has been selected as the field study, being the most urbanised and crowded city in Turkey. A theoretical framework has been drawn up with regard to the factors affecting accessibility. Descriptive statistics of simple percentages and means are used to determine the level of compliance to the guidelines of the instrument and wheelchair accessibility to the surveyed buildings.

Purpose: Several studies were conducted with the aim to evaluate accesssibility to physical environment for disabled people, but a few of them are emprical studies showing different cities' conditions. Because there are no published data on the extent of architectural obstructions that wheelchair users may find when they use public buildings in Istanbul, this

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ISSN 1748-3107 print/ISSN 1748-3115 online
DOI: 10.1080/17483100802543247

study was undertaken. The purpose of this study is to assess the accessibility of public buildings for physically disabled people in the case of Istanbul, the most crowded and largest city in Turkey.

Method: The study is carried out in Istanbul's four different CBDs where numerous public buildings are present. A building is considered as a public building if anyone has a right to enter [4,5]. The data are collected at 26 public buildings providing a different kind of public service by the professor. The architectural students of my elective course in 2005–2006 and 2006–2007 also helped me during the field observation (e.g., taking photos, measuring, etc.) and selection of public buildings. I asked them to poll the first 30 public buildings targeted their visiting preferences in the CBD of Istanbul (Besiktas, Sisli, Beyoglu, Kadikoy). Of the 30 public buildings voted, 4 of them were excluded because of some missing data.

The instrument used is the adapted Useh et al.'s [4] questionnaire covering 9 sections investigating the wheelchair accessibility of public buildings. Section A consists of the descriptive data of the buildings and the other eight sections cover the items related with public transport; access to building; entrance to building; vertical circulation; accessibility inside building; accessibility of toilet, public phone and car parking area. The eight sections are separately assessed under different items (see Appendix). Wheelchair accessibility is determined on a point scale based on each section by considering the American with Disabilities Act (ADA) Guidelines.

The study is a descriptive survey of public buildings in Istanbul CBDs using simple percentages and means to determine the level of compliance to the guidelines of the instrument.

Importance of accessibility to public spaces in urban areas

Most of the researchers argue that disabled people are largely excluded from the spaces for work, recreation, consumption and circulation, forming the public places of cities [5–7]. The reason on this exclusion largely lies out on the inadequately designed cities. This in turn limits disabled people's social and economic opportunities [4,8].

Accessibility to public spaces is a basic consideration for urban planning. 'As it is highlighted by many urban theorists, poor accessibility is one of the major deterrents affecting the use of public spaces' [9, p. 227]. From this point of view, accessibility could be defined as the freedom or ability of people to reach their basic needs so as to increase their quality of life [3,9]. What is important on this definition is to address every resident equitably. Thus, accessibility should not be based on healthy body but rather on a wheelchair user, a mother with a pram or an elderly person or a child [1,10].

Accessibility is indispensable to create livable and successful public spaces. Presently, many urban theorists try to find how a city becomes liveable. According to Mumford [11], the urban experience depends on mobility, mixture and challenges. Besides this, one of the key qualities that make a public space successful is accessibility [12].

Social theorists express that accessibility is the right of being a member of the society [13,14]. It is also highlighted by therapists that participation to social activities outside home is a fundamental part in most individuals lives and highly contributes to people's life satisfaction [15].

Generally, a city layout consists of two types of properties as public and private. Public properties concern all usages for everyone (both opened and closed), whereas private ones concern only for use by certain groups of people. From this point of view, all public property areas, which include theatres, cinemas, cafes, shopping centres, parks, hospitals, museums, libraries, etc., should provide full accessible design layout for all citizens. According to many urban theorists, urban public places have great importance in urban design because community socialization and daily experience of urban life are performed in these places [16]. Generally, it is local authorities' primary responsibility to enforce and create access in the built environment when the social state perspectiveness is taking into account. At that point, because of the physical obstructions, a lot of public places become 'no-go' areas, especially for disabled people [14]. This causes loneliness in the disabled people and social isolation from their daily life.

Factors affecting accessibility of public spaces for disabled people

The accessibility provision in built environment has a complex mechanism, but according to the diverse published studies on the accessibility of public buildings for disabled people, factors affecting accessibility could be examined in two main headings (Figure 1):

1. Inadequately designed built-up areas
2. Legal situation

Accessibility is mainly restricted by designers and public authorities whether unconscious or not. But, these professionals affect directly accessibility of disabled people in daily life. For instance, many

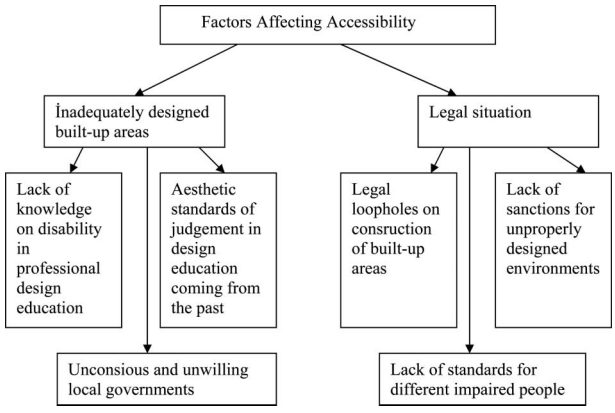

Figure 1. Factors affecting public space accessibility negatively.

disabled people often face problems in urban environment because of architectural obstructions created by society [7,17,18]. Indeed, it is not only a problem of disabled people because everybody can be disabled if the environment is not designed according to his or her needs. This problem defines as architectural disablement, occuring in most of the cities. Goldsmith [10] explains architectural disablement as a limitation put by the architects. This results as inadequately designed of built-up environments. Basically, there is a growing number of studies searching the compliance of public buildings accessibility to the guidelines of studied country [4,5,8,19–21] but, the results are not satisfactory because in most of them architectural barriers indicate a poor quality of life especially for the mobility restricted people [15,22–25]. Additionally, the result is the same in both developed and developing countries' urban environments. So, accessibility for disabled people is a universal problem of humanity even in urbanised cities of wealthy countries.

Another factor affecting accessibility comes from the professional design education. Researchers express that architects' knowledge on the provision of accessibility is inadequate [10,26–30]. Goldsmith [10] explains his experience from 1951 to 1956 in the UK in his book 'Designing for the Disabled the New Paradigm' and highligthed missing knowledge on disabled people's needs of both tutors' and students' in architectural schools. Holmes-Siedle [27] supports his colleague's finding and expresses that according to his study done in the UK's architectural schools, 56% were unable to address the needs of disabled people because of the lack of teachers' awareness. The case is the same in Scotland [29] and Sweden too [15]. Meanwhile, developing countries situations are nearly the same when tutor's knowledge is considered in professional design education. For instance, in Turkey, only 13% of the architectural schools have courses related with the needs of disabled people in built-up environment. Moreover, only 11% of these courses have obligatory status, the others are elective courses. This shows a weakness in professional education in the country (results found by author via universities' web pages in 2007).

The evaluation of one architect in the UK is dramatic but concludes briefly the case 'I feel that there is a need to raise awareness of the needs of disabled people and of the techniques available to meet them, not only for architects but also engineers and clients' [26, p. 420].

On the other hand, some researchers argue that functionality and equity in design concepts come to scene after aesthetic considerations. As Willis underlines [30], architects no longer care how a thing works anymore but only care how it looks. In this context, seeking for the perfect dimensions of human body is as unique as described by Euclidian geometry based on classical comprehensions of the fit and able body. The modern times famous architect and planner Le Corbusier also built up his creation Modular Man, which gets the root of ancient times golden proportion and divine order [31]. He explain this system as a traditional approach coming from Vitrivius, Leonardo Da Vinci's Vitrivian Man, the work of Leon Battista Alberti and others who searched the divine proportions of fit and able human body to improve the appearance of architecture.

Local governments' approach is also effective to improve accessibility for disabled people. In most of the western countries, 'policy and regulations set out high ambitions as concerns accessibility but they are still not meet in practical reality' as observed in Sweden [15, p. 323]. Even the current building legislation and international intentions specifiying requirements for public environment accessibility, regulations which are interpreted by local governments, are not enough to create accessibility. This is because local governments have no valid and reliable data on local accessibility problems at hand including users' opinions [15] or, local governments use building regulations sparingly as it is observed in Britain [13]. Likewise, 'many local authorities subsequently gave little policy priority and few resources to accessibility responsibilities' [7, p. 370]. This is also related with the organization of capitalist societies where profit comes before social objectives such as inclusive design [7].

On the other hand, legal situation has great value in the provision of accessibility for disabled people. Many problems can be derived from legislation according to different country's context such as legal loopholes or lack of sanctions or lack of standards for diverse impaired people. For example, the problem of Ireland and Britain come from legislation, which is

weak and poorly enforced, and there is no prosecutions under the terms of regulation [13,17]. Even in the USA, the UK, Sweden and one or two other western European countries, disability policy practices is limited, although these western countries have enacted laws to improve accessibility for all citizens [32]. Basically, there remain extensive problems with effectiveness and enforcement of access regulations [24] and some conflicts may happen during the practicing period. Even in the USA, the ADA, which requires businesses to provide wheelchair access, is seen as unnecessary restriction upon private property rights, and therefore it caused an infringement of the Fifth Amendment of the US constitution [33]. In short, although most western countries having some form of building and planning legislation, which attempts to improve physical accessibility of cities for all users, the policies are generally failing to reduce or prevent discriminatory urban design [32,34,35].

According to some recorded experiences of eastern countries, legal situation still remains as a factor, which influences negatively the accessibility of public buildings for the disabled people. For instance, in Zimbabwe, the disability act is in operation and prohibits the denial to persons with impairments access to public places, but it does not enforce local authorities to act against architectural obstacles [4]. It is seen poor compliance on accessibility as a result of this fact. In the United Arab Emirates' (UAE) case, public buildings are still inaccessible, especially for mobility restricted people, but in this case, there is no legislation for disability, only public intension tries to create accessibility in built environment [5]. Gleeson [7] summarises that the origins of problems with access regulation lie in socioeconomic relationships, which expresses the existence of frictions between local land economy and access regulation.

To conclude, the exclusion of disabled people from public building are multiple and complex, yet are linked to the policies, practices, values and knowledge of professionals involved in design and construction process [26].

Architectural barriers faced by wheelchair users

In the previous studies, access to public buildings for wheelchair users is mostly assessed by measuring a building's compliance to existing regulation. According to studies using this method, some key and common factors can be derived as architectural obstacles for wheelchair users. For instance, public transportation is the major preventing elements when wheelchair users want to visit public buildings. In London, 80% of city's underground stations are inaccessible for wheelchair users [14]. The absence of lifts in underground stations prevents mobility impaired people [36]. Likewise, poorly designed bus stops, car parking illegally or inaccessible design of buses cause obstacle for mobility impaired people. The location of bus stops also consists a problem when the distance and physical location of the stop is considered [37]. Additionally, there is a need for safe crosswalk [15,38] not only for disabled people but also for the society as a whole.

In terms of accessibility problems in built environment, the most common architectural barrier is seen as steps at entrances [4,15]. Basically, on the entrance of building, level entrance is preferable but entrance with threshold or ramp are used very frequently. Another obstacle on the entrance is the door width. It is dramatic that even in the countries where accessibility regulation is in operation, heavy door and door width compliance recorded at low percentage [15].

Another common criticism of design is the incompliance of public toilet provision [13,39]. The problem becomes extremely serious if this provision is not provided. Lack of public toilet for wheelchair users is considered to be a no-go area. Inappropriate height of toilet seat, sink height, usable mirror and grab bars inside toilets are also recorded as lower compliance [4,5,24].

In parking areas, there are also many physical obstacles reducing wheelchair users accessibility. The most common incompliant items are the number of appropriate parking spaces, accessible parking spaces closest to entrance and parking space width. In some cases, wheelchair users complain from occupied parking loading zones by able bodied drivers [15].

Using public phones and drinking fountains reveal as other architectural obstacles for wheelchair users. Lack of provision and inappropriate dimensions are two common items, which are found incompliant for the use of wheelchair users [4]. Likewise, steep ramps and kerbs are other architectural barriers.

Field study

In the light of aforementioned explanations, this study tries to reveal architectural barriers, which wheelchair users are likely to face when they visit public buildings in Turkey being a country with disability act, but missing regulations. Istanbul is selected as the field study area because of its huge population and similar physical and legal characteristics of other metropoles of developing countries. It is also thought that this descriptive survey may

convey to an understanding of immediate amendments in city's public environment.

This study is inspired by the instruments used in McClain and Todd [8] and Useh et al.'s [4] surveys. Thus, the modified Useh et al.'s questionnaire used to record the data from direct observation and measurement. Three more sections (B-public transportation, C-accessibility to the building-relation with its vicinity and H-accessiblity of public phones), which are relevant to the present study for better understanding the accessibility of wheelchairs, were added to the original questionnaire. Then, the new questionnaire is divided into nine sections. Through a descriptive survey, the level of compliance is determined by using the ADA Guidelines, which is widely accepted all around the world. Additionally, there was no other choice since national standards or guidelines regulating the accessibility of public buildings for wheelchair users are missing in Turkey.

The questionnaire consists of nine sections. Section A is concerned with descriptive data related to the buildings such as building name, function, location and date of construction. Sections B, C, D, E, F, G, H and I are about the assessment of public transport, access to building, entrance to building, vertical and horizontal circulation, accessibility of toilets and public phones and parking areas. Different items are separately assessed under each Section (see Appendix for details of the questionnaire).

Wheelchair accessibility is determined on a 26 point-scale. This means a perfect score of 26 express 100% accessibility. But in some cases, maximum obtainable score is diminished to 21 (e.g., Section E) because six of the surveyed building have only one floor, and so there is no need to vertical circulation. In this case, for Section E, the perfect score is calculated out of 21 expressing 100% accessibility. Each public building was scored as compliant (yes, score: 1), non-compliant (no, score: 0) or partially compliant (e.g., there is a sidewalk but very narrow) (partially, score: 0.5) with each of the items of nine sections. For example, in Section B (public transportation), B1-existing of public transport means receives 6 as score when 26 buildings are investigated. This shows 23% of compliance with the item B1 in the questionnaire, and only 12 buildings provide public transportation facilities.

Results

Public transport (Section B)

All of the 26 buildings are not fully accessible by public transport. Hence, they are determined as partially accessible. During the survey, it is found that buses as public transport means are not wheelchair friendly. It is also examined that even in a subway, which is the most convenient to disabled people, a wheelchair user cannot enter the shopping centre as ordinary citizens because any elevator or ramp is provided on some stations. Among the surveyed building, some of them are totally inaccessible by any public transport. Thus, this item received the lowest mean compliance of 25% (Table I).

Access to building (Section C)

This section recorded the mean compliance of 65%. The item 'convenience of the width of sidewalk' received more compliance (69%) than the item 'convenience of ramps on sidewalk' (60%) (Table I). During the observation, it is found very narrow sidewalk, prolapsed paving stones and obstacles on the sidewalks such as advertisement boards and pots of flowers or parking stoppers. In the 20 surveyed areas, ramps are provided on sidewalk with deficiencies such as inadequate landing area at ramps and inclination of ramps (more than ratio 1–12). Actually, problems mentioned with sidewalk and paving stones are very important because there is a risk of tipping over because small wheels can get stuck in between the stones [15].

Entrance to building (Section D)

The entrance to building complied with standards as 79%. Nearly, all surveyed buildings (25 buildings) have at least one accessible door (92%) (Table I). In 18 public buildings, the entrance to building is examined as convenient but in 3 of them thresholds on the entrance after the ramps reduced the scores. Five of them have incomplied entrance such as steep ramps or steps from sidewalk to building entrance. Besides this, nearly all of the buildings (75%) provide a level access to all ground floor areas from main entrance. Only a few of them (three buildings) have inadequate provision on ramps (more than ratio 1–12) to all ground floor area from main entrance.

Accessibility on vertical circulation within building (Section E)

To this section, six buildings are not included because they are only one floor. Moreover, one elevator of the public building works only on the first 3 floors, and so the upper floors became inaccessible by using elevator. Besides this, the compliance

Table I. Compliance scores of accessibility standards.

Items	Scores	Percent	No. of buildings
Section B – Public transportation			
B1 – Existence of public transport	6	23	12
B2 – Stop convenience	5	19	8
B3 – Stop closeness	8.5	33	10
	Total	75	
	Mean	25	
	(Max. obtainable score is 26, representing 100)		
Section C – Access to building (relation with its vicinity)			
C1 – Width of sidewalk	18	69	23
C2 – Ramp on sidewalk	15.5	60	20
	Total	129	
	Mean	65	
	(Max. obtainable score is 26, representing 100)		
Section D – Entrance to building			
D1 – Accessible approach from sidewalk	18	69	19
D2 – Level access to each place	19.5	75	23
D3 – Door accessibility	24	92	25
	Total	236	
	Mean	79	
	(Max. obtainable score is 26, representing 100)		
Section E – Vertical circulation			
E1 – Existence of elevator/ramp	12.5	63	13
E2 – Elevator features (dimension, etc.)	11	55	13
	Total	118	
	Mean	59	
	(Max. obtainable score is 20, representing 100)		
Section F – Accessibility inside building			
F1 – Level/ramped access to inside space	19.5	75	24
F2 – Cashier/counter dimension convenience	7.5	29	9
	Total	104	
	Mean	52	
	(Max. obtainable score is 26, representing 100)		
Section G – Accessibility of toilet			
G1 – Existence of accessible toilet	12.5	57	13
G2 – Accessibility of elements (toilet seat, etc.)	10.5	48	11
	Total	105	
	Mean	53	
	(Max. obtainable score is 22, representing 100)		
Section H – Accessibility of public phone			
H1-Existence of min. one accessible public phone	7	33	7
H2-Dimension convenience	7	33	7
	Total	66	
	Mean	33	
	(Max. obtainable score is 21, representing 100)		
Section I – Accessibility of car parking area			
I1 – Existence of handicap parking	9	60	9
I2 – Dimension of parking space	8	53	8
I3 – Accessible route from parking to building	7	47	7
	Total	160	
	Mean	53	
	(Max. obtainable score is 15, representing 100)		

recorded 55% for dimensions of elevator and position of buttons because most of the position of buttons is out of standard. The mean percentage compliance of this section is 59% (Table I).

Accessibility inside the building (Section F)

This section recorded a mean score compliance of 52% (Table I). The main reason of this

incompliance is related with the second items' (cashier and counter dimension) irrelevance. Nine out of 26 surveyed buildings recorded as compliant or partially compliant. The other 17 buildings provide inadequate dimension on cashier (too high counter) and counter dimension (too narrow passway). On the other hand, 15 surveyed public buildings have access to all inside space (e.g., shops, classroom, seating in a theatre, etc.). Nine of them are recorded as partially because of the inconvenient ramps in some part or steps on the entrance of some places (concert hall, inside partion of eating places, etc.).

Accessibility of toilet (Section G)

The accessibility of toilet recorded a mean score compliance of 53% (Table I). Eleven toilets are incompliant because of some deficiencies such as narrow doors (less than 100 cm) and higher sink (more than 88 cm above floor). In four surveyed buildings, there was no customer water closet. So, these four buildings are excluded from the calculation, and the maximum obtainable score on this section calculated as 22 representing 100%. More than one of the three surveyed buildings does not provide another toilet for wheelchair users.

Accessibility of public phones (Section H)

Public phones are provided only in 21 public buildings (others have no public phones). Thus, five buildings are not taken into calculation. Only seven of these sites have at least one public phone accessible by wheelchair users and all these seven telephones are compliant to the instrument (33%). Hence, the accessibility of public phones recorded a mean score compliance of 33% (Table I).

Accessibility of car parking areas (Section I)

Eleven of the surveyed public buildings are not provided with any customer car parking areas. Thus, these buildings are excluded from the calculation. Those which are provided parking areas, recorded one of the least percentage compliance on the survey (mean, 53%) (Table I). Only 60% of them provided disabled parking spaces and others have no specialised parking spaces for disabled. 53% of these parking lays are out of standards (parking space width is less than 365 cm). This caused an obstacle for wheelchair users, which also identified in previous studies [4,40]. Additionally, the access provided from the parking through building is not satisfactory (47%).

Public buildings' compliance is also investigated according to the period of building construction. Five buildings are excluded from the analysis because of the missing data. The rest are analysed in four period of construction. It is tried to divide almost the same number of building in each period by keeping in mind the Turkish Disability Act dated 2005. Before 1990, Sections B, C, D, E, F, G, H and I recorded 17, 37.5, 47, 20, 50, 60, 20 and 25% compliance, respectively (Table II). For the next period, public buildings recorded 12, 57, 79, 73, 61, 43, 29 and 53% for the above-mentioned items, respectively. Only in public transport and accessibility of toilets compliance diminished when the first two periods of construction are compared. Public building constructed between 2000 and 2005 recorded the following percentage of compliance, public transport 29%, access to building 62.5%, entrance 75%, vertical circulation 100%, accessibility inside the building 57%, toilets 67%, public telephones 100% and car parking 100%. Lastly, buildings constructed after 2005 recorded a mean percentage of wheelchair compliance of 42, 75, 96, 94, 63, 88, 50 and 75%, respectively. Despite the missing regulation, the results show that there is an improvement on wheelchair users accessibility in public buildings.

Discussion

The results of this study indicate that wheelchair users experience many accessibility problems in

Table II. The mean percentage accessibility of each section surveyed regarding the period of construction of the buildings (n=21, five buildings are excluded).

Period of construction	Number of building	Section B	Section C	Section D	Section E	Section F	Section G	Section H	Section I	Average (%)
Before 1990	6	17 (6)	37.5 (6)	47 (6)	20 (5)	50 (6)	60 (5)	20 (5)	25 (4)	34.5
1990–2000	7	12 (7)	57 (7)	79 (7)	73 (7)	61 (7)	43 (7)	29 (7)	53 (5)	51
2000–2005	4	29 (4)	62.5 (4)	75 (4)	100 (2)	57 (4)	67 (3)	100 (2)	100 (1)	74
After 2005	4	42 (4)	75 (4)	96 (4)	94 (4)	63 (4)	88 (4)	50 (4)	75 (4)	73
Total	*21*									

Number of building given within parentheses.

public environments in Istanbul's CBDs. The buildings sample included 1 museum, 2 hotels, 7 shopping centres, 1 post office and 1 bank branch, 3 concert halls and theatre complex, 1 cinema, 6 cafes and restaurants, 3 universities and 1 stadium located in Istanbul's CBDs (Besiktas, Sisli, Beyoglu and Kadikoy). Different deficiencies were found in all buildings surveyed. In other words, none of them were 100% compliant. The highest compliant accessibility area is 'Entrance to building' with a mean of 79% and the lowest is Public Transport with a mean of 25% (Table I). These results are in concordance with previous studies [4,5,8,15,21,23]. Especially, accessible entrance is the area with the highest compliance score, which is parallel with findings of previous studies [4,5,8].

Several architectural barriers are found in all the buildings surveyed. The major architectural barrier can be public transportation items because the mean compliance recorded is the lowest of the survey. The most compliant to the instrument is entrance to building items with 79% as mean percentage (Table I). The previous studies also identified these incompliant elements in other countries such as in the USA [40], in Sweden [15] in the United Arab Emirates [5] and in Zimbabwe [4].

It is clear that this study is a first explorative step towards general knowledge in this area. Thus, the findings cannot be generalised to all public buildings or to other cities. Nevertheless, the findings express that there is much important knowledge to be gained through this kind of approach. Our knowledge on how physical environment should be designed to create all citizens full participation is still scarce.

The trend of creating accessibility improved dramatically for the buildings constructed recent years, but it is also obvious that Turkish Disability Act's influence is not met in practical reality. The results for 3 cases (2 building examples for 2000–2005 period in vertical circulation, 2 building examples for 2000–2005 in accessibility of public telephones, 1 building example for 2000–2005 period in car parking) show 100% compliance, which may not be confidential because of small simple size. However, there is a fact that in all of the studied areas it is found an improvement on accessibility (Table II).

Urban planning and design research directed to physical environmental accessibility can ensure useful data when analysing process like legislation, employment, social integration and designers' professional education, related to disabled people.

Conclusion

The results of this study show that wheelchair users experience with many accessibility problems in public building in CBD's of Istanbul. To improve on the wheelchair accessibility in public buildings, there is a need to adapt international policy and regulations to country's conditions. In Turkey, the Disabled People Act of 2005 prohibits the discrimination of persons with disabilities in access from public provisions. But this legislation does not enforce the Turkish authorities to act against architectural obstacles. Conversely, this consists of a loophole on the process of the construction of the built-up environment. Local authorities have no sanctions when they meet a poorly designed project. On the other hand, regulations in the country have missing and unclear data, so even professionals want to create accessibility and cannot realise their projects in real world. Therefore, planners, designers and local governments should exhibit human space relation in the public open spaces [41] and they must encourage to create a participatory mechanism [42].

This study results could be used to influence the willingness of service providers like shop owners as McClain and Todd's [8] survey results are positively influenced on the general level of public environment accessibility in city centres [15]. Moreover, the emprical results would help advocacy groups and non governmental organizations to better target their energies on the practices and contexts about the realization of accessibility.

This study is a first descriptive step toward general knowledge on accessibility needs. Because of the small sample and the geographic limitations of this study, the results may not be generalised. But there is no academic study previously reported on wheelchair accessibility of public buildings in Istanbul, this first study may then be used as an example for future studies. Besides this, for further studies, there is also a need to create a valid and reliable assessments of public places accessibility including a client-centred perspective [15], which have a great opportunities for explaining the impact of the built-up environment on people's participation to daily life. Additionally, further research is needed to test the proficiency of design curriculum in Turkey.

To conclude, 'the creation of a safe and pleasant enabling town centre is clearly a major achievement in urban design: not just for those with special mobility needs, but for society at large' [39, p. 739].

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Appendix: The Useh et al.'s 2001 instrument (modified)

Each question is evaluated as Yes; Score: 1 or, No, Score: 0 or Partially, Score: 0.5.

Section A: demographic data

A-1 Name of building
A-2 Its location
A-3 Date of construction
A-4 Purpose of function of building

Section B: public transportation

B-1 Is there any public transportation mean?
B-2 Is the stop of public transport convenient?
B-3 Is the stop close to public building?

Section C: accessibility to the building (relation with its vicinity)

C-1 Is the width of sidewalk convenient? (does the sidewalk extend continuously or is it stopped by an obstacle?)
C-2 Is ramp on sidewalk convenient?

Section D: accessibility to building entrance

D-1 Is the approach from sidewalk to the main entrance of building accessible?

D-2 Is there a level access to all ground floor areas from main building? (horizontal circulation accessibility)

D-3 Is at least one door accessible?

Section E: accessibility on vertical circulation within building

E-1 Is a convenient vertical circulation provided in building? (elevator, ramp)

E-2 Are dimensions of elevator and position of buttons inside and outside convenient?

Section F: accessibility inside building

F-1 Is there a level or ramped access to all inside space (e.g., shops, classroom, seating in a theatre, cinema, etc.)

F-2 Are cashier, counter dimensions convenient? (Does the height of cashier convenient? Does the width of payment point convenient for wheelchair passage?)

Section G: accessibility of toilets

G-1 Is there any designed accessible toilet (handicap toilet)?

G-2 Is interior design of toilet accessible? (the top of toilet seat between 43 and 48 cm from the floor, sink height is less than 86.5 cm above floor etc., toilet has grab bars).

Section H: accessibility of public telephones

H-1 Is there at least one public telephone accessible by a wheelchair?

H-2 Does the accessible telephone have at least 76/122 cm clear floor space that allows the approach by wheelchair?

Section I: accessibility of car parking areas

I-1 Is there any designed accessible parking space (handicap parking)?

I-2 Is disabled people's parking space appropriate (width 365 cm)?

I-3 Is there an accessible route connecting the parking with the entrance of building?