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The Assessment of Barrier-Free Facilities on Vote Stations

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Abstract- In order to achieve substantive equality goal for people with disabilities, the voting rights of the elderly and people with special needs shall not be ignored. This study aimed to inquire the accessibility of voting stations. The barrier-free facilities of 31 voting stations had been assessed in Keelung, Taiwan. The findings noted major failures were inquired through the assessments of ramped entry and disabled entrance, accessible elevator, and barrier-free parking space.

Keywords- *Barrier-Free Facility, Disability, Vote Station*

I. INTRODUCTION

There were over 1.17 million people with disabilities in Taiwan by 2016 according to the statistics investigation done by the Ministry of the Interior. Most of people with disabilities are qualified voters. Furthermore, almost every two years government will hold one national election. Therefore, the readiness and quality of the barrier-free facility of vote stations is an important factor which influences the voting rate of the disabled voters. How to enhance the readiness and practicality of the barrier-free facility becomes one of the popular research topics recently.

The purposes of this study were listed as following:

- Inquire the readiness of the barrier-free facility of vote stations in Keelung, Taiwan
- On-site assess the quality of the barrier-free facility of vote stations according to the design standard of barrier-free facilities
- Address suggestions based on the defects found through the investigations and assessments mentioned above

II. THEORY

A. *Design Concept of Barrier-Free Facilities for Buildings*

Barrier-free facility is the facility particularly for people with disabilities to use, which includes those added facilities inside and outside the building for people with disabilities to get in and out the building independently without interference or obstacle. For examples: ramped entry, disabled entrance, accessible elevator, barrier-free parking space, and etc. Nevertheless, Taiwan has become an aging society since 2010. Barrier-free facility is not only for people with disabilities to use but also for elders. Therefore, the requirements of elders are the key points of barrier-free environment design [1] [2].

B. *Regulations of Barrier-Free Facilities*

The regulations of barrier-free facilities in terms of the specifications of ramped entry, disabled entrance, accessible elevator, and barrier-free parking space are regulated in the following regulations [3] [4] [5] :

- People with Disabilities Rights Protection Act
- Building Code and Regulations
- Design Specifications of Accessible and Usable Buildings and Facilities

III. METHOD

On-Site Assessment was applied to assess 31 vote stations in Keelung, Taiwan. 31 vote stations were picked randomly from the entire Keelung city [6] [7]. The relevant dimensions and status of the facilities were measured and photoed as the records which were evaluated according to the relevant regulations of barrier-free facilities. The authors rode wheelchairs to each vote station in order to experience the status of barrier-free facilities by themselves.

The on-site assessment sheet was designed to record the relevant measures and photos for each vote station. Ten assessment items for ramped entry, disabled entrance, accessible elevator, and barrier-free parking space were designed, please refer to Table 1. All the relevant dimensions of barrier-free facilities were measured according to the regulations of barrier-free facilities in terms of “Building Code and Regulations” and “Design Specifications of Accessible and Usable Buildings and Facilities”.

TABLE I. ASSESSMENT ITEMS AND RESPECTIVE SPECIFICATIONS/REQUIREMENTS

item	Assessment	Specifications/Requirements
1	Ramped entry and disabled entrance	
1.1	Entrance drop	0.5 cm ~ 3 cm
1.2	Ramped slop	
	● 1/10 slop	Under 20 cm drop
	● 1/5 slop	Under 5 cm drop
	● 1/2 slop	Under 3 cm drop
1.3	Quality of ramped entry	Smooth, solid, and anti-slip
1.4	Smoothness of disabled entrance	Smooth as well as no threshold
2	Accessible elevator	
2.1	Location of emergency-call button	85 cm ~ 90 cm above ground level
2.2	Time setting for elevator door closing	Enough time for get in & out
2.3	Gap of the elevator entrance	Under 3.2 cm
2.4	Turning radius inside the elevator	Large enough for the wheelchair making turns
3	Barrier-free parking space	Available

IV. RESULTS AND DISCUSSION

The measurement and status of the barrier-free facilities were shown as following:

A. Assessment Results of Ramped Entry and Disabled Entrance

1) Entrance Drop: Refer to Table 2 regarding the measurements of entrance drop, 19 vote stations were in accordance with the respective regulation and the rest 12 vote stations failed to fulfill the respective regulation.

TABLE II. ENTRANCE DROP: 0.5CM ~ 3CM

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Entrance Drop	19	12

2) Ramped Slop: Refer to Table 3 regarding the measurements of ramped slop, 21 vote stations were in accordance with the respective regulation and the rest 10 vote stations failed to fulfill the respective regulation.

TABLE III. RAMPED SLOP: 1/10 SLOP FOR UNDER 20 CM DROP, 1/5 SLOP FOR UNDER 5 CM DROP, 1/2 SLOP FOR UNDER 3 CM DROP

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Ramped Slop	21	10

3) Quality of Ramped Entry: Refer to Table 4 regarding the quality review of ramped entry, 26 vote stations were in accordance with the respective regulation and the rest 5 vote stations failed to fulfill the respective regulation.

TABLE IV. QUALITY OF RAMPED ENTRY: SMOOTH, SOLID, AND ANTI-SLIP

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Quality of Ramped Entry	26	5

4) Smoothness of Disabled Entrance: Refer to Table 5 regarding the smoothness of disabled entrance, 21 vote stations were in accordance with the respective regulation and the rest 10 vote stations failed to fulfill the respective regulation.

TABLE V. SMOOTHNESS OF DISABLED ENTRANCE: SMOOTH AS WELL AS NO THRESHOLD

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Smoothness of Disabled Entrance	21	10

B. Assessment Results of Accessible Elevator

1) Location of Emergency-Call Button: Refer to Table 6 regarding the location of emergency-call button, all 31 vote stations were in accordance with the respective regulation.

TABLE VI. LOCATION OF EMERGENCY-CALL BUTTON: 85 CM ~ 90 CM ABOVE GROUND LEVEL

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Location of Emergency-Call Button	31	0

Time Setting for Elevator Door Closing: Refer to Table 7 regarding the time setting for elevator door closing, 3 vote stations were in accordance with the respective regulation and the rest 28 vote stations failed to fulfill the respective regulation.

TABLE VII. TIME SETTING FOR ELEVATOR DOOR CLOSING: ENOUGH TIME FOR GETTING IN AND OUT ELEVATORS

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Time Setting for Elevator Door Closing	3	28

2) Gap of The Elevator Entrance: Refer to Table 8 regarding the gap of the elevator entrance, all 31 vote stations were in accordance with the respective regulation.

TABLE VIII. GAP OF THE ELEVATOR ENTRANCE: UNDER 3.2 CM

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Gap of the Elevator Entrance	31	0

3) Turning Radius Inside The Elevator Compartment: Refer to Table 9 regarding the turning radius inside the elevator compartment, 3 vote stations were in accordance with the respective regulation and the rest 28 vote stations failed to fulfill the respective regulation.

TABLE IX. TURNING RADIUS INSIDE THE ELEVATOR COMPARTMENT: BIG ENOUGH FOR THE WHEELCHAIR MAKING TURNS

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Turning Radius inside the Elevator Compartment	3	28

C. Assessment Results of Barrier-Free Parking Space

1) Barrier-Free Parking Space: Refer to Table 10 regarding the barrier-free parking space, only 1 vote station was in accordance with the respective regulation and the rest 30 vote stations failed to fulfill the respective regulation.

TABLE X. BARRIER-FREE PARKING SPACE: AVAILABLE

Assessment	Pass (Qty of stations)	Fail (Qty of stations)
Barrier-Free Parking Space	1	30

V. CONCLUSIONS AND SUGGESTIONS

- According to the assessment results of ramped entry and disabled entrance, the environment of barrier-free facilities for people with disabilities was not user friendly. The failure rate closed to 40% on the assessment of ramped entry and disabled entrance indicated that the environment of barrier-free facilities was not suitable for people with disabilities to perform vote at vote stations. Furthermore, most of vote stations allocate at hill site where is not convenient for people with disabilities to reach.

- According to the assessment results of accessible elevator, the failure rate higher than 90% on the assessments of "time setting for elevator door closing" and "turning radius inside the elevator compartment" indicated that people with disabilities were not able to effectively operate wheelchairs and get in and out the elevator. Especially the serious failure of "time setting for elevator door closing" represented that people with disabilities were not able to get in and out the elevator independently without additional assistance. The vote stations shall either improve the time setting for elevator door closing or provide assistance to ensure convenient accessibility of elevators.

- According to the assessment results of barrier-free parking space, the failure rate closed to 97% on the assessments of "availability of barrier-free parking space" indicated that vote stations lacked for barrier-free parking space extremely. People with disabilities were not able to conveniently get in and out vehicles at the parking lot of vote stations, which interfered the voting right of people with disabilities.

REFERENCES

[1] C.P. Kuo, "Case Study of the Improvement of Barrier-Free Campus Environment". Dissertation of Master, Chung Hua University, Hsinchu, Taiwan, 2013.

[1] C.M. Tang, "Design Concept of Barrier-Free Building". Taipei, Wu-Nan Culture Enterprise, 2006.

[2] Building Code and Regulations, 2017. Construction and Planning Agency, Ministry of the Interior: http://www.cpami.gov.tw/en/

[3] Design Specifications of Accessible and Usable Buildings and Facilities, 2017. Ministry of Interior: http://free.abri.gov.tw/en/

[4] Law and Regulation Database of the Republic of China, 2017. Ministry of Justice: http://law.moj.gov.tw/en/

[5] Central Election Commission, 2017. http://web.cec.gov.tw/

[6] Keelung City Government, 2017. http://www.klcg.gov.tw/en/

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