Housing Accessibility: A Study of Retrofitting Efficient Ramps in Public Buildings in Kisumu City, Kenya

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ABSTRACT
The recent past has seen an increased inquiry into the mobility of the aged and physically impaired persons in public buildings in Kenya. For this reason, the Government of Kenya has made it mandatory that all public buildings that do not have ramps be retrofitted with ramps. Despite this directive, many public buildings do not have accessibility ramps. The purpose of the study was to investigate the factors that hinder the incorporation of efficient ramps in some of the existing public buildings in Kisumu, Kenya. The findings showed that; public buildings in the study area had not complied with the requirements for efficient ramp construction. Also, some factors that impeded the retrofit of efficient ramps included inadequate guides on inclusive design, space requirements, strength of existing building and inadequate building inspection. The study concluded that; many public buildings in the study region remain largely inaccessible to persons with mobility challenges.
Key Words: Housing accessibility, efficient ramp, low rise buildings, inclusive housing, public building, environmental accessibility, retrofitting ramps, mobility impaired population

1. INTRODUCTION

For a long time, buildings have formed part of the human habitat. The built environment has ensured increased human production and socialization. The built environment influences almost every aspect of human activity. The ability of a person to live independently, receive an education, find a job, travel, take part in religious, social, athletic, and recreational activities, and choose where to live is affected.

Despite the numerous benefits, the built environment consists of many barriers. These obstacles which include inaccessible floor spaces, broken pavements, out of reach door knobs and shelves, toilets with accessibility barriers among many others, limit the access to the services offered therein especially for the physically challenged and the elderly. Such impediments make an environment unsafe and cause a high level of difficulty to persons with physical challenges and the elderly. But more importantly, barriers cause spaces to be out of reach, denying people the opportunity to participate in various spheres of life such as education, economic, social, and cultural and many other activities (UN Report, 2004).

Persons with mobility impairments have been widely ignored in the past, but in recent years, they have begun to wage a campaign for equality. Their campaign includes equitable opportunities for employment, education, and access to goods and services among others. All of this requires a minimum degree of access to the places where employment, education, and goods and services may be found (Shannon & Foote, 1996). It is from this perspective that the built environment should be made accessible to all.

Currently, there are many documents and policies put in place in many countries to facilitate the remodelling of the built environment to make it accessible to all and minimize discrimination regarding access to services and socialization. Some of these documents include the Americans with Disability Act, 2010 that set minimum requirements – both scoping and technical – for newly designed and constructed or renovated State and local government amenities, public accommodations, and commercial facilities to be readily accessible to and usable by mobility impaired persons.

In Kenya, the Persons with Disability Act of 2003 require public buildings to be retrofitted with ramps to ease access to services offered therein by persons with physical disability and the elderly. According to the Kenya Constitution (2010) part 3, subsection 54, individuals with any disability are entitled to access to facilities for persons with disabilities that are integrated into the society to the extent compatible with their interests and access to all places.

The study focuses on the ramp as one of the facilities that individuals with disabilities can use in low-rise buildings. It can act as a safe means of circulation by the physically challenged and elderly when constructed to required standards. Ramps are relatively easy and less expensive to build, at least in one storey buildings and will benefit many (UNESCO, 2009).

2. PROBLEM STATEMENT

An accessible built environment enables persons with mobility challenges to get better chances to integrate into the society, access vital services and reduce their dependence on support for everything they require in life. For independent movement in the built environment, efficient ramps are essential for circulation, especially in low rise buildings and building entrances. A spot check of accessibility into buildings in Kisumu City, however, reveals the absence of these accessibility facilities for the mobility impaired population in most public buildings. Access into many buildings by wheelchair bound person is almost impossible.

A study in one of the Kenya cities revealed that there was a planning problem in the Kisumu CBD concerning accessibility for people with physical disabilities, as most buildings have discriminatory designs that significantly hamper accessibility (Ochieng, Onyango & Adoyo, 2010). The UN (2013) report of the sixth conference of state parties on the convention on rights of persons with disabilities held in Kenya state that, in both developed and developing countries, accessibility to public facilities such as buildings and transport systems remain largely inaccessible to persons with mobility difficulties. According to Section 23 of the Persons with Disabilities Act of Kenya 2003, accessibility to buildings by persons with disabilities should be made possible by all stakeholders of the construction industry. The section states ‘every public building should be made accessible to persons with disabilities’. The implementation of the Act however, remains invisible. Sidha (2010) observed that most of the policy promises outlined in the PDA act 2003 have remained unfulfilled.

It is against this slow pace of construction and retrofitting ramps in public buildings that, Housing accessibility: a study of retrofitting efficient ramps in public buildings in Kisumu City, Kenya was conducted.

3. CONCEPT UAL FRAMEWORK

The conceptual framework gives the relationship between the variables under study.

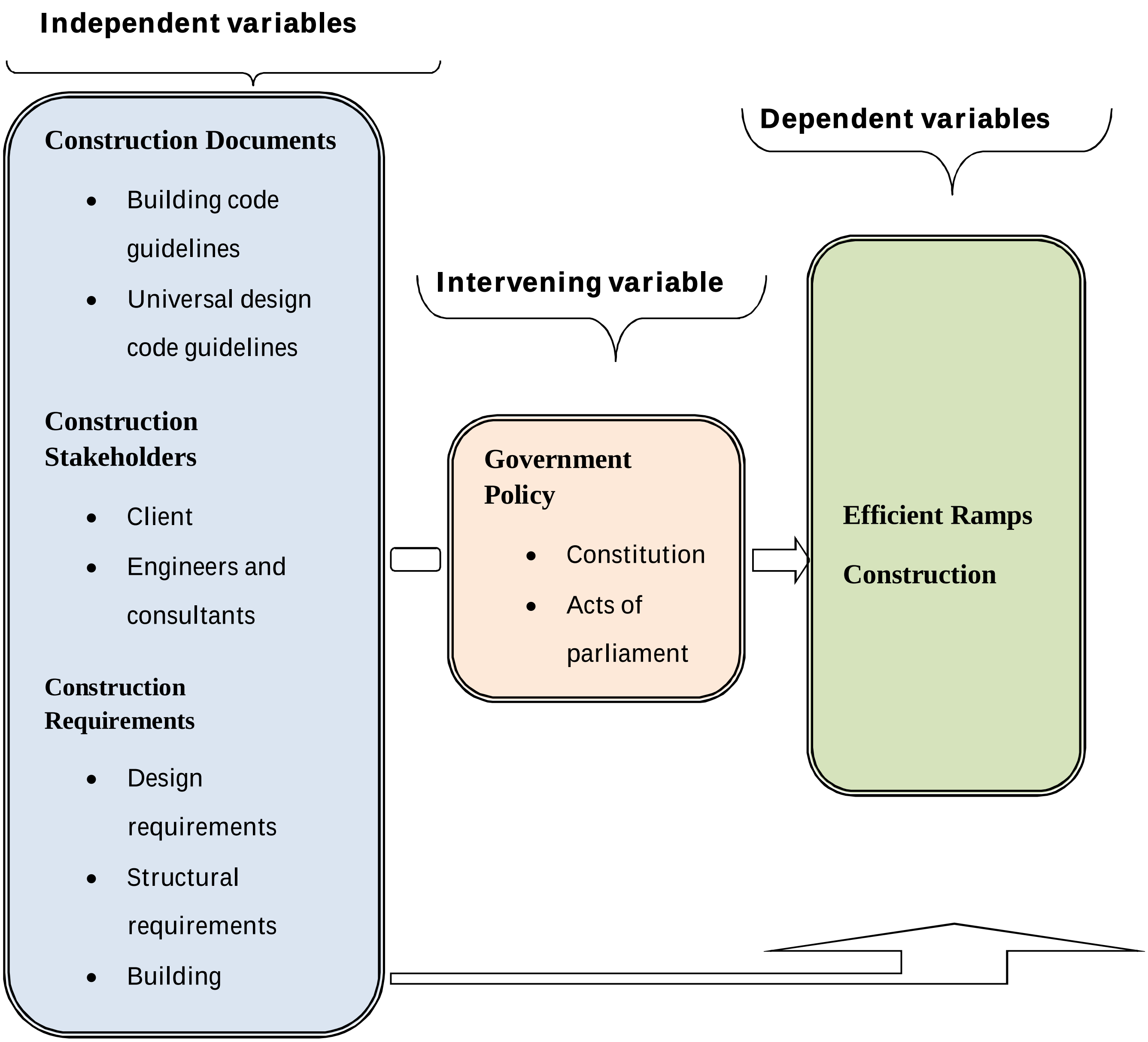

Figure 3.1: Conceptual Framework Flow Chart

The independent variables in the study are; the construction documents, stakeholders in the construction industry and building requirements. The construction documents affect the building elements either positively or negatively by providing the relevant specifications for the construction of elements. The stakeholders in the construction industry on the other hand play a crucial role in the determination of the nature of the final built facility; the client for instance is responsible for financing the project. When the project is funded adequately, all the elements are constructed to the specification and when inadequately funded, the result could be omission of some building elements and substandard construction of others. Engineers too are responsible for the implementation of the design requirements. The efficiency of the engineers may lead to the construction of either standard or substandard products. Also, design requirements allow or limit the construction of accessibility facilities. Limiting space may lead to the omission or substandard construction like using steeper slopes to fit ramps into the space. The spacing of structural elements may also influence the building of ramps by either limiting the size or altering the specification.

The intervening variable in the study was the government policy. The government through acts of parliament and the constitution can regulate the kind of built environment by providing building specifications to be followed during construction. The construction specifications are constituted on behalf of the government by the architectural association of Kenya and the board of engineers.

The dependent variable in the study was the ramp; its construction depends on the by-laws put in place to guide the construction industry. The efficiency of the ramp is dependent on the construction documents available such as building codes and construction guides. It also depends on the workmanship employed during construction and the building constraints present during the retrofitting of ramps in existing buildings and the availability of funds.

4. LITERATURE REVIEW

The chapter presents the reviewed literature related to the study, and it includes the following subsections; review of previous related studies and review of construction guides and building codes on accessible design.

The current built environment poses a lot of mobility obstacles to the persons with physical challenges and the elderly. Barriers in the built environment can contribute to limiting achievements of everyday activities and restrict participation (Helle, 2013). Pynoos (2001) finds that Over 90% of the elderly population lives in conventional single-family houses as well as apartments. Unfortunately, most of these buildings were not designed to meet their needs. They live in housing with problems such as inaccessible entrances and stairs as well as unsafe kitchens and bathrooms.
Access to Education facilities by persons with mobility challenges is also an issue; most schools have not attempted to make the classrooms accessible for children with physical impairments or on wheelchairs (Ingstad & Grut 2007). In higher learning institutions, Ongeta (2013) studied the learning environment and academic participation of students' with physical disabilities in higher education at KU and JKUAT. The study findings revealed that some buildings had stairs or too steep ramps to navigate through. These hindered the students in attending some classes in time. As a result, their participation in class activities was minimized.
Hospitals too have problems of building accessibility. In his study, Ewemar (2008) found that of all the accessibility design features mentioned during the survey, the ramp had the highest tally followed by stairs, spacious rooms, accessible sanitary room features, and hand guardrails respectively 48%36%10%4%2%.
Concerns about urban accessibility include small kerbs that are not a problem for the physically fit community but that are inaccessible for wheelchair bound persons (Adams, 2006).According to the findings of a study by Ochien'g et al (2010) there was a planning problem in the Kisumu CBD concerning accessibility for people with physical disabilities, as most buildings have discriminatory designs that significantly hamper accessibility. Within the building interior, the barriers encountered included absence of lifts and ramps.
Other built environments limit the productivity of employees with mobility challenges. The few persons with mobility challenge employed, experience hindrances at the workplace. A study by

Sajjad (2004) finds there was no special provision made for physically challenged employees to give them a barrier free built environment and to cater for their individual needs. In low-rise buildings access to services in upper floors is a problem. In a study by Ikechukwu, Folaranmi, Philip, Ayodele and Omachoko (2015) there was no building with ramp connecting to an upper floor, in Nigeria. Only 11% of the buildings had an elevator in place to aid movement to the upper floors.

Accessibility of the built environment to individuals with mobility challenges has continued to be a challenge. In a separate study, a majority of the participants (92%) said that they experienced problems while trying to enter buildings that had not complied with the adjustment order as cited in the PDA of 2003 (Wambugu, 2012). Able bodied persons put forth excuses not to make the built environment accessible to all. The courts view physical access to schools as non-negotiable and have not accepted arguments such as the one put forth by the defendants in one case that there are currently no handicapped students in the school system and therefore no ramp is necessary (Manis, 2013).

All stakeholders in the built environment need to embrace the spirit of universal design. An atmosphere that makes people more aware of disabilities of all types would appear to be more likely to improve the built environment for those with disabilities (Winheld, 2010). A barrier free environment is highly welcome. In a study intended to establish whether mobility services improve socialization of students. All the teachers 17 (100%) and students comprising 59 (100%) were of the opinion that mobility services provided enhanced interaction among students and teachers. It was further established from teachers that mobility services enhanced socialization through students playing together with peers, moving in groups and also working together in class. In view of this, socialization took place through the peer interaction in various activities both in and out of class within the school compound (Wachianga, 2010). In a separate study, almost all teachers and key respondents 95% and 90% respectively agreed that the absence/presence of disability friendly facilities affect access to education for all (Najjingo, 2009).

Since mobility is one of the major difficulties which physically challenged children encounter, then the house, pavements, classroom and other structural environments should be made accessible to them. The area around the school and the school compound should be free from architectural barriers which can cause mobility and emotional disturbances. They should be able to move unrestricted with their wheelchairs, crutches, and prostheses (Emily & Mulambula, 2012).Though becoming fully accessible will not happen overnight, neither should it be sidelined or put on the back burner. Even though becoming fully accessible will have some economic cost, it is the right thing to do for everyone. Not striving to become fully accessible also has economic cost through lost revenue (Lewis, 2003).

Review of Construction Guides and Building Codes on Accessible Design

The section deals with a review of building codes and construction guides, most of which are based on anthropometrics. Anthropometrics provide a range of “building blocks” of specific dimensions detailed for people with various mobility devices. These construction blocks vary considerably, for example, the length of a wheelchair as specified by Canada, Spain and Singapore is 1.2m with Mexico and the Philippines providing a longer dimension, while the Canada AFG Guideline specifies 1.4m, as they include the length of both scooters and power wheelchairs in this dimension. The minimum clear floor area of a manual wheelchair ranges from 700mm x 1.2m in Spain to 850mm x 1.3m in the AFG Guideline, while the Expert Panel judges the best practice to be 850mm x 1.3m. The minimum clear floor area to allow access for people using manual wheelchairs is consistently reported at 1.5 x 1.5 m. The minimum diameter for turning a wheelchair is 1.5m with 2.3m required for turning a power wheelchair, and 1.3m required for turning a scooter. These larger dimensions reflect the wide range of mobility devices that are increasingly posing a challenge to designers around the world. (International Best Practices in Universal Design Canadian human rights commission 2007).

The terms universal design and inclusive housing as used in most of the building codes are used to refer to an accessible environment. Universal design refers to the design of a built environment that is usable by as many people as possible in spite of their age, ability or situation. Universal design links directly to the political idea of an all-inclusive society. Its importance has been embraced by governments of many countries, businesses, and industries.

Universal design is a relatively new concept that has been derived from other concepts of accessibility such as barrier-free and assistive technology. Barrier-free design and assistive technology were limiting concepts. As much as they provide a level of accessibility for people with disabilities, they often lead to separate and stigmatizing situations. For instance, a ramp that is only available at the back entrance or a key operated stair lift. Universal design is a broad-spectrum solution that aims at helping everyone, not just people with disabilities alone. Additionally, it recognizes the importance of how things look. For example, while built up handles is a way of making kitchenware more usable for people with gripping limitations, some companies have gone further to introduce larger, easy to grip and attractive handles as a feature of mass production (Brunswick Building Code, 2007).

The Building Code of Kenya (1968); this code provides a brief description of the specifications of efficient ramp construction, it states that Ramps of a slope not exceeding one in ten may be employed instead of outside stairway. If used, ramps shall be maintained with non-slippery surface and if the slope is greater than 1:12, handrails shall be provided.

The ADA Standards guide for accessible design(2010); the Americans with disability code set minimum construction requirements – both scoping and technical – for newly designed and built or altered State and local government housings, public as well as commercial buildings to be readily accessible to and usable by individuals with disabilities. Each construction or part of a facility constructed for use by a public entity shall be designed and built in such manner that it is accessible to and usable by persons with disabilities. Ramps: Interior or exterior ramps to be built on sites or in existing buildings with limited space. The following slopes shall be used:
(i) A slope between 1:10 and 1:12 is allowed for a maximum rise of 150mm.
(ii) A gradient of between 1:8 and 1:10 is allowed for a maximum rise of 760mm. A slope that is greater than 1:8 is not allowed.

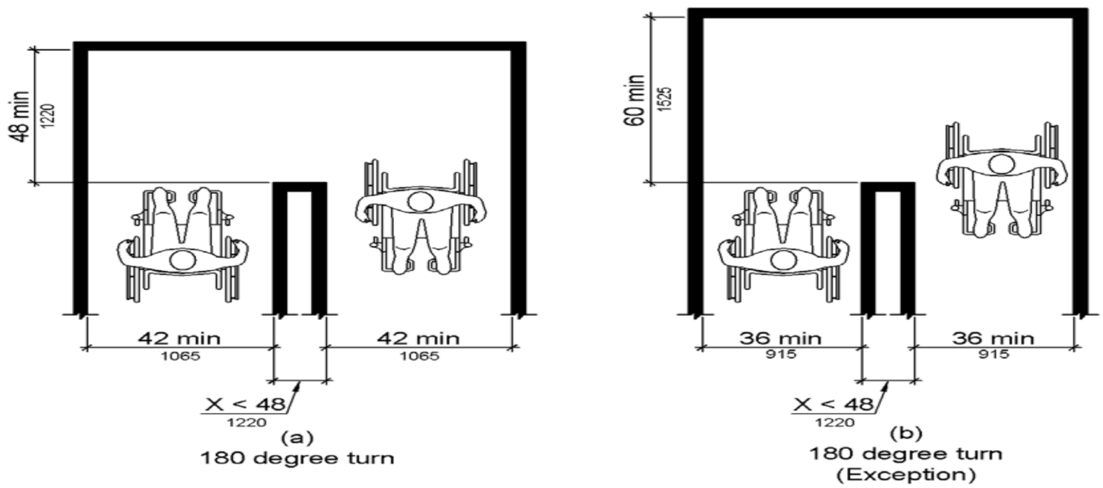

Figure 4.1: Clear Width at Turn (ADA 2010 standards)

Clear Width: The minimum clear width of a ramp shall be 915 mm. Landings: Ramps shall have horizontal landings at top and bottom of each ramp span. Landings shall have the following features: the landing shall be at least as wide as the ramp span leading to it. The length of the landing shall be a minimum of 1525 mm clear. When a ramp changes direction at landings, the landing shall at least 1525 mm by 1525 mm. Handrails: If a ramp runs has a rise greater than 150 mm or a horizontal projection greater than 1830 mm, then it shall have handrails on both sides. Handrails are not required on curb ramps or adjacent to seating in assembly areas. The Handrails shall be provided along both sides of ramp segments. The inside handrail on switchback or dogleg ramp shall always be continuous. Where the accessible route makes a 180 degree turn around an element which is less than 1220 mm wide, clear width shall be 1065 mm.

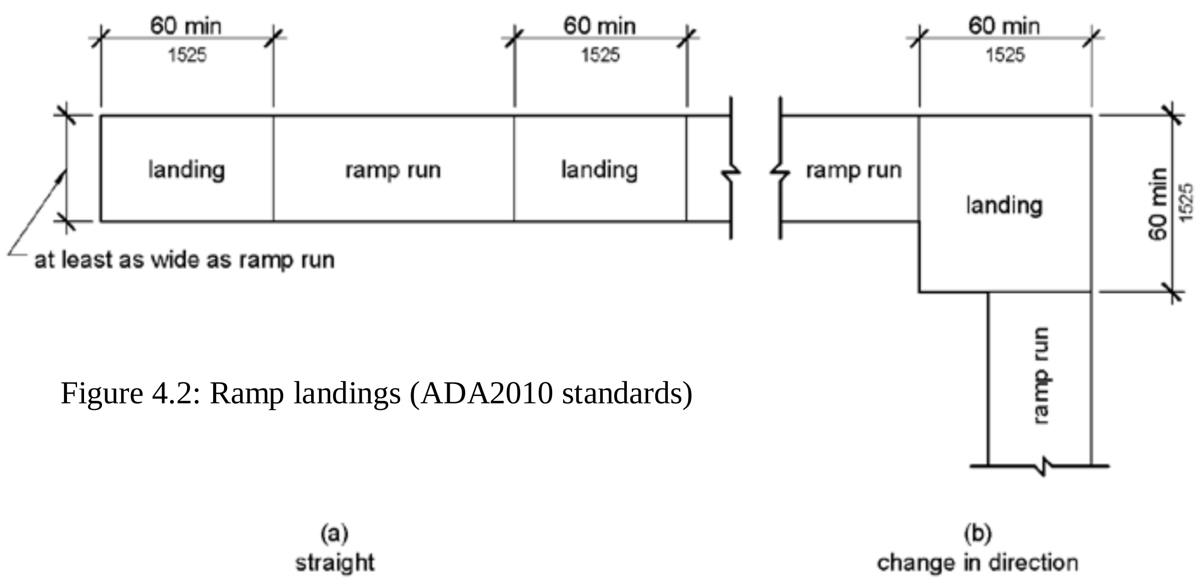

Figure 4.2: Ramp landings (ADA2010 standards)

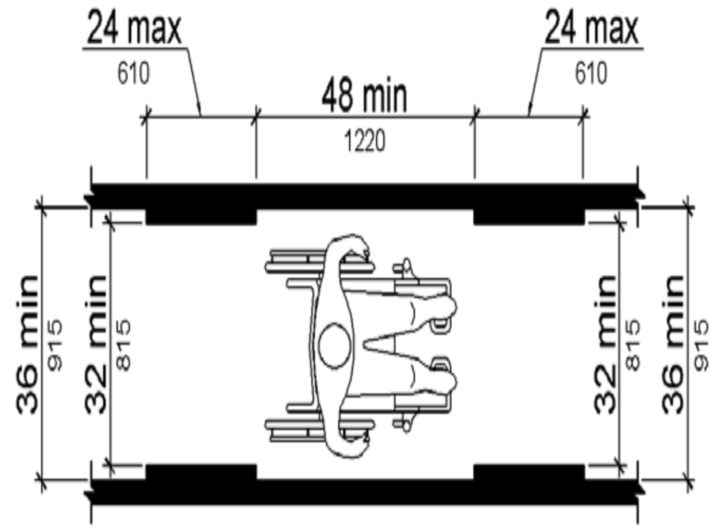

Figure 4.3: Clear Width of an Accessible Route (ADA 2010 standards)

The ramp segment shall extend at least 305 mm beyond the top and bottom as well as be parallel with the floor or ground surface if the handrail is not continuous (see Fig. 2.7). The handrail shall continue to slant for a distance of the width of one tread from the bottom riser at the bottom. The remainder of the extension shall be level. Handrail extensions: shall comply with the following; a clear space between handrails and wall shall be 38 mm. Gripping surfaces shall be uninterrupted by newel posts, other construction elements, or obstructions. Top of handrail gripping surface shall be mounted between 865 mm and 965 mm above stair nosings. Ends of handrail bars shall be either rounded or returned smoothly to floor, wall or post. Figure 2.10 shows various handrail protections that can be utilized on the constructed ramps.

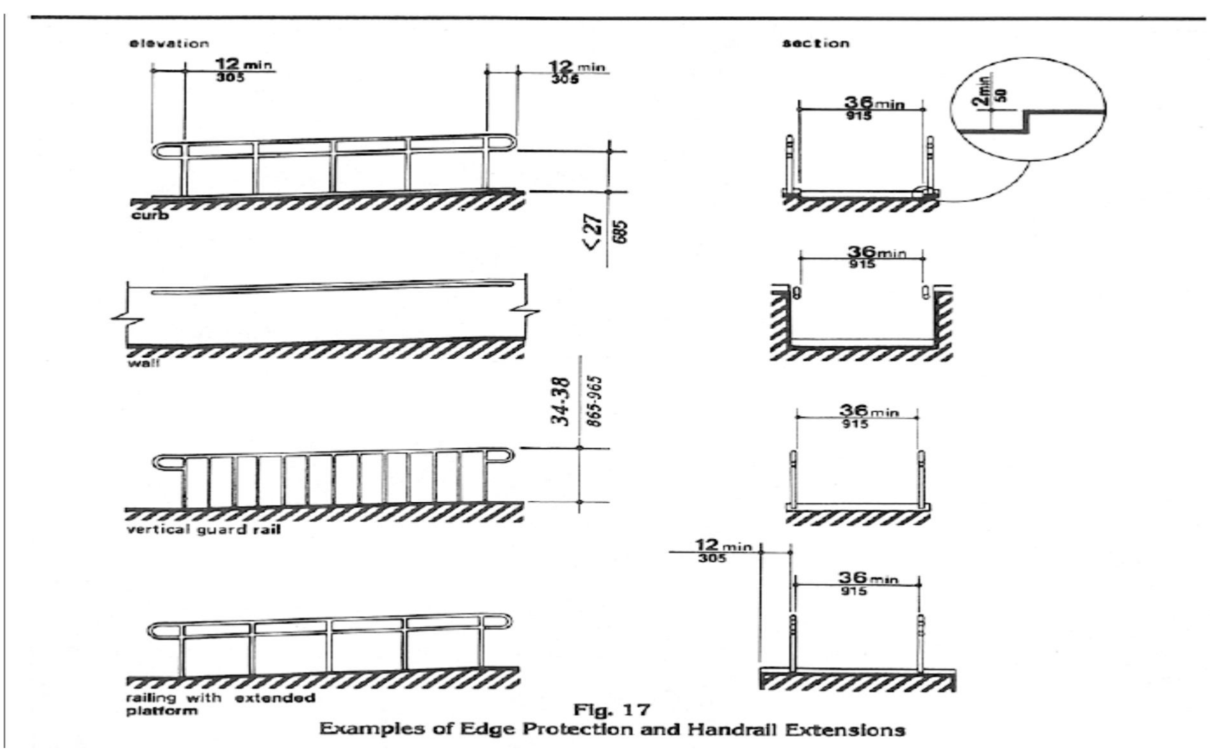

Fig. 17
Examples of Edge Protection and Handrail Extensions

Figure 4.4: Examples of Edge Protection and Handrail Extension (ADA 2010 standards)
Universal design principles for Australia's aid program (2014); the following principles are used as a guide to construction of efficient ramps. Slope*:* 1:20 is the recommended minimum for a non-assisted person in a wheelchair. The slope can be increased to 1:14 where the wheelchair user is assisted. Greater than 1:12 is considered a hazard.
Width: Varies according to use, configuration and slope, but the minimum is 1m. Landings: Provide at least every 9m at every change of direction and at the top and bottom of every ramp and Landing width should be a minimum 1 m and clear from obstructions. Handrails: Provide on both sides and along the full length of every ramp 900mm to 1m high- returning at ends or turning down.

5. RESEARCH METHODOLOGY

5.1 Introduction

The chapter presents the procedure followed in carrying out the study. The chapter includes research design, the study location, target population, sampling methods and sample size, research instruments, reliability, and validity of the research instruments, data collection procedures, and techniques of data analysis.

5.2 Research Design

Orodho (2005) states that a research design can be seen as schemes, outlines or plans that are used to generate answers to research problems. The research design used in this study was a descriptive survey. A descriptive survey is an efficient method for collecting data regarding characteristics of the population and current practices, conditions, and needs. It involves questioning individuals on a topic or topics and then describing their responses **(**Jackson, 2015). Concerning this, the researcher found that the study type suited well with the study as it aimed at assessing the possible impediments to the retrofit of ramps in public buildings.

5.3 Location of the Study

The study was conducted in Kisumu city. It is about 400 km from Nairobi the capital city of Kenya. It is bordered to the south by Nyando District, in the west by Lake Victoria, in the north by Kisumu West District, in the northeast by Vihiga District and the east by Nandi District. The city is characterized by low rise building accounting for over 50% of the total building structures. The low rise buildings make the city an excellent base for my study.

5.4 Study population

The study population was drawn from public buildings within Kisumu Municipality. The buildings selected for study were houses that were used by the public and did not exceed three storeys. At the time of the survey, the study population comprised 54 buildings; 15 Health facilities, 12 Education institutes, 12 Shopping Malls, 15 Public office buildings. In addition to this, 5 building inspectors from the National Construction Authority and the Municipal Council of Kisumu formed part of the survey.

5.5 Study Sample

According to Mugenda and Mugenda (2003), the primary consideration for determining the sample size is the capability to collect in-depth data at affordable costs in terms of time, finances and resources. Kerlinger (1978) states that, a perfect sample range between 10% and 30% of the target population depending on the data to be gathered and analyzed. However when the accessible population is small, the percentage of the sample size from the population should be considerably large. Krejcie and Morgans (1970) provide a statistical table for sample sizes for given population. According to Morgan's table, the sample size for a population of 54 is 48.The sampling techniques employed are the stratified random sampling for the public buildings and purposive sampling for the Building Inspectors. Table 3.2A below shows the distribution of the sampled buildings for the study.

Table 5.5: Total Number of Respondents

Category	Number of participants
Building owners/agents	48
Building inspectors	5
Total	**53**

5.6 Procedure of Data Collection

Before the collection of data, the researcher sought permission from the Department of Technology Education at the University of Eldoret. The introductory letter enabled the researcher to acquire a research permit from the National Commission for Science, Technology, and Innovation. The researcher then sought permission from the District Commissioner and the District Education Officer from the Teachers Service Commission offices, Kisumu County.

Questionnaires were delivered by the researcher in person so as to have an opportunity to explain the purpose of the study. The researcher established a good rapport with the respondents which consequently helped get real responses from them. An observation schedule was then used by the researcher to collect observable data by ticking the appropriate guide plan.

6.0 DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Discussion of Findings

The purpose of the study was to investigate the factors that hinder the incorporation of efficient ramps in some of the existing low-rise public buildings in Kisumu City, Kenya. It was based on the rationale that, the persons with disability act of 2003 has been faced with minimal implementation, accompanied with a slow pace of construction and retrofitting of ramps in existing public buildings.

The study focused on the following research objectives; firstly, to examine the extent of compliance by owners of LRPBs and developers in Kenya with the construction requirements of efficient ramps, Secondly, to investigate possible constraints to the construction and retrofitting of efficient ramps into existing public buildings, and thirdly, to establish the possibility of retrofitting efficient ramps into existing public buildings.

The findings of this study were discussed in two parts. The first section presented the summary of results from observation checklist and the second part presented a discussion of results from the questionnaires issued to building owners/agents and the building inspectors.

Discussion of findings from observation schedules

The objects of study were buildings; the data presentation indicated that majority of the buildings that formed part of the study was ground floor buildings 26(54.17%). The rest were; one storey buildings 14(29.17%), two storey buildings 5(10.42%) and three storey buildings 3(6.24%). The result indicates that majority of the buildings in Kisumu City were constructed to heights where lifts and elevators are uneconomical means of access. Hence, they require ramps as alternative means of accessibility by the mobility impaired population.

The findings from observation schedules revealed that only a few buildings, 15(31.25%) out of the selected 48 had access ramps while 33(68.75%) had no access ramps. It indicates that many owners of buildings have not complied with the requirements for the provision of access ramps for wheelchair bound persons. The findings further showed that, of the fifteen buildings that had ramps, a majority of them were health facilities 13(86.66%), the rest were education buildings 1(6.67%) and commercial buildings 1(6.67%). A majority of the health facilities have ramps because they are the most visited public facilities due to the urgency and nature of services sought. Therefore, the wheelchair bound persons as the rest of the population when sick, are obliged to visit health centers. It also indicates that public sectors like education and public service have not fully embraced the spirit of inclusive design.

The study results on the placement of ramps showed that all of the observed ramps were at the main entrance 15(100%). The ramps are at the main entrance of the building since a majority of the buildings were at ground floor level, and it was also easy to incorporate ramps at this level than at any other.

The findings also revealed that of the 15 observed ramps, none 0 (0%) had fully complied with the requirements for efficient ramps. For full compliance, the ramp ought to conform to all of the following three conditions; Slope not greater than 1:12, non-slip surface texture and provision of guard rails on both sides. The observed ramps, however, had partially complied; 13 (86.66%) of the ramps had the required texture. These results indicate that, the available ramps could be too steep for wheelchair persons to navigate unaided and unsafe for use due to inadequate edge protection.

Discussion of findings from questionnaire responses

The responses from questionnaires that were issued to building owners/agents and building inspectors were coded, analyzed and presented in the following three themes that were based on the study objectives;

1. Compliance with requirements of ramp retrofit.
2. Possible constraints to the retrofitting of ramps.
3. The possibility of retrofitting ramps in public buildings.

Compliance with requirements of ramp retrofit

The findings from descriptive statistics in this section revealed that; a majority of the buildings 33(62.3%) in the study area had not been retrofitted with access ramps. Only 15(37.7%) had access ramps. However, the results from the responses of building inspectors showed that majority of them 4(80%) were aware of the requirements for efficient ramp construction.

The null hypothesis stated for the test under this theme is, H01: There is no compliance by public buildings to the construction requirements for efficient ramps in Kenya. The chi-square test gave a result of $P > 0.05$ for the observed compliance by the researcher and compliance indicated by building owners/agents in questionnaires. The kappa test showed the perfect agreement of these two categories of compliance; therefore, there was enough evidence to fail to reject the null hypothesis Ho1; there is no compliance by public buildings to the requirement of efficient ramps in Kisumu City Kenya. It shows that public buildings in Kisumu city have not complied with the requirement of PDA act of 2003 and concurs with the findings of Sidha (2010) that, most of the policy promises outlined in the PDA act 2003 have remained unfulfilled. The results also suggest that there is laxity on the side of the building inspectors in the supervision and inspection of construction works under renovation. The findings indicated that the building inspectors were fully aware of the requirements for efficient ramps, yet the ramps sampled for the study were substandard.

Possible constraints to the retrofitting of ramps

The results on whether construction documents could be impeding the retrofit of ramps indicated that majority of the respondents, 47(88.68%) had never accessed a construction document and only 6(11.32%) had accessed. Out of the six respondents who had access to construction documents, 4(8%) indicated that the manuals had information on ramps retrofit. On the other hand, 3(6%) of the respondents stated that the clause on retrofitting of ramps was not mandatory. A majority of the stakeholders' in the building sector like clients, builders, and engineers had no access to information regarding ramp retrofit. Also, only a limited number of construction documents 1(2%) can be used to promote the quest for ramp retrofit in public buildings because it has information on ramp retrofit and also makes it mandatory for buildings to be retrofitted with ramps.

The analysis further revealed that 32(60.37%) of the respondents considered space requirement as the most architectural hindrance to ramp retrofit. On the structural aspect, 25(47.17%) considered the strength of the building as the most barrier to ramp retrofitting and 15(28.30%) considered inadequate house inspection as the most hindrance to ramp retrofit on the construction requirement. The results show that even though there is an advocacy for ramp retrofit in buildings, there are constraints that make the process not to be entirely successful. It is, therefore, critical for all stakeholders in the construction industry to converge and come up with comprehensive procedures that can foster a viable and practical method for ramp retrofit.

The hypothesis stated for the test under this theme was Ho2: There are no possible hindrances to the construction and retrofitting of efficient ramps in existing LRPBS. The chi-square test result gave $P < 0.05$; therefore, the null hypothesis was rejected. It shows that there are constraints to the retrofitting of ramps in existing public buildings. The result reveals why there is a slug in the process of making existing public buildings fully accessible to persons with mobility challenges. The findings reveal that most of these buildings were not designed to meet the need of the disabled as observed by (Pynoos, 2001).

Possibility of retrofitting ramps in public buildings

Under this theme, the respondents were asked whether it was possible to retrofit ramps in their premises. The chi-square test gave a statistical value of $P < 0.05$. Therefore, the third null hypothesis of the study; H_{03}; There is no possibility of retrofitting ramps in ELRPBs, was rejected indicating that ramp retrofit was possible. It shows that, though there are challenges in making the built environment inclusive, stakeholders have the will to remove the accessibility barriers. The finding agrees with the views of Emily and Mulambula (2012) that, though becoming fully accessible will not happen overnight, neither should it be sidelined or put on the back burner.

6.2 Conclusions

Based on the discussed findings of the study, the following conclusions were made about the retrofitting of efficient ramps in existing buildings.

1. There is no compliance by public buildings to the construction requirements for efficient ramps and as a result, many public buildings in the study region remain largely inaccessible to persons with mobility challenges.
2. There exist constraints which are not limited to the following; space requirements, the strength of existing buildings and inadequate house inspection.
3. The stakeholders in the construction industry consider the retrofit ramps in buildings possible.
4. Building owners, agents, building contractors and some building engineers are not fully aware of the requirements for constructions of efficient ramps. The construction documents available have insufficient information on efficient ramps; they do not outline the required procedures for construction and retrofitting of ramps.

6.3 Recommendations

The following recommendations were made based on the findings and the conclusions of the study:

The study proposes that the Government of Kenya through the National Construction Authority and the Local government should be tasked with the drafting of comprehensive and adequate construction guides for accessible housing and efficient ramps construction and avail them to all stakeholders in the construction industry. The guides should put into consideration the impeding factors to the retrofitting of ramps and how to overcome them.

In line with the above, through seminars, workshops, and vigorous campaigns on universal designs, all stakeholders including operatives should be made aware of the construction guides. The Media should be assigned the responsibility of removing attitudinal barriers and changing behaviour and attitudes towards persons with mobility challenges. Individuals with disabilities and or those who champion for the rights of the physically impaired should be involved in the drafting and implementation of policies relating to the construction industry.

The government of Kenya should also consider availing funds for retrofitting ramps in public institutions such as education facilities and hospitals. The funding should be for ramp construction up to the first floor or subsidize the cost of building materials' procured for retrofitting ramps in existing buildings.

In buildings where there exist constraints that make it practically impossible to retrofit ramps, an effort should be made to ensure the entrance to the building's ground floor is made accessible. Besides, vital services should be devolved in such a way that persons with mobility challenges can benefit most.

The government ought to capitalize on the goodwill from interested parties in the built environment to foster its campaign on inclusive housing.

6.3 Suggestions for Further Research

Based on this research work:

i. A similar study should be carried out in other types of buildings to compare the results.

ii. A comparative study can be conducted to establish better and cost-effective ways of implementing retrofits in existing buildings.

iii. Studies can be carried out on other aspects of inclusive design like access to washrooms, shelves, door knobs and other facilities in the built environment used by persons with mobility challenges in Kenya.

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