Research Paper
Impact Factor: 4.164
Refereed Journal

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

ANALYSIS OF CHALLENGES AND PRACTICAL STRATEGIES FOR UNIVERSAL DESIGN APPLICATION IN THE PUBLIC TRANSPORT SYSTEM IN NAIROBI CITY-KENYA

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Abstract
In recent years, many governments have introduced the concept of Universal Design (UD) in their transportation planning systems. At the global level, the application of Universal Design application in countries such as USA, China, Norway, Ireland and Japan continue to grow. However, in Africa, accessibility to the built environment and public transport systems is still a major challenge including Kenya. While steps have been undertaken through legislative initiatives calling for implementation of accessible transit systems, finding solutions and standards that can be adapted for local use is still a work in progress and thus a priority area for research. In Nairobi City, for example, efforts at improving accessibility are visible but they seem more of after-thoughts rather than beforehand and purposeful. This paper explores challenges and practical strategies that can be adopted to bring Universal Design into the mainstream of urban planning and implementation into the public transport system in Nairobi City. The study is an effort to help policy makers and professionals in the in public transportation in Nairobi City to clearly understand the recommendation and the importance of Universal Design principles, and promoting quality in accessibility in transport sector and other environments. The study employed exploratory and descriptive research designs and utilized mixed methods, both qualitative and quantitative techniques. It involved quantitative surveys of passengers (public transport users), supplemented by interviews with legislators, policy makers, professionals and Persons with Disabilities. The study also targeted policy makers within National and County Government concerned with city planning and transport sector in Nairobi County. The study targeted key informants and thus employed purposive sampling technique. A sample of 100 participants was considered. Data collection techniques included: observation and participation, case studies, survey using questionnaires (with appropriate rating and ranking scales), workshop/focus group discussions, interviews (structured and semi-structured); and review of available literature. Data were analyzed through quantitative and qualitative techniques.

Keywords: Universal Design, Collaborative systems approach, Transportation systems, People with disabilities, Planning, Accessibility, Social inclusion, Barriers, Awareness, Public transportation, Nairobi City, Urban planning.

Introduction

The idea of universal design began in the 1950s with a new attention to disability. In Europe, Japan, and the United States, barrier-free design developed to remove obstacles in the built environment for people with physical disabilities. It followed the companion social policy of moving people with disabilities from institutional settings to the community. Barrier-free design still tended to be segregated and special, pertinent to people with serious physical limitations, primarily mobility impairments (Fletcher, 2014). In recent years, many governments have introduced the concept of Universal Design (UD) in their transportation planning systems. In the developed countries, much emphasis has been given to sustainable design as the guiding concept to create the built environment that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Gossett, & Feidt, 2009). However, Universal Design (UD) is an inclusive approach to designing for the broader population and is rapidly gaining popularity amongst design practitioners and planners globally (Woodcraft, Hackett & Caistor-Arendar, 2011). However, the application of the concept of accessibility has received little attention in urban design and planning of Nairobi and other cities in Kenya and East Africa. This study intends to look at the need for Universal Design in the transportation sector in Nairobi City.

Universal Design in transportation refers to the design of transport systems that are accessible to all users, irrespective of the users' abilities. Rapid global economic development and urbanization are fueling massive growth in the demand for transportation (McCann, 2010). Many recent statements recognize the vital importance of transportation in advancing sustainable development, including the *Bangkok 2020 Declaration*, endorsed by 22 Asian countries, the *Bogota Declaration*, endorsed by 9 Latin American nations, as well as the Report of the Secretary General to the UN Commission on Sustainable Development 19th Session on *Policy Options and Actions for Expediting Progress in Implementation: Transport* (UN, 2010). However, the challenge for cities like Nairobi remains the inadequate efforts to realize seamlessness that guarantees highly convenient smooth overall travel including greater convenience and smoother transfers at transportation system connections (Stone, 2010). While there is a growing recognition by governments and business community of the value that design can add to the economy the potential for future development of Universal Design industry is still work in progress.

At the global level, countries such as USA, China, Norway, Ireland and Japan have well-positioned Universal Design applications in their transport sector (Imrie & Hall, 2001). In the Norwegian case for example, the Universal Design was introduced into the National Transport Plan in 2004 (Odeck, Hagen & Fearnley, 2010); and laws on accessibility t include general clauses on Universal Design (Fletcher, 2014). In Japan, the general principles of Universal Design Policy were introduced in 2005, which declared that buildings and public transportation should be designed using the concepts of Universal Design (Yoshihiko, 2012). In the United States, Universal Design applications in public transport is well documented, and designs accommodate all passengers, including people with disabilities; public streets are designed with curb cuts allowing free access for wheel chair users and people with disabilities can safely cross the streets (Bramley & Watkins, 2009). Although major legislative initiatives have been adopted in these case examples and Universal Design is gradually finding its way into design practice, the need for Universal Design in Kenya begs for more research and hence the essence of such a study.

In Africa, accessibility to the built environment and public transport systems is still a major challenge for diverse groups of persons in Africa. Audirac (2014) points out that the consequences of low personal mobility include failure to access and benefit from services, such as health care, retail facilities, employment, education and training. In South Africa, there has been efforts towards adoption of Universal Design in the urban development projects (M'rithaa (2009). According to (M'rithaa (2009), Universal Design can ensure social inclusion and participation. While steps have been undertaken through legislative initiatives calling for implementation of accessible transit systems, finding solutions and standards that can be adapted for local use is still a work in progress and thus a priority area for research.

In Nairobi City, transportation is an essential tool that enables people to access facilities and services by driving, bus public transport and railway. However, with the urban growth being experienced, the city not only faces problems of accessibility barriers; but a number of problems related to public transportation and city planning. In the public transportation sector for example, adequate measures to link different transportation companies and to provide information have not necessarily been taken, and the framework of past policies concerning the introduction of new public transportation services does not necessarily guarantee the ability to effectively take barrier-free measures. As a result, the lack of universal design inclusion in public transport creates inconvenience and difficult transfers at transportation system connections. Indeed, the challenge especially for people on wheelchairs would be connecting freely for example, from bus terminus and railway stations and other connection points in the Central Business District (CBD). Therefore, achieving more convenience and easier public movement transfers at such connection points is needed to achieve overall public transportation that everyone can use smoothly in Nairobi County. For that reason, this research will also attempt to evaluate the existing design features in public transport and provide models that take into account Universal Design principles.

Statement of the Problem

The intent of universal design is making the built environment more accessible and usable by everyone. However, the challenge of urbanization and the need to make urban transport more effective has become an urgent development challenge. Subsequently the issues of mobility, access equity, congestion, operational safety and above all environmental sustainability are becoming increasingly crucial in transport planning and policy making. Too often, urban environments have served as a barrier to the inclusion and participation of persons with disabilities in economic and social development in cities and communities.

Although universal design is now a legal requirement in other parts of the world, it seems Kenya, specifically Nairobi City lacks design with emphasis on universal access. Efforts at improving accessibility to buildings are visible but they seem more of after-thoughts rather than beforehand and purposeful. Due to the lack of proper Universal Design integration, there's an accessibility problem in urban public places when it comes to the city population especially persons with disability. This study hopes to use public transportation in Nairobi City to illustrate the situation and need for universal design.

Literature Review

Universal Design: Definitional Concepts and Applications

Universal Design has been defined as a strategy that is aimed at ensuring accessibility and use of services, information technology, communication, products and environments by all people to the maximum, with a greater emphasis on the people with disabilities (Reynolds, 2011). According to Cline (2011), Universal Design is promoted as a way to design for all people. It represents a paradigm shift, from a model that treats people with disabilities as part of the medical community to a model where "everyone is treated as an equal citizen and a disability is seen merely as a social construct" (Cline, 2011).

In addition, Universal design seeks to provide improved usability and safety for all groups in the community. It seeks to extend the ideals of accessible design to previously underserved groups like people of short stature, older people, pregnant women, parents with children in strollers, people who do not speak the local language and others. It recognizes that improved

usability enhances the value of buildings for all of us and, piece by piece, it creates a city that is a true home for everyone and one that welcomes all visitors with grace and dignity (Levine, 2003).

Universal Design Awareness

The move towards universal design has developed due to the expanding population of people with varying degree of abilities and advancing years, their demands for recognition and desire for independent living (Null, 2009). Carvero (2013) observes that press coverage to shine the spotlight on Universal Design and Universal Design e efforts is important. The press needs to be educated on the application and advantages of Universal Design Principles. On the same note, Levine (2003) argues that if the public understands the advantages they will gain if products and services are designed using Universal Design Principles, they can help increase the acceptance of these principles by placing pressure on companies that produce consumer goods and services to accept and use these principles.

Levine further observes that education of decision makers can play a critical role to widening the use of Universal Design Principles in the design and deployment of accessible consumer products and services, especially those based on electronic and information technology (Levine, 2003). Even though there has been some acceptance of these principles by some major corporations, Gomes (2010) argues that there is still not enough use of the principles in the designing of products and services. There needs to be an understanding that design must meet the user's needs, standards are no good if they do not promote usable products. This is the role that Universal Design can fill. Achieving universal access and promoting universal design require a significant shift in thinking and action. The process, however, will include many challenges and require people to set priorities and make compromises (Gomes, 2010).

The UN 'Declaration of the Rights of Disabled Persons' declares that disabled persons and their families, irrespective of their race, colour, sex, language, religion, political opinion, national or social origin, and state of wealth, should be respected in their human dignity. They should share the same fundamental rights as their fellow-citizens. This means that persons having any sort of impairment have the right to a normal life and are entitled to the necessary support in order to enable them to be as self-reliant as possible. They have the right to special education, medical assistance and rehabilitation in order to develop their abilities and to promote their social integration. They also have the right to have their special needs taken into consideration at all stages of the design process (Agarwal, 2009). There is a great disparity of knowledge, resources, and practical assistance between developed countries and countries in development (Jacobs, 2003).

Accessibility

A central concept of Universal Design is the concept of accessibility. The usual notion of accessibility means the ease to approach, enter or use something. It also involves an assessment of the practical suitability of what is available. Studies of spatial accessibility had their origins in the field of geography. A geographical definition of the concept state that, 'accessibility is determined by the spatial distribution of potential destinations, the ease of reaching each destination (Handy & Niemeier, 1997).

Accessibility and mobility within the urban environment has been dictated by the design and layout of buildings and road infrastructure. Both, in their separate ways, have created problems of safety which have conspired to limit pedestrian confidence and therefore movement and travel choice amongst particular groups. Benchmarking of accessibility does not tend to reflect everyday journeys and trips taken or desired, and the perceptual barriers felt by many people. In this study, particular attention will be paid to the mobility and journey needs of users, as well as perceptual and safety issues, since these present some of the major barriers to transport access for not only the vulnerable groups but all users (Graeme, 2011).

In practice, standards in accessible design tend to isolate particular elements such as the design of building features and their approaches (Disability Discrimination Act – DDA, 1995) not if and how the user actually reached the destination itself, or whether transport is integrated with service delivery, e.g. opening times. Official benchmarks classify a service or activity as 'accessible' if it can be reached at reasonable cost, in reasonable time, and with reasonable ease. 'Reasonable' in this context is not however defined (this same term is also used in DDA legislation) with this value judgment decided by the provider (e.g. facility or transport operator) not the user, let alone those most excluded from travel and transport. Access guidance arising from the DDA legislation gives transport limited coverage – less than one and half pages out of over 100 (Ratcliff, 2007), with a focus on building, workplace and vehicular access.

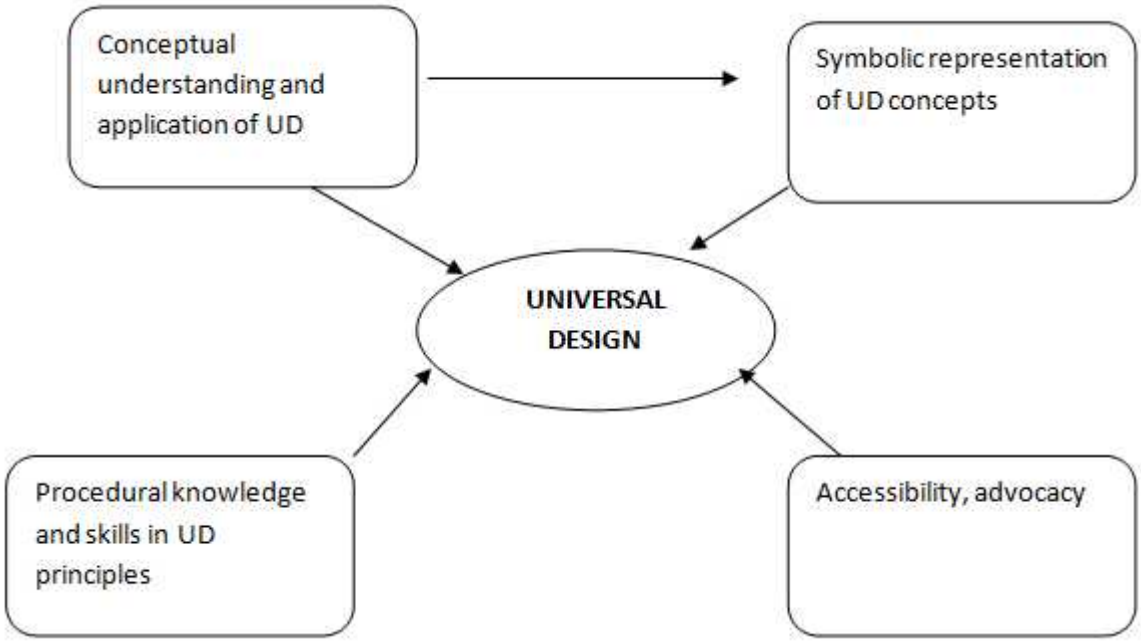
Best practice in Universal Design

The articulation of the Principles of Universal Design by NCSU has clearly been responsible for the helping to create the successes of the Universal Design Principles wherever they are used. The seven principles are listed below (Bade, 2011).

- Equitable Use
- Flexibility of Use
- Simple and Intuitive
- Perceptible Information
- Tolerance for Error
- Low Physical Effort
- Size and Space for Approach and Use

For this reason it is necessary to be specific about accessibility requirements of major user groups, in order to give planners and designers an idea about the specific Universal Design targets (Bade, 2011).

Theoretical Perspective of Universal Design



Research Methodology

This study employed an exploratory and descriptive research design and utilized mixed methods, both qualitative and quantitative techniques. The design allowed for a survey of key case studies in Nairobi City on how Universal Design strategies can be effectively mainstreamed in public transport system.

This study was carried out in Nairobi County with a focus on the Central Business District. The city offers challenges related to multifaceted components of design practice and applications. The research was based on three different sectors even though they are interrelated to mobility and accessibility: These are major bus termini within the CBD (Ambassador Hotel, KenCom House, Railway Station Tele Posta House Bus Park, Bus station, Koja and Muthurwa).

The study employed quantitative surveys of passengers on the affected routes (supplemented by interviews with drivers and personnel), and qualitative case studies with individual public transport users with disabilities. Moreover, the study also targeted policy makers within National and County Government concerned with city planning and transport sector); professionals (interior designers, architects, engineers, property owners and contactors), rogue designers, Bus/Matatu designers and contractors within Nairobi County.

The target population included key informants from various institutions and thus employed purposive sampling technique. The sample population size was 830. The researcher selected 10% of the sample population based on Kothari's recommendation. The study sample was drawn from County Officials, NTSA, Policy Makers, Professionals (architects, designers, quantity surveyors, engineers, conarctors and urban planners), National Council for Persons with Disabilities, Human rights groups and members of the public (public transport users-drivers, passengers and taughts).

Data collection was interactive (semi-structured interviews and Focus Group Discussions seminars, discussions with relevant authorities in the Transport and urban planning sector) and non-interactive involving questionnaire, case study approach, review of relevant literature and observations based on site survey checklist on Universal Design measures. This triangulation enabled the researcher to obtain a variety of information on the lack of universal design in Kenya.

The observation check-list and assessment tools were used in specific areas such as public bus terminus station designs; streets policies and designs; pedestrian road safety audits/potential problems and barriers, service ratings which indicate the quality of convenience, comfort and security experienced by pedestrians, cyclists and transit users, including Universal Design factors; parking facility design standards and access guides.

Data was analyzed through quantitative and qualitative techniques. The use of these quantitative methods enabled the researcher draw meaningful results from a large body of qualitative data, and provides the means to separate out the large number of confounding factors that often obscure the main qualitative findings as supported by Maina (2012).

Quantitative analysis involved use of numeric measures to evaluate the variables based on the study objectives. This was done through assigning numerical values to questionnaire responses and entering the same responses into SPSS computer system. On the other hand, qualitative data was described and interpreted; and information generated from the analysis presented through direct quotes.

Results and Discussion

The study established major challenge of UD application emernationg from a lack of awareness regarding universdal design principles. Moreover, institutions charged with the work and implementation of city public transportation service and urban environment are weak. Focus on people with disabilities does not highlight equal access. Another challenge cited from the study was inadequate monitoring and enforcement of compliance with existing transport legislation. This makes it very difficult even to providing inclusive transport in the city. The legislation available rarely been matches by adequately detailed regulatory frameworks and has therefore generated a very limited response on the ground.

Planning for more inclusive urban transport remains a major challenge. Policymakers are faced with the difficulty of measuring the social and economic benefits of improving accessibility. On the other hand, the availability of funding remains critical to implementing inclusive solutions for urban transport. In many cases national laws that are inflexible and impose too many requirements for infrastructure (without granting flexibility to tailored solutions) place additional pressures on budgets and do not necessarily deliver value for money.

Lack of data makes it impossible to provide a meaningful overall cost estimate for the interventions required to meet the accessibility needs of disabled people within Nairobi City. The study establishes a lack of a clear framework and policies on universal design application in public transportation services creates inconvenience and difficult transfers at transportation system connections. Moreover, the study revealed little coherence in how different agencies define the urban transport system and identify its critical problems, especially with regard to public transport system. Most of the confusion arises from the qualifier ‘transportation network’ and what it should mean in an urban context; since emphasis is laid on road networks and yet, the users and other components are neglected. Another important reason given for the lack of UD implementation was the lack of resources for implementation. The County Government and National Government often find it difficult to allocate funding for this in the face of pressure to meet other priorities.

The study established key strategies to implementation of universal design. Education and campaigning, legislation and legal action, policy and programmes, procurement and monitoring and enforcement were cited as key strategic measures to bringing UD into implementation. Community integration is an important issue for individuals with disabilities. It is essential that the built environment be supportive and provide access to community resources, including housing, employment, transportation, and community services, for all individuals (Sze, 2017). Therefore, design, planning, policy, practices and procedures should comply to appropriate guidelines for the enhancement of community integration for individuals with disabilities

Universalal design planning and implementation in Nairobi City’s public transport could improve the travel experience of users. From the implementation and legislative perspectives, awareness of government directives and institutional cooperation in strategic urban planning is essential for effective UD and accessibility of transport facilities and services.

Conclusions

Greater accessibility is an important element in improving living standards and quality of life through better access to jobs, public services, and other amenities and opportunities. Initiatives to bring universal design into the mainstream of urban transport planning are key to enhancing social inclusion and can effectively maximize accessibility for all groups of society. Consequently, understanding the needs of PWDs poses unique challenges for UD application, but it has the potential to provide unique insights. The attempts at providing solutions for UD principles have not been systematically processed in Nairobi City. The benefits and limitations of UD signal the perception regarding costs of applying UD.

Recommendations

Professional bodies and educational institutions should introduce UD curriculum as a component in training curricula in architecture, construction, design, informatics, marketing, and other relevant professionals. In addition, policy-makers and those working on behalf of people with disabilities need to be educated about the importance and public benefits of universal design. While education is key to promoting UD, Government must prioritize supporting research to develop an evidence-based set of policies and good practices on universal design, with particular emphasis on solutions appropriate to emerging city challenges including traffic and population influx.

There is need for Kenya government to implement an interagency policy structure that includes representatives from all relevant sectors to provide a more holistic approach to public transportation system. An implementation of UD in practical politics and redesign projects calls for knowledge on how UD can be applied in concrete situations. Enhanced progress is needed to engage international actors, including international organizations, technology and products designers and producers, and persons with disabilities and their organizations.

There is need for the County Government, working with National Government, to source for funding development projects that comply with relevant UD standards and promote universal design.

The County Government can also take advantage of new technologies and new forms of funding to support policy implementation in this area. More broadly, planning processes can be made more cost-effective by reinforcing citizen participation, for example with apps and online instruments that allow for the population suggesting where infrastructure investment in accessibility needs to be prioritised. Finally, improving the attractiveness and image of public transport through positive advertising and quality-enhancing investment can support the modal shift necessary to achieve revenue growth from user fees underpinning further investment in transport systems.

The government together with respective agencies in the transport sector should adopt universal design as the conceptual approach for the design of buildings and roads that serve the public. More importantly, full compliance should be required for new construction of building and roads that serve the public. This comprises features such as ramps (curb cuts) and accessible entries; safe crossings across the street; an accessible path of travel to all spaces and access to public amenities, such as toilets. In the public and private sector, there is need to adopt policies on procurement which take into consideration UD criteria.

The government should enhance monitoring and evaluation in the implementation of UD and accessibility laws and standards. Specifically, an impartial monitoring body, preferably outside government, and with a significant membership of disabled people, could be designated and funded to track progress on UD and recommend improvements. There is need to establish a design and innovation centre within the Ministry of Transport charged with enforcing laws and regulations by using design reviews and inspections; participatory accessibility audits and, regulations, and standards.

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