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Universal Design to Ensure Equitable Society

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Abstract— **This paper on universal design is intended to bring out the relation between the concept of the universal design and social equity. The principles of the universal design can be fine tuned with some efforts, we as architects, planners, civil engineers and product designers can make this world a better place to live not only for those who are healthy and wealthy, but all those who are disadvantaged in some manner like children, elderly, differently abled-person, pregnant women and medically unfit persons.**

This paper had tried to present the concepts, definitions and principles of universal design in a consolidated manner which forms the base for the study of the role of universal design in social equity. This paper also explores how the universal design and the legal framework for equality are interrelated and interconnected. The legal and moral guidelines often act as a torch for Professionals who are involved and build environment design to act judiciously.

The paper presents some instances of design which has been meeting the mandates of the universal design and authors seek to create an increased awareness among professionals to be conscious of the needs of the different categories of users.

The paper finally concludes with findings and recommendations which can guide the future course of development in the field of universal design.

Index Terms— **Universal Design, Social Equity, Universal Design Defintions, Concepts of Universal Design, Universal Design Principles, Practical Design Intervention, Equitable Society, Barrier Free Design, Universal Accessibility**

I. Introduction

There are many books and articles on Universal design (UD) yet we felt a need for something is needed to be explored and brought to light. The authors have used their own view-points. We felt that something very important is missing out of the discussion and our attempt will be to fill the gap and add to the healthy and constructive discussion and development in the field of universal design.

When we studied universal design in depth then we felt universal design has its roots in demographic, legislative, economic, and social changes that is taking place throughout the world. It is an attempt to provide our skewed social fabric an equitable outlook and ensure equity in planning and design to ensure that our older adults and differently abled people get access to services unhindered.

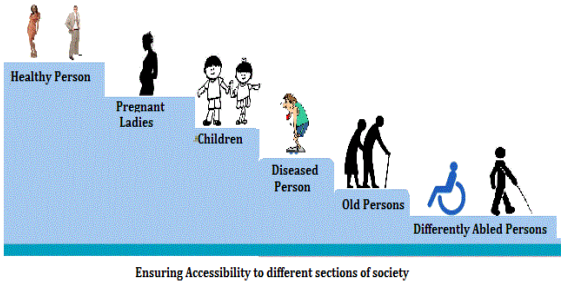

Figure 1: Different Sections of Society who need accessibly through Design (Sharma, Integrating Land Use and Transport, 2013)

II. Concepts and Definitions

When we look at Universal design then what comes to our mind is something which refers to design buildings, space or built environments that can ensure easy access to different categories of persons like differently abled persons, older persons, person with illness, children and pregnant women refer Figure 1: Different Sections of Society who need accessibly through Design (Sharma, Integrating Land Use **and** Transport, 2013).

The term universal design was coined by Ronald L. Mace to refer to the concept of designing products and the built environment that is visually and functionally efficient to ensure access and usability by different sections of society regardless of age, ability, or status in life. Many authors have written on universal design but the work of Selwyn Goldsmith, author of Designing for the Disabled (1963), is remarkable in the sense that he was one who really pioneered the concept of free access for disabled people(Cave, 2011)

Another good definition given by Elaine Ostroff, universal design is an approach to design that honours human diversity, addressing the right for everyone--from childhood into the oldest years--to use all space, products, and information in an independent, inclusive, and equal way (Ostroff, 2001).

The definition is given by Universal Design, Trace Center, 1996, which says, "Universal design is the process of creating products (devices, environments, systems, and processes) which are usable by people with the widest possible range of abilities, operating within the widest possible range of situations (environments, conditions, and circumstances)"(Vanderheiden, 1996).

When we talk about the universal design then it is natural to come across widely used term barrier free design too. In technical term accessibility is defined the extent to which facilities are barrier free and useable by persons with disabilities, including wheelchair users (Trails Glossary, 2013). And barrier free design is the design of a site, building, facility, or portion thereof that can be approached, entered, and used by the physically impaired (AASHTO Glossary, 2001).

The dictionary meaning of equity is the quality of being fair or impartial; fairness; impartiality. The difference between equity and equality must be clear (Equity). Equity is fairness which ensures equal opportunities and due fine tuning to ensure that the poor also get what they deserve in our social system while equality is the state of being comparable.

The equity is defined as the on-going process of increasing our own and society's capacity and commitment to completely respect individuals as complex thinking and feeling humans. The author further adds that this means providing people of different racial, ethnic, gender and

socioeconomic backgrounds with the necessary resources to take advantage of the opportunity to learn and to be encouraged and motivated to do so (Weissglass, 1998).
When we look at the definitions of the universal design and equity, we find that they are closely related and one cannot be attained without caring for the other. This paper will also attempt to see how this interrelation and interdependence work in real life. Now let's look at the Universal Design Principles.

III. Universal Design Principles

The Center for Universal Design at North Carolina State University expounds seven principles of universal design and similar studies were simultaneous done elsewhere too (Center for Universal Design, 1997). We will present the commonly accepted principles. According to the Barrier Free Design Guidelines (Barrier Free Design Standards Sub-Committee, 2006), there are seven key principles which govern the universal design. Here we will put them in a brief manner. The seven principles are as follows:

A. Principle 1: Equitable Use

The concept of equitable use conveys that the design should be easily and equally accessible to the general masses without any form of discrimination expressed or implied. This can be ensured through the provision of same means of use for all users, no segregation of users, privacy, security, and safety equally available and appealing to use.

B. Principle 2: Flexibility in Use

Another important consideration is the accommodation a wide range of users' preferences and flexibility in uses. This can be done through the provision of options of uses, ensure right- or left-handed access and ensure adaptability to the user's requirements.

C. Principle 3: Simple & Intuitive Use

When ATM (Auto Teller Machine) was launched there was less computer literacy and when information technology started reading all, it became a thing of common use. This is also valid for any form of design. The simplicity and utility of the design is that it should make users feel comfortable in use, regardless of the user's experience, knowledge and language skills. This can be ensured through elimination of unnecessary complexity, consistency and meeting users' expectations.

D. Principle 4: Perceptible Information

A good design communicates with users. The design should have enough necessary information which can be effectively communicated to the user. In this regard, I will like to give you two examples, when we are in a lift (older one) we don't know which floor has reached and on reaching a particular floor a person may not find any sign of symbol which can say on which floor he has landed. Another example is the relay of national programmes on television channels like the parade ceremony at Rastrapati Bhawan. The broadcaster doesn't realize that there might be persons who are visually impaired and he needs some form of sign languages which can be used by the anchor or same program can be relayed on another channel in sign language.
This can be achieved through the use different modes of communication, use of sign and symbols, differentiate of elements, like when pedestrian path ends there can be variation in texture which will send a signal to blind persons and use of audio visuals to communicate information.

E. Principle 5: Tolerance for Error

The universal design also aims to ensure minimal or no hazards or bad consequences of accidental actions. This will be done through scientifically and systematically arranging the design components to minimize errors and at the same time the design should be capable of accommodating errors through alternative shield. Adequate provision of warnings of hazards and errors which might occur like fire alarm, automatic water taps etc. discourages unconscious action through design like creating a wide ramp instead of the staircase where a large number of persons use the stairs at the same time.

F. Principle 6: Low Physical Effort

Good design ensures more efficiency, like the provision of lift near the emergency ward of the hospital, which can be used efficiently and comfortably and with a minimum of physical efforts. This can be done through the use reasonable operating forces like escalator where large numbers of persons have to climb the steep height as in the underground metro stations.

G. Principle 7: Size & Space for Approach and Use

Design is nothing but something which makes our life more comfortable. In good design, appropriate size and adequate space for approach, reach, manipulation, and use is required, which must be provided, regardless of user's body size, posture, or mobility.
This can be ensured through making reach to all usable spaces comfortable, accommodate variations in grip size, footsteps and number of users. There should be adequate space which can be later on utilized for assistive devices or personal assistance.
After having understood the nature and character of universal design we will now look at how universal design is influenced and guided by the changing demographics and later on we will also see how the government legislations are trying to integrate the concept of social equity with the universal design.

IV. Changing Demographics

Our design approach must respond to the present and future needs of the society. Here we will see how the changing demographics make it pertinent to ensure universal design in all our design and planning projects.
According to the CIA World Factbook, around 27% of the world's population is under 15 years of age and 8% are above 65 years (The World Fact Book, 2006). Besides these, 35 percent of world population who are either children or old, there are pregnant women and persons suffering from some form of diseases who need special care. Around 15 percent of the world's populationlive with some form of disabilities (Development and Human Rights, UN, 2010).

Table 1: Percentage of Different Sections of Society who Need Care and Better Design of Space

Sr. No.	Category of Users	Percentage of Word Population
1	Children below 14 years	27%
2	Old above 65 years	8%
3	Disabled Persons	15%

Source: (The World Fact Book, 2006) and (Development and Human Rights, UN, 2010)

It is common facts that people are living longer now days due to improvement in the health facilities. The improved health facilities have also enabled the older generation to live longer. It has been assessed that the average lifespan has increased to 76, largely due to healthier living, better medicine, and vaccines and sanitation that have virtually eliminated many killer infectious diseases (LaMendola, 1998).

Moreover, we find that the number of differently abled persons has increased, although there is a decline in the percentage of their population over time.

When we look at these demographic changes in the population of older persons and differently abled persons, it becomes necessary to see how the designed built environment is making their life better or worse. If one moves in Delhi, the capitalof India, then one can find that how the planning agency is taking a proactive role in ensuring incorporation of the universal design concept in the construction of the metro line, replacement of the old buses with low floor buses, elevator on most of the foot over bridges and the repair of the footpaths.

It is a good sign that there is widespread public acceptance of people with disabilities and progress toward universal design in the modern age development and construction works. We will see how the changing government legislations and acts are influencing and re-enforcing the integration of universal design and social equity. There are fine tuning in the universal design movement, and progress in the field of rehabilitation engineering and assistive technology.

V. Civil Movements, Acts and Legislation

When we look into the legal background for universal design, then it is common to look into the building bylaws and design guidelines. It is equally important to see how the legal framework works behind the universal design. The notable among is the Civil Rights Movement of the 1960s, which was initiated and propagated through the intelligentsia which finally resulted in legal backing for the Disability Rights Movement and people's demand for social equity. We will now look at some of the acts and legislation which had been marked as the pillars on which the modern universal design rests.

One of them can be the Architectural Barriers Act of 1968 which mandated the removal of what was conceived to be the hindrance to employment for persons with disabilities: it laid the foundation of the guidelines for the physical design of the buildings and design of the facilities needed for the performance of their job. This Act sought that all buildings designed, constructed, altered, or leased with federal funds to be made more accessible (US Department of Interior, 1968).

Section 504 of the Rehabilitation Act of 1973 was the first civil rights law for people with disabilities. This Act made it illegal to discriminate on the basis of disability and applied to federal agencies, public universities, federal contractors, and any other institution or activity receiving federal funds (US Department of Interior, 1973).

The Education for Handicapped Children Act of 1975 ensured a free, appropriate education for all children with disabilities. This Act had a tremendous impact on educational programs as well as on the educational facilities in which they were conducted (United States of America, 1973).

Government of India enacted The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995 to ensure full participation of the differently abled persons. This proved to be a great milestone in the history of social justice in India (Government of India, 1995).

The Fair Housing Amendments Act of 1988 ensures that the families with children and people with disabilities get access to affordable housing. The Act ensured that accessible units be constructed in all new multi-family housing with four or more units. These accessibility Guidelines for new development were issued by the U.S. Department of Housing and Urban Development in 1991 to facilitate compliance (Devision, 2009).

The Americans with Disabilities Act of 1990 prohibited any form of discrimination in employment, access to places of public accommodation, services, schemes and public transportation (The U.S. Equal Employment Opportunity Commission, 1090).

One of the greatest impacts that these new laws and legislations did was the decrease in the level of discrimination against people who are differently abled rather than persons with disabilities. This slow but steady change in mind-set also plays a big role when we are looking forward for social equity. Simultaneously, the increased consciousness in the community of planners, architects, civil engineers and product designers who initiated and adopted design measures and guidelines which we call universal design played a major role in improving the functionality, usability and efficiency of the build environment. Here the interplay of various disciplines like planning, urban design, civil engineering, etc. ensured that our design can ensure what our laws guide us to achieve and as a civil society we aspire to achieve for our society, i.e., universal access and equal opportunity to use the space without any extra efforts. When we look at the concepts of the universal design in regional content, then we can see how it can ensure access to education, public transport and public space.

Again in the field of transportation planning and design during 1950s, a movement began which we can call a barrier free design movement. This slow movement started by planners and designers led to systemic changes in public policies and design practices. This movement can be seen as a changing form of the movement for ensuring equitable status for the persons with disability to ensure that the vulnerable groups get opportunities for education and employment, institutionalized health care and maintenance. The efforts to make spaces permeable and break the physical barriers in the built environment ensured that various groups of people as mentioned in Figure 1: Different Sections of Society who need accessibly through Design (Sharma, Integrating Land Use and Transport, 2013)

VI. Analysis of the Existing and Perceived Scenario

When we analyze about the future of the universal design, then we can see that the design will not be functionally limited by age or disability. There are other categories of people who will need the assistance of universal design like children, pregnant women, and people from different ethnic and social background. These populations are no longer an insignificant, please refer to Table 1: Percentage of Different Sections of Society who Need Care and Better Design of Space. In the 21st century, there are drastic changes in the demographic character of the world. More persons are now enjoying longer lifespan.

On looking at the changing demographic, legislative, economic, and social dynamics has brought us to a common platform where we cannot think in isolation and thus, we have to have a holistic view and integrated approach of universal design to accommodate individual differences.

During the late 1960s, these were an increasing physical accessibility and adaptive design which paved the way for the recognition of the legal, economic, and social implications of design. The architects, designers, civil engineers, planners and manufacturers recognized the common needs of persons with and without disabilities. Architects and civil engineers started the implementation of standards and guidelines for design and construction to ensure equitable and easy access to the use of the public facilities. Universal design emerged as a savior to ensure that the changes needed to accommodate persons with disabilities reached to everyone. This slow process of adoption and adoption of the legal and moral mandates lets to evolution of affordable, un-differentiated, attractive, and usable products and spaces which proved to be a cornerstoneof the universal design movement.

Universal design is trying to integrate people with disabilities into the mainstream of society through innovation in design and use of assistive technology.

If one turn back the pages of history one cannot deny the fact that there had been irrational community attitudes and physical barriers in the built environment which barred persons with disabilities from fully participating in society and taste the fruit of the scientific and technological progress and innovation. It was a common to hear how social groups had limited access to education, employment, housing, recreation, cultural events, and transportation. The developing sub-consciousness for taking care of others need is getting cultivated in the mind and spirit of manufactures and designers who are now taking the approaches of universal design to ensure that there is equity in our society.

VII. Conclusions and Recommendations

After going through various real experience of design and development in the built environment, it is is realized that the there is striking differences in the theory and practice. This research explored some dimensions of the universal design. It can be seen how the civil movement and legal framework proved to be backbone of the universal design concept and practices.

The Montreal International Declaration of Inclusion by Design objects say that identify and implement sustainable, safe, accessible, affordable and usable lifestyles solution to ensure participation; inter-sectoral, inter-disciplinary, interactive planning and design; accessible and inclusive design of built environment, products and services. We can say that the declaration of this conference paved the way for acting and designing keeping in view the social equity(The Montreal International Declaration on Inclusion, 2001).

Universal Design takes into account the full range of human diversity, including physical, perceptual and cognitive abilities, as well as different body sizes and shapes. By designing for this diversity, we can create things that are more functional and more user-friendly for everyone. For instance, curb cuts at sidewalks were initially designed for people who use wheelchairs, but they are now also used by pedestrians with strollers or rolling luggage. Curb cuts have added functionality to sidewalks that we can all benefit from. While analyzing how universal design is going to ensure equity, we have seen how the universal design managed to succeed and this is due to the generalized form of the guidelines which goes beyond specialization. The concept of universal design promotes designing of products and built space in such a manner as to enable every section of the society to use the services to the greatest extent possible. It is said that when designers and manufacturers will start using this concept without any effort, i.e., naturally while designing then universal design will become common, convenient, and profitable (Mace, 1998).

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