Universal Design as a Significant Component for Sustainable Life and Social Development

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Abstract

Universally designed environment provides comfort, adaptability and flexibility that can help to reduce human life cycle impact and encourage residents’ participation in the community. With that, the purpose of this conceptual study is to explore the concept of Universal Design (UD) as a significant aspect of social sustainability, based on professional practitioners’ and scholarly views. UD implementation in built environment may cater the needs of diverse users over the changing abilities throughout lifespan. This study concludes that UD has evolved as a significant component for sustainable life and social development within the individual’s own dwelling and the community as well.

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1. Introduction

The crucial agenda of the 21st century design, sustainability, can be categorized to three main aspects; environmental, economic and social. Much emphasis has been given to the environmental and economic aspects in the discussion of mainstream sustainability; however, the social sustainability which is equally important has often been neglected (Woodcraft, Hackett & Caistor-Arendar, 2011). Social sustainability relates to how the environment influences human quality of life, thus, a socially sustainable built environment should be created through smart planning and design. World Commission on Environment
and Development (1987) describes 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.” This study, therefore, proposes that Universal Design (UD) is an approach that may help to accomplish those goals of sustainable design. With UD, the built environment shall be able to cater the needs of its present users and sustain the inclusivity for future communities. 

This conceptual paper would like to discuss how UD implementation in built environment may contribute to social sustainability through the inclusive living spaces and livable public realms. The purpose of this study is to explore the concept of UD as a significant aspect in social sustainability, particularly in regards to sustainable life and social development. Method applied for this study is a review of secondary data by scholars and professional practitioners. Nevertheless, it is acknowledged that since the study is being limited by one side of the resource, it can be complemented by other methods such as observation and interviews in future researches.

Despite the limitation, this study hopes to contribute to the knowledge of social sustainability in mainstream debates. This paper will, first, present the evolving criteria of social sustainability, then, discuss the theory of UD in relation to socially sustainable environment, followed by the elaboration on how UD can foster sustainable life and social enhancement.

2. Social sustainability and its relation to Universal Design

2.1. The underlying elements of social sustainability

With respect to the built environment, Young Foundation identifies social sustainability as “a process for creating sustainable, successful places that promote wellbeing, by understanding what people need from the places they live and work. Social sustainability combines design of the physical realm with design of the social world – infrastructure to support social and cultural life, social amenities, systems for citizen engagement and space for people and places to evolve” (Future Communities, n.d.). To complement the definition, this paper would like to suggest that, in addition to the social development within a community, life cycle and growth of the individuals within their private living spaces are also significant as the underlying elements of social sustainability.

Home is where an individual grows physically, develops essential values as a human being and builds a family. In a broader context, a single home is what creates a neighbourhood, and an individual is what composes a community. Social sustainability, thus, can be implied as the collective process of life growth and interaction among humans within their surrounding environment, which evolves from the private domain to the public living environment.

2.2. The emerging criteria for social sustainability

Many studies have been done as to develop a list of standards or criteria which may help researchers to measure social sustainability of a community. According to Colantonio (n.d.), the traditional themes of social sustainability such as poverty mitigation and employment rate are being complemented and slowly substituted by the more subjective themes such as sense of place, social participation and happiness. The author compares the traditional and emerging key themes of social sustainability as in Table 1.
Table 1. Traditional and emerging social sustainability key themes

<table>
<thead>
<tr>
<th>TRADITIONAL</th>
<th>EMERGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic needs, including housing and</td>
<td>Demographic change (aging, migration and</td>
</tr>
<tr>
<td>environmental health</td>
<td>mobility)</td>
</tr>
<tr>
<td>Education and skills</td>
<td>Social mixing and cohesion</td>
</tr>
<tr>
<td>Employment</td>
<td>Identity, sense of place and culture</td>
</tr>
<tr>
<td>Equity</td>
<td>Empowerment, participation and access</td>
</tr>
<tr>
<td>Human rights and gender</td>
<td>Health and Safety</td>
</tr>
<tr>
<td>Poverty</td>
<td>Social capital</td>
</tr>
<tr>
<td>Social justice</td>
<td>Well being, Happiness and Quality of Life</td>
</tr>
</tbody>
</table>

Source: Colantonio (n.d.)

The emergence of the more subjective social sustainability themes as presented in Table 1 is also acknowledged by Sharifi and Murayama (2012) whose study reviews recent criteria for social sustainability. The evolving criteria, as listed in Table 2, were accumulated from precedent social sustainability researches conducted within the last two decades.

Table 2. Criteria for social sustainability

<table>
<thead>
<tr>
<th>AUTHOR(S)</th>
<th>CRITERIA CONSIDERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sachs, 1999</td>
<td>Equity; democracy; human rights; social homogeneity; equitable income distribution; employment; equitable access to resources and social services</td>
</tr>
<tr>
<td>UNDSD, 2001</td>
<td>Equity; health; education; housing; security; population</td>
</tr>
<tr>
<td>Spangenberg, 2004</td>
<td>Income; communication and participation; education; social contacts; social security; distribution of income and assets</td>
</tr>
<tr>
<td>Chouguill, 2008</td>
<td>Citizen participation; social interaction; feeling of belonging; interpersonal relations among the neighborhood residents; collective action; mutual support; access to facilities and amenities; safety</td>
</tr>
<tr>
<td>Bramley et al., 2009</td>
<td>Social equity; access to facilities and amenities; affordable housing; social interaction; safety/ security; satisfaction with home; stability (turnover); participation in collective group/civic activities</td>
</tr>
<tr>
<td>Colantonio, 2009</td>
<td>Equity; inclusion; adaptability; security</td>
</tr>
<tr>
<td>Cuthill, 2010</td>
<td>Social Justice; social/community well-being; human scale development; engaged governance; social infrastructure; community and/or human scale development; community capacity building; human and social capital</td>
</tr>
<tr>
<td>Dave, 2011</td>
<td>Access to facilities and amenities; amount of living space; health of the inhabitants; community spirit and social interaction; safety; satisfaction with the neighborhood</td>
</tr>
<tr>
<td>Dempsey et al., 2011</td>
<td>Social interactions; participation; community stability; pride and sense of place; social equity; safety and security</td>
</tr>
<tr>
<td>Weingaertner &amp; Moberg, 2011</td>
<td>Accessibility; social capital and networks; health and well-being; social cohesion and inclusion; safety and security; fair distribution (income, employment); local democracy, participation and empowerment; cultural heritage; education and training; equal opportunities; housing and community stability; connectivity and movement; social justice; sense of place; mixed use and tenure; attractive public realm</td>
</tr>
</tbody>
</table>

Source: Sharifi & Murayama (2012)

Table 2 indicates that the emerging measures for social sustainability include health and well-being, safety and security, access to facilities and amenities, participation, and social interaction (Sharifi & Murayama, 2012). These criteria can be accomplished through UD implementation in the built environment which provides space to grow and involve in the community.
3. Universal Design and its prospect for diverse users

3.1. The fundamental concept of Universal Design

UD is defined as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptations or specialized design” (NCSU, 1997). This theory comes with seven key principles as described in Table 3, which were established by a working group of architects, product designers, engineers, and environmental design researchers, as design guidelines for various design disciplines including built environment, product and communication.

Table 3. Key principles of Universal Design

<table>
<thead>
<tr>
<th>PRINCIPLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equitable Use</td>
<td>The design is useful and marketable to people with diverse abilities.</td>
</tr>
<tr>
<td>Flexibility in Use</td>
<td>The design accommodates a wide range of individual preferences and abilities.</td>
</tr>
<tr>
<td>Simple and Intuitive Use</td>
<td>Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.</td>
</tr>
<tr>
<td>Perceptible Information</td>
<td>The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.</td>
</tr>
<tr>
<td>Tolerance for Error</td>
<td>The design minimizes hazards and the adverse consequences of accidents or unintended actions.</td>
</tr>
<tr>
<td>Low Physical Effort</td>
<td>The design can be used efficiently and comfortably and with a minimum of fatigue.</td>
</tr>
<tr>
<td>Size and Space for Approach and Use</td>
<td>Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user’s body size, posture, or mobility.</td>
</tr>
</tbody>
</table>

Source: NCSU (1997)

The main objective of UD is to provide inclusivity and therefore, prohibit exclusivity. In regards to the social oppression towards persons with disabilities (PWD), Imrie and Hall (2001) describe the objectives of UD as to hide people’s impairment, avoid such attention to their impairments and minimize public tendency to ‘social ostracism’. A universally designed environment also addresses diversity through flexible design solutions for users with various backgrounds and abilities (Gossett et al., 2009). It may also facilitate everyday’s life of many people other than PWD (Askalen et al., 1997). Among relevant examples of UD solution which benefits diverse users are the automatic sliding door, the inclined moving walkways, and the captioned television displays in a crowded and busy public place such as restaurant and airport.

3.2. The design for diverse users throughout a lifetime

Compared to the specialized barrier-free design, an inclusive environment with UD features is more cost efficient due to UD’s broader scope of accessibility and user-friendliness. UD offers provision and accommodation for a large scope of users, from young children to the frail older adults, including the people requiring healthcare and PWD. As illustrated in Fig. 1, the specialized design only caters the needs of the last two groups of the population, while on the other hand, UD may cover the needs of diverse users to the greatest extent possible (Harrison, 2011).
From Fig. 1, it is also shown that the elderly population (active senior citizens and frail senior citizens) has become the majority of human population. NCSU (1998) indicates that in early 20th century, the minorities of human population include those of older adults and disabled people. Back then, the average human lifespan was 47 years and people with spinal cord injuries had only 10% likelihood to survive. These days, people are living much longer due to better healthcare technology; therefore, the older adults are no longer the minority of world inhabitants (Harrison, 2011). This is what Saito (2006) indicates as the ‘elderly dimension’ which has contributed to the rise of UD concept in today’s built environment as witnessed in Japan.

UD implementation in the built environment is also crucial due to human changing abilities over a lifetime. People needs are never static, and everyone experiences changing abilities throughout their life cycle, thus, some scholars propose that a more universally designed environment is what the world needs in order to sustain everybody’s quality of life (Imrie and Hall, 2011). Considering UD’s prospect of diverse users throughout life changing abilities, there exist associations between UD and social sustainability (Gossett et al., 2009; Vavik & Keitch, 2010).

4. Sustainable life within the private and public living environment

4.1. Universal Design relations to sustainable life

This section discusses how a universally designed environment helps people to sustain their life within the private dwelling and the neighbourhood they live in. Sustainable life begins at home where the individual grows and develops as a person, a part of the family and as a member of the community. The living space and its surrounding areas very much influence the residents’ quality of life; therefore, a universally designed environment is essential as to ensure a sustainable life.

Some of the evolving criteria for social sustainability which are related to sustainable life of an individual include well-being, safety, and access to facilities and amenities (Dave, 2011; Weingaertner & Moberg, 2011). These criteria for sustainable life can be achieved through UD implementation in the planning and design process of housing and neighbourhood areas. Within adaptable private living spaces,
an individual may develop sustainable well-being and a safe place to live in, while within accessible surrounding public realms, an individual may be able to run daily errands and accomplish life essential activities, as discussed in the next section.

4.2. Sustaining one’s life within the private residence

During the late 20th century, housing design with adaptable features is still perceived by planners and designers as a specialized dwelling for PWD and elderly residents, not as an innovative living space usable by broad market users (Askalen et al., 1997). In this early 21st century, the universally designed home has been better recognized by professional architecture and interior design practitioners. This is shown by their increasing awareness on UD provision in housing built with the consideration of ecological sustainability.

Homes which were built with the most sustainable materials and appliances can become unsustainable if the design of the home cannot accommodate the needs of the households’ diverse abilities (Skoda Design & Architecture, 2012). Lawlor (2012) adds to that by saying that a sustainably built home can become emotionally and physically disabled if it cannot cater the changing needs of the households. An inaccessible home not only causes physical limitation to the disabled residents, but also emotional stress to live within an obstructive disabling environment. Therefore, considering the economic, environmental, and social sustainability, Skoda Design & Architecture (2012) asserts that a truly sustainable home is the home that “can withstand the test of time, from using long-lasting and green materials, to accommodating the changing life stages of its residents.”

UD implementation in residential space is not complicated as some people might perceive. The UD key principles as presented previously can be utilized as practical guidelines to create an inclusive and enabling environment for the residents to adapt to life changing abilities over a lifetime. Some examples of simple UD solutions to make a home socially sustainable are listed as in Table 4.

Table 4. Examples of simple UD solution in a residential home

<table>
<thead>
<tr>
<th>DESIGN SOLUTION</th>
<th>BENEFIT TO USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using lever type handles on faucets and doors instead of the knob.</td>
<td>Minimizes energy used.</td>
</tr>
<tr>
<td>Providing different counter height at the standard 36inches and lower counter at 30-32 inches (American standard codes).</td>
<td>Flexible to users with different heights (i.e. children, adult or wheelchair user).</td>
</tr>
<tr>
<td>Providing doorways and hallways with the adequate width.</td>
<td>Comfortable to move around even with two people in the same walkway.</td>
</tr>
<tr>
<td>Using rounded edges for doors, windows and counter tops.</td>
<td>Ensuring safety by avoiding injury due to accidental bumps.</td>
</tr>
</tbody>
</table>


Life cycle impact such as frequently become fatigue due to pregnancy or become less able due to ageing can be reduced by living in a home which is designed with usable appliances, comfortable furniture, and accessible spaces. A universally designed environment which provides adaptable and flexible space to live in may sustain one’s life (Gold Coast City Council, n.d.). Duncan (2007) enhances this idea by saying that diverse users may benefit from UD through usable, safer and more comfortable environment which allows them to remain at a home as their abilities change over the life span. Thus, it may be suggested that UD assists people to sustain their life by providing adaptable, flexible, safe and comfortable living spaces.
4.3. Sustaining one’s life within the public living environment

Looking at the broader extent of sustainable life, UD may also contribute to a sustainable life of the individual within the public living environment (i.e. the neighbourhood or city) that provides accessible facilities and infrastructures. As one of the evolving criteria for social sustainability, the access to facilities and amenities is vital for the residents to run daily errands and perform different kind of life essential activities. For instances, an accessible public transportation enables users to commute to the workplace, and an inclusive grocery market provides life necessities to the nearby residents. This ability to perform life essential activities should be sustained throughout a life span, even when the residents become temporarily impaired or age over time.

This idea of convenient living is also addressed by Town and Country Planning Association (TCPA) via their eco-town program in the United Kingdom. The program considers eco-town as an opportunity to create a responsive dwelling environment where all inhabitants, regardless of age, disability, faith or gender, can live comfortably and conveniently (TCPA, 2009). Convenient living and access to facilities and amenities are also the fundamental means to encourage participation and social interaction within a community as elaborated in the next discussion.

5. Social development within a livable community

5.1. Universal Design relations to sustainable social development

This study proposes that another underlying aspect of social sustainability which may be fostered through a universally designed environment is the social development within a livable community. Social development can be identified as “one that is concerned with processes of change that lead to improvements in human well-being, social relations and social institutions, and that are equitable, sustainable, and compatible with principles of democratic governance and social justice” (UNRISD, 2011). An inclusive living environment may enable the individual to develop socially as a member of the community by being actively involved in the community over a lifetime, for instances, from being young kids at schools to being the elderly at an event at the community halls.

Among the emerging criteria for social sustainability which can be promoted via a universally designed environment are participation and social interaction (Choguill, 2008; Bramley et al., 2009; Dave, 2011; Dempsey et al., 2011; Weingaertner & Moberg, 2011). Duncan (2007) claims that UD can be regarded as an element of social sustainability since it may create a supportive and enabling environment which fosters inclusive community involvement and nurtures social development.

5.2. Fostering social development through the components of social sustainability framework

To elaborate on social development of individuals within a livable community, this study utilizes the components of social sustainability framework by Young Foundation (Fig. 2) as the means for a livable environment which promotes social interaction and participation. The four components of social sustainability framework (amenities and social infrastructures; social and cultural life; voice and influence; space to grow) are explained in relations to UD as to present the idea of social development through an enabling environment.
5.2.1. Amenities and social infrastructure

The amenities provide support services for the community while the infrastructures allow connectivity in a neighbourhood or a city. To ensure a socially sustainable community, Woodcraft, Hackett and Caistor-Arendar (2011) establish that accessible amenities and social infrastructures need to be provided at the early stage of neighbourhood planning and design process. The access to amenities and social infrastructures also create visitability, which can be described as “the ability of individuals to freely interact, navigate, and integrate within their environments” (NCDDR, 2004).

Infrastructures such as public transportation and pedestrian pathways create walkability and connectivity within a neighbourhood, town or city. Rosly and Hashim (2011), in their presentation of “Guideline and Framework for Green Township in Malaysia,” establish three strategies to create efficient walkability as follows:

- Pedestrian network is interconnected and accessible to all amenities and services
- Apply Universal Design or barrier-free design
- Destination and amenities are within walking distance

The scholars indicate that a sustainable town is the place that provides barrier-free housing with consideration of UD, complemented with community support facilities that cater the needs of diverse users especially PWD, and streetscapes that allow all buildings to be accessible by pedestrians (Rosly & Hashim, 2011).
5.2.2. Social and cultural life

A universally designed living environment may also encourage participation and social interaction through the provision of flexible and adaptable spaces which can be shared by diverse users, for various activities, and at different times of the day. Woodcraft, Hackett & Caistor-Arendar (2011) propose that a socially sustainable community needs to provide “shared spaces, collective activities and social architecture to foster local networks, belonging and community identity.”

These spaces should be convivial as to attract people to gather and involve in the local community. Shaftoe (2008) establishes that a convivial and accessible place can attract more visitors to come and spend money at the place, thus, generate more income to the local vendors. The inclusive environment also intends to provide equal opportunities to all people including PWD to support participation and foster an interactive community (Gossett et al., 2009). An inclusive and convivial environment may not only create a fairer environment, but also a richer quality of life (Morrow, 2000), sense of belonging, as well as cultural enrichment. Fig. 3 portrays the Memorial Union Terrace at the University of Wisconsin, Madison as an example of a convivial place, crowded with numerous visitors throughout the day.

![Fig. 3. Example of a shared convivial place that is flexible and adaptable for diverse users and various activities Source: Miller (1996)](image)

5.2.3. Voice and influence

This component of social sustainability framework is more on the inclusive decision-making process and freedom of choices which allow all residents to take part in the planning and design process of the neighbourhood and community policy. This component resembles UD through capability approach that can be described as “what people are effectively able to do and be,” (Robeyns, 2005) or as Alkire (2005) claims as the ability “to enjoy valuable beings and doings.” Oosterlaken (2009) implies that the capability sensitive design is originated from UD where broadest extent of users may be able to enjoy the
environment they choose to have. Inclusive decision-making process gives an opportunity for members of the community to voice their opinion, needs, and make the important decision for the future of the community.

5.2.4. Space to grow

Participation and social interaction may also develop within the living space or the space to grow. The entire neighbourhood or city should be flexible and adaptable to the residents’ life changing abilities so that they may be able to interact with other people and participate in the community over a lifetime (Woodcraft, Hackett & Caistor-Arendar, 2011). In regards to the private living space, this study proposes that each home should be located within the vicinity of nearby houses as to create an inviting atmosphere of the neighbourhood. To encourage visitability and social interaction over a lifespan, housings should also be conducive and welcoming through the provisions of UD solutions and the hospitality of the homeowners themselves.

5.3. Social development beyond the framework

Even though the framework is explained from the external component to the internal component by Woodcraft, Hackett & Caistor-Arendar (2011), this study prefers to elaborate the framework starting from the core component (space to grow) to the outer component and beyond. As the social interaction and participation starts within a “space to grow”, users have control over the community decision-making process through “voice and influence”, thus, enable them to involve in “social and cultural life” while all these private and public spaces are connected by accessible “amenities and social infrastructure”. These components then go beyond the framework by influencing pro-environmental behaviour which benefits ecological sustainability, and contributing to the local and regional economy to enhance economic sustainability.

Thus, it can be said that a universally designed environment may contribute to social sustainability (as well as environmental and economic sustainability) by encouraging participation and social interaction within a livable society. Other benefits of strong social networks and livable community include a sense of attachment to the place and sense of belonging to the community (Woodcraft, Hackett & Caistor-Arendar, 2011).

6. Conclusion and recommendations

Considering UD’s roles in sustaining well-being, safety and accessibility within the individual’s living spaces, as well as encouraging participation and social interaction within a livable community, UD can be regarded as a significant component for social sustainability. UD may cater the needs of diverse users over a life time, therefore be able to sustain one’s life throughout life changing abilities and support social development among all members of the society. In order to be socially sustainable, a person needs to be successfully developed as an individual, a family member and a part of the community.

The social aspect of sustainability should be emphasized in the mainstream discussion on sustainability because it influences human behaviour and quality of life in many ways. It is also recommended that early planning or designing for successful long term sustainable social life of new communities is equally important as planning for environmental and economic sustainability (Woodcraft, Hackett & Caistor-Arendar, 2011). It is also significant to practice smart planning of housing construction to avoid unsustainable house alteration which causes pollution, hazardous construction equipment and material, and inappropriate methods of wastage removal (Isnin, Ramli, Hashim and M. Ali, 2012). UD provisions
should be applied in the planning for sustainability as to create a smarter, greener and more livable future (Skoda Design & Architecture, 2012).

More researches can be conducted to further investigate UD benefits to develop a more sustainable community by incorporating mixed-methods or methodological triangulation. By the end of this study, there rises a question of strategies to encourage sustainable ways of life or pro-environmental behaviour through architectural and interior design, which can be an interesting future research topic.

Acknowledgements

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