Social Sustainability and Mixed Landuse

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Abstract--- Social sustainability focuses on the type of development that promotes social interaction, social inclusion and cultural enrichment. It gives emphasis to inclusive community, social cohesions, quality of life, social equity and diversity. It also focuses on social psychological aspect of individual's behaviour, motives, attitude and actions.

Segregated landuse has single land use and creates social impacts like social inequalities, social exclusion, increased crime rate and physical and psychological problems. Mixed landuse is a development typology which has multiple compatible land uses like residential, commercial, entertainment, etc. within a closed proximity. These diverse uses tend to increase interaction amongst different age groups and people of different income groups, encourages walking thus enhancing visual and verbal interaction.

This paper studies the significance /viability of understanding the notion of mixed land use to achieve social sustainability. Various social parameters like equity, diversity, vitality, community cohesion, health, natural surveillance, security, crime, quality of life, sense of belonging and (anti)social behaviour has been studied in the context of mixed and segregated landuse areas in traditional as well as contemporary urban settings.

This paper also discusses social models, social impact assessment methods and mitigation measures in the context of mixed landuse.

Keywords--- Social Sustainability, Mixed Land Use, Social Psychology

I. INTRODUCTION-PREAMBLE

INDUSTRIAL revolution led to a development pattern with economic growth as a priority while degrading the environment. In 1970's, the conflict between environment and development was first acknowledged and the term sustainable development (SD) was coined and defined in Brundtland Commission as "the development which meets the needs of the present generation without compromising the ability of the future generation to meet their own needs" (Brundtland Commission, 1987). The three pillars of sustainability i.e. social, economic and environmental, together contribute to a healthy, productive and environmentally sustainable present and future community.

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Sustainability is related to creating and maintaining the quality of the life in a community. A community cannot exist without people and their interaction. The inhabitants influence development when they choose where to live, work and play. Social aspect has major capacities to enable immediate and positive change for sustainability but then also the social dimension of sustainability has traditionally received less attention than the environment and economic dimensions because of the difficulty in defining and measuring social sustainability (Richmond, 2012). Mixed landuse development plays a crucial role in enhancing social aspect. Thus, this paper focuses on the aspect of social sustainability its significance to understand the notion of mixed landuse and later discusses social assessment measures.

II. SOCIAL SUSTAINABILITY

Social sustainability focuses on the type of development that promotes social interaction, social inclusion and cultural enrichment. It gives emphasis to inclusive community, social cohesion, quality of life, social equity and diversity which are integral to the long-term sustainability of communities. It involves protecting the mental well being and physical health of all stakeholders, encouraging community, treating all stakeholders fairly, and providing essential services to create a healthy society.

The aspect of human resource development (HRD) plays an important role in the lives of community. It helps to improve the quality of life by facilitating the community to participate in the workplace and societies, employee relations, human rights and governance structure. In Canada, Human Resources Development Canada (HRDC) concerned about social issues and took steps for achieving sustainability. The strategy tries to strengthen the participation, leadership and capacity building of the community (HRD Canada, 2001).

From the philosophical aspect of social sustainability, it focuses on social psychological aspects of individuals' behaviour, motives, attitude and actions. Individuals' behaviour is the combination of knowledge, practices and attitudes that together contribute to motivate actions in a society. Motivation refers to a process that elicits, controls, and sustains certain behaviors. Motives are the inferences from the behaviour. Attitude represents an individual's degree of like or dislike for some item or action. Traditional behavioral teachings, parenting, the value of education, the conservation lessons, the indigenous knowledge systems were passed on to next generations. This setting allows individuals to develop social awareness and natural life cycles at younger age. Individual and community developed a perception of living within the environmental limits and fulfilling the needs (minimalistic requirement) and not the greed (consumerism), sustaining lifestyle. Leadership and motivational topics focus

not only on prosperity in wealth but also different social status (Social Sustainability, 2011).

III.   SOCIAL SUSTAINABILITY AND SPATIAL PLANNING

It's a common practice that economic development and design issues (economic competitiveness, physical infrastructure and public private partnership) are kept at priority in landuse planning. Urban planning and development strategy engross community's physical infrastructure like water supply, sewage disposal, solid waste, roads and electrical utilities. Environmental concerns in last three decades has significant implications for the design and operation of the physical infrastructure such as conservation and ecological management of storm water and sewage; energy, water and other resource conservation; walk and transit supportive environments, etc. A community is composed of people and places where they live. Thus, communities must not only be environmentally sustainable, they must also be socially sustainable. Physical design directly cannot ensure that individuals, families and communities will lead sustainable lifestyles, but the inclusive design supporting social aspects (school, health centers, parks, community centers, etc) can help the communities to be socially sustainable (Hancock).

The rise in the quantitative research approach for planning the urban areas can be effortlessly worked out for the economic aspects. But social aspects such as health wellbeing, safety, sense of place, equity, livelihood, etc are difficult to put on the measurement scales. The measurement of social sustainability currently uses simple demographic indicators as population growth, gender ratio, average income and health statistics. Thus, the notion of social sustainability is grey and ill-defined in the aspect of planning.

Urban designer Jan Gehl focuses on the creation of pedestrian friendly urban environments to promote street activities. The outdoor activities are a) necessary (going to work or shopping); b) optional (exercise or playing); and c) social activities. Resident preference to undertake optional activities are related to the design of the outdoor environment and other factors such as the weather. An outcome of this, social activities happen like people sit, talk and interact with each other. The outdoor environment thus escalates the amount of activity (Gehl, 1971). These social activities are vital to a vibrant community as they provide the opportunity for everyone to have social contact, either passive, through watching and listening to passerby, or active, through meet and engaging with friends. This environment generates the strong sense of place and community (Kavanagh, 2010).

According to Liam Kavanagh, there are six physical factors effecting social sustainability: i) Townscape Design - configuration of built forms and interstitial space; ii) Provision of Social Infrastructure- proximity and number of schools, medical facilities, meeting areas, and recreational facilities; iii) Availability of Job Opportunities; iv) Accessibility to all; v) Ability to fulfil psychological needs; and vi) Preservation of local characteristics- conservation (Kavanagh, 2010). Landcom, Sydney has a Social Sustainability Policy based on the social determinants of health and their application in

landuse.   It aims at providing opportunities for mixed communities (ethnicity, gender and age) with diversity in housing and landuse. (Petersen, 2009).

IV.   MIXED LANDUSE SCENARIO: PAST, PRESENT AND FUTURE

The physical environment enhancing social sustainability can be created by mixed landuse development. Mixed landuse is an appropriate mix of multiple land uses in an area, where a variety of living activities like live, work, shop and play are in close proximity. As mixed use areas tend to promote walkability and social inclusion, are safe and accessible and persuade social aspect. Thus, this study further tries to explore the relationship of mixed use as against segregated landuse to promote social sustainability.

V.   TRADITIONAL SETTLEMENT AND MIXED LANDUSE

Human being wishes to fulfil his basic needs within short distances. He wishes and prefers to have varying activities within his reach (both physical and psychological). In traditional settlements multiple uses were provided in the same vicinity. These settlements were walkable, compact and had mixed land uses. These were self-contained communities, thus not putting much burden on the natural environment. They were natural, convenient, functional and also economical. There was a strong relationship between the workplace, living space, recreation and other ancillary activities. There was a physical and psychological sense of belonging amongst the inhabitants. Group dynamics subsisted and can be proved by the presence of great bath, grand granary stores and religious buildings which involved group activities.

VI.   INDUSTRIAL REVOLUTION AND SEGREGATED LANDUSE

After Industrial revolution, existing towns expanded and new towns like industrial and satellite towns were created with strict land use zoning separating the uses. Low density, segregated sprawl development was favored to separate the residence and workplace resulting to social exclusion and economic inequity especially of the urban poor. Landuse was generated by economic separation of the producer and consumers. The dependency on the transportation increased which led to increased traffic especially during peak hours. Citizens were forced to spend money and time in travelling. Towns like Le Visient built in 1858 had complete segregation of residence, schools, shops, factories and railways stations. Garden city concept tried to the return to nature but it also had separate but closely placed land uses (Kotharkar and Bahadure, 2010).

Post world war, urban planning policies continued segregated landuse zoning. CIAM (Congre's Internationaux d'Architecture Moderne) advocated the 'Functional City' in which the four main land uses of the city (housing, employment, recreation and transport) were clearly separated. To enforce such land use segregation, planners invented powerful regulatory mechanism and the zoning code (Erik & Frank, 2006). Mass exodus from central city increased the physical distance and thus dependency on automobile

increased resulting in increased pollution and resource depletion. The movement of segregated landuse reached its zenith in 1960s.

VII. MIXED USE REVIVAL

In the last three decades sustainable development globally led to the various approaches like new urbanism, urban revitalization, regenerating brownfields, transit oriented development, smart growth and eco-city renewed the interest in mixed-use development initially in certain western cities worldwide. This concept started enhancing the community based society, proximity to the facilities thereby increasing walkability and interaction, equity and health well being thus promoting social sustainability.

VIII. SEGREGATED LANDUSE AND SOCIAL UN-SUSTAINABILITY

Rigid landuse separation is observed where there is a presence of large powerful authority. The political authoritarian governments (the labour town Kahun, ancient Egypt); or economically powerful authority (19ᵗʰ century company town, industrial power) (Procos, 1976); or both politically and economically powerful authority (British in India) had a strong role in segregating the commons from the elites.

In the above mentioned cases, the human behaviour of the authoritarian governments was highly influential. There was strong separation between rich-poor, producer-consumer, high-low class (economically or ethnically or caste based). The attitudes of the commanding authority reflected their hostile and self confidence behaviour. They represented their dislike towards the commons and treated them as workers and slaves. They used the tact's of social learning process by favouring classical conditioning. Commons' were treated as inferior and neglected. Children's exposure to such environment led to persuasion of similar attitudes regarding the commons and the authority. Instrumental conditioning was also percolated by means of punishment and rewards for certain behavioural aspects. The attitude of the authority was directly reflected in their planning strategy of separating themselves from commons. The social distance & splendid isolation was achieved by enforcing policy and norms that disconnect. Strict zoning of segregation increased physical distance between residence and workplace.

People made less money for long working hours in urban areas and could not support families' resources. Desperate need of money forced women and children to work. Children received very little education, had stunted growth, and were weak. Working families often lived in slums with little sanitation, and infant mortality skyrocketed. These social changes resulted in revolution and violent moment. Gradually, concerns for human health, poverty and living conditions increased, eventually intervened in order to put an end to unacceptable practices (SEA, 2003).

IX. SOCIAL IMPACTS

Figure 1: Vacant Road on a Public Holiday in Esplanade

Land use separation either due to income or racial severance causes socio-economic impacts. The community with low diversity of housing and business types creates dull and inactive environment. The spatial segregation in United States has resulted in the issues of local revenue and quality of local services like disparity in school quality, health care and transportation. Segregation of uses and restricted access is more intense, thus growing the social inequalities (Rosalind at el, 2000). The neighbourhood with segregation in public spaces and other uses are relatively isolated as compared to the areas with mixed spatial configuration. Spatially segregated neighbourhoods are highly dependent on accessibility especially through public transportation, bus stops and playgrounds (Legeby, 2009). Bangladeshis in England who live in segregated areas face a higher risk of unemployment and economic inactivity as well as lower returns on their qualification and it has a negative impact on the enclave (Nabil,ct.al, 2010).

Increase in physical distance due to landuse separation of residences, supermarkets, malls and employment centers create car dependent communities. The commute places are far from one another thereby reducing walking or cycling habits and it results in lack of physical exercise and creates health related problems like obesity. Air pollution from roadway traffic has negative effects on human health. The streets and neighbourhood open spaces tend to be vacant during non working hours or days are prone to anti-social activities (Figure 1). Such areas especially in suburbs are more vulnerable to theft and physical assault especially for single occupants, children and elderly persons. Segregated developments are generally low rise and low dense. They consume more resources, land and energy on transportation, construction, building maintenance and operation per capita. It also amounts to higher per person infrastructure cost. Per capita requirement in terms of energy consumption and greenhouse gases emissions for low density single use development is 2.5 and 4 times more than the high-density urban core for the development work and for transportation respectively' (Jonathan, et al., 2006).

X. MIXED LANDUSE, SOCIAL SUSTAINABILITY

The segregated landuse was not accepted by the people especially in developing countries. So encroachment and informal development happened in single use areas. The tendency of doing work and living together helped in mutually reinforcing and monitoring both. According to Jane Jacobs, the conventional way of urban planning and policies which

had strict zoning laws creates isolated unnatural urban spaces. She mentioned dense, mixed-use neighbourhoods are the strong proponents for the safe and socio-economically active growth (Jacobs, 1961). The notion of 'sustainble lifesyle' in America (1980's) was based on using less cars and less resources and making the cities more attractive, viable and safer to live and work. Mixing different landuses in compact setting was seen as a poitive contribution in planning policies (Coupland). It tries to fulfill the goals of sustainability like sense of community and place; employment, and housing choices; preserving and enhancing natural and cultural resources; and promote public health.

XI.   SOCIAL SUSTAINABILITY

Many social benefits are associated with good urban design based on mixed landuse concept. These are allied with safe, comfortable street system and supportive social environment.

Health: There is a clear relationship between one's health, well being and the nature of built environment. Increased physical activity is enhanced by mixed use in terms of walking and cycling to fulfill basic needs which in turn helps in keeping good health. It also reduces the time spend for the transportation. The saved time otherwise could be used for personal development, for the family or for the society to improve personal, family's and community's well being.

Association with provision of active street, multipurpose open green space improves mental well being. To promote active community environments, mixed land use, high density and transportation plan play an important role. Land-use policies and implementation tools that support non motorized transportation improvement and mixed land use foster diverse environments conducive to various types of physical activities like greenways, parks, open space, and walkable areas (S.A. Aytur et al, 2007). The performance of the Body Mass Index (BMI) Model with six land use categories suggests that the presence of mixed land uses improves walkability (Barbara B. et al) and thus increases interaction in a neighborhood and maintains physical fitness.

Equity and Diversity: Sustainable urban structure demands mix of diverse housing types based on functions, income and forms. Single family, multifamily, bachelor's house, housing for different income groups, low rise, mid rise and high rise apartments can be integrated together in the same layout. It ensures people of various socio-economic classes interact and share symbiotic relationship. Symbiosis between the rich and poor can be achieved by rich providing employment to the poor in the same cluster.

Safety and Surveillance: Perceptions of safety depends on the nature and extent to which people use various spaces and places. Street and place design that aims to reduce crime can enhance the physical, mental and social wellbeing of a community. Neighbourhoods with mix of land uses promote high level of activity on the street keeping the streets safe. Children feel safe to play or cycle, elderly can meet and talk and strangers might feel they are intruding. Women feel safe and walk more when basic need destinations generate foot

traffic and natural surveillance (Loukaitou A & Fink C., 2009). The fear of being a victim in crime also reduces. Courtyard shared by multiple buildings, active street network, and inclusive open space involves an active participation by the community (Dittmar, 2007).

Vitality, Attractiveness and Aesthetics: The contribution and potential of mixed-use development schemes confirm the positive contribution that mixed-use schemes can make to the vitality and attractiveness of town-centre environments, to the extension of housing choice, and to the promotion of sustainable modes of Transport (DCLG, 2006). Appropriate mix of housing of different tenure, sizes and types creates a lively atmosphere and make the neighborhood more attractive and creates better quality town centers. A fine-grained mix of attractive destinations, good aesthetic qualities (such as tree cover) in a neighborhood supports walking for various activities and pleasure (Handy, 1996). Mixed neighborhood dwellers are more likely to use public spaces and have optimistic feeling about the neighbourhood (Saville-Smith, 2010).

Employment: Intensified site utilization is an economic solution for mixed land use development. Business activities and employments are generated in mixed land use development. A building or a complex with 24 hour use serves a variety of facilities to occupational or social grouping. Mixed landuse increases economic viability of the development project giving a chance for the developer to plan and consider for affordable housing and lower commercial rents. In the Downtown of city of Los Angeles, mixed-use development is creating more and diverse jobs (retail commercial and professional services, entertainment, health care, etc.) than industrial development (Committee, 2008).

Community Cohesion, Interaction and Sense of Belonging: The aspect of togetherness and bonding is exhibited by members of a mixed use community. As people perform various activities (live, shop, play and/or work) in the same vicinity the frequency to meet, greet, smile & talk increases thus connecting the community. This pattern gives a chance for the people of different age groups to interact among themselves and create an inclusive community.

Quality of life (QoL): QoL plays an important role in achieving sustainability. Social participation; employment levels; relationships; healthcare; liveability; crime etc. are the indicators for QoL and they can be enhanced by inclusive physical planning and mixing the land uses. Mixed landuse neighbourhood becomes attractive for the residents and workers to balance quality of life criteria with salary (Tombari, 2005).

Accessibility: Mixed use neighbourhood has more convenient access to people, places, and activities. This has the social benefit of greater user satisfaction, social connectedness and enhanced viability of ancillary activities.

XII.   ISSUES AND PROBLEMS

Even though mixed landuse has many benefits but also are associated with some problems which need to be tackled properly.

Anti-social behavior: Mixed use area generally have low crime rate but in lower income neighborhood unsocial behavior exists. Youth nuisance and anti-social behavior are frequently found in high density, mixed tenure, low income areas due to multiple deprivations like inadequate education, unemployment, poor infrastructure or rental housing. The problem can be sorted out by a) multi-agency partnerships (strategic and operational partnership); b) engagement of residents to build community capacity; c) developing effective interventions; and d) acceptable behavior contracts (ODPM, 2003).

Noise: High & Medium Density mixed use householders (more likely) see noise as a serious problem (Saville-Smith, 2010). Noise from the certain use type like restaurant and clubs during night time creates problems. This issue could be sorted out by means of proper design and managing noise at source and at receiving end.

XIII. TOOLS AND MODELS TO MEASURE SOCIAL SUSTAINABILITY

To put the concept of social sustainability into practice, measurement tools and social models are vital. They try to investigate the actual scenario or predict the impacts due to change in scenario. It usually works in four stages i) indication of problem or assessment parameter (like population) ii) gives measurable social dimensions (population: its growth, density pattern, literacy rate, sex ratio, etc.) in time and spatial scale, iii) mitigation and adaptation strategies. This helps in rational decision making to promote social sustainability.

Human Development Index (HDI): HDI is used to rank countries by level of 'human development' as very high, high, medium and low human development. It measure of life expectancy, literacy, education, and standards of living for countries worldwide. It is a standard means of measuring well-being (HDI, 2012).

Mercer's Quality of Living Survey: The Mercer survey provides a wide and varied amount of information about the different factors that will impact on the quality of life experienced by a person living in an area. It is a survey of 215 cities on 39 different criteria. The survey investigates different factors such as political and social environment, medical & health considerations, economic environment, socio-cultural environment, public services & transport, housing, recreation, etc (QOLR, 2011).

Social Sustainability Strategic Plan, Boulder city: This plan identifies social concerns; to provide policy guidance on priority goals; and to lay the foundation for an integrated approach to planning and policy under the vision of community sustainability. Social concerns are based on the eight goal areas: i) promote community and city organization engagement, ii) expand and value diversity; iii) improve neighborhood and community livability; iv) address the needs of children; v) youth; vi) seniors; vii) partner with schools and viii) create a shared vision of community sustainability (Richard K. et al).

Social Sustainability Due Diligence Assessments (SSDDA): Landcom undertakes SSDDA for residential and mixed-use projects to identify social risks and opportunities. Based on this assessment a Strategic Social Plan is prepared as a part of the master planning process. It addresses the social context, potentials and risks within which development would proceed. It gives opportunities to ameliorate risk through the provision of community infrastructure, housing and land use diversity to promote mixed communities, adaptable and/or universal housing to facilitate ageing in place and innovation and benefit to existing and new community members through joint ventures or partnering by major stakeholders. It sets out the actions required to achieve social sustainability by identifying lessons, successes, cost/risk and benefits (Petersen, 2009).

'Sustainability Toolkit' Social Models: Sustainable toolkit provides online toolkits, assessment tools, checklists, modeling software, and case studies designed to aid the stakeholders for sustainable projects at the regional, urban, and local levels. 'Social Models' through stakeholder participation focuses on social sustainability, which involves the development of resilient communities that meet residents' health and social needs over the long-term. In a socially-sustainable community, residents are empowered; have equal access to green, healthy spaces; can choose among multiple transportation options; and enjoy a high quality of life (Sustainability Toolkit: Social Models, 2010).

Social Impact Assessment (SIA) for Landuse Plans: SIA is a systematic approach to identify and analyze social impacts of a proposed project or plan on the individual and/or social groups in a community. Social impacts of urban plan refers to factors such like quality of housing, quality of physical and social services, living environment, gentrification, segregation, transport condition, etc. Planned intervention process involves policies, programs, plans and projects of and social change. It is done in advance and during the planning phase and helps in developing mitigation, adaptation or compensation measures (Sairinen, 2004).

XIV. MIXED LANDUSE MEASURES FOR SOCIAL ASPECTS

Measure like entropy index and dissimilarly index are used to study the land uses in a neighborhood based on the variety of different use types in the area and indicate the level of mixing at the neighborhood scale by comparing the existing mix with an ideally balanced mix. Mixed use can also be measured by ratio of jobs to residents at the neighborhood level; or number of various activities/uses within a given distance (typically ¼ mile) of residences; or number of walking destinations in a neighborhood. These measures assess the past and current socio-economic and environmental status for the future decision making. To assess the social aspect in a community, table 1 is prepared to guide in selecting the indicators and their measurement unit. A correlation matrix (Table 2) has been developed to understand the social aspects affecting the mixed use environment. The manifestation or mitigation action guides the stakeholder to comprehend the behaviour pattern.

Table 1: Indicators Influencing Social Sustainably in Areas with Measurement Units

Factors	Measurement Unit
Provision of facilities	Ratio of residential to non-residential land; Quantity and quality of facilities
Segregation and equity	Percentage (%) of different ethnic/income/age/gender group/ households; Owned/rented, car less, able/vulnerable households; Average area per household
Accessibility	Average distance to nearest store, Green Spaces; Availability of transit and walk; % of car/transit/walk users
Job accessibility	% of employees working within/outside the neighborhood; % of low/ high wages, skilled/unskilled jobs
Affordable housing	Average price of lower cost dwellings relative to average income of households; average rent; level of homelessness
Safety /Surveillance /Crime	No of crimes reported; No of people on streets and other open spaces
Health Well being	% of residents with long-term illness; % of residence with mental/physical illness
Vitality & Community Cohesion	% of people interacting on street or public place; % of people with whom interact (talk); % of people greet/smile; % of people familiar with neighborhood
Quality of Public Realm	Area/Quality of Sidewalks, open spaces & public spaces; No. of people interacting in these spaces; Active Street frontage
Sense of belonging	Friendly/ non Friendly neighborhood
Cultural Resources	Preservation of natural/cultural heritage

Table 2: Correlation Matrix to Understand the Mixed Use Social Aspect and its Manifestation

Key Term	Behaviour Pattern	Manifestation/Action
Walkability	People prefer to walk/cycle for basic needs; Visual/ verbal Interaction; Attitude of user	Reduce use of automobile; Health issues (Obesity, stress) reduces; Design Parameters (Street furniture, sidewalks)
24 hour occupancy (changing)	Active streets: Natural Surveillance	Safety and security; Reduce crime but noise problem increases
Open spaces with human scale	Group Dynamics; Surveillance; Kids play without fear; Elderly people relax/ interact	Interaction among different age groups; Frontage/ Openings/Blank facade
Closeness of different land uses	Reduce need for automobile; Time Saving; Association and interaction	Less pollution/ less carbon footprint; More time for self and community; Efficiency & Productivity; Compatibility of uses
Mix of	Diversity; Synergy	Affiliation;

Key Term	Behaviour Pattern	Manifestation/Action
tenure and housing typology	increases; Group dynamics and; Inclusive community	Instrumental and Classical Learning
Financing and feasibility	Networking & coordination of different agencies; Awareness; Cost efficiency	Acceptability; Public subsides; Location advantages / disadvantages; Public revenue
Governance	Learned behaviour; Social awareness; Bureaucrat & leadership; Motivation	Mass communication; Dedication; Publicity & propaganda; Tax benefits; Networking
Planning and Design	Complex (norms, design); Decision making; Functional utility and economical	Dedication; Harmonizing Conflicting land uses; Innovation and creativity
Life and quality	Vibrant and active; Inclusive; Strong social networking; Perception	Attention; Affiliation
Design Quality & Context	Aesthetics; Diversity & Attractive; Socio-economic wellbeing; Sustainable	Characteristic across an Urban area; Positive contribution in augmenting the Urban Texture

XV. CONCLUSION

Social sustainability being one of the three domains of sustainability plays a vital role in enhancing the community by means of giving equal opportunities, creating vibrant, diverse and inclusive environment and fulfill the social needs of the inhabitants. Spatial planning if focuses on creating pedestrian friendly and urban environment at human scale to promote outdoor activities and which deals with improving the quality of social infrastructure like education, healthcare and interactive spaces can create social sustainability. Mixed landuse development, a spatial planning aspect tends to promote walkability and social inclusion and create safe and accessible environment. A historic preview put forth the changing scenario of the mixed and segregated landuse in different settings and it demonstrated that the mixed landuse promotes social sustainability as against the segregated landuse which is a contributor to social unsustainability.

At the end, various measurement tools and social models to achieve social sustainability has been discussed. The selection of these models will depend upon the case specific conditions. These measures were used as a base to develop the mixed landuse indicators and units in the context of social sustainability. A correlation matrix is prepared to understand the behaviour pattern thus leading to manifestation and mitigation actions.

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