

# PLANNING TOOLS THAT CAN BE USED TO FACILITATE URBAN SUSTAINABILITY

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## Abstract

Global urban populations are increasing day by day and putting continuous pressure on cities. The level of world urbanization rate was 50.6% in the year 2010 and it is forecasted that by 2050 it will be 70% , UN (Habitates, 2010). Rising trend of urbanization creates various urban problems like; urban poverty, environmental hazard, urban slum etc which leads continuous change of the physical fabric and eventually; urban sustainability has become a worldwide concern for the urban planners. But what are the appropriate tools for the urban planners regarding urban sustainability are yet to be addressed. If, tools are identified than worldwide researchers can easily use them for making urban area sustainable. So, the main aim of this paper is to explore the possible planning tools that can be used to facilitate urban sustainability. Literature review and case study are the main source of information of this study. In this paper, firstly the definition of urban sustainability is defined. From the concept of urban sustainability three dimensions (environmental, social and economic) of urban sustainability are found. After developing this concept, planning tools that can be used to facilitate urban sustainability are discussed under three broad dimension of urban sustainability.

**Keywords:** urban sustainability, planning tools

## 1. INTRODUCTION

Urban sustainability emerged from the term “sustainable development” which has ascended gradually over couple of years and is the product of environmental movement; started in 1962 through the publication of a book ‘silent spring’. After Passing 25 years of ‘silent spring’, sustainable development got its definition through the publication of the world Commission report ‘Our Common Future’ on Environment and Development in 1987. According to the report sustainable development means:

“Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (Rees, 1998).

So, the term urban sustainability encompasses three key concepts which are development, present generation needs and future generation’s ability. Development is a qualitative concept which is concerned with cultural, social and economic progress. Needs differs according to different social and economic status and therefore, it is more wisely to treat it as the right distribution of resources to achieve social equity. The third concept of future generation’s ability introduces the idea of intra-generational equity.

According to the Spanish Strategy on Urban Environment<sup>1</sup>, sustainability is a complex phenomenon that represents the simultaneous presence of three aspects; economy, environment and society. Environmental Sustainability considers the environmental impact of human activities and suggests not exceeding the carrying capacity of the Earth and the life of its inhabitants is not endangered. Economic Sustainability incorporates to build a strong, stable and sustainable economy which provides prosperity and opportunities for all. It is a production process that satisfies the present level of consumption without compromising future needs. Socio cultural sustainability intends to improve the wellbeing of people in present and future generations and also refers to sustaining cultural diversity.

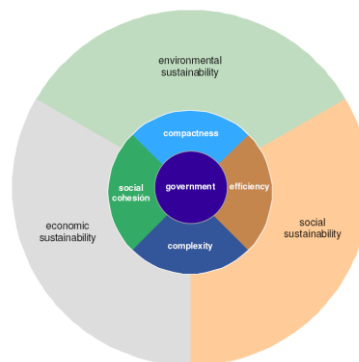


FIGURE 1 - THEORETICAL MODEL OF URBAN SUSTAINABILITY

Source: Spanish Strategy on Urban Environment. Spanish Government, Ministry of Environment, 2006

From the above discussion, it can state that, urban sustainability encompasses economic prosperity, environmental quality and an equitable society of a metropolitan area. It is the economic, social and cultural progress without breaching environmental threshold and maintaining intra-generational equity. The three aspects of sustainable design; environment, society and economy are interrelated and interdependent.

## 2. APPLICABLE PLANNING TOOLS TO FACILITATE URBAN SUSTAINABILITY

Now a day's planners are using various types of planning tools and among them some are policy oriented tools such as; promotion of urban agriculture, transit oriented development etc and some are policy implementation tools such as; zoning, subdivision, tax policies, budget control land acquisition etc. Among the policy tools some are focused on economic sustainability such as; Promotion of urban agriculture, some are more focused on environmental sustainability such as; Develop greenways and greenbelts, integrated natural resource planning and some are more focused on social sustainability such as; Provide adequate, accessible and well connected public open space. Though each policy tool is more focused on a specific dimension of urban sustainability it has also effect on other sustainability dimension such as promotion of

<sup>1</sup> Spanish Strategy on Urban Environment, Spanish Government, Ministry of Environment, 2006

urban agriculture is more focused on economic sustainability but it also improves the environmental quality of an specific urban setting providing more greeneries.

This study has explored some policy oriented planning tools and some policy implementation planning tools to facilitate urban sustainability those are listed below (table 01).

TABLE 1 - PLANNING TOOLS THAT CAN BE USED TO FACILITATE URBAN SUSTAINABILITY

Policy related Planning tools	Policy execution planning tools
<b>Environmental sustainability tools</b>	
1. Provide more greenways and greenbelts	Creating zoning (green buffer zones), protected area planning, and Public capital investment
2. Build with green materials	Imposing sustainable building code, Regulation through By-laws, green building rating system
3. Promotion of more water impoundment areas	Public capital investment, zoning, Regulation through By-laws, Protection plan
4. Transit oriented development (TOD)	Zoning, Regulation through By-laws, land use planning
5. Providing High Occupancy Vehicle (HOV) lanes	Regulation through By- Transportation laws, Transportation planning
6. Discouraging highway along the waterfront	Regulation through By- Transportation laws
<b>Economic sustainability tools</b>	
7. Promotion of Urban Agriculture	Favorable Zoning, Regulation through By-laws, Regional Involvement
8. Promotion of community gardening	Favorable Zoning, Regulation through By-laws, Regional Involvement
<b>Social sustainability tools</b>	
9. Provide more open spaces and community areas	Public capital investment, Landscape planning, Zoning
10. Control of development density, building volume and building type	Subdivision control, Impose design standards, charges to developers, Floor Area Ratio (FAR)
11. Provide pedestrian priority connections and walkable neighborhood	Regulation through By- Transportation laws, Landscape planning, Subdivision control, Detail area planning
12. Develop defined residential clusters and carefully define land territoriality - public to private areas.	Zoning, Land use planning
13. Public involvement in the planning process	Public consultation, workshop, seminar

## 2.1. Environmental sustainability related planning tools

### 1. Provide more greenways and greenbelts

To maintain a pleasant and green environment for the citizens living in the urban area it is excellent to have either a set of connected parks, country parks and public spaces in the urban city. Greeneries are critical for human comfort and balancing the carbon to oxygen cycle and absorb toxins from the air, create oxygen, shade and cool the environment through evaporative transpiration and add to the ambient humidity of indoor and outdoor spaces and thus enhance recreation, livability and sustainability. Apart from the fact, greenways can act as the 'green lung' of the area, it can also enhance social interactions between citizens, especially the elderly people as they can gather, walk and take a rest in the greenway.

Urban planners can promote greenways and green belts by applying some planning tools such as; creating zoning (green buffer zones), protected area planning, and public capital investment. Urban planners can protect the existing green belts by preparing protected area plan for greeneries or making greeneries protection law. Pubic capital can be used to improve the existing ways towards greenways.

In Albania and Montenegro there is a protected area plan (both for existing and proposed) on the the Green Belt between Albania and Montenegro Skutari, Bojana and Buna region to protect all the existing parks and other important green places. In this protection plan they have also proposed some spots for future green belt.

### **2. Build with green materials**

Green, non toxic, materials are environment friendly and enhance indoor as well as outdoor air quality. Every building in an urban area should build with green materials. Green materials are usually produced from sustainable resources and improve performance of energy savings. It also reduces CO2 emissions and eventually leads environmental sustainability.

Urban planner can keep positive role to build infrastructures with green materials in the urban area by imposing some planning tools such as; sustainable building code, Regulation through By-laws

United States developed, green building rating system, LEED, which is now recognized internationally. The system provides third-party verification that a building was designed and built using strategies intended to improve performance of energy savings, water efficiency, CO2 emissions reduction, and so on.

### **3. Promotion of more water impoundment areas**

Adequate water impoundment areas reduce downstream flooding, and increase water quality and bio-diversity. This can enhance the unique qualities of each site and provide for recreation and education and thus it helps to achieve environmental sustainability.



FIGURE 3 - WATER IMPOUNDMENT AREAS ENHANCE HUMAN & NATURAL HABITAT (BIODIVERSITY)  
 Source: Sustainable urban design paradigm, Kazimee (2002)

Some planning tools such as public capital investment, zoning, regulation through By-laws can keep positive role to promote more water impoundment areas. By setting specific planning laws or preparing water impoundments protection laws existing impoundment areas can protect and future impoundment areas can also be proposed.

#### **4. Transit oriented development (TOD)**

Transit-oriented Development (TOD) and Cluster Development are land use tools that potentially direct development in a systematic, sustainable manner by providing alternatives to traditional development patterns. Transit-oriented developments are designed to maximize access to public transport in a residential, commercial or mixed-use area. Ultimately, they discourage an individual's auto-dependency and promote transit ridership, thereby alleviating traffic congestion, improving air quality, and limiting carbon emissions (Australia, 2005). However, TOD keep positive role towards environmental, economic as well as social sustainability as It increase transit ridership, spur economic development, increase housing choice, reduce traffic congestion, create diverse community, improve neighborhood quality, increase political support for transit.

Urban planners can promote transit oriented development by using various policy implementation tools such as; Zoning, Regulation through By-laws, land use planning.

One successful example of Transit-oriented development is "Metropolitan Place" in Renton, Washington (Smutny, 2002). It is one of King County's first transit-oriented developments and was completed in September, 2001. Metropolitan Place is a mixed-use development (apartment/retail) located across from a park-and-ride transit center. It includes 90 apartment units, 4,000 square feet of retail (ground level), and 240 parking spaces in the underground parking garage and 150 parking spaces for park-and-ride. Residents in this community are provided one free bus pass per unit to encourage higher use of public transit. King County leases stalls in the parking garage for park-and-ride use, and these stalls are shared during non-commute hours. Finally, Metropolitan Place provides affordable housing units that attract a mix of income levels (Australia, 2005).

#### **5. Providing High Occupancy Vehicle (HOV) lanes**

In order to encourage public transport and reduce total emission of gases on the roads more exclusive lanes and roads and of High Occupancy Vehicle (HOV) Lanes should be designed for public transport, such as bus-only lanes. Allocating more extensive and sophisticated bus-lane system can effectively enhance efficiency of public vehicles, prevent social inconvenience and induced anxiety of citizens, encourage public transport, save fossil fuels and improve air conditions.

By transportation planning and transportation policy formulation planning can provide HOV. Some regulation may accelerate this policy tool in urban area.

Many cities, including Hong Kong, have already implemented the bus-only lane system in highways at peak hours. As more bus-only lanes can provide exclusive use for public transport and reduce the chances of being stuck in congestions, The HOV lane policy have been adopted in various countries, like the United States, Spain, Australia, New Zealand and the United Kingdom.

### **6. Discouraging highway along the waterfront**

Waterfront areas are good place for the nurture of cultural inspiration and enhancement of cultural exchanges among different artists, street performers and various people from the cultural circles. By prohibiting the design of coastal roadways, the waterfront/riverside can be used for alternative purposes which can enable the public to access and enjoy the waterside without the need of owning and driving a vehicle along the waterfront highway. The suggested tool thus helps in achieving environmental as well as social sustainability as it improves water quality as soluble particulates generated by vehicles running on waterfront highways are eliminated from dissolving into the sea water.

Planning can prevent the design of waterfront highway by imposing planning guidelines and setting transportation regulations and applying the tool of subdivision control.

### **2.2. Economic sustainability related planning tools**

#### **1. Promotion of Urban Agriculture (UA)**

Sustainable economy can be achieved by the promotion of Urban Agriculture (UA) in the urban area. UA is an activity that produces processes, and markets food and other products, on land and water in urban and peri-urban areas, applying intensive production methods, and (re) using natural resources and urban wastes, to yield a diversity of crops and livestock" UNDP (1996). Fao-Coag (1999) states that: "Urban and Peri-Urban Agriculture are agriculture practices within and around cities which compete for resources (land, water, energy, labour) that could also serve other purposes to satisfy the requirements of the urban population. Important sectors of Urban Agriculture include horticulture, livestock, fodder and milk production, aquaculture, and forestry." A more integrated definition is given by Mougeot (1999): "Urban Agriculture is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, an urban centre, a city or metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, reusing mainly human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area". Urban agriculture takes into account the various activities of households to achieve food security, and to create income. Urban food

production is more than food related. Community-based and individual food production in cities meets further needs of the urban population like sustainable urban development and environmental protection (Fao-Coag, 1999; IFPRI, 1998; Tuan, 1994). However, Urban Agriculture refers not only to food crops and fruit trees grown in cities but encompasses different kind of livestock as well as medicinal plants and ornamentals for other purposes.

Planning tools that can be used to promote UA are; Favourable zoning, Regulation through by laws, etc. UA could be permitted under traditional zone classifications (for example, added as a permitted activity in open or green spaces) (Guberman, 1995; Greenhow, 1994) or permitted under new zone categories explicitly dedicated to agricultural use (de Zeeuw et al 1998; Ellis and Sumberg, 1998; Sawio, 1998; Guberman, 1995; Greenhow, 1994; Khosla, 1993). Mixed-use zoning or the permitting of commonly separated land uses within the same zone may prove another means of including UA in residential, institutional and commercial zones (Sawio, 1998).

In Chicago, Illions, UA stems from not only the need for food security for the city's poor, but also from the desire to mitigate the effects of climate change. Presently, like Chicago several cities<sup>2</sup> are practicing UA.

### **2.3. Social sustainability related planning tools**

#### **1. Provide adequate open spaces and community areas**

Public open space and community areas should be adequately provided because of the ever growing population and ever worsening environmental problems in many cities and regions. But land resource is too scarce for public open space, especially in high density area like CBD. To solve this problem, many cities and regions adopt the tools that new developments are able to gain certain times of floor area as a bonus for the provision of public open space. This kind of tools helps to increase the area of public open space in high density district. Hence the heat island effect can be reduced, and more social interaction in public open space can be encouraged. In Australia, under the national guideline for urban design, many cities have their own strategies for providing assorted public open space.

Planners can promote this policy tool by imposing some policy implementation planning tools such as; Public capital investment, Landscape planning, Zoning etc

Not all the public open space is really public because the access for people to visually see it and physically get there is blocked. In some cities or region, the waterfront is privatized by expensive residential

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<sup>2</sup> Nairobi, Kenya, Durban, South Africa, Greater Accra, Ghana, Kumasi, Ghana, Kampala, Uganda, Harare, Zimbabwe, Dar es Salaam, Tanzania, Bangkok, Thailand, Singapore, Quezon City, Philippines, Mexico City, Toronto, Canada



development. This derives the public's right to enjoy the waterfront and becomes a negative force for sustainable urban design as it breaks the natural continuous corridor of coastline. In san Francisco Bay Area, where the coastline is a symbol of its character, have a policy to establish a continuous shoreline band of about 100 feet wide to make sure the waterfront is truly accessible by common people.

## **2. Control of development density, building volume and building type**

Control of development density, building volume and building type is essential for the efficient use of urban infrastructure. Low density and inappropriate building volume lead urban sprawl. Certain degree of high density development and mixed land use leads sustainable urban form that economically and socially enhance vibrancy at the area due to a diversity of commercial and leisure activities as well as a diversity of different population group.

A very basic control tool of building volume is by FAR (Floor Area Ratio) that specifies buildable floor area in relation to the size of a lot. Addition to FAR control, normally local building codes or zoning plan further specify individual building volume for the sake of community health and safety.

## **3. Provide pedestrian priority connections and walkable neighborhood**

It is important to provide pedestrian priority connections between residential developments and neighborhood amenities and services. Bike and walkways are critical to enhancing a more personal/pedestrian sense of community. The concept of walkable neighborhood rejects 'urban sprawl' and 'functional zoning', and seeks alternative urban form and land use pattern, namely, 'compact city' and 'mixed land use'. The concept of walkable neighborhood achieves proximity of living and working, which replaces preceding life style of commuting from suburbs to urban area by individuals' automobile.

A neighborhood should be designed in the way that residents are able to access to local shopping area, leisure facilities, local schools, and so forth by walking or cycling. Residents are also able to access to the transit hub easily for the sake of cross-town traveling. The walkable neighborhood as well as its consequent compact urban form contributes to environmental sustainability by promoting efficient use of infrastructure, reduction of energy consumption from daily traveling, and encouragement of use of public transportation. The concept, in views of economical and social sustainability, also promotes vibrant commercial activities and livable street life around the neighborhood.

To promote Walkable neighborhood and to creating livable and well-functioning walkable neighborhood another two planning tools need to emphasize which are; Introduction of pedestrian-only streets and Introduction of street trees, street furniture, and public art



#### 4. Develop defined residential clusters and carefully define land territoriality - public to private areas.

Well developed residential clusters have the opportunity to share social amenities and open spaces. Orienting dwelling units to the South can enhance comfort and save energy.



FIGURE.4 - FRIENDLY & SAFER HOUSING WITH PERSONALIZED PUBLIC & PRIVATE AREAS



FIGURE 5- CLUSTERED HOUSING ENHANCES NEIGHBORLY INTERACTION

Source: Sustainable urban design paradigm, Kazimee (2002)

Planners can use some planning implementation tools such as Zoning, Land use planning etc to achieve this policy tool.

#### 5 Public involvement in the planning process

Planning never happens without people who are going to have to live with the results day to day being involved' (Walljasper, 1997) and public participation in planning process leads sustainable planning process. It accelerates the efficiency of sustainable urban planning and promotes a sustainable new way of living in community. Planners can promote it through applying various tools such as Public consultation, workshop and seminar.

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