

Interrelationship between Various Contemporary Theories for Sustainable Model of Urban Design and Development

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Abstract—There are thousands of notable definitions for urban design, but the scope and objective of urban design is changing with the time as from- “city beautification to making connections between people and places as well as economy generation (Job opportunities)”.

Currently we are failing to fulfil the above said objective of urban design because of the lacuna in the present model of practice as in the current model designer designed the spaces without much involvement of end users demands as the changed demands from the same spaces needs a lot of exercise and involvement of the end user at various stages of development which is completely missing in the current model of practice.

To fulfil the above objectives and to create a sustainable model we need to understand the concept of sustainable development and various contemporary theories related to urban design and development which supports the current contemporary demand and needs of the people. The paper looks at various contemporary theories like concept of universal design, smart design and applications, lean construction and mixed use development. And their interrelation for sustainable development

Keywords: universal design, lean construction, mixed use, contemporary

1. INTRODUCTION

Urban design and development is the art of making places in urban areas which involves designing group of buildings and the space and landscape between them and further creation of other infrastructural and basic services needed for an urban area. (Urban Design Group, 2011). [13]

With the current worlds trend to become urban, as urban area (towns, cities) comprises a lots of opportunities to live a comfortable life. All population growth over the next three to fourth decades expected to live in cities, it is certain that key pressure on government is to develop urban area with lots of issues like energy, economy and ecological balance etc. [9] which requires a sustainable model for urban design and

development. And to satisfy sustainable development and its parameters, we need to understand various contemporary theories (belonging to present condition)/practices (**concept of universal design and their principles, smart design and applications, lean construction and mixed use development**) which are working on different sectors for betterment of human life on this planet.

The paper explores the concept of sustainable development and identifies the factor coming out from various theories and their role in the formation of a sustainable model for urban design and development. The scope of this paper is about exploring the interrelation between different contemporary theories and their dependency on sustainable model for urban design and development.

2. CONCEPT OF SUSTAINABLE MODEL

The development that fulfill the needs of the present without affecting the ability of next generation to fulfill their demand.[9]With the population and natural resources as a limited factor for the development, we need to look forward towards technological or theories for the development to really justify the definition of sustainable development [11]

According to various studies it has been found that there are three basic parameters of sustainable development and we the people are the end user of all the things happening in the world directly or indirectly.

- **Environmental needs** –climate change and its mitigation; well use of natural resources
- **Social needs** – including quality of life and accessibility for all in the current world
- **Economic needs** – including value creation, feasible with the people, job opportunities



Source-<http://macaulay.cuny.edu/>

Fig. 1: Parameters for sustainable development

The concept of sustainability has become integrated with various development approaches like sustainable architecture, urban design, sustainable transport etc. Today the key task of the urban designer is to give a sustainable places to satisfy the environmental (clean air, water beautiful places to live, work and play), social (good schools, sports facilities, community spaces) and economic needs (jobs, economy generation) of the society.

3. UNIVERSAL DESIGN

Universal design is the design of all products and environments to be usable by people of all ages and abilities, to the greatest extent possible.

Universal design approach gives us a thought of thinking a design solution to address social differences. According to universal design the building and products must be designed to be usable by all intended users without any difficulty. As a design approach universal design requires incorporating flexibility, adaptability and modularity to achieve best fit for all types of user [1-3,5]



Source-http://www.svayam.com/Images/small_bg.gif

Fig. 2: Showing users of with different abilities and infrastructure

3.1 Principles of Universal Design

a. Equitable use

The design is useful to people with diverse capabilities

b. Flexibility in use

Wide range of individual preferences and abilities

c. Simple and intuitive use

Use of design is easy to understand, regardless of the user's experience, knowledge, language skills or concentration level

d. Perceptible information

The design communicates necessary information effectively to the users, regardless of ambient condition or the user's sensory abilities.

e. Tolerance for error

The design minimizes hazards and the adverse consequences of accidental or unintended actions

f. Low physical effort

The design can be used efficiently and comfortably and with a minimum of fatigue

g. Appropriate size and space for approach and use

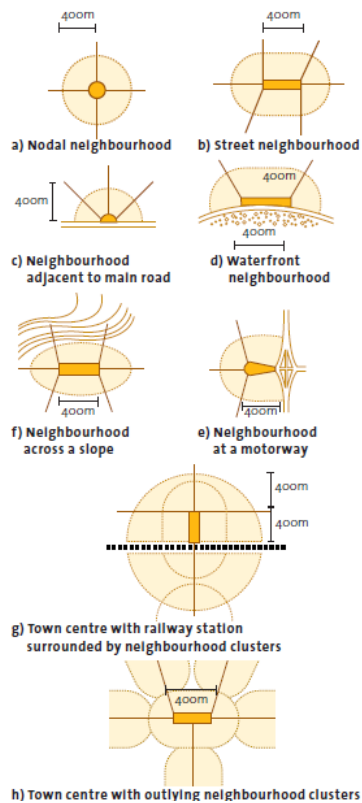
Appropriate size and space is provided for approach, and use regardless of user's body size, posture or mobility. [1-2,5]

universal design is not just to resolve a disability issue or a barrier free design approach for disabled but one that affects all of us one day and we also reacquire a caring community and good design solution for everyday life.

4. MIXED USE

Traditionally, towns have developed around crossroads, or around a commercial activity. Activity Centre becomes a focal point for the development which consists of commercial spaces as well as basic services like educational institutions and hospitals etc. which fulfils people's basic needs for a life but with current growth of a city due to increasing population, the distances between places becomes so much. Which does not support feasible settlement that's why there is need to decentralise our old planning approach and we have to create multiple activity centres which fulfils the needs of the urban peoples. [13]

Peoples are the users of the urban area and to live a comfortable life in an urban area they require a wide range of basic services and facilities other than residential unit which includes commercial, educational, health, spiritual, public parks and civic areas. These need to be properly planned and connected to residential area, neighbourhood or to a community by safe and comfortable routes to make a good functioning of urban area. Over the above mixed use of commercial development within proximity provides comfort to nearby peoples or neighbourhood units for their daily need simultaneously provides opportunities for employment with a small area. [13]



Source- urban design compendium
Fig. 3: Showing neighbourhood patterns

4.1 The Benefits of Mixes Development

There are so many benefits of mixed use development some of them are as follows at urban design level:

- More convenient access to facilities
- Travel to work congestion is minimised
- Greater opportunities for social interaction
- Visual stimulation and delight of different building within close proximity
- A greater feeling of safety and security
- Greater energy efficiency and more efficient use of space and buildings
- More consumers' choice of lifestyle, location and building type
- Urban vitality and street life
- Increased viability of urban facilities and support for small business

5. SMART DESIGN AND APPLICATION

With ever increasing population and limited resources smart technology is only the way to full the urban demand. Smart design and smart application are two approaches for sustainable development. Smart design is the term coined from smart cities initiative. For any particular project Smart design uses information and communication technology (ICT). That

consists of three main functions that are collecting, communicating and crunching. [4]



5.1 Functions of smart design

5.1.1 Collect

Collects Information about current conditions across all responsibility areas (power, water, traffic, weather, buildings, infrastructure etc.) through sensors and other electronic devices.

5.1.2 Communicate

Communicates that collected data through wired or wireless networks sometimes to other devices, sometimes to a control center and sometimes to servers running powerful software.

5.1.3 Crunch

Data, analysing it to present information, to perfect (optimize) operations and to predict what might happen next.

By the intervention of information and communication technology it becomes very easy to collect data from different sources at one source or can share with other as well as take the views of end users for the same at just one single click on the computers or on mobile. This saves time and physical efforts which add economic benefit to the system. We all know with networking technology now days people are hyper connected with each other. Because of Information and communication technology end users and policy makers are able to use a common platform for discussion and talk. It reduces a lot of time and digital data is easily accessible for all of us to share our opinion on the same work. Things are becoming transparent for end user which leads toward development as everyone has opportunity to take part in the process of development

5.2 Opportunities under the smart design

Policy Goals

- Environmental Quality
- Quality of Life
- Mobility
- Health
- Jobs/Growth
- Energy conservation
- Use of non-renewable sources of energy

(ICT) capabilities drive solutions

- Traffic management
- Grid management
- Building management
- Water and Waste management
- Health and public services
- Public safety
- Payments (Smart 2020 for cities
The climate group)

5.3 Smart application

Smart applications in terms of urban design and development are the new innovation in the field of technology that gives a direct benefit from an individual to a mass for a comfortable and easy life some of the example of smart application at urban level are smart transport system like metro rail (MRTS-mass rapid transit system) and BRTS-bus rapid transit system. Solar energy and its other applications like solar street lights for road streets safety which self-renewable etc.

6. Lean Construction

Various studies and site documentation says that Construction industries have a very high level of wastes and non-value added activities at different stages of construction process and represents a relatively large percentage of percentage of production cost. That significant amount of waste in construction industry affects overall performance and productivity and that why we have to take certain measures to rectify such a situation. One of the solutions for the above problem is “lean construction”. [6-8]

Lean production also called Toyota production system the concept first used by Toyota motors in 1959s for the Toyota motor company with two basic concepts: (1) just in time and (2) automation. The term “lean” was first coined by research team working on auto production to reflect both the waste reduction nature of the Toyota production system and mass production. The basic concept comes out from the lean production was “cut down the waste” which is further adopted by different sector like construction sector and here it is termed as lean construction. Lean construction is excellent system for construction management process for achieving the projects by eliminating waste from different construction processes. [10]

Waste has been defined by as “anything different from absolute minimum amount of resources of materials, equipment and manpower, necessary to add value to the product” some common wastes on the site are as under shown in the Fig.



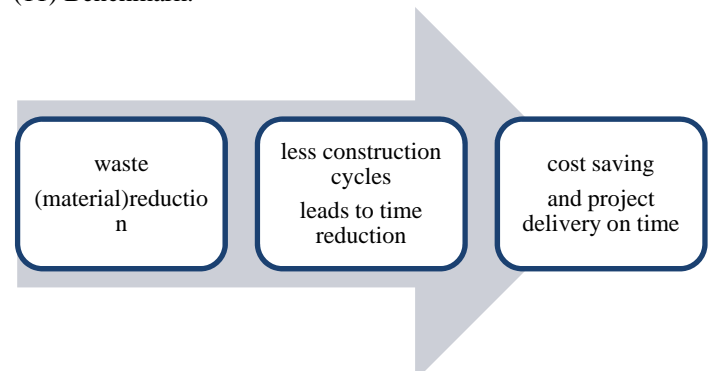
Source-lean4glances.com

Fig. 4: types of waste in construction

6.1 Lean thinking principles

Koskela[6] has summarized lean thinking into eleven principles which are as under:-

- (1) Reduce the share of non-value adding activities (waste)
- (2) Increase output value through systematic consideration of customer requirements
- (3) Reduce variability;
- (4) Reduce cycle times
- (5) Simplify by minimizing the number of steps, parts and linkages
- (6) Increase output flexibility;
- (7) Increase process transparency
- (8) Focus control on the complete process
- (9) Build continuous improvement into the process
- (10) Balance flow improvement with conversion improvement
- (11) Benchmark.



The lean construction techniques and principles helps at every stage of the construction project from planning of the project to the execution stage for minimising waste of materials, time and efforts which leads to cut down the project cost. As well as reduction in material leads toward saving the natural resources.

6. INTERRELATIONSHIP BETWEEN CONTEMPORARY THEORIES AND SUSTAINABLE MODEL FOR URBAN DESIGN AND DEVELOPMENT:

Table no-3: shows the interrelation of various factor of contemporary theories with the parameters of sustainable model, source- author, from above discussion

| Factors for sustainable development Factors/opportunities of contemporary theories | Social | Economic | Environmental |
|---|---|--|---|
| Universal design | Equitable use Flexibility in use Simple and intuitive use Perceptible information Tolerance for error Low physical effort Appropriate size and space for approach and use | | |
| Smart design and application | Building management Water and Waste management Health and public services Public safety | Traffic management Grid management Building management Payments Jobs in the sector Energy conservation Use of non-renewable sources of energy | Traffic management Grid management Building management Water and Waste management Energy conservation Use of non-renewable sources of energy |
| Mixed use development | Commercial centre educational centre, health, spiritual, public parks and civic areas | Commercial centre | public parks and landscape |
| Lean construction | Increase output value through systematic consideration of customer requirements Increase process transparency | Waste reduction Reduce cycle times Simplify by minimizing the number of steps, parts and linkages Increase output flexibility; Increase process transparency | Waste reduction |

The above table shows the how the factors/opportunities of contemporary theories satisfying the parameters affecting the sustainable model for urban design and development. it reflects the interdependency of various theories to achieve sustainable model.

7. CONCLUSION

Based on the above discussion, it is clear that a sustainable model for urban development is only possible by satisfying social, economic and environmental needs, which is not possible by just following a single concept it may be design or other, it requires a multi-dimensional and holistic approach to justify the development for satisfy all types of demand. Some other conclusions are as under for sustainable model for urban design and development.

- Intervention of different systems at different levels
- Involvement of peoples at various stages of development
- Update the needs and demands in the contemporary world

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