The Potential and Relevance of Indigenous Knowledge System of City Planning Principles in Shaping Contemporary Urban Milieu

Ar. Shanu Raina[1], Ar. Bhagyalaxmi S Madapur[2]

[1]Assistant Professor, B M S College of Architecture, Bull Temple Road, Karnataka, India
[2]Associate Professor, B M S College of Architecture, Bull Temple Road, Bangalore, Karnataka, India

---***--

Abstract :*"A city should be built to give its inhabitants security and happiness." – Aristotle The core objective of city planning is to elevate the 'quality of life' by making it 'widely inclusive' (spatially as well as socially) with the sustaining knowledge about the critical systems of the city. Numerous evidences of historic settlements of different countries across the world are testimonials to systematic approaches that were developed encompassing diverse domains (political, geographical, ecological, cultural and socio-economic) of settlements.*

Most of the early approaches of city planning in India have resulted in the crystallization of intellectual and structured body of indigenous knowledge. Indian cities, with the onset of sweeping changes in all the realms have witnessed several adoptions and modifications in their city planning principles.

In this context, quoting Basavanagudi, a historic planned precinct in the city of Bangalore, this paper attempts to contemplate upon the adoptability nature of the early city planning principles to comprehend the challenges and problems of the contemporary urban areas.

Key Words: Indigenous knowledge, City planning principles, Urban milieu, Historic settlements Socio-cultural domain, Political realm

1. INTRODUCTION

Cities being socio-economic systems reflect the most innovative and complex creations of human civilization are dominating the global canvas. Such phenomenal development and progression needs to be channelized through comprehensive planning for optimizing the allocation of its resources to the entire cross-section of the urban society. Thus the core objective of city planning is to elevate the 'quality of life' by making it 'widely inclusive (spatially as well as socially) with the sustaining knowledge about the critical systems of the city. Numerous evidences of historic settlements of different countries across the world are testimonials to systematic approaches that were developed encompassing diverse domains (political, geographical, ecological, cultural and socio-economic) of settlements.

India's strong historical past of more than 2000 years, in the form of civilizations and associated systems, of which town planning was a characteristic feature has been well researched by historians. Planning for cities in India dates back to the Vedic times with most of the cities like Patliputra, Varanasi, Nalanda etc. were built on the basis of well-conceived plans (Nallathiga, 2009). Most of the early approaches of city planning in India have resulted in the crystallization of intellectual and structured body of indigenous knowledge.

Architects and Engineers from Ancient India have derived principles of architecture and construction based on experience, observation of natural phenomena and considering social and cultural aspect of the society. These principles are aimed at developing built environment which is compatible for the inhabitants and extracting maximum benefits from nature (Chauhan, 2016).

The indigenous planning models were designed keeping in mind the overall sustainability (physical, social, economic and environment) and have stood against the test of time. It is these indigenous principles which can be used even today for better planning.

2. CIVILIZATION IN INDIAN SUBCONTINENT – INDUS VALLEY CIVILIZATION

The prehistoric period of India varies from Indus valley civilization to Vedic period. Cities like Harappa and Mohenjo-Daro are examples of the well-planned settlements during Indus valley civilization in 2500BC (Refer Fig. 1). It is very clear from the historic evidences that the people then had knowledge of cardinal directions. They also had knowledge of geometry, which is reflected in grid iron street pattern of Mohenjo-Daro(Refer Fig. 2). The key characteristics of Indus valley civilization town are listed below (Refer Table 1).

Fig -1: Location of Cities in Indus Valley

Table -1: Key Characteristics of Indus valley civilization town

Key Characteristics	Indus Valley civilization
Area of city	Approximately 1km in size
Population	23000-40000 people
Density	90- 160 people per Acre
Example of cities	Mohenjo-Daro & Harappa
Orientation	North south orientation
Focal Point	Market place
Street Pattern	9M wide streets divided city in 12 blocks - each of 365mx244m. Grid Iron street pattern.
Number of floors	Two storey houses
Boundary	Fortified wall
Drainage	Each house connected to proper drainage system
Public Amenities	Great Bath and vast Granaries

Fig -2: Plan of houses and streets at Mohenjo- Daro

2.1 Indigenous Planning of Vedic India

Indian culture and civilization has survived thousands of years because it is based on the strong foundation of the wisdom known as "Vedas". Man can improve his conditions by properly designing and understanding the location, direction and disposition of a building that have a direct bearing on the human being. (Patra, 2010).

The ancient architects used the science of Vastu Shastra for planning and architecture. The ancient city planning Kautilya's Arth Shastra and Manasara Silpa Sastra, give insight into scientific ways of city planning in ancient India. Madhurai, Kanchipuram and Srirangam demonstrate the scientific planning approach. These cities were built with concentric square streets all around and the temple was the focal point of these settlements (Refer Fig. 3). Different towns and different features in Vedic civilizations are shown in Table 2.
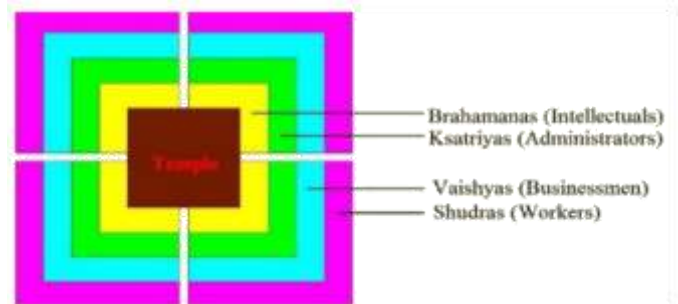

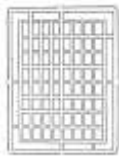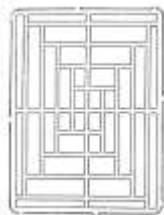**Fig -3**: Segregation on planning zones based on caste system

Table -2: Different towns and different features in vedic civilizations

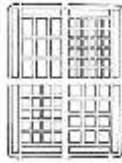| S.No	Different Towns	Function of Towns
1	Nagara	District Head quarters
2	Rajdhani	Capital
3	Pathare	Commercial town
4	Druga/Durg	Fortified/small industrial town
5	Kheta	Town grown by local industries
6	Kharveta	Big industry town
7	Sivira	Military encampment
8	Senamukha	Military township at suburbs
9	Skandavara	Military town with royal quarters
10	Sthaneya	Fortified town
11	Dronamukha	Commercial/market town
12	Kotamakoraka	Hill/forest site settlement

2.1.1 Manasare Shipa shastra

Manasare Shipa shastra in its seventy-five chapters gives the details of the indigenous planning knowledge for architecture of buildings, rituals connected with the commissioning of the finished structures, towers, pillars, idols of gods etc. Various chapters describe in details like planning of settlements according to their suitability for the placement of palaces, houses, temples roads etc. Eleventh chapter deals with foundation of cities, towns and fortresses. The details of different types of settlements were planned keeping in mind temple, schools, public halls and houses for different strata of castes of people. According to Manasara different types of towns are Chanturmukha, Dandaka, karmuka, Nandyavarta, Padmaka, Prastara, sarvathobhadra and Swastika(Refer Table 3). All the types of town plans had different numbers of entrances and road networks.

Table -3: Different settlement patterns

S.No	Types of Town Plan with typical plans	Planning of the Towns
1	Dandaka	• Rectangular or square in shape. • Streets bisect each other at right angles. • Generally used for small town and villages. • Two entrance gates. • Offices and panchayats located in the East direction. • This pattern of town considered auspicious for Brahmins and hence may contain 12, 24, 50, 108 or 300 families.
2	Sarvathobhadra	• The meaning translates to "blissful for all". • Dominant feature of the village is Temple (placed in centre). • All the houses to be fully occupied by people of various castes. • Jaipur is laid in Sarvathobhadra pattern.
3	Nandyavarta	• Name derived from the name of a flower. • Meant for planning and construction of towns. • Accommodates minimum of 1000 houses and maximum of 4000 houses. • Circular/oblong or square shape site. • Temple in the centre of town. • Srirangam and Madhurai are laid
		in Nandyavartha Pattern. • Streets are as wide as 3, 4 or 5 D-andas.
4	Padmaka	• Pattern is similar to lotus flower. • Towns had fortified wall all around. • City was surrounding by water. • No scope for future expansion.
5	Swastika	• Site may be of any shape. • Triangular plots. • Eight gates. • Temple at centre • Diagonal streets. • Town surrounded by water body, foot filled with water. • Streets bisect each other at centre (south to north and west to east).
6	Prastara	• Site had to be rectangular or square and not circular or triangular. • Sites divided according to the economic status of the people. • Wider roads.
7	Karmuka	• Applied to the towns on the sea shore or river banks. • Bow, semi-circular or parabolic site shape. • Temple may or may not be at centre. • Road runs at right angles.
8	Chaturmukha	• Used for small towns as well as large towns. • Site had four sides (rectangular or square). • Town east to west lengthwise. • Four main streets • Temple at the centre of town

2.1.2 Kautiliya's Arthasasthra

Kangle mentions in his findings (Kangle, 1965) the Arthasasthra laid down the scientific and systematic approach towards the city planning. The Bye laws/Development control regulations mentioned in Arthasasthra are still relevant today. The zoning as per temple area, commercial spaces or garden/green areas were adopted while planning. The main idea of these bye laws revolved around light, ventilation, privacy, walkability, ratio of built to open, aesthetics etc. (Refer Table 4).

Table -4: Conceptual key characteristics of a settlement as described in Arthasasthra

S.No	Key Characteristics of settlements	Detail description of the key features
1	Road Width	24 feet (4 Dandas) wide roads with trees for shade and aesthetic.
2	Plot sizes	Based on particular caste. Lower income groups had smaller plots and low height houses and higher income groups had larger plot sizes and multistoried houses. No deviation from aforementioned sizes was allowed.
3	Entrance to Building	Buildings faced royal roads.
4	Ground Coverage	Not exceeding 50% of the site. Front yard opens as wide as one third of the plot size.
5	Plinth	High plinth. Raised seating on each side of the door.
6	footpath	Footpath was risen on the sides of the streets
7	Service roads	At the rear side of the houses service lane was to be provided.
8	Drainage system	Each house was connected with drainage system.
9	Water System	Water storage reservoirs to be built using natural source of water or water brought from elsewhere
10	Public Amenities	Shades, courtyards, fire places, open spaces, latrines to be used by all as common properties.

2.1.3 Vaastu Shastra

Vaastu is the ancient Indian science of placement and design of building. The Architect was known as Sthapati, Draughtsman was known as Sutragrahi, Carpanter as Takshaka and Mason as Vardhak, together these four were considered as the four faces of Brahma (the god of Creator). The Vaastu literally translates to "wisdom of dwelling place". It gives the principles of selection of site, construction, layout and design of interior spaces of temple, houses and town as well. During the Vedic period Sthapatya Veda (Atharava Veda) prescribed the layout of city, Smrithi shastra the street

planning at macro and micro level and Vaastu sastra provided the knowledge of house planning.
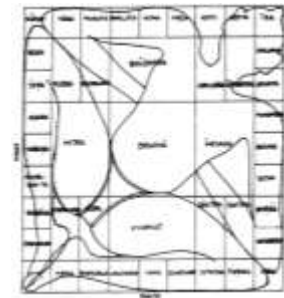

Fig 4: Vaastu Purusha, Mandala of 91 squares

The Above diagram (Fig 4) is divided into grid of 9X9 = 81Parts. Forty-five gods on the external and 12 in the internal enclosure hold down the vaastu purusha. These symbolic gods have certain essential qualities and govern various aspect of life (Refer Fig 5)
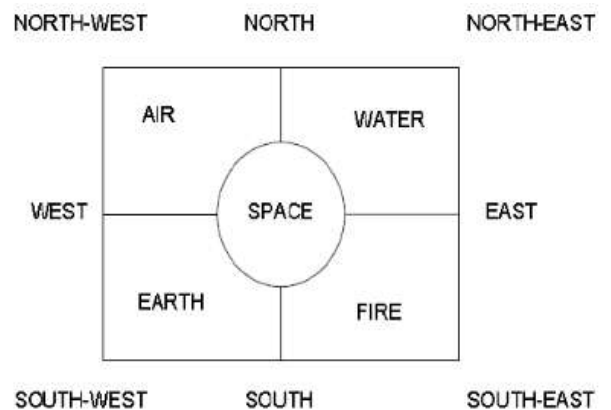

Fig -5: Arrangement of Panch Mahabhoot With respect to cardinal directions

Fig -6: Plan of old city of Jaipur, based on Vaastu

Entire universe including our body is composed of five basic elements- Air, Earth, Fire, Space and Water called "Panch Mahabhoot". The main principle of Vastu is to maintain the balance between dwelling/structure and the elements of universe for happiness and comfort. Vastu is the science of direction that combines all the five elements of nature and balances them with the man and the material (P. Ranjeet, 2016). These principles are based on movement of celestial elements like planets, Sun, Moon and their effects on environment, velocity and direction of wind rainfall volume and intensity and characteristic of soil. These principles are also derived on the basis of special characteristics and influences of elements of universe such as the magnetic field, gravitational effect of Earth and Galaxies in sky, light and heat of Sun including the effects of its ultra-violet and infra-red rays, etc. (Hitoshma Singh, 2011). City of Jaipur was built as per the planning principles of Vedic city planning (Refer Fig. 6)

2.3 City planning concepts of Mughals

The Mughal Period, starting from 16th century and lasting over 300 years, brought a comparatively settled period when city planning covered not only capitals but also defense outposts, trading establishments, ports and military cantonments (Thooyavan, 2005) Ramanathan (Ramanathan, 2011) categorized the towns of this period into four categories (Refer Table 5)

Table -5: Function of various Cities by planned by Mughals

S.No	Function of city	Example of city
1	Administrative	Delhi, Lahore, Fatehpur Sikri
2	religious	Varanasi, Mathura
3	Military/Strategic	Attock, Asirgarh
4	Trade	Patna, Ahmedabad

A separate department existed for the construction and development work during the reign of Akbar and Shahjahan (Rangawala, 2005). From the mid sixteenth through the early eighteenth centuries, the Mughal empire was the predominant political power of South Asia, ruling over a maximal territory of 3.2 million km^2 and a population estimated at between 100 and 150 million (Richards, 1993).

Although the planning and architecture of Mughals was influenced by central Asian traditions, though in India development of new spatial forms and architectural language was innovated which was very specific and unique to India..

Few the examples of the cities built during Mughals in India are Fatehpur Sikri near Agra (Refer Fig. 7), Shahjahanbad etc. the key characterstics of Fatehpur Sikri are listed below(Table 6). Sikri an extionsion of the upper Vindhyan

ranges is sitated on the bank of a natural lake, which has now mostly dried up. It is a pre- historic site and, with adundant water, forest and raw material, it was ideal for primitive man's habitation. Although built in the 16th century, the architectural glory speaks in volumes about the monumentality and the splendid architecture form created by Mughals.

Table -6: Conceptual key characteristics of planning of Fatehpur Sikri

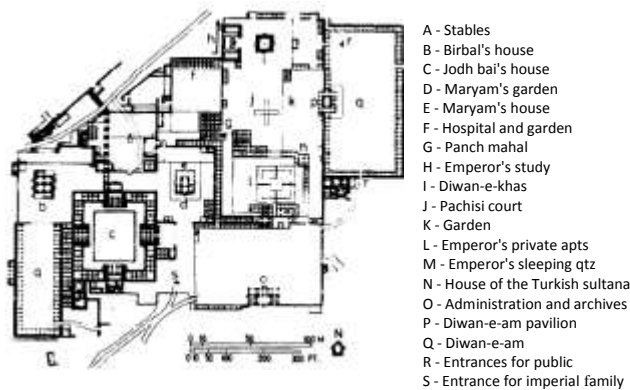| S.No	Key Characteristics of settlements	Detail description of the key features
1	Orientation	• Orientation of the city was NE to SW, majority of the buildings were secular buildings and were oriented N- S. • Located at 41 Km west of Agra

2	Planning	• The city was designed at three levels
		  ✓ First Tier - Mosque
		  ✓ second Tier - Royal Complex
		  ✓ Third Tier – Public Complex
		• The courtyards, verandas, pavilions, colonnades, terraces were provided to enable enough light and ventilation.
		• Segregation of public and private areas
		• It has religious and secular buildings

3	Plot sizes	• Geometric planning. • Quarters on ridge for royal palaces (North - South axis) and mansions for nobles • House made of marble and red sand stone. • Houses of common were mostly two storey high.
4	Drainage system	Perfect drainage system
5	Water System	• Perfect water system. • Collection of rain water and drained into tanks and reservoirs.
6	Public Amenities	• Dewane khaas for public meetings. • Gardens built in Char Bagh style. • Stables for elephants, horses and camels built in proximity to water source

A - Stables
B - Birbal's house
C - Jodh bai's house
D - Maryam's garden
E - Maryam's house
F - Hospital and garden
G - Panch mahal
H - Emperor's study
I - Diwan-e-khas
J - Pachisi court
K - Garden
L - Emperor's private apts
M - Emperor's sleeping qtz
N - House of the Turkish sultana
O - Administration and archives
P - Diwan-e-am pavilion
Q - Diwan-e-am
R - Entrances for public
S - Entrance for imperial family

Fig -7: Plan of Fatehpur Sikri

2.4 City planning concepts of Colonial Period

The Decline of Mughals and colonization of India by Britishers paved the way for modern planning principles that were borrowed from the west. The ports towns were developed for ease of trade and commerce and defense (Refer Table 7). They had laid principles for organization of settlements, lying of infrastructure, legislation for legal validity of planning proposals. The system was mainly designed to serve the economic interests of the Britishers first and the social interests of Indians later. Therefore, it had several undesirable features associated with it. A clear division of areas was visible between Victorian grandiose of the 'rulers' within the city and contrasting poor neighborhoods resided by the 'ruled' i.e. the general public (Dwivedi, 1995). The new way of developing towns was not indigenous to the India and was rather monumental in scale.

Table -7: Classification of Towns and their functions

S.No	Categories	City	Key Characteristics
1	Cantonments	Bangalore, Dehradun, Kausali, Firozpur, Poona, Lucknow,Agra, Kanpore, Ambala	• Located at the strategic places along the major main routes. • These had permanent army camp with small civil population. • Grid iron street pattern. • Disconnected from surroundings. • Low density housing. • Housing provided strictly as per ranking. • Parade grounds and other facilities for army personnel's. • All Cantonments were kept neat and tidy, the roads, were paved in concrete or asphalt and lined with shady trees. • Filtered water system.
			• Underground drainage and sewers.
2	Provincial capitals	Chennai, Mumbai, Kolkata, Allahabad, Nagpur	• These were administrative and commercial centers. • Later developed into Industrial towns. • Distinction between residential areas of native and whites. • Better planning and amenities for whites. • Growth of Slums in cities with industries, as lot of people migrated in search of employment opportunities without proper housing facilities. • Insufficient supply of water. • Poor Drainage system.
3	Hill stations	Shimla, Dalhousie, Nanital, Darjeeling, Kodaikanal	• Hill stations developed both in North and South of India. • Laid out with spacious Bungalows, gardens, wide roads and avenues. • Almost negligible planning and infrastructure for native population.

The Britishers had been able to introduce dual character to cities, where those residential areas were separated from those of the native population in the congested core. In the areas developed by Britishers, streets were no longer an integrated element of neighborhood but were used as the dominant elements that fragment spaces. While traditional houses were set against the streets with an internal private courtyard and built in close proximity to each other, the colonial houses had setbacks on all sides leaving no room for internal courtyards. Houses for the British were far flung and built on larger plots, lined along road networks (Ramanathan, 2011).

2.4.1 Key features of urban development and planning regulation by Britishers

*   Monumental characteristics with many palaces, museums, libraries, hospitals, schools and other public buildings constructed at huge cost.

*   Appointment of Sanitary Commission in 1864 for provincial capitals.

*   Establishment of Municipal Corporation 18888 under Bombay Municipal Act.

- Introduction of Building regulations 1898.

- First Unitary Trust of India established.

- Formulation of Bombay Improvement Trust – responsible for physical development of different parts of city under different schemes.

- The Punjab Municipalities Act 1911 - provided the provisions for preparation of town planning schemes by the Urban Local Bodies (ULB).

- Another town planning legislation, Bombay Town Planning Act - 1915 enabled the preparation of land use plan within city limits.

- Subsequently, the governments of princely state of Hyderabad in 1916, United Provinces in 1919, Madras in 1920 and Punjab in 1922 have enacted town planning legislations for their respective states, thus paving the way for introducing Town Planning Schemes for future expansion. The main focus of these schemes was to develop residential, commercial, industrial land uses in different areas. However, it emerged later that these schemes did not ensure comprehensive development of cities as expected (Thooyavan, 2005).

3. BANGALORE – THE URBAN PLANNING SYTHESIS

Bangalore ranked as the most dynamic capital city and famously identified as Silicon Valley of India has evolved from being a non-descript small town into an administrative as well as economic metropolis (Refer Fig. 12).

Fig. 8: Location of Bangalore w.r.t. Karnataka & India

Bangalore, as a 'ridge and valley settlement' was shaped by the source of water supply and considerations of proper drainage of the soil. Sophisticated layout and planning of the great city Hampi of Vijayanagar Empire in Northern part of Karnataka state, India inspired Chieftain Kempegowda-I to build a city with fort, temples, and water tanks for all professionals. Thus he founded the new town, Bangalore in 1537 (Refer Fig. 8) and made it the capital of

Yelahankanadu (it is today called as Yelahanka and is part of Bangalore). Kempegowda-I endeavored for next few years to establish Bangalore as a prosperous city with commerce, culture, military and education. The annual revenue earned from several clusters of surrounding villages was used to sustain the city. Several early administrative and planning attempts belonging to the particular time period have been predominately engraved by various rulers and administrators which readily got absorbed by each sequential venture. The city has been built systematically and methodically by different empires and subsequently state as well as city governments (Refer Table 8).

Fig. 9: Conceptual sketch of Bangalore in 1537 enclosed within a mudfort surrounded by a moat

Table - 8: Chronological developments of Bangalore city

Sl. No.	Year	Various rulers and administrators	Annotations
1	1537	Chieftain Kempegowda-I	Founded Bangalore.
2	1638	Ibrahim Adil Shah, Sultan of Bijapur	Conquered Bangalore.
3	1686	Mughals	Mughals Conquered Bangalore and sold it to Mysore Kings in 1689.
4	1759	Hyder Ali, Army General	Krishnaraja Wodeyar gifted Bangalore to Hyder Ali as a Jagir.
5	1782	Tippu Sultan	Tippu Sultan Ruled and developed Bangalore.
6	1799		Conquered Bangalore.
7	1804		Bangalore was given the status of capital city of

8	1898	British Empire	Mysore State.
			New planned extensions (Basavanagudi, Chamarajpet, Seshadripuram & Malleshwaram) were developed as 'Model Hygienic Suburbs to combat widespread bubonic plague.
9	1927		Bangalore was famously referred as Garden City.
10	1947-1980	State and city governments	State and Central Government Investments to develop the city as hub of education, science and industries.
11	1980 to till date		Hi-tech phase owing to the surge of Information Technology, IT enabled service industries and bio tech industries garnering the status of Silicon Valley of India

These administrators could ably contribute to the growth of the growth of the city as they had the authority, control over exchequer and manpower to build and run the city efficiently. They were also immensely supplemented by over one hundred philanthropists including women who invested their self-earned monetary funds to build lakes, medical facilities, budget accommodation facilities, roads, multi-purpose spaces, etc. for the welfare of the citizens. Several such century old buildings stand tall as a testimony to the liberality of these great Samaritans. The much touted contemporary idea of Public-Private-Partnership (PPP) for developing city was successfully endorsed during those days itself. The geographical and spatial distribution of socio-economical and administrative activities across various parts of the city reflects its different stages of evolution and the distinctive contexts.

3.1. Planning and Spatial Layout, 1537 to 1800

Chieftain Kempegowda-I built a strong mud fort with four prominent gates. The two main streets running East-West (named as Chikkapete) and North-South Street (named as Doddapete at present called as Avenue road) were the main axes of activities (Refer Fig.9). Kempegowda formed several layouts specifically for different trades and related activities. These layouts were named after the goods sold. For ex: Akkipete is for rice traders, Nagarthapete for gold traders, Gollarpete and Kurubarapete for cattle and sheep traders respectively, Aralepete for cotton traders, etc. (Refer Fig.10). The city was characterized by narrow streets and organic in

appearance. Residences were closely placed and generally terrace roofed. Indeed the street was an extension of the home, with raised short platforms flanking the entrance to the house where inhabitants often worked and socialised. Other domestic chores were housed in private courtyards of the residences.

Fig. 10: Bangalore mud fort- Planning and spatial layouts for different trades and related activities

A reliable supply of water for irrigation and domestic purposes was imperative from the earliest days of the settlement as it was not close to a water source and was situated on an elevated ridge. He built several water tanks and reservoirs around the fort to supply water (Refer Fig. 10). Temples were built not only for the religious purposes but also as learning centers. Several temples including Gavi Gangadhareshwar temple (Refer Fig. 11) which is considered as an astronomical wonder highlight the fact that Kempegowda-I was not only interested in making Bangalore a business center but was interested in inculcating scientific temper in the city. Immadi Kempegowda or Kempegowda-II, son of Kempegowda-I continued his father's vision of developing the city. He was not only instrumental in building new lakes and temples; he built remarkable structures such as watch towers at different locations of the city (Refer Fig.12, 13 & 14). These watch towers were built to mark the boundaries of the city and housed security personnel to ensure the security of the city.

Fig. 11: Location of several water tanks and reservoirs around the fort

Fig. 12: Gavi Gangadhareshwar temple along with the watchtower on a hillock in the background

Fig. 13 & 14: Watch towers in different locations across the city

Throughout 17th century, Bangalore endured quick succession under different rulers rendering its development stagnant. Chikka Deva Raja Wodeyar purchased Bangalore from Mughals in 1687. He built an oval fort as a military barrack to the south of the existing mud fort to house the soldiers (Refer Fig. 16). Hyder Ali during 1761 not only rebuilt the entire fort but expanded it using better techniques and materials which enhanced the appearance of the city .The fort had several gates for security purposes, among which Delhi and Mysore gates facing North and South respectively were significant ones (Refer Fig. 17 & 18).
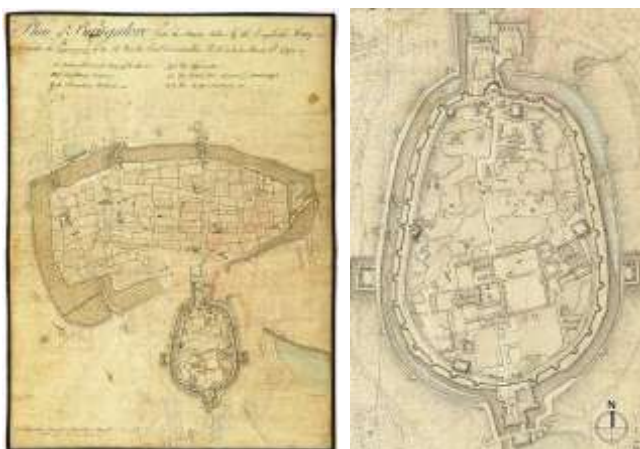

Fig. 15 & 16: Map of Bangalore, 1791 showing oval fort adjacent to mud fort and Detailed map of oval fort

Fig. 17 & 18: Delhi gate (facing north) and Mysore gate (facing south)

Consequently, a new cantonment region was developed to house the British personnel when the city came under the control of British Empire.

3.1.1 Legend of Two Cities, 1800 to 1947

The first major physical expansion of Bangalore was during the early 19th C. The British developed military - administrative district for the settlement of army personnel and officers as British felt that the Pete area was filthy and unhygienic and was not suitable for its troops. Thus city evolved as two isolated entities; Pete (western part or Native area) and Cantonment (eastern part or British area). These two entities evidently developed as independent areas with their own central markets, railway stations, hospitals, wholesale and retail areas (Refer Fig. 19). The demands for various goods and services attracted trade and other opportunities for public and private employment.

Fig. 19: Two isolated entities - Pete (Native area) and Cantonment (British area)

4.0 BASAVANGUDI – PLOTTING THE BLUEPRINT OF CITY PLANNING PRINCIPLES

The second major expansion was taken up in the 1890s and included the development of extensions to the city. Basavanagudi was one such extension and historically significant planned precincts of growing metropolitan city of Bangalore. It is named after a colossal temple dedicated to bull. Hence the name Basavanagudi, literally meaning the

adobe of bull and is a major religious landmark on the cultural map of Bangalore (Refer Fig.20).

A major epidemic, plague in 1898, forced city administrators to enforce the rules of town planning that emphasized on public health. Basavanagudi was the location of the plague camp. But soon an extension in the form of a layout was planned on 440 acres of dry land and came to be popularly known as Basavanagudi. Several other extensions and new developments such as Chamarajpet, Shankarapuram, Malleshwaram along with Basavanagudi were built strictly according to the grid iron or chess plan and were promoted as 'Model Hygienic Suburbs' (Refer Fig. 14). All the expansions to the city area were inspired by colonial zoning regulations and the strict separation of residence and workplace.
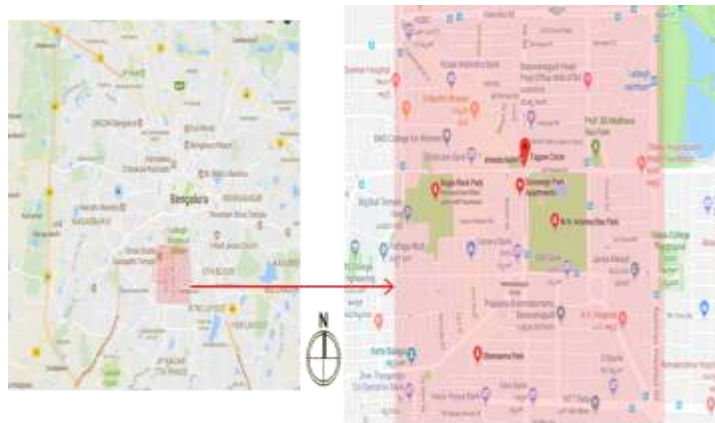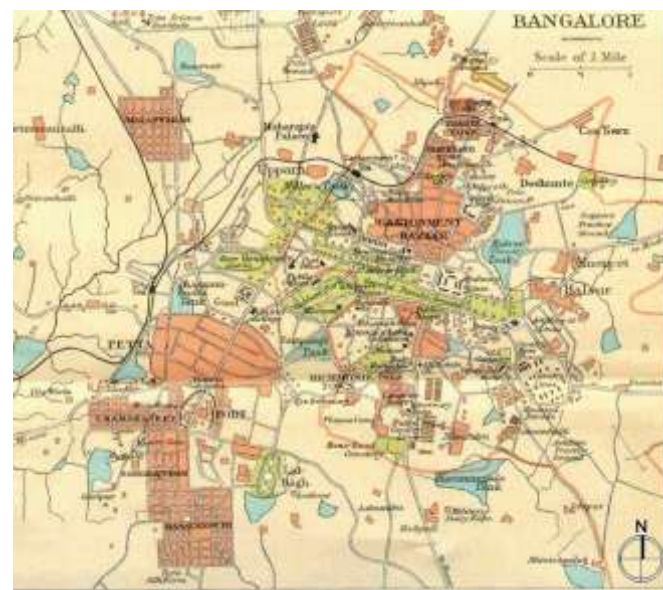

Fig. 20: Location of Basavanagudi

Fig. 21: Planned extensions - Basavanagudi, Chamarajpet, Shankarapuram and Malleshwaram

4.1. Basavanagudi – Town Planning Principles Adopted

4.1.1. Urban Form

Basavanagudi extension facilitated built forms to be constructed facing the cardinal points as per the ancient Hindu tradition by following the rectangular design, with boundary roads running North-South and East-West and intermediate roads parallel to them to them (Refer Fig.22). All the blocks were well-spaced and most importantly a heavy downpour would not leave a trace of standing water in the entire neighbourhood owing to the well planned block layouts that followed natural drainage system. This particular aspect highlights the fact that highest consideration for the topography of the area was the underpinning attribute for planning the spatial layout of the neighborhood.
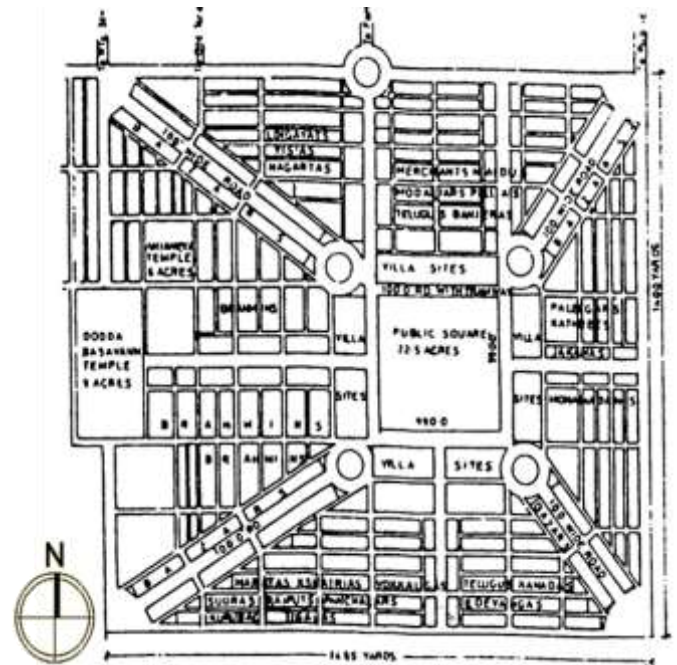

Fig. 22: Plan Basavanagudi Extension, 1894

4.1.1. Street Pattern

Street pattern and typologies, having major impact on the accessibility criteria form the main guiding template in shaping the physical layout of an area or neighbourhood. Basavanagudi Extension Plan, 1894 (Refer Fig.15) specifically indicates the prominence given to pedestrians through its street hierarchy and wider footpaths (8.0M wide) to promote walkability of the neighborhood (Refer Fig.23).
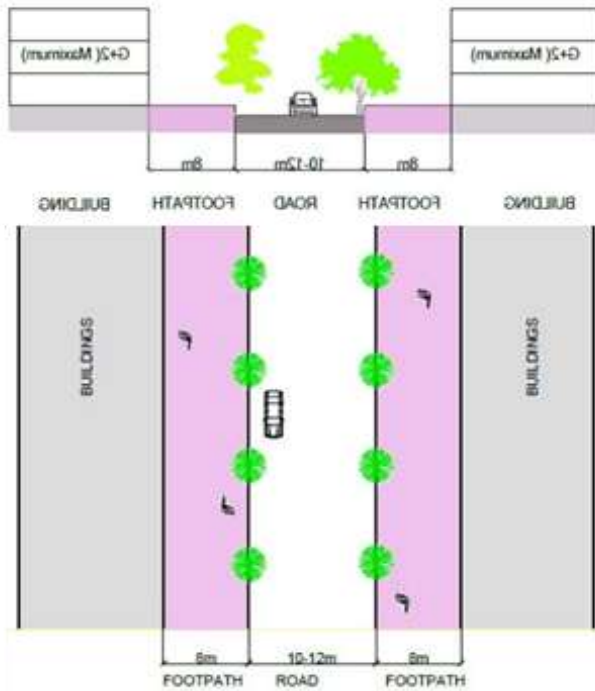
Fig. 23: Street with better footpaths promoting walkability

4.1.2. Neighborhood – Spatial Planning

Houses were grouped around large open quadrangles planted with shady trees, voids which provided a valuable space for social and community events. The planning of open squares and spaces was an attempt to infuse notions of civic or community life and indeed assert new divisions between public and private. It is no uncommon to see these spaces put to unintended uses, sometimes as an extension of private space.

If the concern for public health thus redrew the map of the city, the planning authorities also paid scrupulous attention to the social hierarchies within the city. Within these layouts, hierarchies revolved around cast and in effect class, so that the largest and best placed sites were for the Brahmin community.

Most accommodating of social hierarchies were the 'five principal divisions for the different castes, limited by cross roads, Muslims, Hindus, Brahmins, Native Christians and Lingayats. Bonds of community and occupation which may or may not have coincided with caste formed the basis of separate layouts (Refer Fig. 24).
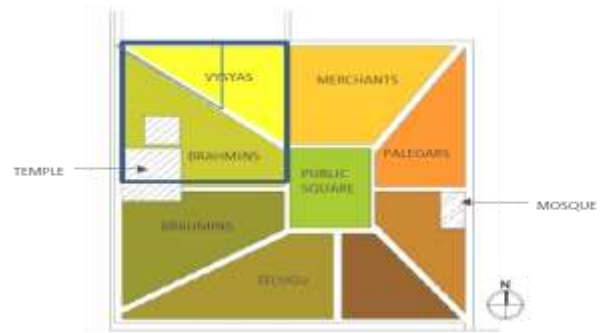

Fig. 24: Basavanagudi-Neighbourhood division and spatial layout

A city's human resource is actively productive when it has wider and inclusive accessibility to adequate social infrastructure in turn fostering equitable economic growth. In this regard, Basavanagudi neighborhood was planned to have good connectivity with all the social amenities such as schools, health care, post office, police station, etc.

4.1.3. Public Realm

Public realm, essentially representing the integral part of shared community space influences form and function of the neighbourhood. The area with its vibrancy renders one with sensorial experience and exploration. The area's earlier planned wide network of streets, public spaces and parks/open spaces still continue to contribute in elevating the quality of life effectively (Refer Fig. 25).

Fig. 25: Transformation of urban fabric to suit contemporary needs

4.1.4. Basavanagudi - Relevance of the Planning Principles Adopted

Basavanagudi as a major residential extension in 1898, was planned and conceptualized as 'neighborhood' and was 'rationally designed' according to the 'size' demonstrating a certain degree of 'self-sufficiency' while providing better quality in terms of community life.

The major planning principles that were used aimed at developing compatible built environment while providing maximum benefits from the natural setting. The impact of

this consideration is reflected in the particular aspect that the Basavanagudi area still continues to be a vibrant and significant neighborhood of Bangalore city while efficiently adapting to the changing urban scenarios.

5. DISCUSSION AND WAY FORWARD

Various factors have contributed to the urbanization of Bangalore city and its resultant spatial expansion. Conception of 'zoning' to segregate various kinds of compatible activities was the fundamental aspect of majority of spatial developments. The two major extensions of the city discussed, essentially represent an act of 'decongestion'. It served as mechanism to prevent recurrence of the epidemic while giving the city a sense of legibility. Apart from developing extensions, Government commissioned surveys to develop a city schemes to influence the future developments through allocation of spaces and finances. Among spaces configured for development, long term vision and planning for future developments in a way was also creating a 'need' in turn to create better environment.

Along with decongestion and relocation, housing for middle class, healthy environment and other considerable number of measures for improvements reflected a series of social welfare measures focused on cross sections of the society.

Until the 1970s, Bangalore was not even considered as anything more than a modest sized state capital though it was the site of major public sector industries.

Bangalore's remarkable growth can be spatially categorized into Centers, Corridors, Wedges and Peripheries such as:

- Economic and socio-cultural activity centres
- Mass transit corridors
- Wedges consisting of neighbourhoods
- Expanding urban peripheries

With the onset of sweeping changes in all the realms, the city is going through accelerated pace of urbanization.

In this scenario, the future planning attempts should aim at re-energizing the earlier city planning principles to direct the inclusive growth both spatially and socially while optimizing the resource provisions. Academics such as planners, designers, geographers, environmentalists, historians, political scientists, anthropologists, etc. should draw broad range of knowledge from ontologies of indigeneity as a means of increasing indigenous intervention in planning and management of urban environments.

5.1. Indigenous Planning Practice – Connecting Identity and Place

Indigenous planning practice continues to emerge globally and given the fact that majority of socio-economic sectors and various aspects of inhabitation remain dependent on the indigenous knowledge system, the contribution of this knowledge system continues to strongly impact the sustenance of our cities. The established indigenous knowledge can be perceived as an alternative way for promoting inclusive growth. Sustainable urban areas can be planned by establishing revived relationships between indigenous and contemporary knowledge systems. This promotes awareness and positive attitude towards protection of environmental and socio-economical elements for the benefits of urban dwellers while elevating the quality of urban living.

REFERENCES

[1] Chauhan, K., Resident's selection and priority setting for the satisfaction in housing using analytical hiererchy process - A novel study of GujarataThesis degree of Ph. D, Surat: V.N.S.G.U.

[2] Dwivedi, R. M. a. S., 1995. Bombay: The Cities Within. New Delhi: Oxford University Press.

[3] Hitoshma Singh, S. N. a. A. C., 2011. Seismic Design of Buildings in Acoordance with Vastu Shastra. s.l., Inernational Conference on Recent Trends in Transport, Environmental and Civil Engineering.

[4] Kangle, R., 1965. The Kautilya Arthashastra. Part III ed. Delhi: M.B. Publishers.

[5] Nallathiga, R., 2009. From Master Plan to Vision Plan: The changing role of plans and plan making in City Development (with reference to Mumbai). Theoretical and Empirical Researchers in Urban Management, Volume 4(13), pp. 141- 157.

[6] P. Ranjeet, D. N. R. a. M. A. U. K., 2016. Vastu in Construction in civil engineering point of view. International Journal of Research in Engineering and Technology, 05(April).

[7] Patra, R., 2010. Town Planning in Ancient India: In Moral Prspective. The International Journal of Humanities and Social Studies, Volume ISSN 2321 - 9203.

[8] Ramanathan, S., 2011. Shaping Vibrant Cities. Bussiness Standard India, pp. 155-179.

[9] Rangawala, S., 2005. Town planning. 19th ed. s.l.: Charotar Publishing House.

[10] Richards, J., 1993. The Mughal Empire. Cambridge: Cambridge University Press.

[11] Thooyavan, K., 2005. Human Settlements: A Planning Guide to Beginners. Chennai: MA Publications.