'EKISTICS'

"as holistic urban planning approach for India"

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Abstract: 'Ekistics' aims to provide a holistic planning methodology studying its metrics through elements of human settlements & City of future (COF) by Sir Constantinos Apostolos Doxiadis. As per doxiadis the ideal planning shall be the one which provides happiness and satisfaction to its people and reduces the exploitation and wastage of resources, natural and manmade. Targets can be socialized as: The inhabitants should feel proud of their settlements, Settlements are self-sustainable. It should take care of all their biological, physical, emotional, spiritual and intellectual needs. It should provide people a sense of security and all means to achieve dignified livelihood. Citizens should be empowered and employed. Their health and their relationship with nature should never be compromised and they should live like a part of nature itself, while constantly striving to achieve balance and attempting to make things easier for them.

- India where economic & political inclusive planning becomes essential ancillary tool for the planning of villages, towns, & cities. Successful planning interventions becomes completely a government responsibility, here the research intends to equip the society with the holistic understanding of our complex, indigenous, old and new city fabrics across the disciplines so that they could play meaningful roles in urban planning, city building and shaping our settlements; ultimately improving the Quality of life (QOL). Also, aims at reflecting the emergence of the theories given by Constantinos Apostolos Doxiadis in terms of Ekistics as Science of human settlements extending to Ecumenopolis.

Index Terms **- Ekistics, Urban planning, City of future**

I. INTRODUCTION

The evolution of towns & cities in India has always been among land of great cities. Civilization in the sub-continent is said to have had its highest institutional expression in the cities, where all types of people met and its great tradition was elaborated and refined. The Indian city has had many reasons for its existence: there were capitals, ports and emporia, centers of handicraft production, pilgrim, temple and monastery cities, educational centers and garrison cities. Many had more than one function. The traditional Indian city has always been Energy- conscious. Evidence of such cities in the past and those surviving even today tells us that adherence to the above concepts resulted in a healthy and wholesome civic life. It is crucial that large scale planned settlements be seen in totality; not as mere edifices, but as an entire system, where people live, work and play. Ekistics being the science of human settlements includes a comprehensive and holistic dimension across the disciplines ranging from the study of settlements and society, demographics, land economics, sociology, environment, legislations, transportation and networks, regional planning and GIS.

II. TOWN PLANNING IN INDIA

Town Planning was developed and practiced as an art by our ancestor's way back in 8000 BC when the small settlements evolved into about 100 large Indus Valley settlements following a hierarchy of cities, villages and outposts. Some of the legendary ancient cities along the Indus were Dholavira, Kalibangan, Rupar, Rakhigarhi and Lothal - presently located in states of Gujarat, Haryana, Punjab and Rajasthan in India. Thooyavan (2005) explained in his book on 'Human Settlements' that the settlements built during Silpa Sasthras and Kautilya's Arthasasthra were within the framework of strict rules and regulations laid down in Hindu Shastras and Puranas. Ancient treatises on town administration and architecture indicate how scientifically the art of town planning in the earlier ages was studied and practiced.

Based on the predominant features and functions, the towns were classified as

a) Nagara (District headquarters),
b) Rajdhani (Royal Capital),
c) Pathare (Commercial town),
d) Druga (Fortified, or small industrial town),
e) Kheta (Town grown by local industries),
f) Kharveta (Big industrial town),
g) Sivira (Military encampment),
h) Senamukha (Suburban military township),
i) Skandavara (Military towns with imperial quarters),
j) Sthaneya (Frontier Headquarters, fortified town),
k) Dronamukha (Market town),
l) Kotamakoraka (Hill / Forest site settlement).

Layout: The cities were well planned and laid according to numerous patterns like

a) Dandaka,
b) Swastika,
c) Padmaka,
d) Nanyavartha,
e) Chatmukha,
f) Pratara,
g) Karmuka,
h) Sarvothobhadra etc.

Town characteristics: The planning of the ancient cities clearly demonstrated appropriate planning approach.

1. The whole area of the city was divided into zones, based on the political and religious hierarchy, thus determining the exact sites for the Royal Palaces, the council hall, market places, streets and lanes, gardens, temples, wells (1: 10 houses), reservoirs and above all the blocks of houses and wards for different communities and professions. Further the building controls ensured that the buildings in the cities followed a uniform approach and provided enough room for light and ventilation.
2. It was ensured that all the houses followed a similar layout resulting in organized development.
3. The controls provided structured development of the cities with commercial and residential areas separated from each other.
4. Each of these types differs from the other in their shape, method of street planning and location of activities based on size and principal purpose of settlement. The division of areas or zones were based on the system of "Padavinyasa" i.e. division of town into a number of blocks (or pada). A person could conveniently transverse the whole width of the settlement.

Researcher Rangarajan (1992) who studied and explored Kautiliya's 'Arthasasthra' in the light of town planning mentioned that it was mandatory to have the width of main thoroughfares be adequately wide up to 4 dandas i.e. 24 feet in width and lined with trees for aesthetic and comfort values. A number of bye-laws and regulations regarding construction of buildings in the towns were also highlighted in their studies. Although many of them were very conceptual giving directions related to the planning of a town and house.

III. EKISTICS

Ekistics as holistic planning approach is needed to describe & revisit many land parcels are destined to become urban or not thus to resolve this dichotomy of planning process. Need of the study is to balance all the elements of human settlements to make them Ideal and enhance the Quality of life.

We are dealing by necessity with:

1) Nature, which is being spoilt and unconsciously neglected as per present as per business standards India hosts desertification meet, 30% of its land is already degraded.

2) Man, who is continuously changing and growing at tremendous rate.

3) Society, which is changing because of man's new needs.

4) Shells, which must be constructed, renovated/retrofit, removed/demolished & restore/rebuild.

5) Networks, which are also changing to cope up with new demands in which the villages, towns, cities, metropolis are formed.

Facts:

EVOLUTION
Phase 1: Primitive non-organized human – settlements (started with the evolution of man)
Phase 2: Primitive organized settlements- Eopolis (period of villages lasted 10,000 years)
Phase 3: Static urban settlements or cities- Polis (lasted about 5,000 to 6,000 years)
Phase 4: Dynamic urban settlements Dynapolis (lasted 200 to 400 years)
Phase 5: Universal City- Ecumenopolis (which is now beginning)

According to the 2019 revision of the WORLD POPULATION PROSPECTS population stood at *1,352,642,280*.

- During 1975–2010, the population doubled to 1.2 billion. The Indian population reached the billion mark in 1998.
- India is projected to be the world's most populous country by 2024 surpassing the population of China.

I. PLANNING PRICIPLES

a) The first principle is maximization of man's potential contacts with the elements of nature (such as water and trees), with other people, and with the works of man (such as buildings and roads).
b) The second principle is minimization of the effort required for the achievement of man's actual and potential contacts. The areas of cultivation where our main goal is cultivation of plants (agriculture), of animals (cattle breeding) on land or in water for the sake of humans. These are the cultivars.
c) The third principle is optimization of man's (Anthropos) protective space, which means the selection of such a distance from other persons, animals, or objects that he can keep his Contacts with them (first principle) without any kind of Sensory or Psychological discomfort.
d) The fourth principle is optimization of the quality of man's relationship with his environment, which consists of nature, society, shells (buildings and houses of all sorts) and networks (ranging from roads to telecommunications). This is the principle that leads to order, physiological and aesthetic, and that influences architecture and, in many respects, art.
e) The areas of industry and mining where humans process natural resources in their own ways which are artificial but may turn into more and more biological ones as in recycling of water and other materials.

IV. SCOPE

- EKISTICS covers scope of planning as well as architecture.
- It functions in three ways: Extent of space, functions they perform, Intentions as a discipline concerned with human settlements. The subject begins to illustrate multiple ways in which collective settlements formed and inter-relate.
- Human settlements are meant to expand efficiently and economically thus to reorganize the way ekistics is practiced.

V. EKISTICS UNITS

Doxiadis believed that the conclusion from biological and social experience was clear: to avoid chaos we must organize our system of life from Anthropos (individual) to Ecumenopolis (global city) in hierarchical levels, represented by human settlements. So, he articulated a general hierarchical scale with fifteen levels of Ekistic Units [Ekistic Units] **15 LEVELS Also called EKISTICS LOGARITHMIC SCALE (ELS).**

- Units range from Man to Ecu menopolis which turn into four basic groups.
- Names of Units and Population Scale: EKISTICS POPULATION SCALE

	Ekistic Population Scale	Persons
15	Ecumenopolis	69,206,436,005
14	Eperopolis	9,886,633,715
13	Small eperopolis	1,412,376,245
12	Megalopolis	201,768,035
11	Small megalopolis	28,824,005
10	Metropolis	4,117,715
9	Small metropolis	558,245
8	Polls	84,035
7	Small polis	12,005
6	Village	1,715
5	Small village	245
4	House group	35
3	Family	5
2	Couple	2
1	Anthropos	1

Figure 1Ekistics population scale

A. TIME AND SPACE FACTOR

Apart from the quantitative variables, the TIME AND SPACE factors had also to be considered.

I. The COF project, in order to achieve its goals, used techniques such as: For example, the population projections, estimated to 50 billion (high), 15-20 billion (low), and the inevitable intermediate approximation of 35 billion people, have been assumed to be reached between the years 2090 and 2120 for high population assumption, between 2030 and 2060 for the low assumption and between 2060 and 2090 for the middle one.
II. The space factor is perhaps the only one which cannot be considered purely as "variable" since the criteria used for estimating the habitable land in the future were quite predictable (ruggedness, drinkable water, cost of development of hostile areas).
III. The total surface of habitable land at a reasonable development cost was estimated at 57 to 68 million sq. km. allocated almost equally to production (25 million sq. km. for food, power, water, minerals), to natural reserves (23 million sq. km. for breathing space, wild life, floras), and to settlements (20 million sq. km.) where the projected population would be housed. (Maps of habitability study).

VI. CASE STUDY

I. INTRODUCTION:

Based on the concept of dynapolis Islamabad is aimed at creating "City of the Future" with the concept of dynapolis. 'Dynapolis' is planned as a unidirectional linear city based on the SWOT analysis of explosive urbanization growth, strong environmental elements are synthesized for the planning of new towns and Architectural principles.
Design of the Islamabad city plan is an manifestation of C.A.DOXIDIS proto-form & also an investigation and anticipation into the landscape of the project site for New capital of Pakistan.
Islamabad, the new Capital of Pakistan, planned by Doxiadis Associates in 1950s, is now a fast-pace metropolitan city of about 1.5 million inhabitants.

The adjacent old city of Rawalpindi, A National Park and Large Metropolitan Area - Greater Islamabad/Rawalpindi with approximately 4.5 million inhabitants.

a. Planned for a future population of about 2,500,000.
b. Located on pothohar plateau.
c. Built during the 1960s, aimed to outgrow Karachi (most developed city in this era) which is divided into sectors and zones.
d. These are certain examples and trends which are starting milestones.
e. Firstly, the population shall continue to grow and secondly, we expect there will be an unprecedented increase in the urban population or this additional population to convert majorly into urban residents. From the ekistiks point of view looking at the patterns of growth - The New Capital city of Islamabad is recommended.

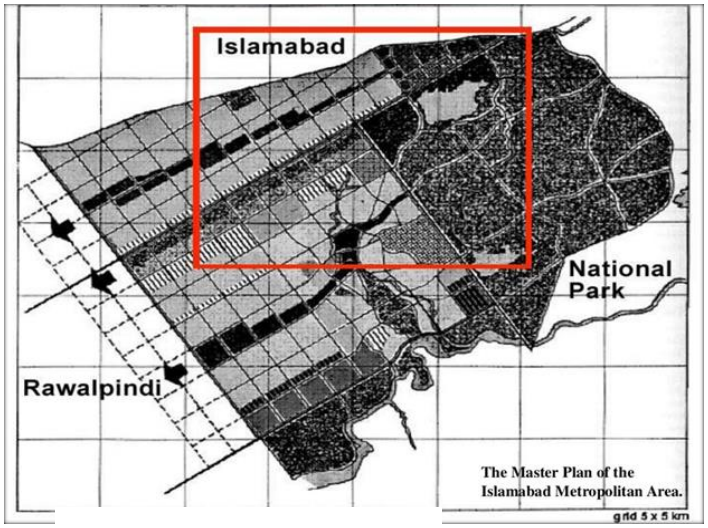

Figure 2 Master plan of islamabad

I. THE LAYOUT PLAN

i. Organization
ii. Hierarchy of Functions
iii. The Landscape and Climate
iv. Social Planning

II. ECONOMIC ASPECT

Supporting Arguments in relation of capital investment in favor of a new city:
TABLE I. Fifty per cent of capital investment will be utilized in land acquisition, widening of streets, and rejuvenation of existing facilities to serve the newborn functions.
TABLE II. This will double the capital expenditure per square foot of administrative buildings.
TABLE III. If the investment were to be made in a new or under-developed area, the increased land value of the surrounding area will affect the government.
TABLE IV. This will initiate investment and action but not to those who happened to be land-owners near the neo government developments.

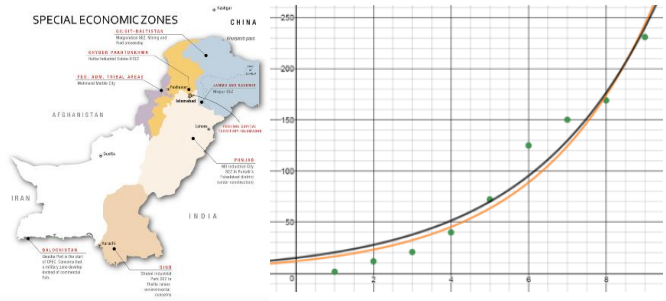

Figure 3 FEDERAL CAPITAL POPULATION INCREASE

III. ECONOMIC ALTERNATIVES

Fig. 1. This modern capital city will create elaborate influence on the entire country.
Fig. 2. To favor this development this city should belong to versatile economic, political, ethical and other groups - in ratios corresponding to the national ratios. This will represent the population of the new capital as the best possible presentation for the country or region.
Fig. 3. Since existing cities misrepresent the nation as a whole unless they happen to have served as capitals for extensive periods, thus for the unidirectional doxiadis dream of a new capital city, variety is important from the social point of view.

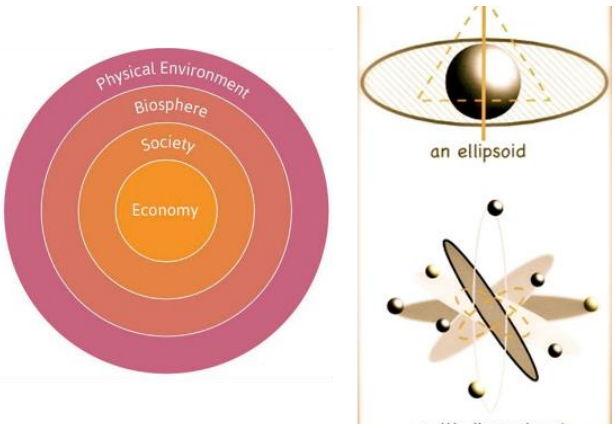

Figure 4 CHARACTER & BASIC FORM

IV. MASTER PLAN: ISLAMABAD 1964

II. Doxiadis created a new city near an existing city.
III. Rawalpindi (expansion towards SW): Industrial & commercial avenues for Regional center
IV. This will be a Binucleated dynapolis where growth will be uni-directional and guided.
V. The binucleated city will spread in space to form an emphatic metropolis.
VI. The city of Rawalpindi; another nearby city, Islamabad begins as a dynapolis fed by the existing one. It will eventually grow as a double dynapolis.
VII. Unity of scale for cohesion between various elements of town.

VIII. To govern these inter-related elements composing the city - a scale measurement is determined for plots, streets, open spaces, squares, roads, etc. Unity of Expression: Basic step is to follow a system of four highways for the metropolitan area. These axes will unite together to form a big square, which will define future transportation systems & major utilities within.

IX. 3 DISTINCTIVE AREAS: (subdivided into sectors)

X. Upper Islamabad (expansion towards SW): New Capital of nation catering administrative & cultural block.

NATIONAL PARK:

To retain selected For Biodiversity & Ecosystem Preservation, Agricultural functions, public research rejuvenation (national sports centres), universities, or institutes.

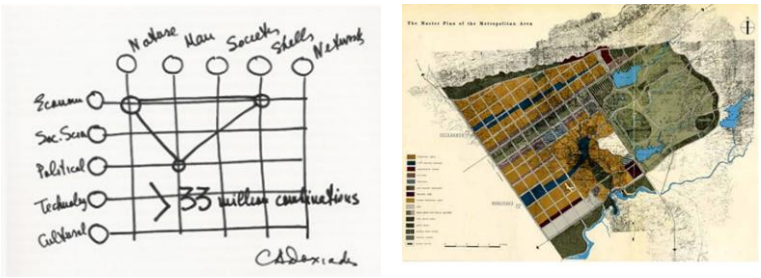

Figure 5 ISLAMABAD MASTER PLAN

CAPITAL AVENUE

Central main axis through the core of Islamabad

• Presidential Palace is precariously placed at the top of a hill.
• Location of the administrative center on a higher level is due to the fixed road. Each sector of Islamabad is self-contained & self-supported w.r.t. to the structured & unstructured both ways of lifestyle.

- Sub-divided into 3 or 4 micro Communities based on the economy of the neighborhood.
- Civic center will act as CBT, containing shopping, business and civic avenues.
- By providing required amenities with maintenance & repairs at the right pace within minimum time required for approach. Enhancing accessibility to various areas.

Figure 6 ISLAMBAD CITY LAYOUT

FACILITIES

I. WATER SUPPLY SYSTEM: Water is now being planned to dam the Swan river for bringing water to the town by gravity which was earlier carried by two springs in Nurpur and Saidpur.

a. Water storage tanks
b. filtration plants
c. Pivotal works have been constructed while the distribution system is now under construction.

- **SEWERAGE AND DRAINAGE:** The Capital Development Authority is fulfilling the responsibility of constructing Sewage and drainage networks.
- **ROAD CONSTRUCTION:** Two main highways each having a width of two lanes will be the first roads under construction sectioning the city which is sufficient for the first stage development.
- Adding to it, there is a 10-foot shoulder on both the sides of lane.
- Street Design-The Positive Space
- Alterations and additions to the Landscape
- House layout design
- Bare Minimum Accommodation Privacy

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

II. INFERENCES

The new layout:

- The aesthete & ambivalence of house front and back by having local streets function in grid iron & adjoining community spaces as main access to routes.
- Vital use of open green spaces into focal points with the familiar character of a village square.

To achieve the ideal world of doxiadis four principle are to be take care.

- Maximization of human potential.
- Minimization of human efforts.
- Optimization of man's proactive space.
- Optimization of man's relationship with environment.

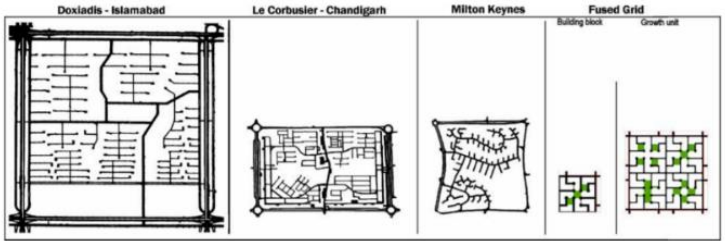

Figure 7New layouts

The land will be divided into zone division:

1. Zone 1: REAL WILDLIFE: 40%
2. Zone 2: WILDLIFE VISITED (17%).
3. Zone 3: WILDLIFE EMBRACED (10%).
4. Zone 4: WILDLIFE INVADED (8%).
5. Zone 5: WILDLIFE CONQUERED (7%).
6. Zone 6: NATURAL AGRICULTURE (5.5%).
7. Zone 7: INDUSTRIAL AGRICULTURE (5%).
8. Zone 8: MAN'S PHYSICAL LIFE (5%).
9. Zone 9: LOW-DENSITY CITY (1.3%).
10. Zone 10: MIDDLE-DENSITY CITY (0.7%).
11. Zone 11: HIGH-DENSITY CITY (0.3%).
12. Zone 12: HEAVY INDUSTRY AND WASTE (0.2%)

III. CITY OF FUTURE METHODOLOGY:

The first task of the initial COF team was to compile a quest design, setting the goals and therefore the time horizons of the study in addition as specifying the mandatory specialties, which might cover the big form of topics involved.

The City of Future project to achieve its goals used techniques such as:

EKISTIC PRINCIPLES	DESIRABILITY OUTCOME
Maximization of potential contacts	Each individual's need for access to other people, work, goods, and services, is met in ways that score positively in terms of accessibility, technology and cultural appropriateness.
Minimization of effort in terms of energy, time and cost	People can satisfy their needs (e.g. as above) without having to expend unnecessary time and energy.
Optimization of Anthropos' protective space when alone	People live in a human scale neighborhood which is safe and secure, where culturally sensitive provisions meet these needs.
Optimization of the quality of Anthropos' relationship with the system of life	People have levels of access to opportunities, and economic and social benefit which are fair and culturally sensitive.
Optimization in the synthesis of all principles	The human habitat exhibits a sensitive balance in the desirability outcomes where quality of life and social justice reinforce the desirability to achieve a sustainable environment.

IV. CONCLUSION:

Current crisis of our cities has been lacking in systematic approach to urban planning in terms land optimization, where urban planning schemes are not integrated leading to urban chaos, resource allocation, accessibility & more. This demands a contemporary inclusive and rational approach in urban and regional planning. • The key to the solution is the creation of the human community as a part of a much larger city. The problem, therefore, is reshaped as a problem of an organized Ecumenopolis, consisting of many human communities that will be its fundamental cells, interconnected by the tens, hundreds, thousands, and tens of thousands into major urban complexes that will be the parts of Ecumenopolis. In this way, what was a natural human community can be immensely enlarged into a human city. With proper organization of transportation and telecommunications networks, the extra-human scale of the large city can be turned into a human one and the inhuman conditions now existing in many parts of the city can be eliminated. Thus, development of human culture, where men & women congregate in small or large communities to live Healthy self-sustainable quality of life.

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