

# Density in Urban Development Literature

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**ABSTRACT:** Selecting density in urban designs has been often based on experiences and direct understating. The role and importance of density is a general concept in urban development and it is a special, evident concept in urban planning and design. No urban plan and design can be prepared and fulfilled without dealing with density as the main factor for determining and influencing all aspects of planning and designing. Providing a description of a practical method in order to determine maximum density of building in reliance on blocks' specifications and their influence on building density is one of the notable and practical themes which has been less discussed. Exertion of specific tendencies and unscientific approaches in determination of suggested densities as well as the disproportionateness of these suggestions to specifications of residential blocks are some of the reasons why environmental quality of residential blocks in Iranian cities has decreased. This study makes efforts to first deal with different issues on densities as well as their transformation, and then analyze the main determining and effective factors on density.

**Keywords:** urban density; construction density; population density; stable density

## INTRODUCTION

Density can be defined as a measurement system enabling us to calculate and define the number of people in a definite area on earth as population density, or a substructure located in a definite area on earth as construction density in a simple mathematical way. (HMSO (1962) Residential Areas- Higher Densities). The rapid development and the horizontal expansion of cities in recent decades have caused almost all developed and developing countries to encounter serious problems. The issues on this phenomenon have not only affected urban development policies greatly but their consequences have also played a significant role in the extension of economic, social, political, managerial and environmental affairs of societies. The concerns and worries resulted from this phenomenon have caused developed countries, especially after World War II, to take some remedies for solving or controlling this crisis. The basic grounds of these remedies include eminent policies and mass-construction, the changes in tax law, enactment of land laws in order for its optimal use, improvement and renewal of old textures and city centers, the plan for preparation of land for new place, new cities and, above all, the policy of increasing population and construction densities of cities. The rapid, dispersed urban expansions and following that, adopting policies of increasing densities have led to the appearance and development of new terms in urban development culture. For instance, some terms including urban expansion and dispersion, dispersed cities, urban mass-construction, compact cities, and eminent complexes can be mentioned.

### **Theoretical basics of the research**

Defining and classifying various types of density depend directly on its intended usage and objective. In general, some authority like Ylvisaker in his book *Density in urban fringe area* presented three different interpretations of the studies related to density:

Density merely as the number of people or residential units in an area

Density merely as the index and the degree of cultural gap and difference among rich and poor classes

Density from the viewpoint of national indifference and regardlessness towards a basic and important issue

The importance of density quality

The effect of density on city size

The urban form in general and its executive qualities in particular are affected by the following factors:

Scale            2. Density            3. Height            4. Building mass

The most common tool for controlling visual quality by municipalities is density (and the coefficient of sub-construction area) and one of the variables which is dependant on density and very important in organizing urban view is height. The effective tool of height on density quality is to determine the ratio of building floors with regard to the neighboring buildings and the qualities of the street in which they are located. The effect of

the buildings' height on making the feeling of spatial restriction is really remarkable; the feeling that depends on the relationship between the supervisor and the body height.

b. density types according to hanke divisions

On the basis of severity and degree of density: low density – high density

On the basis of measurement unit of density: construction density – population density

On the basis of spatial domain of density: national density – megacity density – urban density- density of new towns and cities– residential project density

c. the common density in the domain of urban planning and designing

Population Density, GRD = Gross Residential Density

Total Residential Density

Gross Residential Density

NRD = Net Residential Density

Construction Density or FAR = Floor Area Ratio

Population density: means population per unit of area, and usually individual per hectare: population density of the country, urban population density and/or district population density (Gross Residential Density)

Population Density or Gross Residential Density =  
population

geographical area (country, city, district)

Total Residential Density: is a measurement tool for measuring in total scale of a city

Total Residential Density =

the number of residential units

Geographical area (city, district, neighborhood unit)

Gross Residential Density: is a measurement tool for measuring in the scale of special residential projects in the total scale of a district or residential area

Gross Residential Density =

population

city area minus open spaces and non-residential activities

Net Residential Density: is a measurement tool for measuring in the scale of special residential projects

Net Residential Density =

population or the number of residential units

The area occupied by the project

Construction density: it is a measurement tool to state 3 concepts

Construction density =

the total area of subconstruction (in all floors)

area of the piece of land

Occupation coefficient =

the ground floor area

The area of the piece of land

The open space ratio =

the ground floor area – the area of the piece of land

the area of the land

Housing density

The number of families in dwellings =

the number of families

The number of dwellings

The individual's density in the dwelling or room =

population

the total number of dwellings or the total number of rooms

Per capita: means the start point of analyzing the current body status of a city and

the main index of space allocation

Per capita = the area of the special space for each usage

population

### ***Strategies for controlling and optimizing density quality***

Strategies for obtaining desired density

Classification of strategies:

Based on required time to achieve the goals

Based on the nature and direction of the strategy

Classification based on time period:

Occasional and short-term strategies

Gradual and long-term strategies

Classification based on the nature and direction:

Concentration strategy: deals with development and changes of a city from inside (e.g. compact city pattern and urban consolidation policies)

Lack of centralized concentration strategy: deals with development and changes in megacity regions (e.g. New Urbanism and Pedestrian Pocket patterns)

Urban consolidation policies: in order to increase the number of residential units in current urban textures, mainly in the form of medium-density housing, whose purpose is to save the costs of substructures and reduce the demands for land.

Urban consolidation policies include the following 4 cases:

Construction in useless pieces of land inside cities (infill development)

Redivision of residential blocks in countries that used to use large residential blocks

Reducing the size of minimum authorized area of residential divided land in land-use planning

Allowing medium-density dwelling construction in foreseen low-density regions

### **Stable density concept**

#### **Urban sustainable development in relation with stable density**

Discussions on sustainable development in the field of urban development focused on the concept of density with a different approach. In other words, density with the approach of policies and standards in a project of specified scale is compiled in order for its consequences to be used in the project because the experiences obtained from cities of high-density have always shown the tendency to use personal cars and public transportation. Therefore, less fuel is consumed and less air pollution is resulted. But in cities that develop widely with low density, the tendency to use personal cars increases and the interest in walking decreases.

In high-density urban textures, creating urban environments for interactions of the citizens enters the planning as a necessity and makes it possible for different groups of people in societies to interact in an urban environment. If construction and residential densities are taken into consideration, the approach of texture renewal as well as combining and retaining architectural value of the building with new parts will be paid attention to, and in some plans, land use change leads to the change in neighborhood unit pattern and social structure. In other words, density was first known as a standard in urban development stages and by passing time, it changed with policies and it is now playing its multiple, effective role in various structures of urban design.

Elizabeth Barton, et al. in her article *Compact Cities and Sustainable Development* gives a citation from Church and states the features of a sustainable city and also discusses the complexity of sustainability definition. Regarding the focus of international organizations on sustainability principle in the current century, a sustainable city as the place of living for human beings plays an important role.

### **Compact city definitions**

A city built in the form of residential compact buildings and activity condensation in different regions (Barton)

A city with a compact and centralized form that prevents waste of resources and the feeling of rupturing resulted from separation and the distance between the places of living and working (Child)

A city formed from housing patterns and residential buildings in a way that residence is single-unit, dispersed houses with yards for whose construction, land is mainly used (Shoenor)

Stable density (environmental density)

A compact city uses less space for more people to reside and, therefore, reduces urban sprawl. In a compact city people are closer to stores, places of work and services, and this causes most movements to be in the form of walking and bike riding rather than driving. Besides, the development of public transportation systems and the emphasis on green traffic as well as the relationship between different regions the systematic interaction between the riders or drivers and the pedestrians are done.

Using Green Design Instructions for multi-family dwellings

### **Urban stable density (environmental density)**

The existence of social plans and facilities, healthy food systems, economic development, variable open spaces, and green substructures altogether is effective in making welfare facilities, enhancing security, compact development of governmental sector, compact development of food stores and food production places, managing energy infrastructures, optimal use of sewages and recyclable materials, increasing the

possibility of investment in commercial and service sectors as well as meeting social and ecological needs, and providing entertainment facilities.

3 main elements of stable environmental density

Economy

Justice

Environment

### ***Norms and abnormalities of urban density***

Selling density as the possibility of occupying more spaces than permitted by city development standards is unjust and unwise behavior since the municipalities must examine what belongs to them and they have received its authority legally. Density is not the property of the municipalities and is not a source of revenue for them. Rather, it is a standard like other standards and the municipalities are responsible for executing and applying it. Hence, they must be bound to this standard (Gholam Reza Kamyar – urban laws and regulations)

Selling density is not only against city development standards but it also violates the rights of the neighbors who have enjoyed the easement rights for years. As a result of selling density, the harmony and balance of the city get disorganized and beauty is replaced by wrongfulness. In addition, high towers and skyscrapers are built next to short buildings.

In general, the dominance of new buildings is in such a way that even in their houses where people must feel comfortable, they would feel insecure.

Consequences of selling density

Increasing general price of land and dwelling in formal markets

Intensification of land stock exchange

Increase of living in fringe suburbs and constructing buildings in informal markets

Increasing the cost of providing urban services

Increasing the cost of investment in other production sectors

Increasing unemployment

Weakening rules, standards and regulations of urban development

Missing urban identity

## **CONCLUSION**

While international urban development processes are compiled based on qualitative objectives, the effects of construction density on body dimensions of dwellings are more perceptible so that disorder in body appearance of cities and incongruousness of their spatial structure are noticeable negative consequences of lawless increase of construction density in cities. In this regard, some standards including occupation extent, height, the ratio of mass and space, etc. arise that somehow determine the extent of construction density and if they are truly planned and regulated, an organized, integrated spatial structure will be achieved for cities.

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