Form and Position：The Study of Building Capacity Distribution

——with discussion about the common problems in China's city development and urban planning

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Abstract

FAR (Floor Area Ratio) is an important index to understand and study the spatial development pattern of the city. In the condition of a given FAR, the spatial distribution of the capacity always represents the city form in particular place. A good design proposal is necessary to give a comprehensive treatment to the different contradictions in the site. The contradictions contain both external problems such like how to deal with the relationship between the site and surrounding area and internal problems such like how to deal with the contradiction between orientation and landscape. In the process of historical period, the distribution of FAR is highly explored by architects and urbanists such like Walter Gropius, Rem Koolhaas, MVRDV and so on.

In this paper, from a case study of urban design in Chongqing(China) , a methodology to create a understandable city form is present. This methodology is usually used at the beginning of a design proposal. Without considering the architectural style and material in advance, the urban form can have a visual assessment through the study on the distribution of FAR. Diverse spatial forms which come from different capacity distributions are explored, and then dealing with different contradictions, the urban designers need to give a contrast and assess between different forms, and finally conclude the optimize one.

Combined with the case study, the authors argue the complex relationship between FAR, site coverage and architecture height. And the general problems in China's city development and urban planning are also explored and discussed.

1. Density and FAR in city development

In the past ten years, China has a shocking urbanization process, with more building ,more car, more roads and so on.In this process , we can see hope of improving, which is different from many western countries. we should see the

advertage of the Chinese urbanization ,which takes along with more opportunity of working ,more goods. But on the other side it also have more problems such like high density of city environment , traffic jam and poor quality of building. It is well known that urban planning is a subject about how to distribute resources effectively, especially for land resources and a governmental decision on the goal of urban growth. At present, with the rapid urbanization and commercial development, the maximum economic that benefits from the given site is the main purpose of the city developer. So impose restrictions on density in urbanism becomes more and more important for the city developers. On the other side ,all the city governments have to face the basic contradiction between guaranteeing the continuous development of the city economic which means a narrow urban space with high density and avoiding the overdevelopment which meaning the damage to a livable city and a consummate image of the city. What is more , for the citizens, a city with high density is not suitable to live. As a result of all the city people paying attention to the density, FAR becomes an important index to deal with the urban spatial development mode, and it is also a kind of effective measures in the present urban planning and construction control of the city.

The concept of density in urbanism is frequently used to describe the relationship between a given area and the number of certain entities in that area. These entities might be people dwellings, services, or floor space. However, the simple fact that density is used in , for instance , design requirements, plan descriptions and communication between parties, does not mean that it is used correctly or to its full potential.①. In the book “farmax” ,density means the amount of available space per person. FAR (floor area ratio) means the total floor space of a built area to the total size of its lot. In the urban planning in China, every given area has a maximal FAR which is control by the local plan state.

For a given FAR of limited conditions, which is the basic premise of Chinese city planning and architectural design, different FAR means the space what can be built of local area ,also means distribution of urban form, while the same FAR can produce many different ways of space distribution, which lead to different space forms and architectural forms. In the condition of a given FAR, the spatial distribution of the capacity always represents the city form in particular place. A good design proposal is necessary to give a comprehensive treatment to the different contradictions in the site. The contradictions contain both external problems such like how to deal with the relationship between the site and surrounding area and internal problems such like how to deal with the contradiction between orientation and landscape.

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2. Historical research on density

During the last century, density has used to show the problems of the city. There are some arguments about the lack of relationship between density and form and some people think that the use of density in urban plan does not create a more livable city,
After a period of lacking the interest of the density, the research of Rem Koolhaas makes the concept get more attention in urban research fields.In the early research to Manhattan and New York, he used "crowded culture" to summarize the essence of Manhattan. "Crowded culture" can be analyzed as the skyscraper and high density of the city. What is more, its deep meaning is the crowd of the program in Manhattan. What he wants to show is the change of life style in the big modern city. The skyscraper changes cities culture, people can't gain a single function through a single plot. On the research of Rem Koolhaas, density is used to show the mixed culture of big city.

MVRDV does a research of the Netherlands and other states, seem to be filling up with a suburban "matter" of low cost housing, low rent offices, warehouses and other low density elements. The book "Farmax" examines the possibilities of how are we to cope with the matter that is turning our environments into a "sea of mediocrity", one vast "greyness", an education of difference and individualism and it is possible to reconsider this situation by carrying density to extremes and ruffling the texture with inserts or polarities.②. In addition, the light, the sunshine and related issues such as noise is also parts of the research content. In the study of MVRDV it clearly shows that in the extreme condition, any requirements, rules or logic are pure and unforeseen. They transcend the art intuition. In the research , the most important thing is how to change the restrict into possibilities.

Besides the mentioned arguments for a revaluation of density, there are two general

developments in the process of urbanization which can be identified that further legitimize the study of density. Firstly ,recent changes in how city building is organized have created a greater need to relate development programs to spatial qualities. Second, the trend in the increase in space consumption and the environmental, economic and social effects associated with this trend point to the need for research into the relationship between the quality and capacity of space.

Here we can see that the concern of density does not only focus on density as research method of a city, but also more and more urban researcher, urban planners and architects use creative ways. In the paper what is discussed is how to provide a planning and design method at the early stage of the design.

3. Form and position: a case study on FAR

Under a given FAR of the site, with no doubt, it means a fixed building capacity. But in such a fixed space size, urban design shapes as many as different possibilities, it just like putting certain capacity of water into different containers. So different containers show different forms and the different types of forms have different advantage and disadvantage. For example, a proposal with high level and low density of building-covered area and another proposal with low level and high density of building-covered area have many different impacts on the city.

In the numerous of design proposals, as the research of density in the works of MVRDV, they can have different qualities between the relation of a performance. So comparing with the different kinds of works, what the designers need to do is to choose the best one. If with a kind of design research to approach, in acme condition, the proposals can be measured with any demand, rules or logic in a pure form, which makes it to trend optimal design scheme through the assessment.

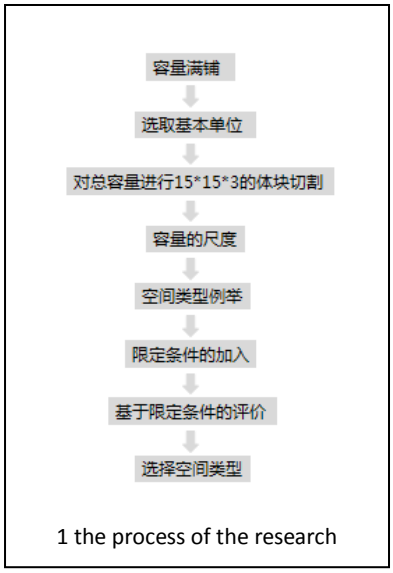
In this part, a specific case in Chongqing will be discussed to explore the planning and design method in a residential area planning project. What needs to be valued is the limiting condition which makes the design to be more logical in the project. What is more, the method is useful for the urban planners to optimize the space form in the urban design projects.

This methodology is usually used at the beginning of a design proposal. Without considering the architectural style and material in advance, the urban form can have a visual assessment through the study on the distribution of FAR. In the design process, firstly it puts forward different space forms which come from different distribution of density, then urban planners need to give a contrast and assess between different forms, and finally confirm one unique optimal space form. In the process, the

interaction condition will be appraised such like physical environment, behavior patterns, urban image and so on.

1) Background of the project

The project is located in stone pillars which is a small city in Sichuan province, China. It belongs to the new district. The main river of the city is close to the site which brings a realizable river view. The site is also along the main road which leads to convenience transportation. On surrounding environment there is a primary school near the site and some residential spaces.



1 the process of the research

The land use of the site contains green corridor, commercial and residential in the plan of government. Based on the space research of the elements on construction density and city's skyline control, the project tries to make it to be a new important area supporting residential, large-scale commercial, office services and so on. In the future it will become a new center area of the city.

For the urban planner, the most important thing is how to balance the public interest and the city development. In the project, the designer have to maximize the development scale in a given FAR, which is the main purpose of the developer. On the other side, the optimization urban spaces need to be created. So how to balance the two parts is the main question.

Before coming into a detail design, the logic of building space derivation method is discussed. The method can be separated into four steps. In the given FAR capacity calculation need to be discussed firstly. Secondly several typical space forms will have to be given under the certain FAR and certain capacity. Then contrast and assess between different forms. The interaction condition will be appraised such like physical environment, behavior patterns, urban image and so on. This process is the most important step. Finally using the chosen proposals (not only one proposal), the designers have to give more optimization and adjustment scheme.

Therefore, the logic of building space is discussed using a derived way in the early step of the design stage, but that does not means that the city design have the absolute most optimal solutions. In the selection of the evaluation, there was not the "correct" solution. This way just try to show a research attitude that in the design process there is a relatively rational way to cut into the study.

2) Four steps of the research

i. capacity calculation

In order to select the typical spatial types, the use of extreme conditions on the basic capacity can have a better effect in a fixed development capacity. So according to the given FAR and the land area, the biggest capacity of the project can be known. The biggest capacity means the maximal capacity calculation that can be built in the project.

2 capacity calculation

The Maximal Capacity Calculation= FAR * (Area of Fabric)

After that, the maximal of the construction spaces should be calculated. The maximal of the construction spaces means the rate of coverage which is given by the local government times the area of fabric. At the same time, without thinking about the possible existence of sunshine distance requirements, build capacity in the maximal of the construction spaces. The building should cover the construction spaces completely. After that the least layers and the lowest height can be known.

The Least Layers= The Maximal Capacity Calculation/ [(Area of Fabric)* (The Rate of Coverage)]

This limit layer (height) looks be like an unreachable situation and also can't start successfully in practical projects, but it can effectively delimit the boundary, making more intuitive understanding on the capacity size of this typical project for the urban planner.

Then the basic architectural dimension will be determined. There are two typical buildings (7 layer and 12 layer). According to each building there is a fixed construction area, the number of the building can be calculated.

ii. typical space forms

There are several factors to decide the forms of the space such like height, building forms, road density and so on. Also, the different combinations such like “I” “L” “U” can have different space visual experiences. So for different height, there are high-rise building and multistory building. According to different building layouts, there are different space type examples such like enclosed layout, half enclosed layout, linear

3 numbers of two typical building

layout and so on.

In order to improve the operation of the model, firstly the basic scale of one layer is used to cut the whole capacity. This process looks like cut the cake ,also when the whole capacity is cut into smaller and basic ones(15m*15m*3),the next thing is to group them and create a new form. On another word, it can be operated like playing the LEGO.

4 typical space forms

What should be noted is that in the process of taking examples of different space forms, there is not a result to put forward all the types. And the only thing that the designer need to do is trying to aim at different emphasis on the layout and give the typical and spatial types.

iii. contrast and assess

5 contrast and assess

In the whole process of the derivation of space form, contrast and assess the space performance is the most important step. The assessment is not a fixed standard measure. By contrast, in the different conditions and in different sites the factors that can influence the layout of the space are also different. These factors do not need a precise computation but the site investigation and the emotional thinking which are made by the designer.

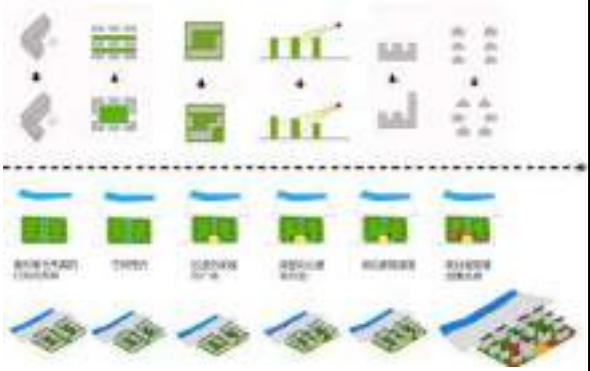
In this case, because of the functional requirement of the house, factors on light of the residential space and ventilated condition become the most important one to be considered first.

Secondly the public spaces are also play a positive role in social interaction. Also public space means more green plants and a more livable environment. What is more , considering the location of the site , there is a good river view which means the designer need to make more liver of the site to have the river view. Lastly the city environment also has important effect on the space forms. With the goal of becoming the a new center area of the city the space form need to create a impressive image of the city including the skyline and the public space of the city.

For the specific environment, a suitable standard is created to contrast and assess the

different proposals. After the urban designers give a contrast and assess between different forms, and finally the optimize ones are concluded. In the part, exclusive method is an effective way .

iv. Optimization and adjustment



6 optimization and adjustment

Based on the combination of limited conditions, many types of space layouts do not meet the requirements. So these space layouts will be deleted. Then the designer can choose one or two types to give more optimization and adjustment and finally choose the most suitable one. In the process of optimization and adjustment, considering the specific situation of the environment, more adjustments are added to the chosen proposal. The adjustments are more focused on the detail of the space forms. For example ,in the city environment ,a land mark is useful for the image of the site, so the designer improves the height of one building to 100m while other building can be more lower. The liner layout is a good way for the building to have enough sunlight, but considering the feeling in the site, some buildings turn to face east and west so that the whole space can have an enclosed feeling. Considering the sun light, the southern building should be lower than the northern ones. Al l the adjustments makes the proposal be more effective.

4. summary

In the China's urban development and planning, density is one of the essential fields of urban questions. The general problems in China’s city development and urban planning are lack of thinking on integrity. Most of the city developments only pay attention to the economic factor. Some others consider the sun light. But how to balance all the factors is the main problem. In this essay, a methodology to create a understandable city form is present. Used at the beginning of a design proposal, this methodology does not consider the architectural style and material in advance so that the urban form can have a visual assessment through the study on the distribution of FAR. During the process the urban designers give a contrast and assess between different forms, and the designer can have an integrity view which is the most valuable part of the methodology.

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