Overcrowding Countermeasures from an Urban Engineering Perspective

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The term "*Toshi Kogaku* (urban engineering)" itself is not yet fully developed. In the past, the technologies for urban development included architecture, civil engineering, and landscaping, but the discipline of urban engineering was born out of the need for more than just these individual technologies. However, the concept of urban engineering has just been born, and its content is not yet clear. I believe that it is important to move beyond the framework of urban engineering to a comprehensive science of urban planning for the future of urban development. How different is urban engineering from urban planning, what is the science of planning, and to what extent is this kind of urban engineering or urban planning effective against overcrowding, and what measures can be taken? I would like to consider the following questions.

1 Urban Problems and Overcrowding

1-1 Aspects of the Urban Problem

Some opinions on what the urban problem is include the following theories.

Eiichi Isomura (1963)
(1) Population problem
(2) Land problem
(3) Water use problems
(4) Livelihood issues (housing, human waste management)
(5) Cultural and educational problems
(6) Industrial location issues,
(7) Consumption problems (disparity in living standards)
(8) Administrative and financial problems

Shigeto Tsuru (1963)
(1) Traffic Hell
(2) Air pollution
(3) River pollution
(4) Decrease in open space
(5) Ground subsidence
(6) Noise
(7) Vibration

Kenichi Miyamoto (1964)
(1) Housing shortage, rising land prices
(2) Traffic paralysis
(3) Pollution, natural disasters
(4) Stagnation of cleanup operations
(5) Decline in education, youth crime
(6) Infectious diseases
(7) Concentration of unemployment, slums

As you can see from these urban problems, overcrowding is often the cause. For example, in the case of land issues, there is a shortage of land due to overcrowding, or land prices are rising. In the case of water supply problems, there is a shortage of water due to overcrowding, or there is a shortage of housing. Cultural and educational facilities are delayed. Traffic rushes and congestion. Dense factories

cause pollution. The "rural city," on the other hand, is a city with a lot of rural areas.

On the other hand, the famous Howard, who advocated the "rural city," listed the following urban ills in his book "The City of Tomorrow.

(1) Isolation from nature
(2) Clutter
(3) remoteness of work location
(4) Rising rent
(5) Uncontrolled hours
(6) Drought, fog
(7) Air pollution, gloomy sky
(8) Slum

It has been about 70 years since this book was published, and if you look at the problems listed in the book, you will see that they are very similar to the various theories of urban problems that are being presented these days. It is just as well that Japan's cities have been suffering from the same problems as England's 70 years ago. It may be said that Japanese cities are exactly as they were in England 70 years ago. Many of the urban ills Howard described are also rooted in overcrowding. Overcrowding was also caused by the establishment of large-scale industry after the Industrial Revolution and the rapid concentration of unskilled labor in cities. In the United Kingdom, which was quick to recognize the evils of overcrowding, measures to combat urban sprawl were seriously considered. Some, if not all, of these measures have been successful.

However, Japan, which now ranks third among the world's capitalist countries in terms of GNP, has not made any progress in overcrowding control. We may say that we are still 70 years behind. In fact, it could even be said that this extraordinary rapid growth was made possible by neglecting overcrowding countermeasures. The reality that Japan ranks third in the world in terms of GNP, but twenty-first to twenty-third in terms of per capita income is a clear indication of the urban problems caused by overcrowding. However, this situation can no longer be left unchecked. It is said that in 20 years 80% of the population will be urban dwellers. If this overcrowding is allowed to continue, the world's third largest national income will be nothing more than a piece of paper.

1-2 Urban Problems from an Environmental Perspective

The following five factors can be considered when considering the urban problems listed above in terms of the physical environment that surrounds us.

1 Safety Issues Hazardous Conditions for Survival
2 Livelihood issues Decrease in quality of life.
3 Productivity issues Decreased production efficiency.
4 Activity problem Inefficiency of means of distribution.
5 Creativity problem Decrease in human development potential.

Let me begin by briefly explaining the term "environment. In the primitive age, man was thrown naked into nature. For humans, the environment was nature itself, and they lived in a way that allowed them to adapt to it. In the case of humans, in addition to such adaptations, we also remake nature to make it more convenient or less harsh for human beings, changing the flow of rivers, building cities, creating heating systems, and so on. In this way, we can say that nature has been artificially created. In this way, we can call artificially created nature, or the physical conditions that humans have formed by working on nature, the environment. The term "environment" is now widely used to refer to the social environment or the economic environment. Here, I will limit my discussion to the physical environment that surrounds us. Starting with the most familiar things, such as wearing clothes or building a house, we gradually create an environment that envelops not only one person but also the

entire society.

The typical example of such an environment that embraces the entire society of human beings is the city. But nowadays even rural and natural areas, which is less artificial than the city, are artificially processed. The term "environment" encompasses what we might call the human-made garment that envelops such a large, comprehensive society.

1-3 Five elements of environment

Environment is a general concept, but if we divide it functionally, we can think of the five elements mentioned above. Firstly, human beings must be safe from natural and external disasters. This is the first step in creating the environment.

We must prevent animals from harming us, and we must also prevent floods, strong sunlight, cold, and so on. For a human being to live a full life, the first and fundamental condition is to create a safe environment.

In the case of the urban problems mentioned above, the conditions for survival are being threatened. For example, traffic accidents and pollution have caused deaths and endangered the very survival of people. Many of these are caused by overcrowding.

The second factor is the living environment, which seeks to improve the comfort and convenience of life, but overcrowding has led to a decline in the quality of life, which is a major problem.

Survival is at the very least living, and humans have created an environment that improves the quality of life. However, due to overcrowding, the size of each house is smaller, there is not enough sunlight, and the waste treatment and sewage facilities are incomplete, which worsen the conditions of the living environment facilities and leave no time to improve the living environment. Since the beginning of the 19th century, when the urban environment became slum-like and the deterioration of the environment extended to upper class society, the so-called "visionary socialists" first tried to improve this living environment.

The third was the production environment. Firstly, once security is ensured, people seek to improve their lives. On the other hand, we need to produce the things necessary for life. These two basic elements support human life. However, as overcrowding has increased, production efficiency has declined. For example, trucks take a very long time due to traffic obstacles. In some extreme cases, truckers are only able to make three round trips instead of the 10 round trips they used to be able to make. In addition, overcrowding causes pollution. In the past, there was one factory in the middle of a rice field, and even if it made some noise, it was not complained about very much. When houses were built in the vicinity, they asked for something to be done about the noise. We had to improve the machinery. Or they drained some sewage into the area. They did not complain about it, but as the human population increased, they began to complain about it. To prevent this, treatment facilities are needed, and overcrowding has a negative impact on production costs.

The distribution environment is fourth on the list. This covers both the living and the production environment. However, the means of distribution has become very inefficient, which can be interpreted as mainly affecting production. From the production side, there is the problem of trucks, which I mentioned earlier, and from the living side, there is the rush to distribute goods.

Finally, there is the issue of the development of creativity. In terms of the physical environment, we ensure the safety of the environment and wait for the means of production.... Human beings are never satisfied with such a stable environment. They want to create something. If we were to describe a creative environment in physical terms, we could say that a university or a research institute is a facility for the development of creativity. However, because of overcrowding, creativity is no longer possible

in the city. If we compare it to the cerebrum, the survival environment is the interneuron, and the creative environment is the frontal lobe, which has recently been called the seat of the human will. This frontal lobe is no longer nurtured in the city, and urban people have become weak, palm-like human beings. For example, the problem of youth crime among young people and the decline in the quality of education can be attributed to the deterioration of the environment for creativity due to overcrowding.

1-4 The Physical Environment and Political Economy

The environment is also based on economic conditions and the social and political triangle. When we speak of creating a physical environment, we do not mean that things appear out of the blue. To establish the physical environment, the environment is supported by economic, social, and political factors, and in turn, the environment regulates social and economic conditions. On the other hand, the economic situation improves, or the system is changed because of the creation of material goods, and the material and socioeconomic aspects are interrelated. When slums are created due to lack of money, the economic aspect influences the material aspect. However, once a slum is created, the social goodness or badness that is born in the slum, and this harms the social condition of the city. This time, the physical environment affects each other in a reciprocal way, as if the social aspect is affected by the physical environment.

2 What is Overcrowding?

2-1 The Meaning of Overcrowding

So far, we have discussed the problem of overcrowding in terms of the five physical aspects that form the basis of the urban problem. However, the actual meaning of overcrowding has not been clarified. There are similar terms such as overcrowding and overcrowding. The opposite of overcrowding is undercrowding, and the term low density is contrasted with high density.

So how does the term "overcrowding" differ from other terms such as "oversizing" and "high density"? When comparing the term "high density," high density is simply high in density. High density means that the amount of material that depends on a certain area and a certain land is very large, such as when the density of human beings is high or the density of buildings is high. However, high density does not necessarily mean overcrowding, and conversely, even low density can be overcrowding. Mere density alone does not determine overcrowding. The first standard for urban planning is population density per hectare. Here, taking Yokohama City as an example, the population is about 44. The population density, however, varies greatly depending on how the city area is selected. For example, in 1935, the city of Yokohama was about one third of the current size and had a small population, but the density was 53 hectares. Before that, at the beginning of the Showa period, before the great merger of the Yokohama city area, the density was about 100 people. Therefore, the density of Yokohama City is gradually decreasing. This is because the city area has expanded, and it cannot be said that the former density was higher and the current density is lower. While the overall density is decreasing in the current city, there is an extreme overcrowding phenomenon in some parts of the city.

Thus, it can be said that the criteria for overcrowding do not necessarily come from numbers alone. Then there is the word "overcrowding. The term "overcrowded city problem" is often used. The terms "overcrowded city" and "oversized city" or "overcrowded city" are sometimes used interchangeably. Overcrowded cities are overcrowded because they are overcrowded. However, if we interpret the meaning more strictly, oversized means that it is too large by some standard. Excessive is a quantitative excess over a certain standard. If there is such a thing as a "standard city," then a city with a population of 500,000~700,000 is excessive in terms of the amount of population above the standard. There are studies that suggest that a city with a population of 500,000 to 700,000 is an efficient city, but this is also based on a very problematic premise, and it is difficult to determine a certain standard. It is difficult to determine a standard for each city, especially when cities are closely interconnected with other cities and are no longer independent entities, as is the case today. In contrast, overcrowding

differs from overloading in that overcrowding has a box to hold various things. Overcrowding, on the other hand, differs from overcrowding in the sense that there is an imbalance between the container and the contents, such as when a box is filled with various items, but it overflows or does not fit properly. Therefore, overcrowding can occur regardless of the size of the city. When there is an imbalance between the contents and the containers, overcrowding can occur even if the city is too small or too low in density. In general, however, overcrowding is more likely to occur when the population increases and becomes oversized. Even though the two are clearly distinct in concept, they are quite correlated.

2-2 Overcrowding from a physical point of view

What does it mean by "overcrowding from a physical point of view" as an engineering subject? What is the content? What is the container? I would like to consider these questions. The first is usually people, but recently the meaning of cars has become so important in a city that it must be expressed not only in terms of the population density but also in terms of the density of cars. Therefore, even if there are 100 people in the city, if all of them have a car, it is the size of a car. In principle, a single parking space requires 30 to 40 square meters if you include aisles and everything else. However, if you look at how much space is needed for a human being to sleep, it is only 2 square meters. Including various other living conditions, 10 square meters per person would be just fine. There are many overcrowded dwellings that are much smaller than this. However, whether it is overcrowded or not depends entirely on how many cars are owned. In the case of people living quietly and in the case of motorization, there is a difference in the degree of overcrowding even with the same population density. In the case of cars, not only garages but also long roads are required. Parking is also required at each destination. When all these factors are considered, an enormous amount of space is required.

Also, with the development of transportation, we need more space than ever before. Yesterday, I was staying in Nagoya, working a few kilometers outside of Nagoya, and then headed back to Nagoya to go to Kyoto in the afternoon. I went to Kyoto, used the hotel for a meeting, and then came back to Tokyo. Then I come back to Tokyo. I live in Yokohama, so I come back to Yokohama from Tokyo. Such activities can be done easily in a single day. So, as one person moves from place to place during a day, the more mobile he or she becomes, the more space is needed.

In the case of containers, the containers are also becoming more and more luxurious, depending on the patterns of human life. For example, even a single electric charge or a single water supply, which were simple in the past, cannot be compared to the way people used them in the past. A typical example is water. In the past, 150 liters of water per person was enough, but in Tokyo, it is about 400 liters. In Tokyo, however, it is about 400 liters, and in Chicago, 750 liters. It is said that the figure will soon reach 1,000 liters. The more convenient it becomes, the more demanding it becomes. It seems to me that we are repeating this phenomenon: the higher the demand, the more overcrowded it becomes.

There are also cases where there are no basic facilities. There is also the case of overcrowding due to inadequate facilities from the beginning. It is natural for people to live in places that are properly equipped with roads, sewage systems, water supply systems, and so on, but from the beginning, there are no such facilities. In other words, people settled where there were no receptacles. As seen in Yokohama, for example, there are many such places in the suburbs, and no matter how low the density is, it will always be overcrowded. People live in places where there is nothing and start to get upset when they say, "There is no passageway. This is also a kind of overcrowding due to the extreme imbalance between the contents and the containers. In Japan, there are many cases where such basic facilities are not provided. There are various ways to control the problem of why such things were brought in and why so many people are gathering here, but on the other hand, no matter how many people enter, if the containers are adequately made, there will be no overcrowding.

Furthermore, there is overcrowding due to incorrect placement or combination. There is a factory here, there is a house here, and so on. If they are all placed in the same place, we do not have to build

unnecessary facilities and do not have to worry about unnecessary noise. However, if they were to come in separately, they would cause friction with each other. This is another very common example of overcrowding due to lack of planning.

There is also the matter of the form not being able to withstand the container. For example, when the width of a road in the past became too wide for automobile traffic, it became unbearable for the existing road to accommodate the new traffic.

If there are no basic facilities, it is only natural to build them, and as long as they are economically backed up, the problem can be solved to some extent, but the following layout, combination, and form are not purely engineering matters, but rather urban engineering as a comprehensive technology or urban planning It is very important to solve these problems through a systems approach called urban engineering or urban planning, which is a comprehensive technology. Urban engineering is one of the means to realize urban planning. That is why I objected to the title "urban engineering" in the beginning, because there are so many aspects that cannot be solved by such engineering alone.

2-3 Social and economic overcrowding

In terms of overcrowding, the economic conditions that support the physical environment and the social conditions are also considered. As more and more areas are concentrated, it becomes easier for people to exchange information with each other. Or, for example, central heating becomes possible for the whole city, which is very inexpensive. In general, cities benefit from this kind of concentration, but the fact that these benefits are gradually diminishing is the problem of overcrowding from an economic point of view, especially the problem that has been discussed recently.

In terms of overcrowding from a social point of view, delinquency, crime, traffic accidents, and the decline in the physical condition of the population are all problems that have emerged. In many cases, there is a lack of adequate facilities and guidance to deal with these phenomena. As a result of social overcrowding, slums that are prone to crime have naturally developed. There is also the phenomenon of social overcrowding that is caused by physical factors. People's thoughts are regulated by these containers. The physical environment, as I mentioned earlier, affects the social environment, creating conditions such as uncleanness, unsanitary conditions, disease, and crime.

Overcrowding from an economic point of view can be explained as the point at which the cost of accumulation exceeds the benefits of accumulation. For example, economic overcrowding occurs when land prices rise or production efficiency declines. However, abstract economic overcrowding does not exist from the beginning, and what emerges from the physical city has economic repercussions in terms of land prices, traffic, pollution, etc. Furthermore, as overcrowding becomes denser and denser, it becomes more difficult for people to live in the city.

Overcrowding is also caused by the speed at which the city becomes densely populated. If the rate of filling is very slow, the containers can compensate for it. If, however, the filling is being added too quickly, the container cannot be reinforced. This is a phenomenon in which the container is only able to receive the contents. For example, according to the next census, the population of Yokohama will increase by more than 30% in the next 35-40 years. At such a high rate of population growth, urban facilities will not be developed in time, resulting in the phenomenon of overcrowding.

3 Causes of Overcrowding

I have already mentioned some of the causes of overcrowding, but let me try to summarize them.

First, urban concentration of secondary and tertiary industries, which are inevitably brought about by the socioeconomic structure, is said to be the general cause of urbanization. The concentration of administrative functions in cities is one of the basic causes of the formation of modern metropolitan

cities. Therefore, in searching for the problem of overcrowding, we must inevitably address the cause of this urbanization phenomenon itself, which cannot be viewed in its essence merely in terms of the physical city or its morphology.

The next possible cause of overcrowding is absolute overcrowding. Absolute overcrowding is a bit of a misnomer, but if we assume that the earth itself is the only container for human life, the absolute quantity of its containers is already fixed. On the other hand, the number of human beings is increasing at a furious pace. The number of human beings is said to be about 3.5 billion at present, and it will probably double in about 30 years. After about 600 years, according to some calculations, the current population density will be approximately one person per square meter. No matter where you go, there will always be one person per square meter standing next to you.

As the earth is a fixed object, overcrowding, which will appear sooner or later, is called absolute overcrowding, and classically, Thomas Robert Malthus (1766-1834) and others have taken up this aspect as an inter-population problem.

Then there is functional overcrowding. It can also be referred to as the overcrowding of the contents relative to the container. For example, when we consider the functions of people, cars, and so on, the standard of living has risen dramatically in the case of human beings. Earlier, I said that 10 square meters per person is sufficient, but this is the minimum, and it is not sufficient. In fact, without 20 square meters or more, it is not possible to meet the increasing demand for space for furniture, electrical appliances, etc. A 2DK in a public housing complex is not enough. A 2DK in a public housing complex is approximately 50 square meters. In contrast, a standard family of four would require 12.5 square meters per person, and it is doubtful how much living space such a standard can accommodate. As the standard of living rises, the amount of money required per person will increase, and the higher the standard of living, the more people will demand 20 square meters or 30 square meters. This can be clearly seen in the examples of developed countries. The problem of cars, as I mentioned earlier, is another factor that promotes overcrowding.

In addition, various central functions are required. For example, computers are being installed. As a result, the office space required per person, even per office space, is increasing. In addition, as more and more people actively communicate with each other, facilities for such communication are required. The increase in the number of functions means the need for more facilities, and this, too, will lead to overcrowding as more space per person is demanded per person than ever before.

As I have already mentioned many times, overcrowding from the container side is becaise the containers themselves become very old and the quantity of the containers themselves is not sufficient. The overcrowding is caused by the fact that the containers themselves become very old, the quantity of the containers themselves is not sufficient, or the containers are designed to hold 1 million people at first, but the number exceeds the expected 1.5 million or 2 million people. In addition, the containers themselves will be required to perform new functions.

In addition, there is overcrowding resulting from coordination techniques. Overcrowding can occur not only because there are not enough containers, but also because they are placed incorrectly.

One example of overcrowding is, for example, population density. Let me give you an example.
Let us assume, for example, that a house of 3 ken x 5 ken (15 tsubo) is built on a lot of 5 ken x 6 ken (30 tsubo). If this house is a flat house, there is a gap of 1 ken in depth and only half a ken on each side. If we consider the eaves to be half a meter long, the roof is almost completely covered by the site, and there is only a small gap in front. If we consider such a house and site side by side without any gap, there would be no fire spreading danger, no fire prevention activity, and little sunlight and ventilation. This condition is not necessarily the worst, but there are even worse examples. If we assume a population density of 4 persons per dwelling, the density is 400 persons per net hectare.

However, if the houses are raised to the second floor, sunlight and ventilation are finally possible, and if they are four or five stories high, not only are sunlight and ventilation no longer a concern, but playgrounds and flower beds can also be provided. Even with the same population density, there is a marked difference in the content of life. The efficiency of land can be measured more effectively when considering the "people-area" method. In this way, it is not only a question of density but also a question of engineering and physical planning technology, depending on how the population is arranged.

Thus, it cannot be assumed that the density is simply the number of people per hectare. For example, the famous Kamagasaki district in Osaka, which is now known as the Ai-Ring district, has a density of 850 people per hectare. However, in Nagoya, an urban housing complex called Mataho Housing was built, which has about 1,000 people per hectare. In this way, there is room for various improvements, such as the way the houses are laid out or arranged, depending on the way the containers are built, rather than simply saying that the city is overcrowded because there are too many people.

However, the problems are different depending on the measures taken to deal with them. For example, Moscow, the capital of a socialist country, was originally planned to have a population of 4.5 million, but it now has a population of about 7 million. Even with such a planned economy, it was impossible to control the population of a large city. However, as to whether Moscone is overcrowded because of this, the city itself is more neatly organized and systematically built than other cities. In other words, the contents are coming in rapidly, but the containers are being systematically and rapidly developed to solve the problem. That is the way it is possible.

4 Aspects of Overcrowding Prevention

4-1 Two directions

There are two major approaches to overcrowding countermeasures. The first is to affirm urban concentration to some extent and to solve it technologically and morphologically, which can be said to be a method based on urban engineering or urban design. The second approach is to deny concentration and to decentralize the city. This is no longer an issue of technology alone, but requires a new comprehensive technology called urban layout planning, land use planning, and other planning from a broad perspective. In the case of aggressive denial of concentration, methods such as forcibly preventing population influx or restricting urban functions are used.

The first method attributes overcrowding to the poor way in which urban containers are built, and attempts to adapt the way in which these containers are built to meet modern requirements.

However, these two approaches are not in conflict with each other, and they often go hand in hand to prevent overcrowding. For example, to avoid the concentration of population in the city center, it is the second method of wide-area planning to absorb a certain amount of population by locating satellite cities around the city center. The same problem arises because the mother city must also be appropriately shaped to cope with overcrowding. The balance between concentration and decentralization is the key to preventing overcrowding.

4-2 Affirmation of Concentration

There are three general directions in which concentration can be affirmed. The first is to increase the real capacity of the city as a container and improve its functions by supplementing or redeveloping the existing city with the benefits of agglomeration. The second is the idea of creating a second new city, leaving the current city as it is, even though it will be centralized. Kenzo Tange's Tokyo Plan, which extends out over Tokyo Bay, the formation of a second Tokyo by reclaiming Tokyo Bay by the Industrial Planning Council, and Kiyonori Kikutake's Maritime City are all descended from this idea.

The third method is the "new town" style, in which the mother city is redeveloped to some extent as a countermeasure against overcrowding, while avoiding the concentration of the entire burden on the central city, and placing cities with a certain degree of independence in the vicinity of the mother city. New towns in Japan do not have their own unique characteristics as towns, and are not what is called "new towns" here. The new town plan is decentralization while affirming urban concentration to a certain extent, and it seems to stand at the point of contact between concentration and decentralization measures.

4-3 Measures to Negate Concentration

On the other hand, there are also three ways to counteract overcrowding by denying centralization and decentralization. The first is to move certain functions out of the city to relieve the internal pressure of the city, such as the planning of new towns, construction of government offices and new industrial cities. The second and third methods of the previous centralization policy have something in common with the first and second methods, even though they are different in the way they are applied. The second is to strengthen the existing cities in the regions and to stop the one-sided concentration in the big cities in the central cities of the regions. Of course, since each regional city has its own concentration, it is necessary to rationalize urban design within the city. The third way is to deny concentration altogether, and the extreme case is the restriction of moving in, as has been done since the end of the war. Restrictions on the construction of new factories and schools in the metropolitan area can be said to be along these lines.

These measures, while being implemented by combining each of them, are designed to counteract overcrowding.

4-4 Direction of Physical Measures

The concentration of population in metropolitan areas is increasing, and although Japan's population is estimated to be 160 million in 1985, approximately 60 million, or more than 50%, will be concentrated in the Keihin, Hanshin, and Chukyo zones, which are said to be the three largest metropolitan areas. Even in socialist countries with planned economies, it seems to be difficult to control this concentration of people with a planned workforce. Therefore, urban design that creates a rational container to prevent overcrowding of people, goods, information, and vehicles will play an important role in future countermeasures against overcrowding. The technologies that were previously considered separately, such as roads, sewage, and railroads, must now be considered from the perspective of the city as a comprehensive human environment and container for humans. This comprehensive technology is the field of urban engineering. At the same time, however, it requires a different field from conventional engineering technology, such as the relationship between land use and railroads within a city, the relationship between land use and urban functions, and the layout of the mother city and surrounding cities. From a physical point of view, a new urban planning science that goes beyond the field of engineering is needed, and since cities are also at the opposite side of the problem of rural overcrowding, it is necessary to develop a broader perspective of regional planning.

In addition to the physical aspects, let us look at economic measures. Some economists have adopted a method of determining the imbalance between social capital and private capital by determining a certain coefficient of overcrowding. However, is it sufficient to measure the addition of social capital quantitatively? Even if additional investment is necessary, the results of the same amount of investment can vary considerably depending on the specifics of that investment. Economic analysis is useful in analyzing the causes of overcrowding. However, although it can provide a rough indication of the measures to be taken, when we consider a city as an aggregate of things, it ultimately comes down to physical measures.

4-5 Socioeconomic measures

Economic measures are related to physical measures. For example, there are economic policies such as increasing train fares in large cities because they are expensive, or specially increasing water rates in large cities to weed out those who cannot bear the economic burden by having them bear the cost through fee policies, thereby preventing excessive concentration.

Then, from the perspective of social measures, we should decentralize functions. For example, decentralize the functions of universities and research institutes, or decentralize government offices. For example, there are measures to decentralize the functions of universities and research institutes, or to decentralize government offices, or to create a research and educational city. As with economic measures, this will also come down to the physical aspect.

4-6The role of physical measures (engineering and planning measures)

I have listed various measures, but in the end, whether we agree or disagree with centralization, we must consider various economic and social measures, and in the end, we must consider how to make the city as a collection of physical objects, or as I mentioned earlier, the city as a physical environment. What kind of measures should be taken? In other words, the city as a physical environment, as I mentioned earlier, depends on how it is made. Even if we say that the school alone will be separated from the city, how will the site of the school be used? There will be an immediate physical problem. Even if we say that the factory will be relocated, we do not want the same pollution and overcrowding problems to occur at the new location. Therefore, it is necessary to determine what kind of concrete measures should be taken to address these problems. In the triangular structure I mentioned earlier, even if economic and social measures are added, how they will be realized in the end is only clear when they are materialized.

Once these measures are implemented, they cannot be changed drastically. For example, as I mentioned earlier about the expressway problem, the expressway is coming into Yokohama. It is a very difficult problem to take real measures to deal with all the traffic and street problems. With a piece of legislation, if you try to do something and it doesn't work, you can rewrite the legislation and change the measures. However, when it comes to a city as a collection of physical objects, once a measure has been implemented, it cannot be changed again. It is not easy to change something that has been physically established for a long period of time, such as 30 or 50 years.

That is why, when economic and social measures become physical, we can see the signs of a shift toward the synthesis and materialization of all measures.

As I mentioned earlier, urban engineering is not only engineering, the art of building things. It also includes various kinds of integration. For example, there are traffic engineering, sewerage engineering, and road engineering, which can be considered as part of urban engineering, but if you ask whether road engineering is urban engineering, then it is not equal to urban engineering. There is also traffic engineering and sewerage engineering. This is also not equal to urban engineering. As I mentioned earlier, a city is a large human-made environment. It is a social environment. That is why it is in a complex state. There are roads. There are buildings. There are parks. A park is a park and there is landscape engineering, or a building is architectural engineering, but architectural engineering is an end. However, when a building is built, the sewage pipes must be as large as possible. The building must be able to accommodate human beings, who must fulfill various functions.

They must be able to shop, eat, and ride the train, so the transportation system must be well-developed as well. A city is a state in which these things are all intertwined with each other. Therefore, urban engineering is about how to solve such intertwined situations, not about individual technical solutions.

For example, as a technological solution, there is the overcrowded house in the previous example. By reconstructing it to about 5 stories, a much better housing environment can be obtained. This is simply a technological solution, but the actual city is much more complex and not only such a residential area.

For example, if there is a large factory next to a residential area that makes a lot of noise, no matter how many 5-story buildings are built, the problem of overcrowding will only be solved by the amount of daylight, not the noise. It is impossible to solve the noise problem unless the entire building is relocated to a different location and the factory and housing are separated. Therefore, urban engineering is not limited to physical engineering and technical solution of problems. The premise of urban engineering is the concept of planning. The basis of planning is not only the problem of containers, but also the problem of content, as I mentioned earlier, what kind of life will the content be? What kind of life will human beings lead in the future? In what kind of place and in what kind of manner will human work be carried out? How much and where is needed for human leisure? We need to think about how human life should be in such a civilized world, as well as about the containers that hold it. Or how will the car develop? Urban engineering is the correlation between the contents and the containers.

When we talk about urban engineering, it is often said that we only build containers. It is often thought that if we only build a bucket with a large container, anything can fit in it. However, a city is a correlation between the container and its contents. Even if the container is more magnificent with fine roads and sewers, it is meaningless if the contents are not as substantial.

For example, Nagoya is often mentioned as a relatively successful example of urban planning in Japan. Nagoya started urban planning immediately after the end of the war. As you will see when you go there, they built the best roads in a large city, including 100-meter roads. But then, how is the life of people in Nagoya? As you can see, Nagoya has the most developed underground shopping center. The reason why underground shopping malls have developed is because the roads are too wide, and although they have become very convenient for automobiles, they have divided both sides of the road. The roads became too wide, making them very convenient for automobiles, but they were divided on both sides of the road. So the roads were all taken by automobiles. In Nagoya, roads used to be for people to walk on, but in the case of Nagoya, they are completely for automobiles, and all the people have gone underground, swirling from building to building in the underground shopping center. In Nagoya, people laughed when I told them that they would not be able to move around unless they knew a map of the underground malls, not to mention a map of the ground level. People are wandering around in the dimly lit underground malls, where there is no sunlight at all. It is a strange town where everything, from bars to restaurants, is located.

Nagoya was indeed very successful in one respect, but what kind of life would people lead in that era? In other words, they thought about the contents of the cars, but they did not think about the most important of the contents, the human being. Somehow, the master, the human being, has gone away. As a result, too much weight has been placed on the creation of containers, and the city has not been a success in creating a city for human beings. When considering urban planning in the future, we must think of a place where the container and the contents are in perfect balance. However, in the case of Yokohama, due to confiscation and other problems, the container was not considered very much after the war. The same was true in Tokyo, where the containers were finally considered in a hurry under the name of the Olympics. Yokohama is even later than Tokyo, and overcrowding is occurring before the containers can even be built satisfactorily.

However, urban engineering is not only a technical solution, but it is also necessary to consider so-called planning solutions. If we do not consider the way of human life and the future of cars in the planning solution, building only containers may be equivalent to building slums and ruins.

5 Proposals from Urban Design and Planning

Many proposals have been made from the standpoints of urban design and planning, which consider the city physically.

One idea is to use space densely in a rational way, assuming that densification cannot be avoided.

Three-dimensional expansion of human habitable space such as aerial cities, subterranean cities, and maritime cities are examples in this line of thought.
An example of this type of urbanism is the futuristic urbanism proposed by the Italian designer Santeria in 1922. He advocated the construction of three-dimensional roads in cities in 1922, before the Great Kanto Earthquake of 1923, when automobiles were still rarely used. After that, road traffic became the basis of the city, and the city became an empty three-dimensional intersection, with roads like a mesh and buildings connected by elevators in a three-dimensional high-density configuration.

In fact, this idea did not come into being until the 20th century, and was even illustrated by da Vinci during the Renaissance. Although there were no automobiles in that period, he separated the carriage traffic from the human walking traffic. These examples show the idea of securing space for human beings while measuring three-dimensionality. High density does not necessarily lead to overcrowding and denial of human beings. On the contrary, it can be said to be an urban design technique that anticipates overcrowding early on and considers the protection of humanity while rationally resolving it.

After this period, there was a proposal by the American architect Wright called the Mile Tower. The mile-long tower, shaped like a tripod, is a mile high, or 1,600 meters, and can accommodate about 20,000 people for work. The office space is completely concentrated here, avoiding the need to expand the town. Except for the tower, the rest of the site is a natural setting of fields and forests, in which the residences are located. The tower can be seen from every residence through the forest. "Ah, there is our city. "Our father is working there." The tower has a significance as a symbol of the city.

In the past, buildings played a symbolic role in the city, but today, the city is a jumbled mass that no longer appeals to the human mind. In response to this, technologically speaking, the high-rise building is a thorough implementation of one idea for achieving high density that combines the function of a symbol of the city with all the necessary items in a single building.

Next is the famous French architect Corbusier's "City of Light" (1935), a tower-like building of 60 to 70 stories with a base pattern that would accommodate a population of 3 million people. Despite its high density, it has plenty of green space between the towers, demonstrating that a high-density modern city can provide a rational and healthy lifestyle.

The Mile Tower differs from the Mile Tower in that it does not attempt to accommodate everything in a single building, but rather to build the city as a mass of buildings of a certain height, both of which aim for high density, but in very different ways.

It is a famous story that when Corbusier visited the U.S., he saw the Manhattan skyline and said, "The buildings in Manhattan are too low. The proposal to raise the city into the air has already been seen in the previous Santeria, and Jonah Friedman advocates a city suspended in an aerial structure. Housing, transportation, industry, etc. are gathered into this aerial structure, creating a dense development, while below this aerial structure, farmers farm and forests are located. He also proposed to hang such an aerial structure over the Straits of Dover.

Kenzo Tange's Tokyo Plan 1960 utilizes Tokyo Bay and has a school zone and a residential zone with an urban axis extending out from the bay. In the above-mentioned classification, it can be called the second urban type. In these methods, the concentration of population in the city is unavoidable, and the emphasis is on maintaining good environmental conditions and resilience for the future, while rationally centralizing the population. If concentration is inevitable, we should not install containers in a haphazard and unplanned manner, but rather, even at the cost of some sacrifices, we should prevent overcrowding and rationalize through higher densification.

The city center is experiencing a doughnut phenomenon, with a declining population and a rapid outward expansion of residential areas. Even in central Tokyo, the average floor is less than two stories

high, so sprawl to the periphery is unavoidable. As a result, commuting distances have increased, creating commuting hell. It is said that the energy consumed in commuting to and from work is 800 calories per day. It is a great loss to society to use more energy in commuting than is used in work, and the loss will be far greater than the loss caused by high-density commuting. Considering this point, I think we have no choice but to think of ways to maintain the human environment despite high density.

All of the proposals I have mentioned so far are engineering or design methods of constructing a city as a structure. However, before suddenly building a structure, we can also consider measures against overcrowding from the standpoint of land use. While design is mainly a proposal from architects, land use is the domain of orthodox urban planners. In land use, the shape of the containment is not the only consideration, but the layout of the containment itself, its interrelationships, and the regulatory system for human access to prevent the creation of overcrowding.

The pioneer of this type of thinking was Howard, the first of the above-mentioned pioneers, who thought of establishing rural cities that combined the charms of the city and the countryside in suburban areas far from large cities. Although the attempts at Letchworth and Welwyn in this period were not always successful, they gave rise to many new towns in England. The construction of such towns has attempted to alleviate the pressure of overcrowding in urban centers.

Around the same time as Howard, the Italian Tony Garnier proposed an excellent city plan at the beginning of the 20th century. His proposal for an industrial city was in response to the development of industrial society, but he clearly separated the functions of the city into housing, labor, transportation, and comfort, so that there would be no confusion in the functions of the city in the future development. This was an attempt to give positive significance to modern industry, which had been neglected until then, by introducing the basic concept of city planning as a zoning system. This idea was later adopted by the CIAM (International Council of Architects) as the basic principle of modern urban planning, which divided the city into three functions: labor, housing, and recreation, and connected them by a fourth function: transportation.

Patrick Geddes opened the frontiers of urban planning techniques with his quantitative analysis of the city at the London Exposition of 1914. The possibility of quantitative treatment of urban ills and urban problems by interpreting them from the perspective of the beautiful and ugly made it possible for a new profession of urban planner to be established.

These series of proposals, of course, cannot be said to be a one-size-fits-all solution to overcrowding, but they opened planning methods such as land use and the arrangement of facilities, and proposed a harmonious urban form, in addition to the previously mentioned methods to prevent overcrowding by increasing the density.

Various measures have since been considered to prevent overcrowding by giving elasticity to the urban structure through the land and urban patterns.

The Great London Plan (1944) used a green belt to prevent urban sprawl and a cluster of new towns in the suburbs outside the green belt. 1944 was during World War II, and even though there were air defense reasons, the British were thinking about the future development of the city. We admire the British for thinking about the future development of the city. In Japan, too, the Metropolitan Area Development Plan was drawn up completely following the Great London Plan, but it failed miserably because it lacked the means to implement the plan.

There is also the idea of the zonal city. This was implemented in Volgograd (Russia, previously named Stalingrad), but it avoids the centripetal radial city, and instead arranges the city in a long and narrow strip, extending it as long as necessary. Kenzo Tange's Tokyo Plan advocates a city with this kind of elasticity. He illustrates how the evolutionary process of animals has progressed from mononuclear to dorsal thrust animals, and argues that an axial form is the right way to incorporate higher and more

complex functions.

In the case of the Great London Plan, it is proposed that the bucket that serves as the container should be rationally created, and in the case of the zonal city, it is proposed that the city should be able to expand and contract to provide elasticity, so that even 20 or 30 million people, let alone 10 million, can be accommodated without overcrowding. These methods can prevent some degree of overcrowding, if not absolute overcrowding.

6 Toward Planned Overcrowding Countermeasures

The various proposals I have mentioned so far, such as the aerial city and the subterranean city, are engineering or formative proposals based on advanced construction technology. However, mere formative or technical methods alone will not solve overcrowding. It is also necessary to take planning measures that are based on the premise of conventional narrow construction technology, such as a rational way of land use and the relationship between street layout and land use. Technology can only demonstrate its power when it is perfectly matched to the plan.

Let us consider what kind of engineers have been involved in conventional urban development. The first to be enthusiastic about urban planning were the landscape architects. Architects only built small dots in cities. Civil engineers were involved in point building, such as bridges and tunnels, but they were also involved in line building, such as rivers, roads, and sewage systems. Landscape architects, on the other hand, were creating a certain amount of area. Therefore, landscape architects did a lot of work in the early days of cities, which have an expanse of land. However, the landscapers were not sufficient as an element of city-building, since their actual targets were trees and plants rather than human dwellings. After landscape architects, it is civil engineers who have been engaged in urban development. The reason why civil engineers have been at the center of city planning is that it is essential to have roads, transportation, railroads, sewage systems, and other key facilities in order to build a city. However, as I mentioned earlier, although roads alone have been built very well in Nagoya city planning, the question is what will happen to the land divided by roads. Since roads are the framework of the city, but not the meat, many proposals were made by the architects who create the meat. Architecture plays an important role in town planning because it is the vessel for life itself and for the city. Therefore, a new field that combines these two is needed.

A city is a complex organism composed of various elements. Therefore, to think of a city only in terms of one aspect, such as roads, is to think of the city as a blank slate, which is no longer a city at all. Roads are certainly an extremely important element of the city, but their significance lies in the fact that they exist as a part of the organic body of the city. Comparing a city to the human body, there is a difference between the study of the heart, blood vessels, and other individual tissues and skills in glycolysis, and the study of circulatory function and its relationship to other organs in a living person in physiology.

The individual techniques of landscaping, civil engineering, and architecture correspond to anatomy and are individual specialized techniques, but as each technique evolves, the science of planning becomes necessary as a comprehensive science corresponding to physiology, which examines these techniques as a living whole and their functions.

Systematically, planning can be thought of as a comprehensive system with two axes and four elements. One axis is the planning of physical, visible things. Technology and form exist at both ends of this axis. The other axis is the non-physical problem, with analysis and management at both ends. In fact, these two axes are in a complementary relationship and finally settle on the first, the other, the form of the thing. The first of the physical axes is technology, which emerges as a counterbalance to nature, based on natural laws and rooted in them. The second is morphing, which is called design. It is born in response to the spirit of the times, human psychology, etc., and its physical existence is determined by technology and form.

And in what should be called the non-physical socioeconomic axis, the first begins with the art of analyzing the social situation and ends with how to manage it according to the economic and social conditions.

Tracing back in time, if we limit ourselves to the problem of urban overcrowding, we must first recognize and analyze the situation of overcrowding. To what extent is it overcrowded, who lives there, what kind of people live there, what role do they play in the city, why are they doing so, what do they want, do they have the funds, etc.? As a result of all this, if we decide to do something to reduce overcrowding, the question immediately arises as to what exactly we are going to do. As I mentioned earlier, simply reducing the population density does not tell us whether it is overcrowded or not. Whether or not overcrowding can be eliminated can only be answered when it is made into a concrete form. Giving it a concrete form, technical considerations are necessary. It is necessary to examine not only construction technologies such as architecture and civil engineering, but also facilities, landscaping, etc. in an integrated technical manner. However, it is not enough just to say that it is technically safe or feasible when giving it a concrete form.

In a city, people live there. People are not machines, so even if you build a walking belt, for example, they will not just be carried around like a machine, but there is a difference in the richness of life in a city if there is something there to comfort the human spirit. This is the reason why the form itself is so important. The field of urban design is needed.

Furthermore, for those that are physically completed, the management problem of how they will be financed and who will operate and manage them after completion will be considered as a non-physical problem. The physical and non-physical axes are complementary, and it can be said that overcrowding countermeasures based on planning science are to narrow down the solution to the overcrowding problem based on the interrelationship of these two axes.

However, the process of building something, even if it is not a city, follows a similar path. For example, when we make a cup, we consider what kind of people are demanding this cup. If this cup is to be sold as a business, how should it be sold? This is a problem of management. Then there is the technology of making glass cups, such as how to make glass or the cutting technology. And then there is the question of the form of the glass, which is beautiful, and whether it is comfortable for people or not. There is also the question of form. The shape of even such a small object is determined and manufactured under a comprehensive plan.

This is true even for a single glass, and it becomes even more complicated when it comes to cities. In a city, many people with different and conflicting interests live in one place. There are in very different positions, such as producers and consumers, and there are also many technological complexities. When integrating such things, it is inevitably necessary to coordinate these internal considerations, give them targets, and find ways to respond to these demands. For this reason, it is necessary to look at the city and the region from a broad perspective and to plan as a comprehensive whole, which is called agricultural planning when applied to rural areas or urban planning when applied to cities. These are collectively referred to as regional planning.

Next, if we trace back the history of physical town planning, we can see that after the Renaissance, modern cities first emphasized the beauty of the city. The emphasis was on large, straight streets and large parks. However, since the Industrial Revolution, population has been concentrated in cities and the problem of overcrowding has arisen. Urban beauty has been a problem of the skin of the container. In contrast, what has recently become a problem is what to do about the inside.

What will probably become even more problematic in the future, however, is the question of what will become of human beings themselves, although the relationship between such containers and human beings will remain a physical theory. In other words, in Japan, more than 80% of people will be living

in cities in about 20 years, and cities will become like a mass of human beings. In such a situation, what kind of life will be possible for human beings? What is the meaning of the gathering of human beings in a city? In a city where people are densely packed together, the phenomenon of alienation of people is more likely to appear. The individual is alienated while many people gathered, and the revival of community has become a central issue in urban development as a remedy for this situation.

For example, slum clearance is used as a countermeasure against overcrowding. In the case of slums, something human remained, but after development, the slums are cleaned up in terms of form but lose their humanness.

We have been talking about human beings as the "core" of the city, but now we are in a situation where human beings are treated as nothing more than a material part of the city's core. In response to this situation, it is necessary not only to scientifically solve overcrowding, but also to create a system in which living people can gather at the same time. In addition, I would like to point out the importance of a fundamental philosophy concerning human beings themselves.

7 Visions of Overcrowding Countermeasures

Who then benefits from overcrowding control measures? Because the city is a comprehensive entity, the relationship between the benefits of overcrowding countermeasures, which is at the heart of urban problems, is complex.

The inefficiency caused by overcrowding in cities has already been seen in the case of industrial capital, and the need for rationalization of this inefficiency has been called for. Roads, ports, industrial water, etc. have been considered as remedies for overcrowded cities to increase industrial efficiency.

On the other hand, the quality of life of the city's inhabitants has also been forced to deteriorate due to overcrowding. From the side of industrial capital, improving the quality of life of workers is also becoming necessary to maintain the recruitment of labor. It is also important for the whole country to alleviate the social problems caused by overcrowding and to prevent social unrest.

The benefits of overcrowding measures are thus spread over various fields, but in the end, as mentioned at the beginning, they should be directed toward improving the overall environment of safe production, living, distribution, and creation, and not only for the benefit of specific beneficiaries.

In urban life, a certain degree of concentration is natural, and it is unavoidable to have high density to the extent that it does not lead to overcrowding. Therefore, it is difficult to expect the same light, air, and greenery as in the countryside. However, this does not mean, of course, that cities should become slums swirling with the soot and filth of the immediate post-industrial revolution era. What then? There are at least three ways to go about it. The first is to set a minimum standard of living for citizens. According to Engels, in early 19th century Glasgow, three to four families lived on each floor of a building, with 15 to 20 people crammed into a room. Because of the lack of sanitary facilities in these poor neighborhoods, some studies have shown a higher mortality rate in one-room dwellers compared to two-room dwellers or three-room dwellers. In Japan's large cities, there is a situation where several people are crammed into a single 6-mat room.

Improving such a bad situation, the famous Lord Shaftesbury made efforts to improve the social conditions of workers in England. Subsequently, a national survey of sanitary conditions was announced, public health laws were passed, and by the end of the 19th century, building and urban ordinances were legislated to clear streets, secure vacant lots around buildings, improve slums, etc. These efforts were, in essence, the beginning of a new era in urban development. These efforts were, in essence, to define minimum standards of civic life in the city and to protect life. The establishment of such a minimum standard of living will still be an important tool in the fight against overcrowding in the future.

The minimum standard of living per capita should include living space, water quality, air quality, playgrounds, green spaces, etc., and strong measures should be taken to protect these standards. Of course, standards will continue to improve with time.
Along with that, the highest standards may also be necessary. Urban life should be used for the common benefit of many people, and it is unreasonable to have vast private gardens and mansions in the city while public parks are meager. Urban life should be limited to a certain level, and any higher level should be used for public purposes.

The second measure is how to rationalize the given urban space. Achieving this, it is necessary to avoid the use of the land in an uneven manner, and to establish a rhythm by coexisting densely populated areas with vast parks and green spaces in contrast. In Japan, for example, Ueno Park is 50 hectares, Hibiya Park is 15 hectares, and Yokohama Park is only 5 hectares. In London, Hyde Park is 47 hectares like Ueno Park and Kensington Park is twice as large, and Boulogne in Paris is more than three times the size of Kensington Park with 320 hectares. The famous Central Park in the center of Manhattan, New York, with its many skyscrapers, is more than 300 hectares, more than 20 times the size of Hibiya Park and 60 times the size of Yokohama Park. This vast green space contrasts with the magical skyscraper, which is urban land use. While public spaces are made as large as possible, they are also made three-dimensional, rationalized, and densely packed. This strong accent gives charm to the urban life, which is often monotonous.

Overcrowding measures are not a matter of uniformly and evenly reducing density, but rather the coexistence of high-density rationalization and open space in a confrontational manner.
The third is the human claim to motorization. Motorization has pushed human space into underground malls and buildings. However, as seen in the case of Fort Worth(Texas), there is a plan to reserve the entire city center as a place for people and have cars park in the periphery. The Smitson's Berlin Plan also provides space for people to move higher above ground level by means of a network of pedestrian decks. The idea of man-made land also focuses on the restoration of land at the disposal of human beings. Such planning measures should be used to actively separate people from their vehicles.

Through these means, urban functions that had been paralyzed by overcrowding were restored, and human life within the city was maintained at a standard and improved. However, what is more important is that the city is only one form of human settlement. Although the current concentration of population in cities is continuing, the difference between urban and rural areas will disappear when the means of information is fully developed. There is a limit to urban engineering and planning methods that attempt to rationalize the city as a physical entity. Just as the magic skyscraper and the large fringe land coexisted within the city, the city and the completely natural area must coexist within the land of Japan. In between, a rural form of settlement could be considered. It is necessary for human beings not to be fixed only in cities, but to flow among such striking contrasts. Urban life has many negative aspects if man is not to lose the richness of his creativity. Even if rational cities are created that eliminate overcrowding, people will not be satisfied. The city itself is difficult to move, but man is free to move. What cannot be obtained in urban life will become more and more important in the future. Human beings should not be immobilized in one city, but should be free to move about. Planning only for the city is not sufficient to create an environment that makes this mobility possible. All environments must ultimately function as creative environments.

If human mobility becomes possible, overcrowded cities will be abandoned, people will flow out, overcrowding will be eliminated, or fundamental measures against overcrowding will be taken. On the other hand, if there is no mobility, no matter how much engineering is done to relieve overcrowding, it will only be temporary, and overcrowding will soon return. A city is merely a means of settling freely moving people at a certain point in time and according to a certain purpose. Creating a new environment other than a fixed city, where free and creative people can be nurtured and settled, is the only way to eliminate the negative effects of overcrowding.