

A STUDY ON URBAN FORM AND STYLE FOR HIGH-DENSITY LIVING — CASE STUDY OF CHUO CIYT IN TOKYO

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Summary

Mega cities in Asia, utilizing western scientific technology, have achieved modernization while maintaining their own cultures and embracing the nature. How can those cities with huge populations be sustained over next 100-year period? Redefinition of 'sustainability' itself should be the objective of this study. This led to the conclusion that we should produce an urban design for a light life in a light city. The expression light city means a vigorous and flexible city, designed through application of leading-edge technology such as highly advanced infrastructures, lightweight and flexible structures, and information technology (IT). It is a city that achieves savings in energy consumption through innovative lifestyle. Light life means urban living in a light city. It is a lifestyle that is not based on the materialistic values of people who live in commercial and residential areas. The light life can be achieved when IT and infrastructures are thoughtfully developed.

1. Reality of Mega Cities

We are now looking carefully at emerging mega cities in Asian countries, because we are interested in how they will sustain into the future. These mega cities, utilizing western scientific technologies, have achieved modernization while maintaining their own cultures and embracing nature. We believe that analysis of these mega cities is very important in considering the issue of the global environment.

How can cities with populations of, for example, more than 100,000 be maintained over a 100-year period? What is required for cities to maintain their identities and realities while performing as members of the international community, without having a self-contained system? What does sustainability mean to cities? We tried answering these questions.

1.1 Sustainability for Tokyo

We studied inner-city districts of Tokyo. The reasons why we chose Tokyo for our study are:

- Tokyo is a mega city with a high concentration of population
- Tokyo has a distinct 400 year-old urban culture.
- Tokyo, utilizing natural landscapes, has been developed by large-scale renovation.
- Tokyo is a functional pre-modern city, and it is materialistically new.
- Tokyo is a city in which the service industries are vigorously active, today.
- Tokyo is technology-based.
- Tokyo has its own lifestyle in a fusion of western and eastern cultures.

On a global scale, there is strong expectation of considerable urban population growth in megacities over the next one hundred years. We thought that Tokyo would make a good model for design of the new city.

1.2 High-Density Living

Tokyo has a population of about 13 million. The daytime population of 23 of its wards is 8 million, and the population of five Tokyo central wards is 800,000. If the populations of three neighboring prefectures, Chiba, Saitama, and Kanagawa are included, the residential population totals about 34 million. Of this 34 million, 6 million people commute to and from the center of Tokyo.

Tokyo has a highly advanced railway system (including central-city subway system). Trains are scheduled to depart on time, at a few minutes interval, from early morning until late at night. Tokyo has a large number of high-rise buildings located in many areas, and a vast number of very low-rise buildings. Groups of low-rise buildings expand two-dimensionally into suburbs that sprawl for many kilometers. The population of the suburbs is 30-50 times greater than that of Tokyo.

We believe that if our urban design encourages more people to live in the greater Tokyo central area, and to enjoy efficient urban lives, we will be on the right track for solutions to such problems as energy conservation and waste disposal, which are critical to the global environment.



Figure 1 High-Density Buildings in Chuo City, Tokyo (photo by Chuo-ku)

1.3 Energy and Culture

Over the last 50 years, Japan strived to build cities suitable for Japan in the 20th century. As a result, energy and materials consumption have increased considerably compared with the energy use of 50's and 60's. But, Japanese people traditionally used to respect non-materialistic values. The wisdom and aesthetic sensibilities of people who were used to having scant resources were respected, and developed as a social system. People were careful not to waste anything, and conserved energy, and preserved things. A system of recycling was established as a cultural system within society. Those people who were not consuming as much energy as we do today used to live happily. And their lifestyle was very cultured. I realized that energy consumption levels are not necessarily proportional to the quality of people's lifestyles and happiness. Because I have observed Tokyo in its transition from the time when Japan was a still developing country through to when it became an economically advanced nation. Our proposal for urban design has been produced with this perspective firmly in mind.

1.4 Paradox of "100 Years = Three Generations"

The theme of this plan is to study urban design which is sustainable over a hundred-year period. At the outset of the study, we were struggling. The problem was that it was hard to assess accurately what resources would be utilized over the next hundred years at a macro level. How could we visualize cities in the future if we couldn't even foresee basic energy resources for the near future? It seemed impossible for us to make an assessment, even allowing that a hundred-year time-span is far too great to actually predict the future.

On the other hand, if the time-span is considered from the perspective of units of 'generations of people,' 100 years can be regarded as merely a period of three generations. In other words, within the span of 100 years, grandparents can talk face-to-face with their grandchildren. This is a time-span people can expect to experience in a normal lifetime.

So, while 100 years hence appears to be the far distant future, we can say it is not so removed from our everyday life. This is a major paradox.

We had to avoid walking into the trap of this paradox. So, we decided that we would first observe the changes in our normal lives, and produce a scenario that describes the situation 100 years on with a mind to specific technologies and design methods that are or will be available. We considered that we could realistically visualize future cities if we took the approach of using micro-scale level analysis of things under different conditions and integrated the results.

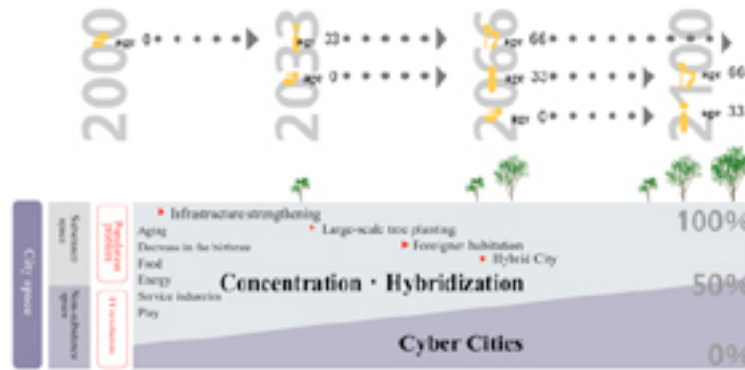


Figure 2 Proposed Out line Process of Three Generations in 21C

2. Light Life in a Light City

We decided that a redefinition of 'sustainability' itself should be the object of our study. This led to the conclusion that we should produce an urban design for a light life in a light city.

2.1 Light City: A Vision for Urban Design

The expression light city means a vigorous and flexible city, designed through the application of leading-edge technologies such as highly advanced infrastructures, lightweight and flexible structures, and information technologies (IT). It is a city that achieves savings in energy consumption through innovative lifestyles. And, it is a city that reinvents itself according to changing times, in harmonious coexistence with nature.

2.2 Light Life: A Vision for Urban Living

Light life means urban living in a light city. It is a lifestyle that is not based on the materialistic values of people who live in areas where commercial and residential districts are adjacent. The light life can be achieved when IT and infrastructures are thoughtfully developed. It is also a lifestyle that contains a balance between materialistic and non-materialistic cycles, high quality services, cultural and economic activities, and people's everyday lives.

In the light life, people practice a lifestyle that makes daily use of leading-edge technologies, while still enjoying nature. It is a multi-faceted and lighthearted urban lifestyle that capitalizes on the respective benefits of both long-cherished tradition and advanced technology.

2.3 Toward Values Based on Non-Materialistic Considerations

In the course of our urban design study, we decided that although practical and efficient production, processing and distribution of materials and energy are obviously important, these approaches do not solve all problems. Given modern people's insatiable acquisitiveness and the world's booming urban populations, we concluded that materialism itself is an issue. Therefore, we considered it rather important to examine values which are not based on materialistic views, in order to construct a new definition of sustainability.

In the 21st century, both the environment and information are highly valued. Trans-national communications between peoples that are represented, for instance, by the link between people and nature, or the link between people, will be more important and valuable, in order for people to feel happy and fulfilled in their lives. We decided to investigate values in non-materialistic urban spaces that can be developed through information, culture, and natural environment, and to explore new lifestyles that can be pursued in new spaces.

3. Case Study : on Chuo-City of Edo-Tokyo Morphology -Strategy for Urban Design

3.1 Urban Design Model: Chuo City, Tokyo

We refer central area in today's Tokyo; one with a long history. That is Chuo City, which has been the center of the commercial district since the early days of urban design. The population of Chuo City, which is a traditional commercial area, has been declining and is now under study for revitalization.

It is 400 years since old Tokyo (Edo) was established. Taking this mega city's long history into consideration, and seeking a future direction for Tokyo, we have come up with the concept of a sustainable city, based on a feasible scenario.

Chuo City, at the heart of Tokyo, grew out of a commercial district established during the Edo period. The city still serves as a commercial and economic center, and is the home of the Bank of Japan and the Tokyo Stock Exchange. Tokyo's main commercial and economic districts, such as Ginza, Kyobashi, Yaesu, and Nihonbashi, were developed on land reclaimed from marsh and tidal flats. In the old days, canals and water channels extended in all directions throughout those areas for the purpose of transportation.

During the Edo period (17th-19th centuries), Chuo City was a densely populated early-modern city, home to many merchants and artisans. By the end of the Edo period, the population had reached 1.3 million, with a density of 200 people/ha (690 people/ha in ordinary people's area only). In '100 Famous Views of Edo', we can see pictures of Edo inhabitants living different lifestyles according to the changing seasons. Those people who lived in this large urban environment developed their own lifestyle, while learning how to enjoy nature. The culture of the common people blossomed as a result.

By the middle of the 20th century, Chuo City, where people both lived and worked, had become a commercial city with a vast number of wooden, low-rise buildings. With a population of about 300,000 and 360 people/ha density, it was a heavily populated area.

Today's Chuo City has a population of 80,000 at night, and 700,000 during the day. The city, designated a commercial district by the government, is crammed with low- and medium-rise buildings. The floor area ratio for the city is 600-800%. In Chuo City, Tsukuda and Tsukishima are residential areas with many high-rise apartment buildings, while Yaesu, Ginza, and Nihonbashi are non-residential areas which are full of people during the daytime. Of the gross floor area of the city, about 70% is devoted to offices and shops, while 20% is housing. Most companies or shops providing wholesale, financial, and other services in the city belong to the service industry sector.

3.2 Five Points for Next Generation of Chuo City

To facilitate Chuo City becoming a sustainable city over a 100-year period, we have come up with five proposals:

1. Increase in residential population
2. Self-sustaining continuous improvement in features and network establishment
3. Improvement in quality of the residential environment
4. Establishment of basic systems for the service industry
5. Improvement in the concentration and efficiency of energy and materials

In order to arrive at these, we studied lifestyles and technologies, and developed the following general suggestions:

- Boost the current population from 80,000 to 300,000. Have 200,000 people working within Chuo City, and 100,000 working in other parts of Tokyo.
- Review use of the Sumida River and canals, and expand green zones dramatically.
- Restructure transportation systems to encourage people to use subways, ride bicycles, and walk.
- By improving the content and flow of cultural information and making the city more attractive to people, strengthen the Chuo's competitiveness against other cities.
- Help local service industry businesses to flourish.
- Improve the concentration and use of space and reduce the rate of energy consumption.
- Establish a dispersed power generation network utilizing fuel cells, to provide the city with power generation and reception functions.

Proposal A1: Renaissance of the Sumida River, Biological Broadband

We propose that Chuo City be redesigned as a compact garden city. People will be able to pursue and enjoy a rich and pleasant lifestyle in this environment. We would develop green zones on the banks of the Sumida River for the purpose of establishing of a biological broadband area. The green zones would start from Hamarikyū, a famous garden. This new development can be realized in compliance with existing regulatory systems in the city. In these new areas, large green belts, inhabited by small animals, insects, birds, etc., would be developed.

More specifically, we propose the greening of all available spaces, such as rooftops of buildings, walls, terraces, and balconies. We also need to plant and widen streets and pavements. Furthermore, we need to

introduce vegetation to open spaces alongside high rise-buildings, promenades along the Sumida River, and vacant lots.

Proposal A2: A Number of Small Transportation Systems

We propose to develop a vigorous city that dramatically enhances transportation convenience through an information network linking pedestrians, bicycle riders, and the subway system. This will provide people with many options for moving about within the city.

The subway network concentration in Chuo City is the highest not only in Japan but also in the world. People can find a subway station anywhere in the city within a few minutes' walk. The terrain, being man-made, is flat and therefore convenient for walking and cycling. We propose the development of a small and very user-friendly transportation system through construction of public bicycle rental kiosks at all subway stations.

Proposal A3: Easy Communities

We propose the fostering of friendly and simple communities (easy communities). Since these 'easy communities' will be welcoming, people will feel more comfortable moving in and out of them. As the population increases, community activities will engender places where people can get together, and 'virtual places' where people can interactively exchange information and ideas IT media. These communities will be cheerful and welcoming. Friendly communities will be formed by individuals with one foot on the ground in Chuo City, and the other stepping out into the world. This kind of 'light footwork' will help Chuo City to be an active urban district.

Proposal A4: Lots of Information Media Places

Intercommunicative public spaces linking homes and offices — Media Places — will be provided at a number of locations. Because, as IT use increases, direct communication between people will become more important. Different combinations of office areas and residential districts, supported by IT, will create different lifestyles. A new lifestyle in which people lead personal and relaxed community lives in different modes will be established. We call this a 'dual lifestyle'. Development of an intelligent 'tertiary' industry centered on service businesses will flourish.

Proposal A5: New Types of Architecture and Urban Space

We propose that Chuo City will incorporate new types of buildings which will be developed through the fusion of light structure and infrastructure. While more high-rise apartment buildings will be constructed, medium-rise buildings will be redeveloped through conversion and connection. Buildings will be more intelligently networked and energy wastage in the city will be reduced. We propose to upgrade the functions and capabilities of the city to become more compact and intelligent. Once the quality of living spaces is improved, efficiency of material and energy use will be greatly enhanced. We will develop new types of buildings and urban spaces that meet different lifestyles, and make full use of IT. Apartment and condominium complexes combined with 'floating' city and highway systems will be developed.



Figure 3 Images of re-design for urban archtype in Nihonbashi Area no.4

Conclusion : towards Intelligent Light City

As for conclusion of this paper, we touch with the rough sketches of town with autonomic nervous system. The entire complex of buildings and facilities in Chuo City will be regarded as a large network of energy saving plants. This will enable us to boost energy efficiency. With this network, comprising groups of a nested sub-system in something like a fractal arrangement, surplus electricity from variously-located fuel cells of many sizes will be sent or received through the network. A vast number of computers in the city will also control local energy and material usage through the network.

We envision the entire ward being an intelligent light city by the technologies of Traffic, Logistics / Intelligent Energy, Optimization / Fuel Cell / On-demand Water Purification through changes in lifestyles.



Figure 4 example of studied archetype for urban dwellings

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