Compact City as a Means of Long-term Urban Regeneration

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1. The Needs for Urban Regeneration A Brief Historical Review

The needs for urban regeneration go back to 17th century. Christopher Ren as restoration reconstructed London through stone buildings after the Big Fire in 1666. Napoleon III ordered Haussmann to rebuild Paris in 1850 so as to a) protect from riots, b) ventilate smelly streets, c) create rich landscape in streets and d) equip high-quality housings in the city (Photo 1).

Photo 1. "Socially capitalized" housings (Paris)
In London and other industrial cities in England, urban slums were formed due to excess migration into cities from rural areas, where labor class people lived in an unsanitary condition. Ebenezer Howard was moved to create the concept of "Garden City" concept as an ideal space named "urban suburb" in 1896 to save people from miserable life in the inner city. He started to construct Letchworth (Photo 2) already in 1903 in northeast of London as the first realized Garden City.

![Photo 2 Garden City (Letchworth)](image)

During 1960's, city centers in big European cities suffered from serious traffic congestion due to increasing car ownership. In London, they decided, according to the recommendation of Buchanan report not to construct inner-urban motorways, as it would attract more cars in the inner city. In Germany, Transport Minister Leber decided to use mineral oil tax to reform the inner areas to be transit mall where the streets were pedestrianized and only public transport was allowed to pass through.

During 1970's, European cities faced serious problems of unemployment together with urban decay of inner cities. This is due to the progresses of urbanization stage into a new stage, deurbanization, after a long suburbanization period, because the economic recession stopped immigration into central areas of cities from rural areas though outer-migration of population continued. "Enterprise Zone" was a typical policy to reurbanize the inner cities by exempting "Rate" (a kind of land ownership tax) and abolishing planning permit. By introducing such a planning regulation release, the London Docklands (Photo 3) and several other inner areas of big cities were renovated to re-attract
inhabitants back inward.

![Photo 3 The London Docklands](image)

Nowadays, there are still many cars used to move between city center and suburban residential areas and even the number is increasing in many cities of developed countries despite of enormous amount of road and rail investment. This is due to induced traffic. This shows that it is almost impossible to solve traffic problems by increasing transport infrastructure.

2. A Turning Point of Socio-economic Structure and Newly Raised Constraints Case of Japan

The per capita income of Japan has grown by seventy-five times, i.e. by 9% per annum during 1950-2000 and is expected to grow up to 2% or decline in the next fifty years (Fig.1).

![Fig.1 Population decline in Japan](image)
4. Dual Strategies

3. Solutions for Regeneration

and global warming problems are common also in developing countries. This is already more or less a typical problem in developed countries. Financial build-up areas by the smaller number of taxpayers in the future. local governments due to rapid increase in per capita burden to maintain the

What will come in the next scenes very clear. It will be a financial collapse in

(c) Global Warming

(b) Economic recession and reduced financial resources

(a) Population decline in long term

Today, Japan is facing big changes in boundary conditions as follows.

FIG. 2 Low Growth Rate of Japanese Economy in Future

- GDP
- GDP

The current level by 2100 will be the same as in 1990 (FIG. 2).

The population is forecasted to decline by 20% by 2050 and will become 50% of

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compact city.
b) Renovation of built-up areas by street-block in 3-dimensionin central areas to realize a better living environment to attract people to move from suburbs.

The idea is to reduce the built-up areas in the suburbs to save infrastructure maintenance cost, which will be used for subsidies for households to return into central areas.

3.2 Basic Principles

The basic idea for mechanizing the above dual strategies, following requirements should be cleared:
a) Making consensus on future goal of block-landscape among the land owners and inhabitants as well as general citizens
b) Coordinating building control and taxation tools
c) Giving incentives for social capitalization in real estate market
d) Transferring development gains to conservation areas

By considering these requirements together, all the land is divided in A zone and B zone where zone A is within walking distance from a station and B beyond it (Fig.3). Based on the zone distinction, following rules are applied:

3.3 Types of Compact Cities

There are alternative types of compact cities to realized a) one-center type such as New York (Manhattan), b) multi-cluster center type such as Tokyo and c) homogeneous type such as Paris (Fig.4). The nighttime population density distributions of different cities are illustrated as in Fig.5.
Zone A+B:
- Strengthening Land Ownership Tax (LOT)

Zone A:
- Block Landscape Plan (BLP)
- LOT Reduction for Developments
- Fitting BLP
- Incentive@Reduction Inhabitant/Enterprise Tax@Attracting Housing/Office Demand in Zone A

Zone B:
- Re-designate as Conservation Zone@Transfer of Development Gains to Conservation

Fig. 3 Nagoya model

Fig. 4 Alternative types of compact cities
4. The Mechanism for Reforming the Cities to Be More Compact

We will conduct feasibility studies in Nagoya as an example. Nagoya has 2.18 million population in 326km² territory, equipped with a 80km long underground network as well as 82.5km long urban expressway and 6229km long roads.

Fig.6 Compact city type for the city of Nagoya
We assume three scenarios of future population distribution (Fig.6) 1) BAU (Business As Usual), 2) City center concentration scenario: Increasing the population in city center by 300% (Fig.7), 3) Subcenters concentration scenario: Increasing the population of subcenters by 50%.

Using a housing location model, which we developed, we can estimate the number of households choosing a set of location and housing type based on the cost and the utility for each household.

The relationship between housing subsidy and the number of households to choose the location is obtained (Fig.8).
Fig. 8 Estimated increase of population according to housing subsidy level

Fig. 9 Impacts on housing subsidization

Fig. 9 shows the balance between "The amount of expenditure for subsidy", "Subsidy rate", "The rate of increase of population in city center", "The rate of decrease of built-up area in suburbs", "Savings of infrastructure maintenance cost in built-up areas" and "The deficit for subsidy".
5. The Effects of Compact City and Visual Representation Method of Landscape Changes

As an effect of compact city, total vehicle-km was reduced by 41% in the City center concentration scenario (Fig.10) while by 38% in the Subcenters concentration scenario. Accordingly, air pollutions are reduced as NOx by 38%.

Fig.10 Changes in traffic volume

Landscape will be also changed. This is represented by computer graphics as
seen in Fig. 11. CG movies are automatically generated from GIS database.

Fig. 11 An example of visualization

References:


6) Yu M., Hayashi, Y. and H.Kato.: Proposal to define "Social Capitalization of
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