

## **HARMONIOUS COEXISTENCE OF HOUSING AND MANUFACTURING IN INDUSTRIAL AREAS OF JAPAN**

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This paper examines current approaches to and challenges of town design and management in industrial areas with a large number of small and medium size factories in Japan. We focus on a detailed case study on town design and management in the Takaida district of Higashi-Osaka City. In this paper, the term "Harmonious Coexistence of Housing and Manufacturing" is defined as a conceptual aim of achieving sustainable development and building a "compact city" in an area with a mix of housing and workplaces. The preliminary findings of the study revealed that industrial area has decreased 29%, while residential area has increased 34% between 1983 and 2003, and the mixing of residences and factories has progressed. A large number of stakeholders has made it difficult to build consensus for a master plan of the district and there is therefore a need of introducing a new mechanism for drawing up the master plan.

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### **1. INTRODUCTION**

This paper examines current approaches to and challenges of the 'Harmonious Coexistence of Housing and Manufacturing' concept of town design and management in industrial areas with a large number of small and medium size factories in Japan. We focus on a detailed case study on town design and management involving housing and manufacturing in the Takaida district of Higashi-Osaka City in Osaka Prefecture. In this paper, the term "Harmonious Coexistence of Housing and Manufacturing" is defined as having the aim of achieving sustainable development of a 'Compact City' (DETR 1999) in an industrial area. The term 'Compact City' is a relatively new concept within the urban planning in Japan, but it has risen in importance since the introduction of the sustainable development. The motivation of this research is as follows.

- Sustainable development and a 'Compact City' through the coexistence of residential and working interests can be considered as global concepts, but little or no research has sought to achieve "Harmonious Coexistence of Housing and Manufacturing" in the Japanese context."
- There are many areas with a mix of residential and manufacturing property in Japan, because residential building is not prohibited in an industrial area under Japan's urban planning Act (Shimizu 2007).

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- In industrial areas with many small and medium size factories, there has been a mixed land use of residential and manufacturing since the 1980s, and many studies have been carried out (Ando, 1985). However, the findings of the research is only based on the time during the booming economy in the 1980s and also limited to prosperous industrial locations. Thus a new policy of mixed land use of residential and manufacturing is earnestly awaited based on new research.

This paper focuses on the Takaida district in Osaka Prefecture, which has many small and medium size factories, because the local government has proactively promoted "Harmonious Coexistence of Housing and Manufacturing" there.

## 2. OSAKA PREFECTURE

Osaka Prefecture is located in the centre of the Kansai region. As the capital of Osaka Prefecture (with an area of 1,869 km<sup>2</sup>), Osaka City (with an area of 221 km<sup>2</sup>) is the administrative, industrial, cultural, and traffic centre of the western part of Japan. It is the third-largest city in Japan, with a population of 2.7 million, and its gross domestic product (22 trillion yen), is second only to Tokyo. Figure 1 shows maps of Japan, Kansai Region and Osaka.



Figure 1 Maps of Japan; Osaka and the Kansai Region

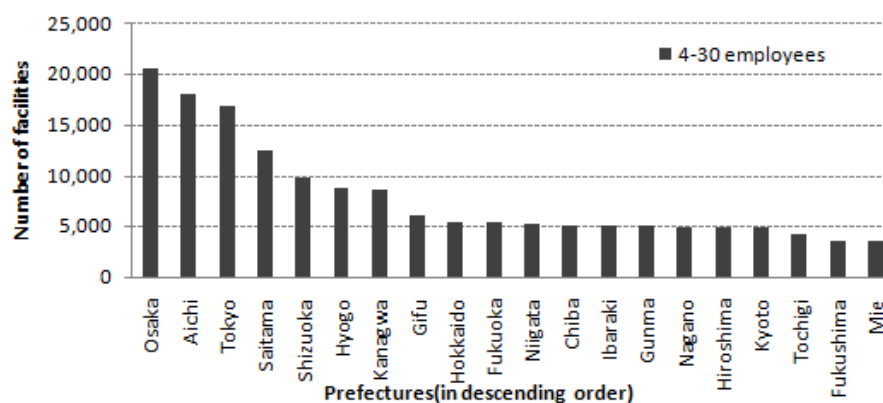
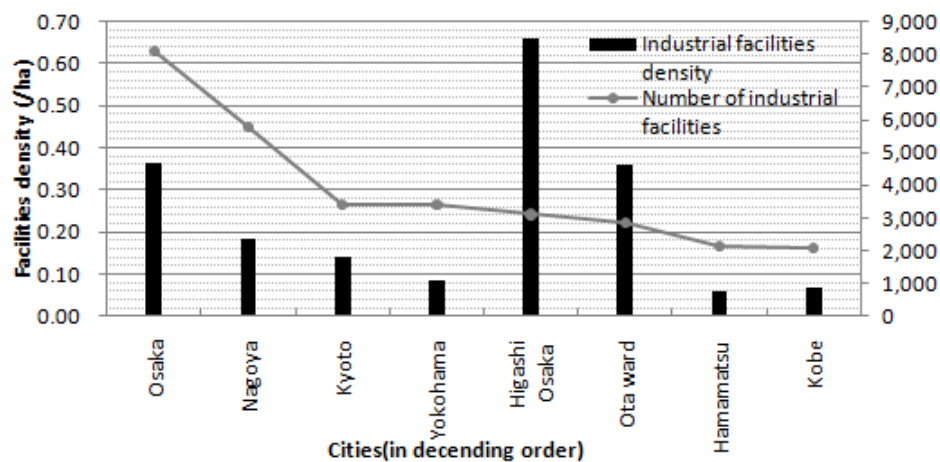


Figure 2 Number of manufacturing facilities in Japan (MoE 2007)



**Figure 3 Density of manufacturing facilities of key industrial cities (MoE 2007)**

Figure 2 shows the number of small to medium size manufacturing facilities (with 4 to 30 employees) in Japan for the top 20 prefectures. Osaka Prefecture contains the most manufacturing facilities for small and medium size businesses in Japan with 20,562 units (MLIT, 2009a). Figure 3 presents the density of manufacturing facilities in the key industrial cities in Japan. The density of manufacturing facilities in Higashi-Osaka City is 0.66 (number of factories/ha) which is the highest figure in Japan. Higashi-Osaka City (with an area of 61.81 km<sup>2</sup> and a population of 515,000) is located in the east part of Osaka Prefecture, and the east side of the city borders Osaka City. Takaida district, which is the target area of this research, is located in the west part of Higashi-Osaka City (Fig.4).



**Figure 4 Higashi-Osaka City and the Takaida district**

### 3. METHOD

Two stages are involved in this study to identify current approaches to and challenges of ‘Harmonious Coexistence of Housing and Manufacturing’ town design and management in an industrial area with many small and medium size factories.

- Stage 1 examines the perception of 81 local governments with respect to ‘Compact City’ and ‘Housing Close to the Workplace’ by a questionnaire survey.
- Stage 2 focuses on a case study of the Takaida district, which has many small and medium size factories. This stage will;
  1. identify the transition conditions of land use in the Takaida district by reviewing literature.
  2. identify the current approaches of local governments by interviews and field surveys.
  3. identify the awareness of administration and relevant stakeholders by interviews.

#### 4. PERCEPTION OF "COMPACT CITY" IN JAPAN (STAGE 1)

In the Stage 1, we have examined the perception of the local governments regarding ‘Housing Close to the Workplace’ and ‘Compact City’ by means of a questionnaire survey. The targets of this research are 81 local governments all over Japan. In Japan, the concept of "Housing Close to the Workplace" is, like "Compact City", which have spread across the nation (Japan?) with expectations of revitalising [for activation in] city centres. The contents of the questionnaire are shown in Fig. 5. We had distributed questionnaires to local governments and received from 65 return answers with a response rate of 80%.

Title	: <u>The survey of 'Compact City', 'Housing Close to the Workplace' and 'Activation in the city centre'.</u>
Survey item	: ① General questions about 'Compact City' ② Question about Attitudes towards 'Compact City' ③ Question about Problem of town development in your city
Objects	: 81 cities
Method	: Mail-in survey
Date	: 9.Dec.2009~24.Dec.2009
Answer	: 65 cities (80%)

Figure 5 Contents of questionnaire

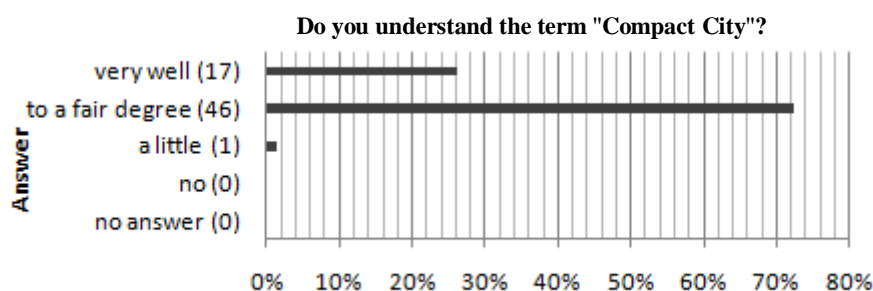


Figure 6 Results for Question 1

Figure 6 shows the results for Question 1; “Do you understand the term of Compact City?” It indicates that 27.0% of the local governments are "very well". And 70.8% of local governments are “to a fair degree”. Thus 98.5% of local government understand the term “Compact City” fairly well.

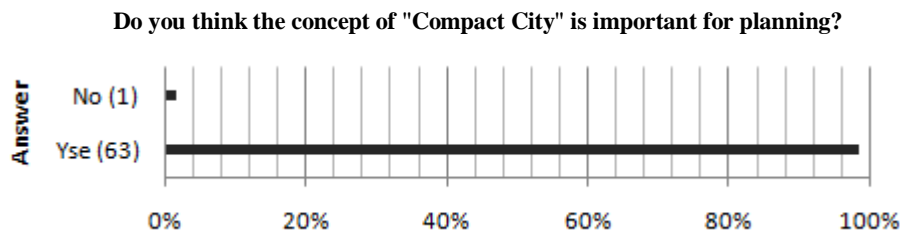
**Figure 7 Results for Question 2**

Figure 7 shows the results for Question 2; “Do you think the concept of Compact City is important for planning?” It indicates that proportion of “very well” and “to a fair degree” exceeds 98%.

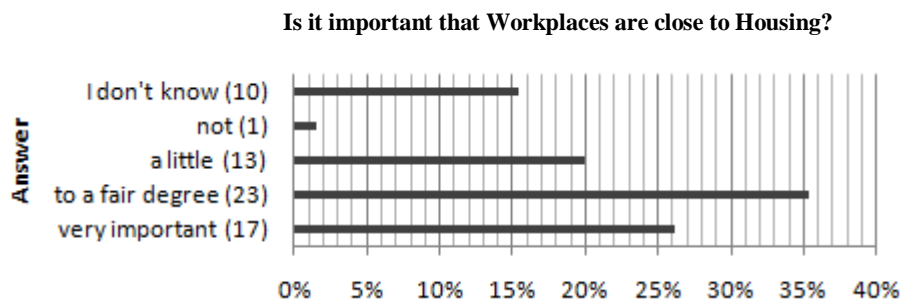
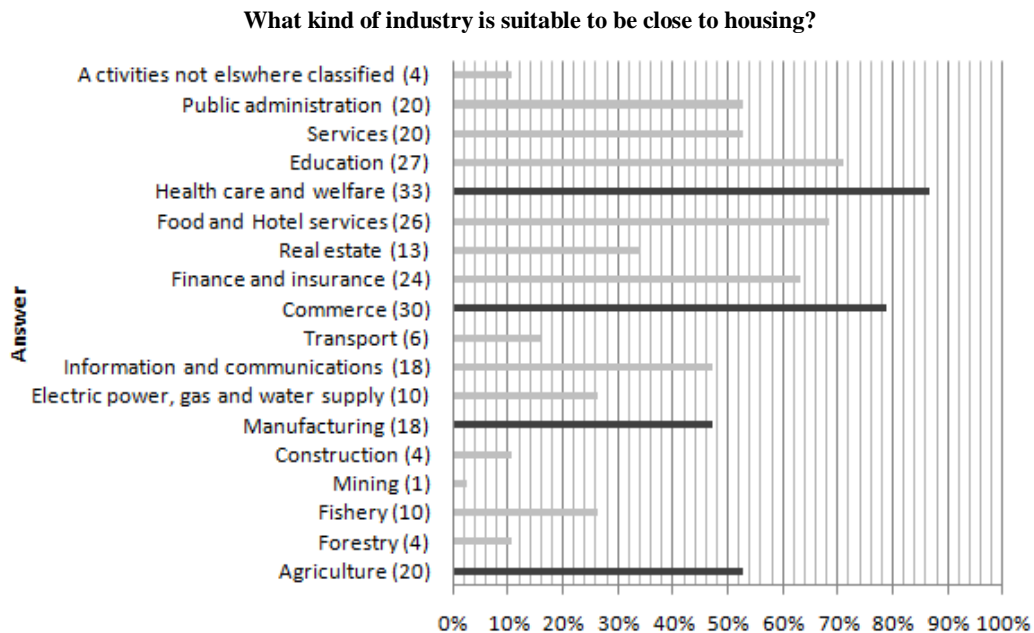
**Figure 8 Results for Question 3**

Figure 8 shows the results for Question 3; “Is it important that Workplaces are close to Housing?” It indicates that 27.0% of local governments are “very important” and 35.4% are “to a fair degree”. Thus 61.6% of local governments consider the coexistence of workplace and living space is important.

One local government who answered “very important” commented: “The concept of ‘Workplaces are close to Housing’ could help business, industry and housing in some areas and it is important to reduce heavy commuter traffic and CO<sub>2</sub> emissions.”

Another person who answered “to a fair degree,” commented: “Generally in regional cities, the urban structure is based on the assumption that we use cars, but it is certain that the number of elderly people who should not drive will increase in the future. So we should reduce dependence on automobiles, and thus we need to build a more compact city, so we need to improve public transportation. On the other hand, the concept of ‘Workplaces are close to Housing’ is not an urgent task compared to the issue of the increasing number of elderly people, because many workers drive, they can travel anywhere.”



**Figure 9 Results for Question 4**

Figure 9 shows the results for Question 4; ‘What kind of industry is suitable to be close to housing?’ It indicates that a suitable kind of industry is ‘Health care and Welfare’ and ‘Commerce’ with 75% or more, "Agriculture" with 52%, and "Manufacturing" with 47% respectively.

One local government officer commented: "I think it would be better if all types of employment were close to housing, but we should consider the living environment."

However, another respondent suggested: "I think ‘Workplaces are close to Housing’ is rather good, but ‘Coexistence of Housing and Manufacturing’ is not good, it is more of a problem."

The key findings of this stage are:

- 96.9% of local governments placed some degree of importance on the concept of "Compact City."
- 61.6% of local governments replied that the concept of "Workplaces are close to Housing" is important.
- 87% of local governments responded that "Health care and Welfare" facilities are suitable to be located close to housing, "Commerce" was 75%, "Agriculture" was 52%, and "Manufacturing" was 48.%

## 5. CASE STUDY OF TAKAIDA DISTRICT (STAGE 2)

The Takaida district has one of the highest density of manufacturing factories in Higashi-Osaka City (Figure.11), which has approximately 8,000 residents, and about 700 manufacturing companies are located there, employing more than 6,200 workers, producing shipments valued at around 110 billion yen a year (MLIT, 2003). Recently, many houses have been built on the sites of former factories which had discontinued operations following a change in the industrial structure of Japan.



Figure 10 Street view in the Takaida district

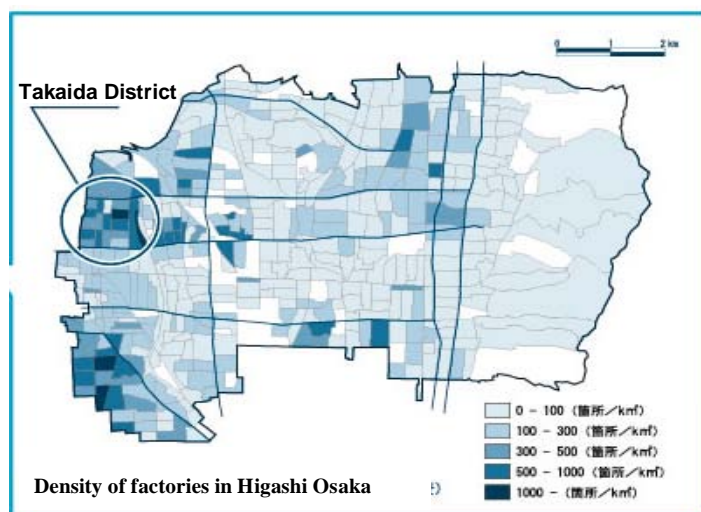









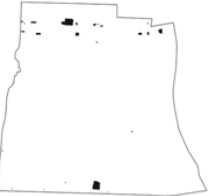
Figure 11 Density of factory in Higashi-Osaka City (MLIT, 2003)

### 5.1 CONTEXT OF LAND-USE

Figure 12 shows land use maps for each kind of industry in 1983 and 2003 (HCC, 2009). According to this, the amount of the industrial sites has decreased with more than 10,000 m<sup>2</sup> compared to 1983. On the other hand, the amount of the transportation sites in 2003 has increased with approximately 7,000 m<sup>2</sup> compared to



1983, and the amount of the residential sites has also increased with approximately 4,000 m<sup>2</sup>. Therefore, it indicates that the increase of mix of housing and manufacturing has been progressed between 1983 and 2003.

	Factories	Warehouses	Housing	Commercial
1983				
Area (m <sup>2</sup> )	361,236	27,184	118,584	24,491
2003				
Area (m <sup>2</sup> )	258,150	100,095	159,140	8,076

**Figure 12 Land-use maps for various industries in the Takaida district**

## 5.2 CURRENT APPROACHES AND CHALLENGES

The Takaida district has been facing to environmental and economical problems with the coexistence of housing and manufacturing. Many new houses and apartments have been built on sites of former factories which had closed down. And the number of new inhabitants who were unaware of the local industrial situation has increased. Confrontations between local residents and factory owners have therefore become intense. In addition, the benefit of the industrial accumulation has been lost, and the vitality and competitive power of Takaida has deteriorated. To tackle these issues the local government has promoted an establishment of 'Takaida local Committee of Town planning' (TLCT). Some current approaches and challenges for Takaida model project are shown below.

- Establishment of forum on manufacturing and learning in Takaida
- "Vision for a future town plan of Harmonious Coexistence of Housing and Manufacturing" proposed (TLCT, 2009)
- "Harmonious Coexistence of Housing and Manufacturing" to be incorporated in city planning
- "Takaida Rule Book" indicating goals of the town development (TLCT, 2009) (Fig. 14)
- "City and Respect in manufacturing project" authorized as one of model projects led by Ministry of Land, Infrastructure, Transport and Tourism (MLIT, 2009b)



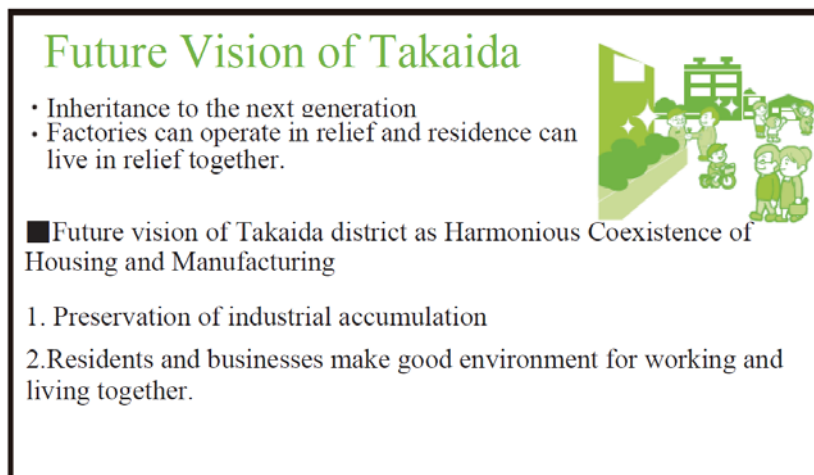


Figure 13 Future Vision for Takaida (TLCT, 2009)

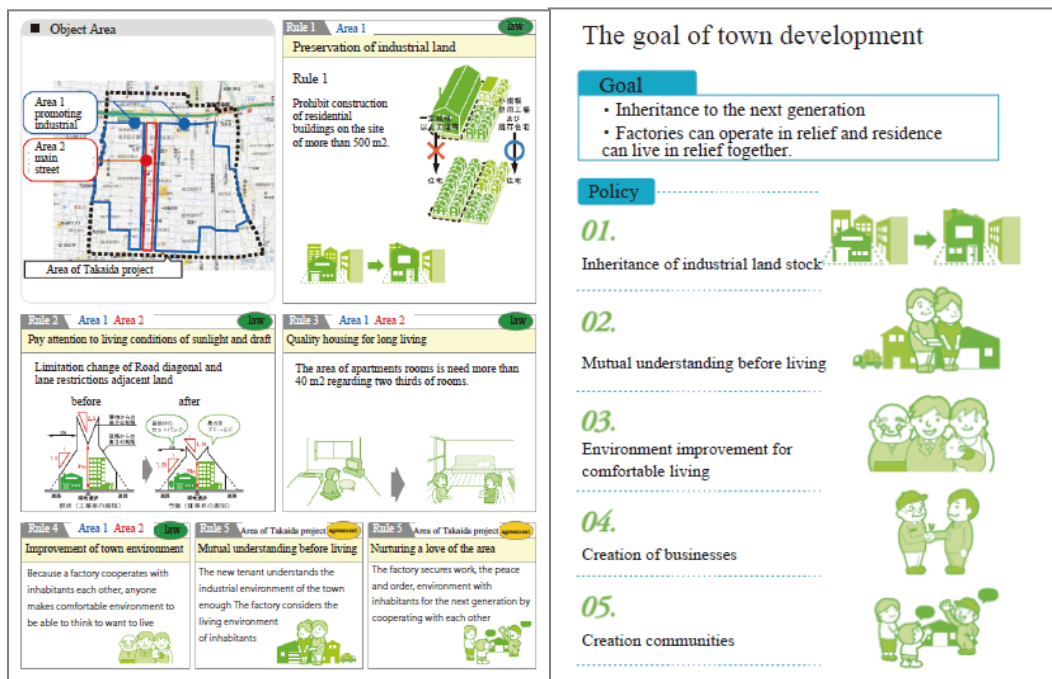


Figure 14 Takaida Rule Book (TLCT, 2009)

### 5.3 ROLE OF STAKEHOLDERS

We interviewed two stakeholders (i.e. a local government official and a town planning consultant) to assess the impact of the concept of ‘Harmonious Coexistence of Housing and Manufacturing’ on town planning. Their comments are summarized in Table 1. A local government officer commented: "We should keep the accumulation of small and medium size factories because they support industry in Higashi-Osaka City. But since there are more than 3,000 landowners in the Takaida district, it is difficult to build a consensus for drawing up a master plan. It will be important to review or introduce a new system to make the master plan easily in such a region in the future."

A consultant commented, "Factory owners hesitate to make investment for facilities because they concerned about complaints by inhabitants, especially new. If investment is reduced due to the risk of mixed industry and housing, the number of factories will decrease further. So it is high risk, for factory owners, to increase housing."

Local government of Higashi-Osaka City is concerned with making a master plan for town design and management. In contrast, the consultant is concerned about a reduction in the investment in the Takaida district due to the risk of mixed land use of manufacturing and housing. But both of them are in favor of keeping the accumulation of small and medium size factories for the benefit of Higashi-Osaka industry.

**Table 1 Results of interviews**

	Local Government	Consultant
problem consciousness	<ul style="list-style-type: none"> <li>• The concern about collapse of the industry accumulation in Takaida district</li> <li>• The new apartment is located on the old site of a certain scale plant, causing a conflict with the existing plant.</li> <li>• We should keep the small factories accumulation because they support industry in Higashi-Osaka City.</li> <li>• There are more over 3000 land owners and leaseholders in Takaida area, it is difficult to build the consensus for making the master plan.</li> </ul>	<ul style="list-style-type: none"> <li>• It is high risk for factory owner to increase housing.</li> <li>• If it is happen to reduce investment due to the risk of 'mixed industry and housing', factories would more decreased in future.</li> <li>• Dropping in land prices, residential development occurs.</li> </ul>
role	<ul style="list-style-type: none"> <li>• We cooperate in the establishment of the consociation for town management.</li> <li>• We draw up upper level plan</li> <li>• Quarification for the master plan of town management</li> </ul>	<ul style="list-style-type: none"> <li>• We explain the problem of town planning for people living in that area.</li> <li>• Adjustments of local government and people</li> <li>• Making future 'vision'</li> </ul>
support activity	<ul style="list-style-type: none"> <li>• Subsidization</li> <li>• Sending a consultant</li> </ul>	<ul style="list-style-type: none"> <li>• Advice about making town planning</li> </ul>
problem	<ul style="list-style-type: none"> <li>• It is difficult to regard public opinion without over 30% of land owner's answer of the questionnaire survey for master plan in Takaida district.</li> </ul>	<ul style="list-style-type: none"> <li>• It is important to carry out 'vision' in future.</li> </ul>
future	<ul style="list-style-type: none"> <li>• Each section need to think about specific measures for future 'vision'.</li> <li>• It was important to stop collapse of accumulation of factories and to keep the living environment in Takaida and will make the master plan using planning system of district in Takaida.</li> <li>• It would be important to review or manage a new system to make the master plan easily in such a region in the future.</li> </ul>	<ul style="list-style-type: none"> <li>• Rules reviewed every ten years.</li> <li>• We need to monitor this district.</li> <li>• It is necessary to enhance the interaction between factories and residents.</li> </ul>

The key findings of this stage are:

- The amount of the industrial area decreased with approximately 29%, while the residential area increased with 34% between 1983 and 2003 in the Takaida district. It indicates that the mix land use of housing and manufacturing has been progressed between 1983 and 2003.
- In order to conserve the factories and its concentration, local government is required to draw up a master plan of the Takaida district to restrict the construction of housing with a floor area of 500 m<sup>2</sup> or more.
- There are more than 3,000 landowners in the Takaida district, thus it is difficult to build a consensus for drawing up a master plan. It would be important to review or introduce a new system to make the master plan easily in such a region in the future.

## 6. CONCLUSION

We examined the current approaches to and challenges of "Harmonious Coexistence of Housing and Manufacturing" town design and management in an industrial area with many small and medium size factories in Japan. The key findings of this paper are:

1. Most local governments place some degree of importance on the concept of 'Compact City'. The half of local governments considers that the concept of 'Workplaces are close to Housing' is important. Moreover, about 30% of local governments consider that manufacturing can be suitable to be suitably located close to housing from the standpoint of 'Compact City'.
2. In order to conserve the factories and its concentration, the local government of the Takaida district is required to draw up a master plan to restrict the construction of housing with a floor area of 500 m<sup>2</sup> or more. There are more than 3,000 landowners in Takaida district, thus it is difficult to build a consensus for drawing up a master plan

In Japan, most local governments consider that the concept of a sustainable city such as a "Compact City" is important. Some local governments consider that manufacturing industries can be suitable to be located close to housing, and this is evident from the fact that they already have some mixed areas of housing and manufacturing. In addition, the mix of housing and manufacturing is progressing in the Takaida district—although it is one of the highest density areas of manufacturing facilities in Japan. Regarding their approach to "Harmonious Coexistence of Housing and Manufacturing" town design and management in the Takaida district, both Higashi-Osaka City and the town management consultant have recognised that it would be a problem to increase housing land use in this area because it would cause the decreasing number of factories. For the next step, we need to identify the appropriate balance of residential and industrial land use to follow up this current study. We will examine in detail the relationship and key stakeholders and identify a new concept on mixed use of residential and manufacturing space, for achieving sustainable development in districts like Takaida.

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