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THE ECONOMICAL IMPACT OF AN URBAN HOLLOW

– Examination of the Redevelopment Project after the Great Hanshin Earthquake –



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ABSTRACT

This paper examines spatial problem in the redevelopment project introduced by the government as a method of reconstruction of Shin-Nagata area in Kobe city after the Great Hanshin Earthquake. Reviewing the catastrophic damage of Shin-Nagata Area, the government decided huge redevelopment project as an urban planning, which is mainly based on the removal of small alleys inside urban blocks and the construction of many huge buildings in the town centre. However, what this spatial transformation brought is re-intensification of local urban blocks, and an “urban hollow” appeared in the town centre. Far from reconstruction, it aggravated economical decline which has continued before the earthquake as an inner-city problem. Due to the re-intensification of the urban blocks, density and interaccessibility within the town centre were decreased. In addition, the appearance of new shopping centres, which have spatially good conditions, plunged the town centre into the difficult situation. Summarising these facts, it turned out that the new spatial layout brought in the redevelopment project cannot contribute to the economical reconstruction of Shin-Nagata area.

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CHAPTER 1 – INTRODUCTION

Town centres as a main stage of commercial activities take different styles in their spatial configuration. In some town centres, shopping takes place in dense urban block based on small commercial avenues where many retail shops stand side by side. In other town centres, shopping is concentrates in large squares, which tend to be formed in front of stations, churches and historical places. In addition, a large number of huge shopping centres have appeared as a stage of commercial activities in recent years, especially in suburban towns. Although they have different types of spatial configuration, each layout has been formed to meet local circumstances. However, if unsuited spatial layout was introduced into a town centre, what would happen to its commercial activity? If a town centre had energetic shopping style, is it necessary to change its spatial layout completely? Shin-Nagata area is the downtown which has been intensively redeveloped by local government as a western subcentre in Kobe city after the Great Hanshin Earthquake in 1995. This is a typical example of town centres where their spatial layout was completely replaced. Therefore, it is worth discussing the impact of the new spatial layout on the revival of the live town centre of this area.

In 1995, The Great Hanshin Earthquake killed more than six thousands people and destroyed a large part of Kobe. Shin-Nagata, which is a Midwestern town in Kobe city, suffered the most severe damage within the city. After the earthquake, the government made a new urban plan and put it into practice for reconstruction of the area. However, the new urban planning was not only a reconstruction plan but also a huge redevelopment plan which involved the whole town centre. Although the area had a lively downtown atmosphere based on small and dense shopping malls, the redevelopment of the area includes many big shopping complex and high-rise condominiums, which are the largest scale redevelopment in Japan. Therefore, this new urban planning are discredited by people who have lived in this area for long time, many of whom think that the scale of the redevelopment project is too large for the purpose of the reconstruction of the area. In fact, a lot of vacant tenancies can be seen in the huge buildings constructed for the redevelopment project. According to Kobe City Planning and Coordination Bureau, regional economy of Shin-Nagata area has continued to decline since 1995 in spite of gradual recovery of the whole city. As a result, the stagnation in local industry and commercial activity as an inner-city problem was accelerated by the earthquake. Although the redevelopment project is still in progress, reconstruction of the area has not seemed to be achieved so far. It seems worthwhile to consider whether there are underlying spatial causes for this apparent economic failure: does it have to do with the spatial configuration generated by new urban planning?

This paper is mainly divided into two parts, which are background section and analysis section. The background section starts with general information, including geographical and historical backgrounds, provided to give a range of knowledge about Shin-Nagata area in Kobe. In particular, some explanations about The Great Hanshin Earthquake are essential in understanding dynamic spatial transformations which have taken place in the area because it is difficult to understand the intention of the new

urban planning without knowing the degree of the damage brought by the big earthquake. Next, based on the knowledge about the disaster, this paper will introduce the purpose and the methods of new urban planning, referring to actual spatial changes and how the reconstruction has been achieved in terms of regional economy. At last, the theories which are the basis of the analysis and the argument are provided. In the analysis section, based on the theoretical background, the paper will attempt to do some kinds of analyses focusing on the town centre of Shin-Nagata area, comparing the spatial configurations of 1994 (before the earthquake), 2005 (10 years after the earthquake) and the future (after the completion of the redevelopment project). After that, the findings of the analyses will be given to discuss what kind of phenomena was brought by the spatial transformation in the town centre. Finally, the paper will be concluded by summarising results of the research and answering the research question that whether new spatial layout can contribute to the economical reconstruction of the area.

In analysing the relationship between the economical decline and the spatial configuration of the urban area, the theory of "Space Syntax" will be applied as an analytical method of the space. According to Hillier, "compact and dense blocks attract people and enhance a centre of settlement in terms of its economy" (1996, *Space is the Machine*), and "a live centre is formed by reasonably integrated location and convex, compact and dense urban grids" (1999, *Centrality as a process: accounting for attraction inequalities in deformed grids*). However, the town centre of Shin-Nagata area has shown completely opposite process to the theories in its spatial transformation. Therefore, it is worthwhile to review these theories before carrying out the analysis of the new spatial layout brought by the redevelopment project.

CHAPTER 2 – GEOGRAPHY

Located on the west side of the main island of Japan, the city of Kobe has developed as big port toward the Pacific Ocean (Figure1). The city is easily accessible to most domestic and international destinations by land, sea, or air. It takes only two and a half hours from Japanese capital Tokyo by Shinkansen Bullet Train, and just an hour by bus from the Kansai International Airport. Also, as Figure2 shows, Kobe is very close to Kyoto and Osaka, and these three cities sustain the economy of western Japan.

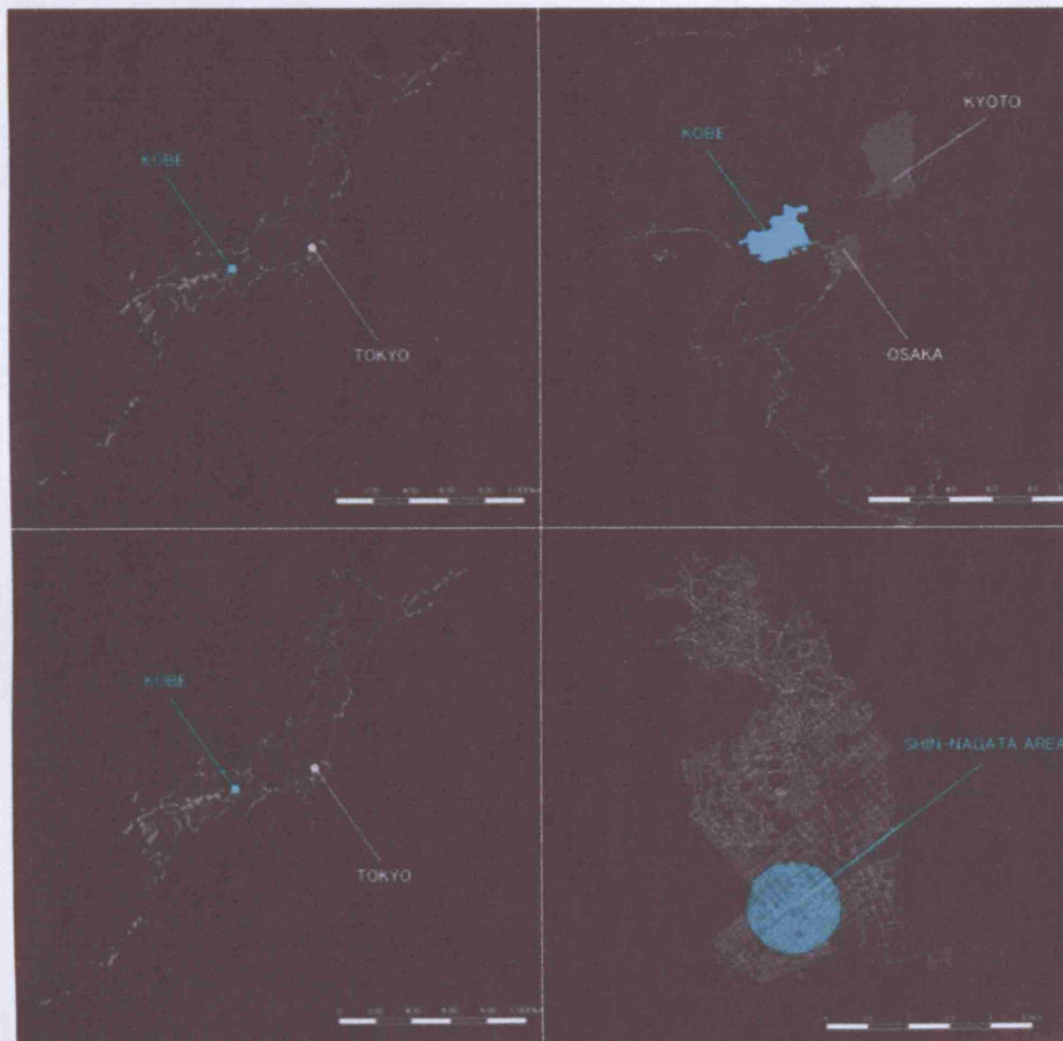


Figure1 Location of Shin-Nagata Area in Kobe

Source: Self Elaboration

The city of Kobe is roughly divided into two parts by the Rokko Mountain Range, as can be seen in Figure2. The southern part of the city constitutes the main part of the city, which is linked to Osaka by urban district and occupies 30% of the city and

60% of the population. Developmentally, the southern part of the city can be divided into three layers: a port and industrial zone along the coast, residential areas on the hillsides, and mixed residential and commercial area in the intermediate zone between the mountains and the sea. In contrast, the northern and western part has developed as new towns to prepare enough residences for a growing population by carving the part of the mountain, large part of which was used for the formations of "Port Island" and "Rokko Island", which are artificial islands in Kobe Port. Nagata Ward is included in the southern urbanised area and, therefore, has three layers as well as other wards in the southern part of the city. Shin-Nagata, which is the town centre of the ward, is located on the intermediate zone between industrial and residential area.



Figure 2 Geographical Condition of Shin-Nagata Area in Kobe

Source: Self Elaboration based on Google Map BETA

(<http://maps.google.co.jp/>)

After the World War 2, Shin-Nagata began to recover by the power of local industries supported by small and medium-sized enterprises. Also, several local commercial centres and shopping malls were built there based on the development of local industries. Shin-Nagata reached its peak in 1980s, the population of the area reached to 20,000 people. In contrast with developed area, where job and residential space together was created as a main characteristic of the area.

However, in 1970's, suburbanization rose in the whole of Kobe city as well as other large cities. With the construction of new towns in the northern and the western part of the city, many people, especially the young generation, moved away from Shin-Nagata. This was due to the cheaper land price and attractive living environment. This migration of the population from central city to suburbs greatly affected Shin-Nagata area, and the influence appeared not only as population decrease but also as aging of society and decay of the local industries. Therefore, it was natural that commercial activities along that vitality in the area where the local

CHAPTER 3 – HISTORY

From historical point of view, Kobe port was opened as a base of international trading in the modernisation of Japan in 1868. Although the port and central Kobe grew big with phenomenal speed, Shin-Nagata Area had remained just a rural area until the end of 19th century. It was around 1900 that the urbanization of Shin-Nagata area started. After road system was built, and land readjustment for the future development was done, the development of the local industries, such as match, rubber and shoes, accelerated urbanisation of the area. Although the population of Nagata ward increased to 229,358, which is 23.7% of the whole city at the moment, as a result of urbanisation, large part of the town was seriously damaged by the disaster and the war. In 1938, the Great Hanshin Flood devastated the 80% of residences in the area, and, in 1945, the air raid of US Air Force in World War 2 completely destroyed the urban function (Figure3).



Figure3 Photos after the Great Hanshin Flood (Left) and World War II (Right)

Source: Reference Library War and Disaster Kobe

(<http://www.city.kobe.jp/cityoffice/09/010/shiryokan/flood/flood03.html>)

After the World War 2, Shin-Nagata has achieved the recovery by the power of local industry supported by small and medium-sized enterprise. Also, several local commercial avenues and markets with many retail shops have formed in the town centre, based on the development of local industries. Shin-Nagata regained vitality, and, around 1965, the population of the area reached to 200,000 again. In consequence, downtown community, where job and residence came together, was created as a main characteristic of the area.

However, in 1970's, sprawl phenomenon rose to the surface in Kobe city as well as other large cities. With the construction of new towns in the northern and the western part of the city, many people, especially the young generation, moved over Rokko Mountain Range, seeking for cheaper land price and attractive living environment. This rapid shift of the population from inner city to suburbs greatly affected Shin-Nagata area, and the influences appeared not only as population decrease but also as aging of society and decay of the local industries. Therefore, it was natural that commercial activities also lost vitality in the area where the local

industries were the foundation of people's lives. In 1995, The Great Hanshin Earthquake struck Shin-Nagata area under such a situation, as one misfortune followed another. In the next chapter, how seriously the area was damaged by the earthquake will be examined, introducing concrete figure data.

CHAPTER 4 – THE GREAT HANSHIN EARTHQUAKE

4-1 The Damage of Kobe City

On 17th January 1995 at 5:46am, Kobe city was hit by a huge earthquake measuring 7.2 on the Richter scale. The earthquake was focused 20 kilometres under the northern part of Awaji Island, which is approximately south of Kobe. Its quake lasted for 20 seconds and caused widespread damage to surrounding areas including Osaka and even Kyoto. It was inland earthquake directly striking the urban district with destructive shaking never experienced before, and lifelines such as roads, rail, electricity, water, gas and telephone were fragmented in large area of the city. Although Japanese architecture had been said to have a structure resistant to earthquakes, not only frame houses, but also many large scale buildings, like condominium, hospital and station, were demolished or partially destroyed, in the south part of the city (Figure4).

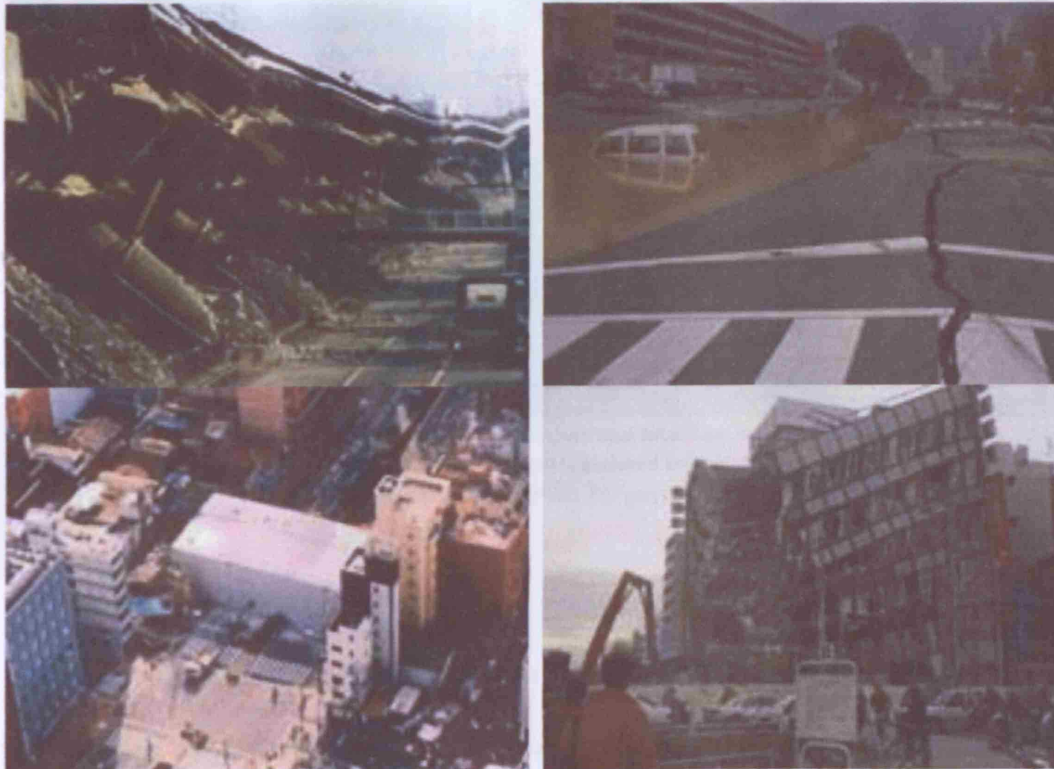


Figure4 Photos after the Great Hanshin Earthquake in Kobe City

Source: Kobe University Library Digital Archive
(<http://www.lib.kobe-u.ac.jp/dlib/index.html>)

According to Kobe city, from the viewpoint of human suffering, the disaster caused as many as 6,433 fatalities, 3 missing persons and 43,792 casualties, and more than 300,000 people sought refuge in public facilities, such as schools, gymnasiums and citizen's hall. Concerned with housing, it caused 104,906 complete collapses, 144,274 half collapses and 263,702 partial collapses, and 6,148 houses were burned out by the

big fire accompanied by the earthquake. As a whole, the damage amounted to about 10 trillions yen, including the damage of social capitals, cultural assets, private companies, and so on.

Figure5 shows the distribution of building collapse and fatalities by the earthquake in Kobe city. The serious suffering is roughly divided into the east and the west parts of the city and concentrates on the middle layer of the city, which is the intermediate layer between residential and commercial zone. In other words, heavy damage concentrates on the built-up area where urbanisation took place before World War 2. That is certainly the case with Shin-Nagata Area, which is the town centre located in the middle layer of the city. The situations of this area will be provided in greater detail in the following part.

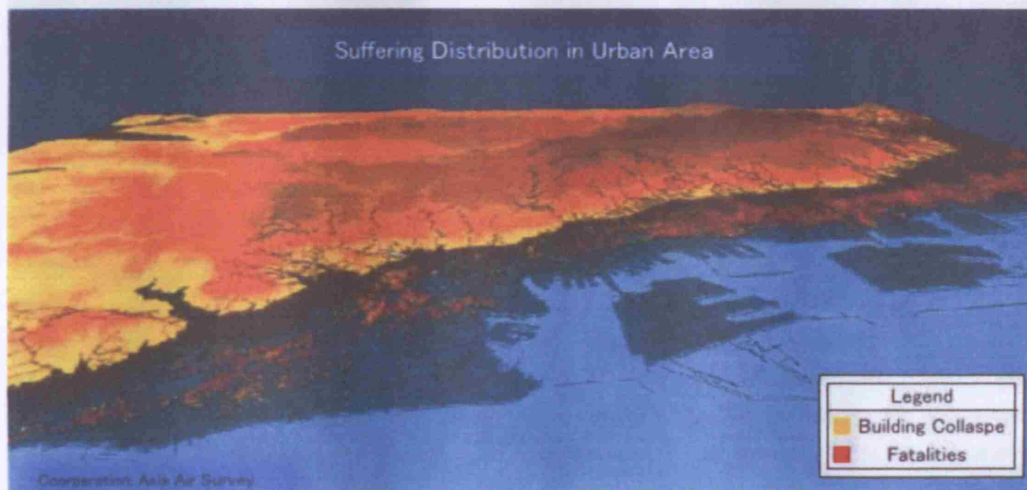


Figure5 Distribution of building collapse and fatalities in Kobe City

Source: Nagata Ward Disaster Related Information

(<http://www.city.kobe.jp/cityoffice/86/gaiyo/06sinsai.html>)

4-2 The Damage of Shin-Nagata Area

As is mentioned above, Shin-Nagata area is one of the most seriously damaged areas in the city, where a large number of frame houses were destroyed and burned out. Just as the case with whole city, a large percentage of collapses and fatalities are focused on the intermediate zone between residential and commercial zone including Shin-Nagata area in Nagata Ward (Figure6).

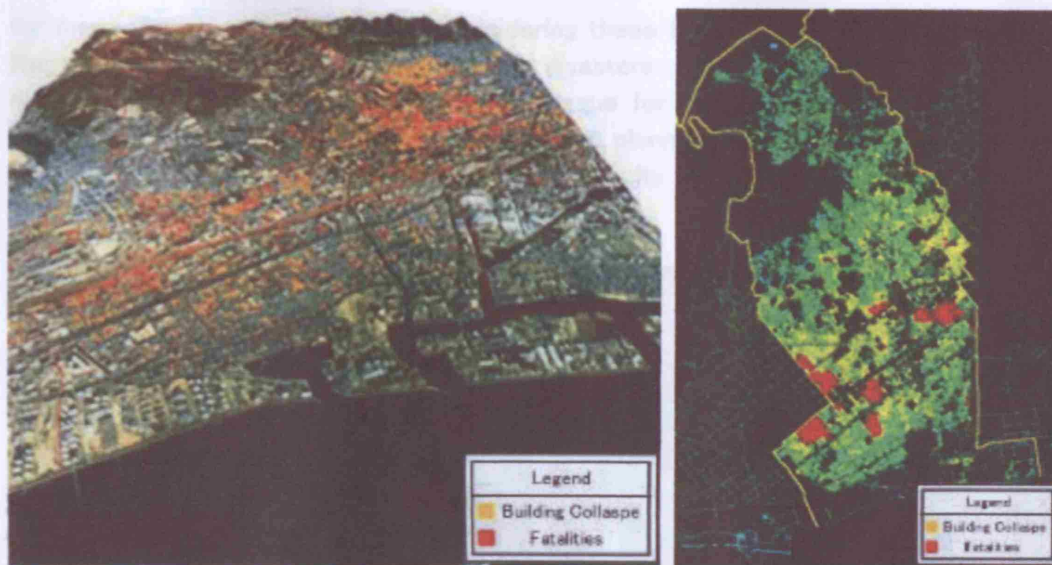


Figure 6 Distribution of building collapse and fatalities (Left) and that of building collapse and Fire (Right) in Nagata Ward

Source: Nagata Ward Disaster Related Information
<http://www.city.kobe.jp/cityoffice/86/gaiyo/06sinsai.html>

In Nagata ward, 4,759 houses were burnt down (68% of the total number in Kobe city), and the burnout area amounted to 524,000 square meter (64% of the total area in the city) by the extensive fire accompanied by the earthquake. The main reason why this area had such a serious damage is that there were many areas dense with old frame houses. First of all, old frame house is relatively vulnerable to the shake, and at the same time, highly combustible because of its constructive and material reason. Secondly, these houses were built in very dense urban block with so narrow alleys that even a light car could not go into it (Figure 7). Such a condition not only encouraged the force of the fire, but also robbed people of the space by which they could escape.



Figure 7 Dense Urban Block with Narrow Alleys
 Source: Kobe Shin-Nagata Library

The same is equally true of Shin-Nagata area. Since the space around the main shopping mall was filled with a large number of small frame houses and narrow alleys, the fire quickly spread to all part of town centre after it took place, and it had lasted

for more than two days (Figure8). Considering these facts, it can be said that Shin-Nagata was very vulnerable area against disasters. Therefore, it was natural that disaster prevention became a high-priority issue for the government in formulating new urban planning. Then, what was new urban planning like? The next chapter will examine the contents of new urban planning Kobe city established and put into force.

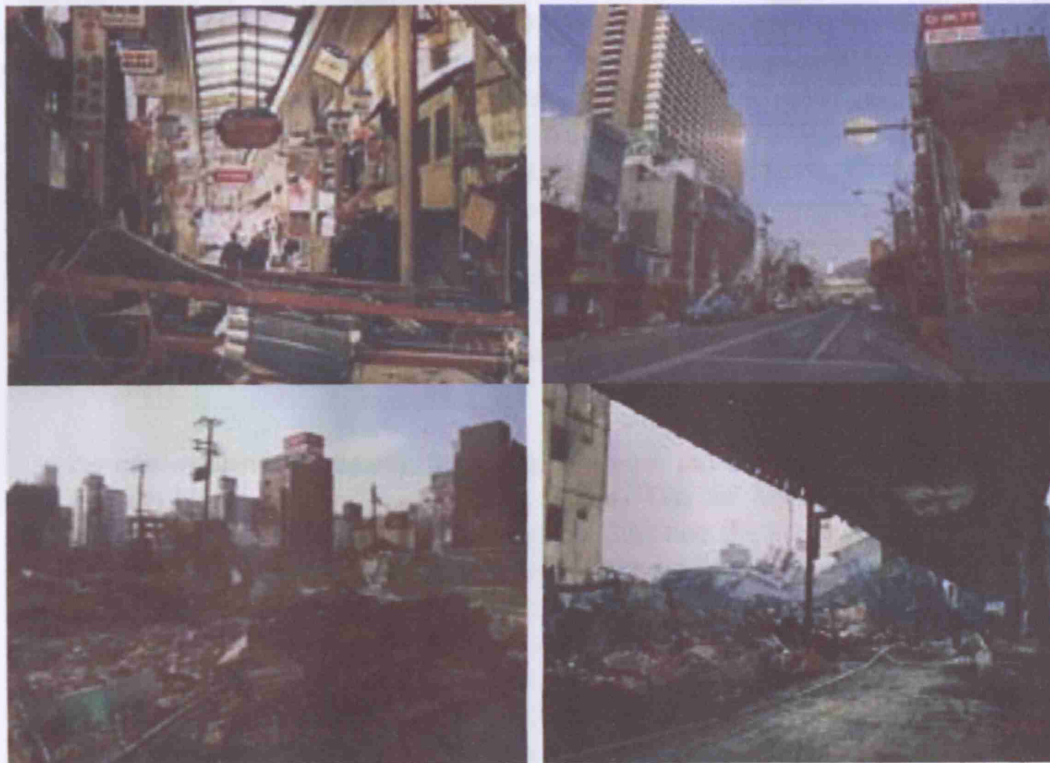


Figure8 Photos after the Great Hanshin Earthquake in Shin-Nagata Area

Source: Kobe University Library Digital Archive
(<http://www.lib.kobe-u.ac.jp/dlib/index.html>)

CHAPTER 5 – URBAN PLANNING

5-1 Planning Making Process

According to Urban Planning and Housing Bureau City of Kobe, urban planning projects are divided into street project, redevelopment project and land rearrangement project, and the reconstruction plan of Shin-Nagata Area was decided within this framework. The main focus of the reconstruction plan is the construction high rise buildings as a redevelopment project and the rearrangement of dense urban blocks as a land readjustment project. The urban planning project of this area and that of Rokko area, which is the most seriously damaged area in eastern part of the city, were different from normal urban planning projects in two respects. Firstly, intensive land purchase of the administration was carried out for these projects although this acquisition is allowed only where vulnerability against disasters is recognised or improvement of shelter for disaster is needed. Secondly, these towns had lost urban function by the catastrophic damage. Considering these conditions, it was inevitable that the scale and the impact of the projects became much more significant than other projects.

In the master plan of Kobe city, Shin-Nagata Area is positioned as subcentre of the city. Though Urban Planning and Housing Bureau City of Kobe had worked some projects such as the construction of new subway line and the improvement of station square in front of Shin-Nagata Station, in order to activate the inner city where deterioration of living environment, aging of population and industrial stagnation are recognised, intensive redevelopment of the area started on the occasion of the Great Hanshin Earthquake. In the planning making process of the redevelopment project and land rearrangement project, the bureau took in local residents' voice through the town development conference which was organised by each block of the area. The conference formed local residents' opinion and had many discussions with the administration to review road system, park, and land use in the project plan. In this way, details of the project plan were made by the cooperation with local residents, based on the fundamental principle of the project. In the next part, the concrete plan will be introduced, referring the purpose of the project.

5-2 Redevelopment Project

On 17th March, two months after the earthquake, redevelopment project was decided to reconstruct the town centre destroyed by the earthquake, to construct disaster-prevention, to provide quality housings, and to realise the activation of the area and the improvement of urban functions. According to the bureau, the redevelopment project centred on the south side of Shin-Nagata station covers 20.1 hectares, and it costs about 271 billions yen in total. Therefore, it is said to be one of the largest scale urban projects in Japan.

To achieve the purpose of the reconstruction, high utilisation of space was pursued as a method. The plan aimed to ensure open space such as squares and parks and improve alleys and public facilities by replacing old built-up area with middle or high rise building. In Shin-Nagata area, high-rise apartments and large shopping complexes with residences in its upper floor were planned in the burned out site which used to be a dense urban fabric. Figure9 shows the scale of the redevelopment project and significant contrast between the town centre and surroundings which are low and dense urban blocks.



Figure9: Rendering of the Redevelopment Project in South Shin-Nagata Area

Source: Urban Planning and Housing Bureau City of Kobe

(<http://www.city.kobe.jp/cityoffice/33/33/>)

Figure10 is the full plan of the redevelopment project in Shin-Nagata area which shows the spatial layout after the completion of the redevelopment project. Since the project aims high utilisation of space, the site is made up of many buildings based on large urban block. It is clear that the urban blocks in the town centre is much larger

than the surroundings which remain dense, supported by many short alleys. Therefore, movement pattern within the town centre is limited to main streets constituting the site, minimising interaccessibility.



Figure10: Plan of the Redevelopment Project in South Shin-Nagata Area

Source: Urban Planning and Housing Bureau City of Kobe

(<http://www.city.kobe.jp/cityoffice/33/33/>)

5-3 Land Rearrangement Project

In Shin-Nagata area, Land rearrangement project was done for the purpose of improvement of the housing site and the urban foundations, such as roads and parks. Particularly, this area was located in the intermediate layer, where a large number of commercial facilities, industrial plant and small houses are mixed, and the urban foundations were insufficient. The project aimed for quick reconstruction of the area and full equipment of a safe and comfortable town which is eligible to be the subcentre of Kobe.

After the discussion with the local residents of the area, the land rearrangement project plan, which covers 42.6 hectare centred on the north side of the station, was decided as an urban planning of the city on 17th March in 1997. Figure10 shows the spatial layout composed of urban planning road, partition road, pedestrianised road and public facilities, in the northern side of Shin-Nagata Area. In general, urban planning road functions as a main route in the area, and partition road divides residences within an urban block. Main spatial change are widening of the several urban planning roads and most partition road, relocation and expansion of the park, and the redistribution of land use.



Figure11: Rendering of the Land Rearrangement Project in North Shin-Nagata Area

Source: Urban Planning and Housing Bureau City of Kobe

(<http://www.city.kobe.jp/cityoffice/33/33/>)

CHAPTER 6 – CURRENT SITUATION

The city of Kobe marked the 10th anniversary of the Great Hanshin Earthquake on 17th January in 2005. How much the reconstruction of Shin-Nagata area has been done? Have the redevelopment and land rearrangement projects achieved any concrete results? This chapter will focus on the reconstruction from spatial and economical point of view.

6-1 Urban Transformation

A long time has passed since the redevelopment project and land rearrangement project started as urban planning of Kobe city, and most redevelopment projects in the city have already completed. However, the project of Shin-Nagata area is still incomplete because of the difficulty in coordinating of local residents' opinions and purchasing their land for the project. This is why only 20 out of 42 buildings have completed, and 18 buildings have not been even started till the end of March in 2005. Although former land owners and leaseholders of the site moved into these buildings as tenants of shops and residences, resistance to the compulsory land purchase and redevelopment is strong.

On the other hand, land rearrangement project is also delayed as well as the redevelopment project. The land rearrangement project finishes when the notification of final replotting is done, which means provisional plot designation assignment reaches 100%. Looking at the areas where the land rearrangement project was planned, 9 of 11 areas have already done final replotting. Nevertheless, the project is in progress in Shin-Nagata area. Though provisional plot designation assignment stated on 1st January 1997, and the assignment rate is still 87% as of 17th March in 2005. The main possible cause is the coordination of land use. It is not easy task to distribute residences, shops and factories in this area where these elements used to be mixed originally. According to Nara University Research Group of Disaster Prevention, the empty lot rate of Nagata ward is over 16%, which is much higher than other wards. Even so, Urban Planning and Housing Bureau City of Kobe expects that the final replotting of this area will be completed within a year.

Figure11 is the fixed-point observation in Shin-Nagata area which represents the actual spatial changes brought by the redevelopment project. The left and the upper photos were taken in 1995 soon after the earthquake, and the right and the lower photos were taken in 2005. As these photos show, urban space of the area has changed drastically. In general, the rebuilt urban area has larger open space than previous one, considering the importance of disaster prevention, and traffic flow. Instead of that, more living and shopping spaces are built upon the redevelopment buildings in order to compensate for the space which used to be in ground level. In addition, Wakamatsu Park is planned to be expanded for to accommodate the local residents in the event of emergency. In this way, through the redevelopment project

since 1995, clear spatial transformation can be recognized in the town centre of Shin-Nagata area.



Figure12: Fixed-Point Observation in Shin-Nagata Area in 1995 and 2005

Source: Kobe University Library Digital Archive and Own Snapshot

(<http://www.lib.kobe-u.ac.jp/dlib/index.html>)

Urban Planning and Housing Bureau City of Kobe

(<http://www.city.kobe.jp/cityoffice/33/33/>)

6-2 Economical Reconstruction

In terms of population, Kobe has shown gradual increase for a decade. According to the Kobe City Public Information Division, the number of population dropped to 1,423,792 in October 1995 though it was 1,520,365 just before the earthquake, increasing by 10 thousands per year (Figure12, Left). However, many people have come back to Kobe city in proportion to the process of the reconstruction. Then, in November 2004, the population exceeded that of pre-earthquake, combined with the population inflow to the suburbs of the city, centred on Kita ward and Nishi ward.

However, it is simply not the case with Nagata ward. Inner-city problem and the delay in spatial reconstruction around Shin-Nagata area have prevented population growth. As Figure12 shows, after the dramatic population drop by the earthquake, the people have continued to emigrate from Nagata ward. Looking at the good side of the phenomena, the pace of population outflow has become slow in recent years. At the end of January 2005, Nagata ward has a population of 103,911, which are 26,067 less than that of pre-earthquake.

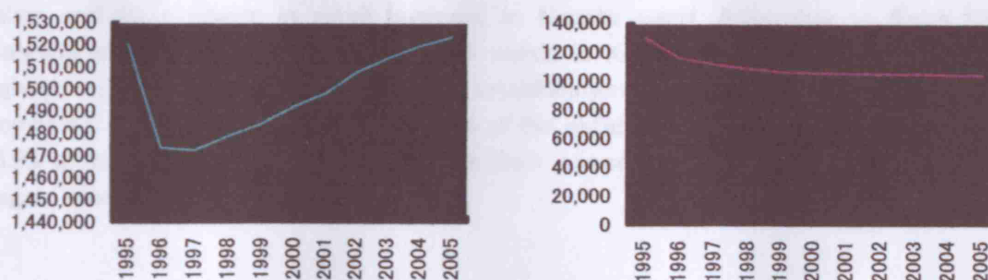


Figure13: Change in Population in Kobe City (Left) and Nagata Ward (Right)

Source: Kobe City Planning and Coordination Bureau
(<http://www.city.kobe.jp/cityoffice/15/020/quake/>)

Decay in population directly affects local industries. Figure13 represents the transition of product shipment value in main industries in Nagata ward. The Hanshin Great Earthquake inflicted catastrophic damage on all local industries by destroying factories and establishments. The product shipment value of all industries decreased in 1995 by the effect of the earthquake. Although the value of food and steel industry has gradually recovered for this decade, the value of other industries has continued to decrease. Especially, petrochemical and coal product industry, which is mainly represented by chemical shoes, shows distinct decay after the transient recovery in 1998. In 2003, the product shipment value dropped to one-sixth of the value in 1985 though it used to be the most important industry in this area. Thus, it can be said that the local industries of the area have not recovered from the catastrophic damage of the earthquake yet.

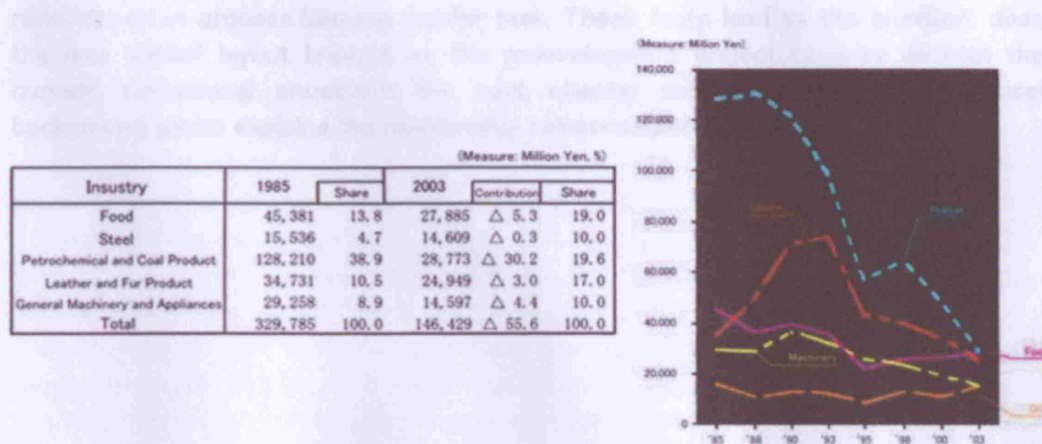


Figure14: Transition of Product Shipment Value in Main Industries in Nagata Ward

Source: Kobe City Planning and Coordination Bureau

(<http://www.city.kobe.jp/cityoffice/06/013/toukei/index.html>)

As well as local industries, commercial activities of the area has not reconstructed yet. Figure14 shows the transition of the number of establishment and employee, total sales, and floor space in retail business in Nagata ward. According to Kobe City Planning and Coordination Bureau, of all wards in Kobe city, Nagata ward recorded highest decrease in the number of establishments, employee and total sales. Compared with the research in 1999, 8.9% of the establishments, 9.8% of the employee, 16.9% of the total sales, and 8.0% of the floor space were lost in retail business in Nagata ward.

	1999	2002	Ratio (1999)	Flactuation (2002/1999)
Number of Establishments	1,591 (16,355)	1,449 (15,552)	9.3	-8.9
Number of Employee	6,786 (103,032)	6,124 (99,716)	6.1	-9.8
Total Sales (million yen)	97,861 (2,000,847)	81,367 (1,775,672)	4.6	-16.9
Floor Space (m ²)	75,984 (1,525,206)	69,942 (1,529,372)	4.6	-8.0

() represents the number of whole city.

Figure15: Transition of the Number of Establishments and Employee, Total Sales and Floor Space Between 1999 and 2002 in Retail Business in Nagata Ward

Source: Kobe City Planning and Coordination Bureau

(<http://www.city.kobe.jp/cityoffice/06/013/toukei/index.html>)

It can be said that the decay in local industries and retail business in Nagata ward is mainly due to Shin-Nagata area, considering its function and the degree of the damage by the earthquake. Although it should be the centre of regional economy represented by local industries and retail business, the area has not achieved reconstruction yet as a town centre. Thus, looking at the statistics which represents actual data in regional economy, it cannot be said that the reconstruction of Shin-Nagata area was achieved so far. Since the earthquake accelerated the inner-city problem which has continued before the earthquake in the area, the economical

reconstruction process became harder task. These facts lead to the question: does the new spatial layout brought by the redevelopment project have to do with the current economical situation? The next chapter will deal with the theoretical background which explains the relationship between space and economical issue.

CHAPTER 7 – LITERATURE REVIEW

This chapter will introduce theoretical backgrounds which will be the basis of the following analysis. The analysis will be done based on Space Syntax which is a set of syntactical and theoretical methodology for the analysis of spatial configuration from architecture to urban space. Since it enables clear measurement and comparison of space by mathematical calculation and its graphical representation, in carrying out spatial analysis, this project adopts Space Syntax as a main method of the analysis. Above all, the theory of “movement economy” (1996, Space is the Machine) and “centrality process” (1999, Centrality as a process: accounting for attraction inequalities in deformed grids) are fundamental ideas in carrying out spatial analysis in the town centre of Shin-Nagata area in order to clarify the relationship between the spatial configuration and the economical decay. Therefore, these theories will be the basis of the following spatial analysis in the next chapter.

7-1 Movement Economy

In Space Syntax methodology, the main object of analysis is spatial configuration. It means the morphological system which determines human activities, such as movement flow in buildings or urban space. The theory of movement economy process is described in “Space is the Machine”. According to Hillier (1996), this theory explains the relationship between spatial configuration and attraction inequality. In this process, spatial configuration forms movement flows by restricting the way people move, and the distribution of land use is decided after that according to the movement flow. According to this theory, streets where many people pass through attract shops, and places which are convenient for transport attracts factories. Thus, spatial configuration generates movement flows and subsequently the distribution of land use. In the next step, the distribution of land use determines the formation of ‘a live centres’; the place where a wide range of activities takes place by the distribution of land use constitutes a live centre. This is because the concentration of land use attracts people and intensifies activities in a particular location. Additionally, larger central blocks decrease integration, and small central blocks increase it according to the theory of space syntax. Therefore, regarding the spatial configuration in a town centre, compact and dense blocks attract people and enhance a centre of settlement in terms of its economy.

7-2 Centrality Process

The idea of centrality is explained in “Centrality as a process: accounting for attraction inequalities in deformed grids”, in which Hillier (1999) argues that a live centre is determined by a spatial process explained by the movement economy process, and this is essential to understanding the process of centrality. He defines the ‘centre’ of a settlement as “a concentration and mix of land use activities in prominent location” (p. 107), regardless of whether it is city, town or village. In other

words, a live centre also should have a function as a centre of commercial activity in a settlement. Fundamentally, movement economy process works at global and local levels in generating centrality. At global level, reasonably integrated location is selected by the process, concerned with a settlement as a whole. On the other hand, convex, compact and dense grids are selected as a centre of the settlements in order to reinforce interaccessibility at local level. The process of centrality, which is reflected back on spatial layout, is dependent on the functional and spatial variables which are caused by social and economic evolutions.

At the same time, Hillier divide the movements which generate centrality process into two. The first is linear (1-dimensional) movement which connects the edge of the settlement to the centre, and this movement will define the location of the centre. The second is convex (2-dimensional) movement which define the hierarchy of centres and subcentres within a centre, and this movement will reinforce interaccessibility which minimise the distance in centres.

7-3 Case Study in London

In examining the redevelopment project of Shin-Nagata area in Kobe, a review of a similar case is beneficial. Retracing the long history of London, also it had an opportunity to reconstruct the town centre after the Great Fire of 1666. According to Hanson (1989), in those days, as well as the case with Shin-Nagata area, a large percentage of houses were built of wood in City. Furthermore, the streets in the town centre were quite narrow and were often occupied by open markets. It was proper that such a condition caused a serious extensive damage in the event of the Great Fire.

Naturally, the reconstruction of the town centre started with the viewpoint of disaster prevention. However, what is remarkable is that the spatial layout of the town centre, which had been formed in the process of the development until the big fire, was not replaced in spite of the opportunity to change the spatial layout drastically. While many architects suggested various kinds of beautiful geometrical plans, the reconstruction was done based on Ogilby and Morgan's plan, which is basically followed the pre-fire plan of the city. In this respect, the case of City is different from that of Shin-Nagata area. They aimed the reconstruction of the area not by introducing different geometrical layout, but by widening and straightening streets, and keeping dense urban grid conditions. In short, they made a point of maintenance and enhancement of the main characteristic of pre-fire plan, which was a live town centre based on dense street system allowing flexible and convex (2-dimensional) movement within the area. Thus, while the spatial layout of city was not replaced in the process of reconstruction, it not only recovered and reinforced functions, but also kept the density of the local grid condition and interaccessibility within the town centre. It is a suggestive case in examining the spatial transformation in Shin-Nagata area.

7-4 Hypothesis

After the Great Hanshin Earthquake, Urban Planning and Housing Bureau City of Kobe have carried out the redevelopment project and the land rearrangement project in Shin-Nagata area. In the process of the redevelopment project, a significant number of large buildings are being constructed on the site where many small commercial avenues constituted the town centre before the earthquake. That is to say, street based shopping style is being replaced by building based shopping style.

From a spatial point of view, the local urban grids of the area have become less dense than before, and it is difficult to justify the location of the town centre by seeing a map of the area. Contrariwise, residential areas around the town centre have denser urban grids. This phenomenon is completely different process from the theory of centrality process, and that of London after the Great Fire 1666. It might be one of the reasons why reconstruction of the area has not seemed to be achieved so far. Therefore, it is worth analysing local urban grid conditions based on the theory of centrality process, to examine whether linear (1-dimensional) movement from the edge of the area concentrates on the town centre, and whether the grids can maximise interaccessibility based on convex (2-dimensional) movement. The analysis will be done by comparing the local grid conditions before and after the disaster and those of the future after the redevelopment plan.

At the same time, it should be mentioned that some shopping centres have appeared not only in the town centre, but also around the town centre in Shin-Nagata area. Since they also are likely to affect the current situation of the town centre, the comparison of these shopping centres will be done in terms of spatial configuration. The supposition is that if they possess more desirable spatial conditions, the decline of the town centre will have been unavoidable. This is because according to the aforementioned theory, the "movement economy" decides a town centre and land use of an area. If the town centre lost movement flow and intensive urban grids, it would be natural that the town centre loses its attraction and vitality as a centre of commercial activities. In the following syntactic analysis, these hypotheses will be examined by using a set of Space Syntax methods.

CHAPTER 8 – SYNTACTIC ANALYSIS

This chapter aims to understand the spatial transformation of Shin-Nagata area from 1994 (before the earthquake) to 2005 (10 years after the earthquake) and the future through the analysis of the spatial configuration of the town centre. The paper will adopt “axial analysis”, which is one of the Space Syntax approach, as a main analytic method of the urban area. The analysis needs an “axial map” which is composed of the fewest and longest lines that cover accessible open space in the system, and it enables some measures such as connectivity, control, depth, and global and local integration, by the calculation of spatial configuration.

As a measure, integration value calculates “the minimum number of intervening lines that must be used, in whole or in part, to go from one line to another” (Hillier, 1998, *The Common Language of Space: a way of looking at the social, economic and environmental functioning of cities on a common basis*, Space Syntax Laboratory) in the whole system. Then, the distinction between global integration ($r=n$) and local integration ($r=3$) depends on the limit of radius: global integration is measured in the relation of an element to all the others, and local integration is measured within 3 steps from an element in the system. Additionally, bright colour represents streets with high integration value, and dark colour represents streets with low integration value.

8-1 Nature of the Area

Figure15 is an axial map of Nagata ward in 2005, and the left-hand image shows global integration ($r=n$) and the right-hand image shows local integration ($r=3$). Because of the geographical conditions, the axial map shows greatest contrast between northern and southern parts in both global and local level: since the northern part of the ward expands to the Rokko Mountain Range, spatial configuration of the northern area tends to be less integrated. This part is mainly a residential area, and commercial and industrial facilities can be hardly seen. On the other hand, the southern part of the ward has much more integrated spatial configuration based on the urban grids, 100m on a side. In detail, the southern part of the ward can be divided into southwest part and southeast part by Minatogawa River. Comparatively, more commercial facilities can be seen in southwest part and industrial facilities in southeast part. Shin-Nagata area is located in the southwest part which is the most integrated area in whole system. In short, it can be said that Shin-Nagata area is a town centre in the ward, and functions as a centre of commercial activity.



Figure 16: Axial Map of Nagata Ward in 2005 Global Integration (Left) and Local Integration (Right)

Source: Own Elaboration Based on its-mo Guide
(<http://www.its-mo.com/>)

8-2 Local Grid Conditions

Figure 16 is the axial map centred on Shin-Nagata area and scattergram representing intelligibility and synergy of the area. Intelligibility is the degree of correlation between connectivity and global integration value, and synergy is that of global and local integration of each space. As the right-hand scattergram shows, the intelligibility of the system is quite low (r^2 0.1011) because of the northern segregated area. Looking at the regression line for the town centre streets indicated by red dots in the scattergram, the intelligibility becomes much higher (0.6519). The same thing is true of synergy. Although the synergy of whole system is relatively high (0.4834), the value of the town centre is much higher (0.9072). It means that Shin-Nagata Area is located in a reasonably well structured area in the whole system and allows linear (1-dimensional) movement from the edges of the area. Next, focusing on the distribution of red dots in both intelligibility and synergy scattergrams, it turns out that they are divided into the upper right group and the lower left group. The red dots in the upper right group are main roads, and that of the lower left groups represents short alleys inside urban blocks. Therefore, it is natural that main roads have much more connectivity and high integration value, compared to small alleys.

Such a categorisation in the distribution can be seen everywhere in the urban fabric because, in general, the system is composed of two kinds of lines. The first are main roads constituting a certain size of urban block, and the second are short and narrow alleys intensifying a local urban grid. Overlooking the axial map of the area, dense

urban blocks with many short alleys are mainly found around the town centre, and they become less dense as they step away from the town centre. This urban phenomenon is explained by the theory of centrality process. However, the local grid conditions of the town centre seem less dense than those of around the town centre. According to the theory of centrality process, the centre should have the densest local grid in the urban fabric. In such a situation, convex (2-dimensional) movement which maximise interaccessibility within the area tends to decrease. In order to trace the spatial transformation of the town centre, the spatial configurations before earthquake and after the redevelopment project will be examined as well.

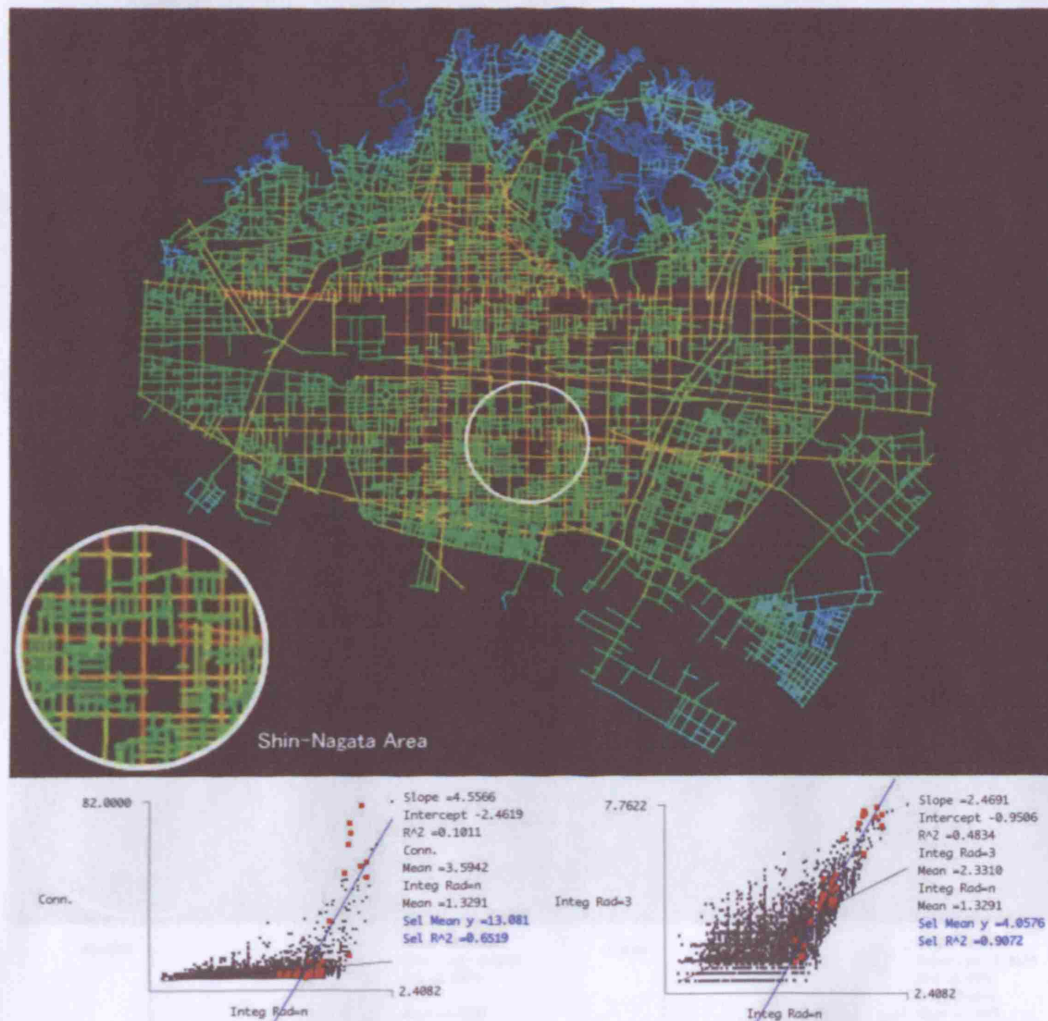


Figure17: Axial Map of Shin-Nagata Area in 2005

Source: Own Elaboration Based on its-mo Guide

(<http://www.its-mo.com/>)

The axial map in Figure17 was generated based on the map in 1994, a year before the earthquake. It is clear that there are a large number of short alleys inside the

urban blocks in the town centre. The local grid conditions of the town centre are much denser than that of 2005 and fit the surroundings. Concerned with the distribution of the lines, many more red dots can be found in the lower left group in the intelligibility scattergram, and the value of the town centre is comparatively lower (0.5617) than that of 2005 (0.6519) because of many short alleys. For the same reason, the synergy scattergram indicates slightly lower correspondence between the local and global conditions (0.8947), showing many red dots in the lower left quadrant. In this way, at the moment of 1994, the system had much dense urban grids in the town centre and applied to the principle of centrality process, which can maximise convex (2-dimensional) movement within the town centre. Nevertheless it became less dense in 2005 by the placing large urban blocks. The question then arises, what it will be like when the redevelopment project will finish, completing the construction of 41 buildings in the area.

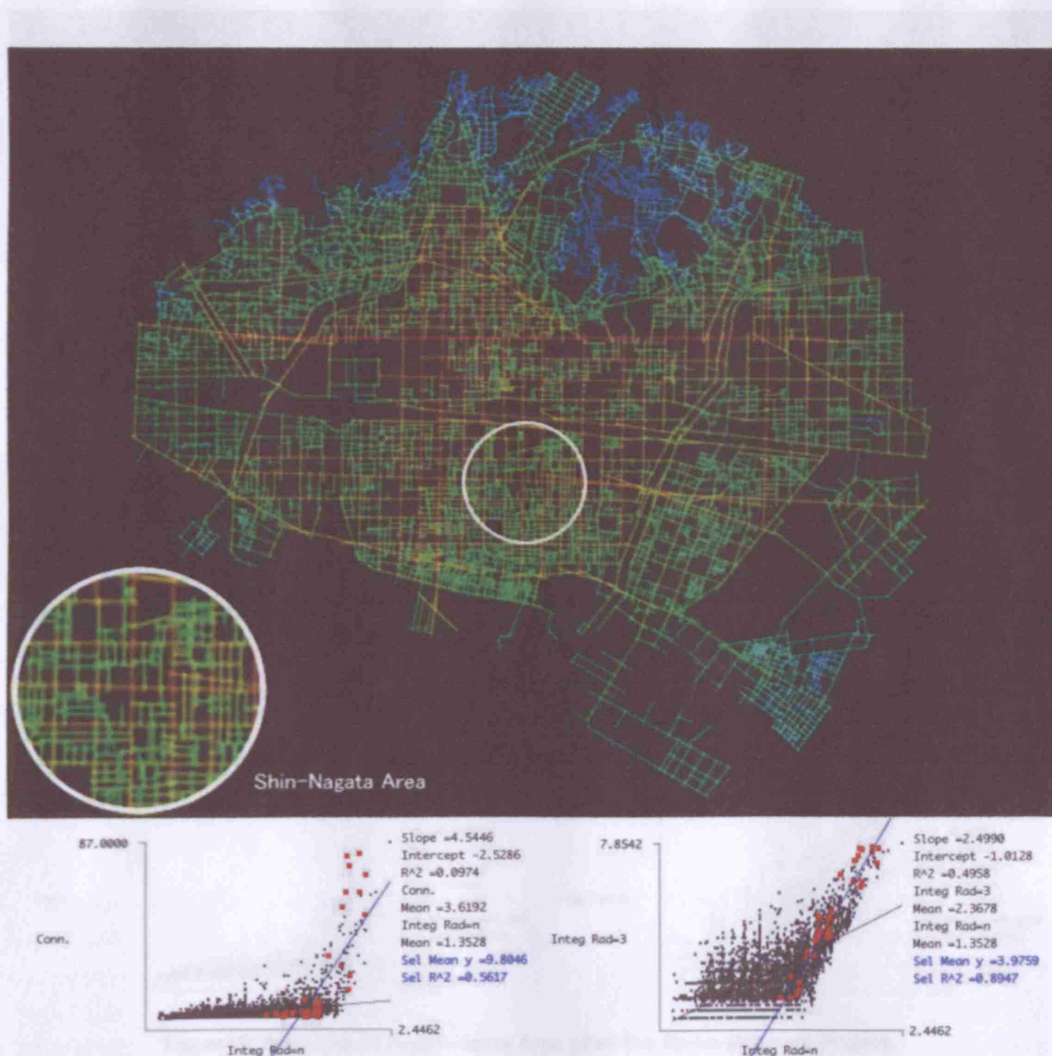


Figure 18: Axial Map of Shin-Nagata Area in 1994

Global Integration (Upper) Intelligibility Scattergram (Lower Left) and Synergy Scattergram (Lower Right)

Source: Own Elaboration Based on its-mo Guide and Zenrin Residential Map

(<http://www.its-mo.com/>)

Figure18 is generated based on the completion plan of the redevelopment project. It is very easy to distinguish the future plan from previous one because of clear difference in spatial configuration of the town centre. Since a large building was put into each urban block, short alleys do not exist in the urban block in the future plan. As the axial map shows, the town centre looks like an "urban hollow". Therefore, the lines constituting the town centre were decreased, and the lower left dots in intelligibility and synergy scattergram disappeared. As a result of that, both intelligibility and synergy value decreased (intelligibility=0.3620, synergy=0.5254). In this system, the convex movement within the town centre would be rather restricted by the large urban blocks, and interaccessibility should be minimised. Thus, re-intensification of the local urban grids makes the town centre less integrated in terms of syntactic value.

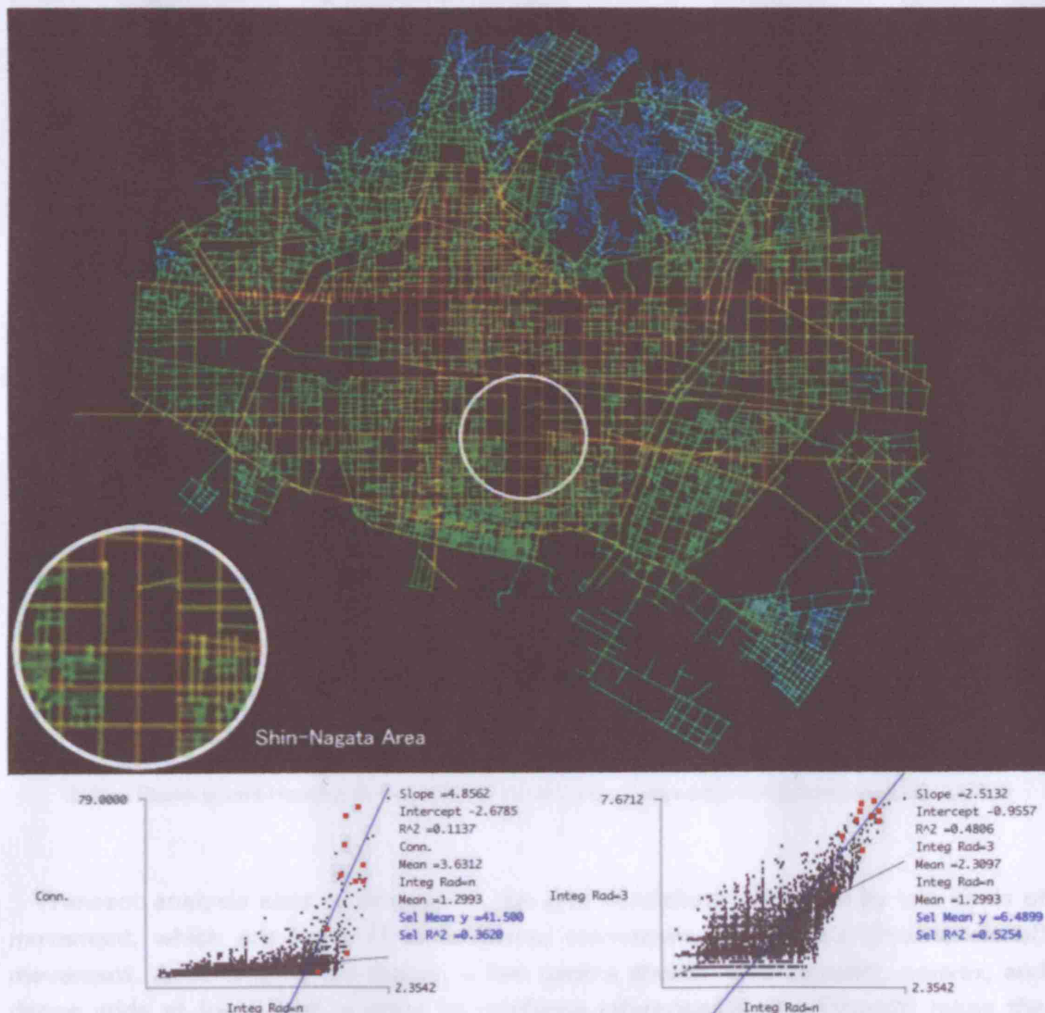


Figure19: Axial Map of Shin-Nagata Area after the Redevelopment Project

Global Integration (Left) Intelligibility Scattergram (Upper Right) and Synergy Scattergram (Lower Right)

Source: Own Elaboration Based on its-mo Guide (<http://www.its-mo.com/>)

Urban Planning and Housing Bureau City of Kobe (<http://www.city.kobe.jp/cityoffice/33/33/>)

The axial map in each period has shown distinct differences in the spatial configuration of the town centre. Figure19 shows the transition of spatial configuration in the town centre. It is clear that, as the redevelopment project proceeds, the local grid conditions of the town centre seem less dense than that of around the town centre. In 1994, before the earthquake, the town centre had a street based shopping style, and therefore, the spatial layout with dense urban block allowed various kinds of movement flows and maximised interaccessibility. However, after the earthquake, the street based shopping style was replaced by building based shopping style, and the appearance of huge buildings removed small alleys from the urban blocks in the town centre. As a result of that, the urban hollow started to appear in the town centre, and it decreased density and interaccessibility of the area. Although, undergoing significant spatial transformations, the redevelopment project is still in progress, this "urban hollow phenomenon" will be accelerated at the end of the project as far as examining the completion plan of the government. In the space of the urban hollow, flexible convex movement at ground level would not be allowed, and the movement flow would be converted from horizontal to vertical in the physical limitation of the buildings. Ironically, the spatial configuration brought by the redevelopment project might deprive the town centre of attraction. Thus, the project has decreased density of the local grid by putting large urban blocks and finally would generate an urban hollow in the town centre, which can be a high wall interfering with flexible movement.

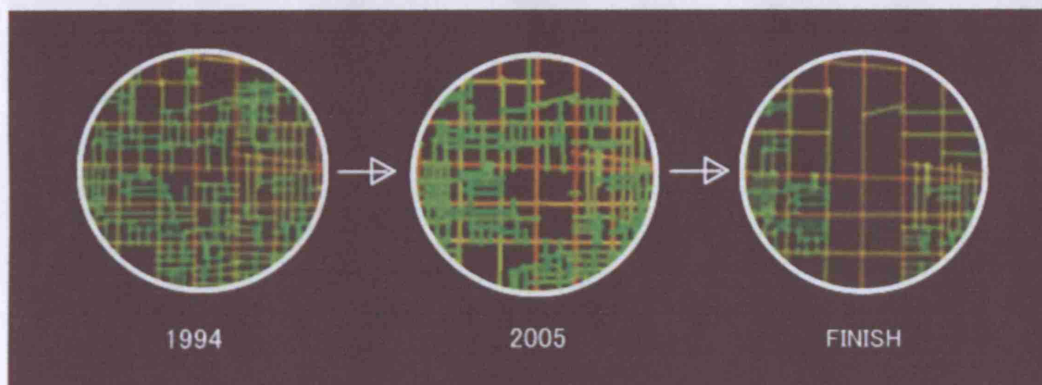


Figure20: Transformation of Spatial Configuration in the Town Centre

Source: Own Elaboration Based on its-mo Guide and Zenrin Residential Map (<http://www.its-mo.com/>)
Urban Planning and Housing Bureau City of Kobe (<http://www.city.kobe.jp/cityoffice/33/33/>)

Transect analysis aims to investigate the grid conditions generated by two kinds of movement, which are linear (1-dimensional) movement and convex (2-dimensional) movement. According to the theory, a live centre should have compact, convex, and dense grids at local level in order to reinforce interaccessibility. Figure20 takes the main through route from east to west through the town centre and attaches the lines which can be reached within 2 steps from the through route. Accordingly, the map represents the changing local grid conditions associated with each stretch of the route. In order to understand the size of the urban block, each transect map is divided

into three sections, defined by relative gaps in the local grid. What is notable at the transect map is that the central section is constituted by many more urban blocks with a large number of short alleys inside them than east and west sections. This is why the central section tends to be more compact than the edge sections, and this phenomenon can be explained by the centrality process.

However, the situation is changed, when focusing on “the centre of the central section”, which is the town centre of the area. Though, in 1994, it has enough density compared to surroundings, empty urban blocks start to stand out in 2005. Finally, the urban blocks in the town centre will be an urban hollow, where there should be the densest area originally. This is why the central point on the though route becomes an urban hollow. Although the central section has much a denser urban grid than its surroundings, in reverse, the centre or the central section have less dense urban grids. This is the urban hollow phenomenon.

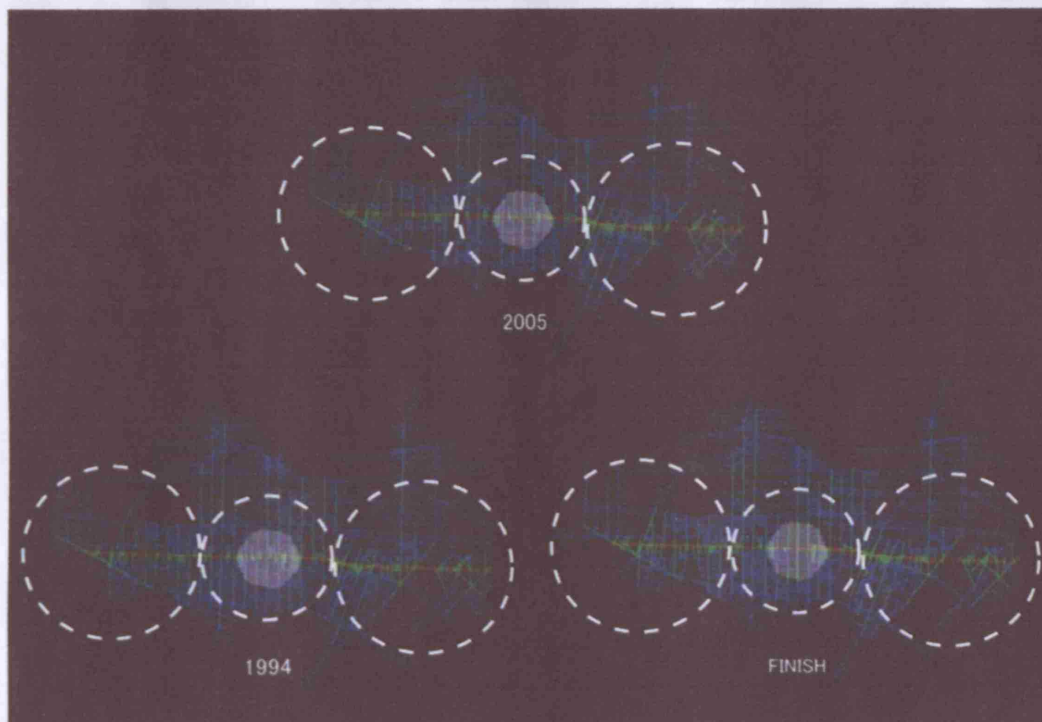


Figure 21: Transect Analysis Taking Through Route from East to West

Source: Own Elaboration Based on its-mo Guide and Zenrin Residential Map (<http://www.its-mo.com/>)
Urban Planning and Housing Bureau City of Kobe (<http://www.city.kobe.jp/cityoffice/33/33/>)

In short, the spatial configuration of Shin-Nagata area has transformed after the Great Hanshin Earthquake by the redevelopment project which put large urban blocks instead of dense and small ones. In the process, density of the local urban grids in the town centre is reduced, and an urban hollow appears there. It decreases the value of intelligibility and synergy, and interaccessibility – which allows flexible convex movement flows – is minimised. Therefore, it can be said that the re-intensification

brought by the redevelopment project deprives the attraction generated by the spatial configuration.

8-3 Appearance of New Shopping Centres

While the redevelopment project proceeds in the town centre, a few middle scale shopping centres have opened around the town centre. What they have in common is that both of them are located in dense urban blocks around the town centre where re-intensification of the urban blocks is recognised. That is to say, they are located around the urban hollow. How do they have effects on the town centre where the redevelopment project has not completed yet? Do they have better conditions in terms of spatial configuration? In this part, the spatial characteristics of these shopping centres will be examined by axial analysis.

Firstly, the new shopping centre Soleil Nishidai will be analysed in the urban fabric. This new shopping centre opened in 2004 and is located on the northern side of Shin-Nagata area. Figure 21 is point depth from the lines the entrances of shopping centre face, and the red dots in the scattergram represent the lines which can be reached within 2 steps from the entrances. What is notable is that the entrance of the shopping centre borders on two well integrated roads in the system, and therefore it is very accessible from everywhere as point depth measure represents. The scattergram shows the high value of synergy (0.6815) which is higher than that of the town centre after the project (0.5254). Since Soleil Nishidai has only two entrances on the north and west side of the building, it cannot build street based shopping system which maximise interaccessibility. However, it might be affect the economical reconstruction of the town centre, considering its high accessibility and integration value.

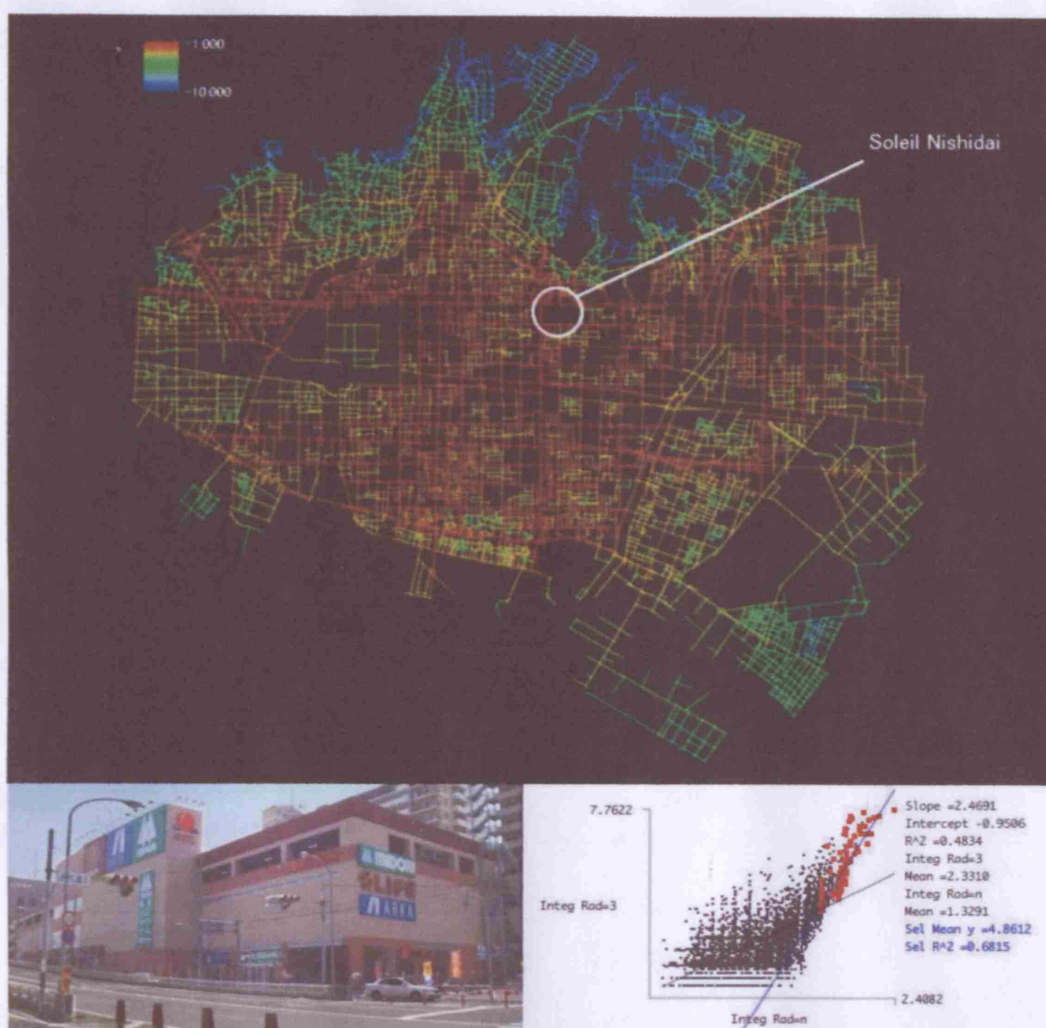


Figure 22: Point Depth 2 Step from the Entrance of Shopping Centre Soleil Nishidai (Left) Picture (Upper Right) and Synergy Scattergram (Lower Right)

Source: Own Elaboration Based on its-mo Guide
(<http://www.its-mo.com/>)

Secondly, the spatial conditions of new shopping centre Agro Garden will be discussed. The shopping centre opened in 2003 at the sea side which is around the urban hollow and relatively close to the south side of the redevelopment site. Figure 22 shows point depth from the entrances as well, and the scattergram highlights the dots representing the lines within 2 steps from the entrances. Since the shopping centre is located in the directly south side of Shin-Nagata area, it shares main roads with the town centre. Accordingly, the accessibility from the north side of the town is good though it is located in the edge of the town. In addition, the value of synergy is extremely high (0.7806) because there are many urban blocks with high density around the shopping centre. In that sense, it would attract people to some extent. However, it is unlikely to cause the shift of the town centre. This is because the area cannot offer a wide range of activities based on land use since the dense urban blocks around the shopping centre are mainly residential.

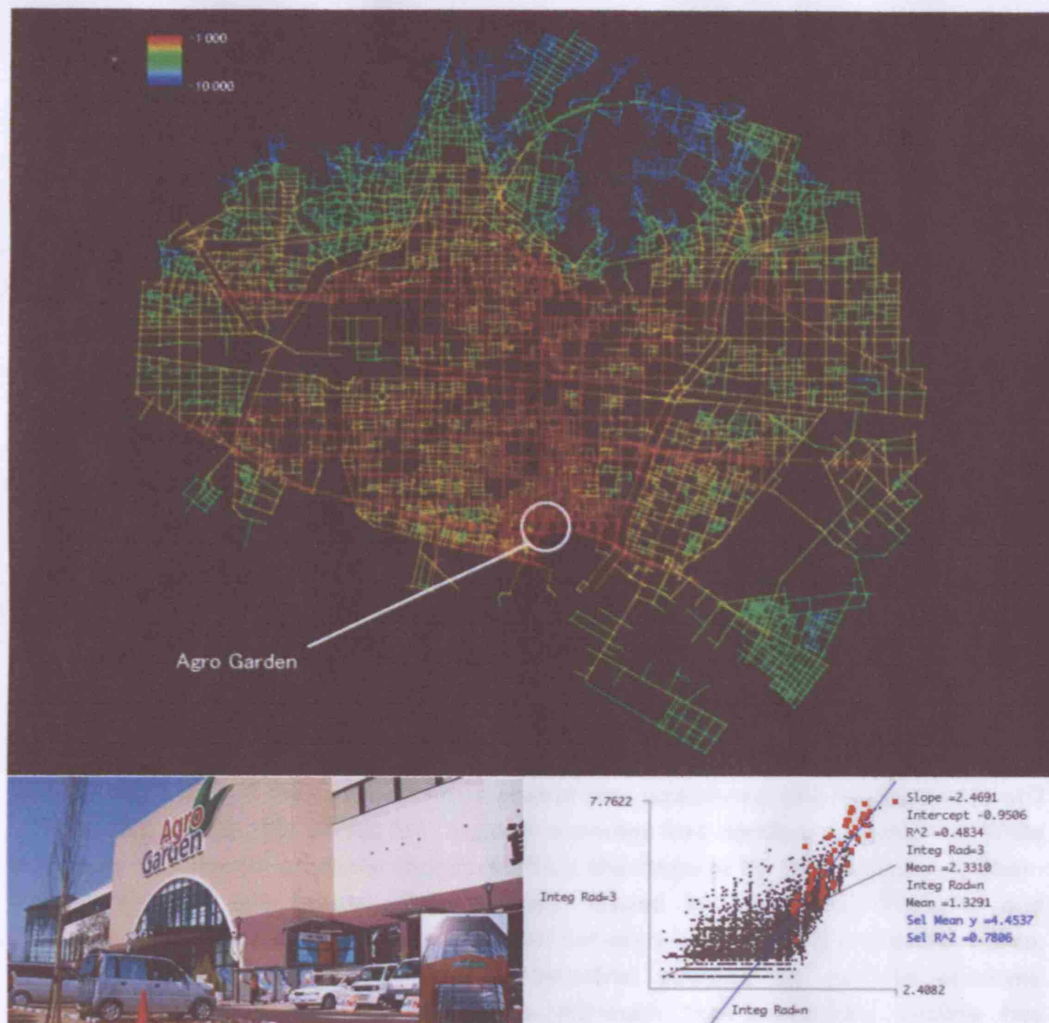


Figure 23: Point Depth 2 Step from the Entrance of Shopping Centre Agro Garden (Left) Picture (Upper Right) and Synergy Scattergram (Lower Right)

Source: Own Elaboration Based on its-mo Guide
(<http://www.its-mo.com/>)

In short, both of new shopping centres can affect the economy of the Shin-Nagata area though they are not crucial because of their problem such as interaccessibility and land use. Therefore, the local residents are likely to shift their shopping stage from the town centre to new shopping centres unless some measures against re-intensification are taken in the town centre. The existence of these new shopping centres should make regional economy more competitive than before. Therefore, the town centre needs to review its spatial layout and finish the redevelopment project as soon as possible, to survive the competition.

CHAPTER 9 – CONCLUSION

The Great Hanshin Earthquake in 1995 attacked Kobe city and caused serious damage to the urban area. Above all, Shin-Nagata area, which is the western subcentre of the city, suffered catastrophic damage since the Great Hanshin Flood and the World War 2. Some houses were completely collapsed by strong tremors, and others were burned down by the extensive fire which took place in the area. In those days, Shin-Nagata area was dense built with old frame houses, and therefore, the town was very vulnerable to disasters. As a result, such a situation expanded the degree of the damage.

Considering what happened in Shin-Nagata area, it was natural that the government aimed the new urban area which is resistant to disasters including earthquake and fire. Before long, Urban Planning and Housing Bureau City of Kobe undertook the urban planning to reconstruct the area physically and economically. However, the urban planning presented for the local residents was huge redevelopment project mainly composed of the construction of many huge buildings. Then the government purchased the land intensively, and started the redevelopment project, which was one of the largest scale redevelopment projects in Japan.

Though 20 out of 41 buildings have completed till March 2005, the expected date of the completion of the redevelopment project was postponed, and the project is still in progress. During this period, the regional economy has continued to decline. While Kobe city has overall gradually recovered from the damage by the earthquake, Shin-Nagata is itself left behind. The statistics issued by Kobe City Planning and Coordination Bureau shows clear distinction between Nagata ward and other wards. From the viewpoint of commercial and industrial activity, the regional economy remains a serious problem in the area. Although the economical decline has recognised before the earthquake as an inner-city problem, the disaster accelerated this trend.

In the process of the redevelopment project, many small alleys inside urban blocks in the town centre disappeared as a construction of the new redevelopment building started. Until the end of the project, almost all small alleys will have been removed from the town centre. As a result of that, the density of the urban blocks and interaccessibility were lost in the town centre. Compared with the dense urban blocks around the town centre, it looks like an urban hollow. This is the completely different phenomenon from centrality process.

The result of axial analysis shows significant difference between the past and the future. After the redevelopment project, both intelligibility value and synergy value of the town centre decreased vastly because of the re-intensification of the urban blocks. This phenomenon becomes clearer when the local grid conditions are investigated by transect analysis. Although the town centre had much denser urban block with small alleys in 1994, it became less dense than those of surrounding. It is completely different process from that of normal settlement's development.

According to the theory of the movement economy and the centrality process, the centre of settlements should be the concentration of the linear (1-dimensional) movement from the edges of the settlement at global level and have compact and dense urban grids for the convex (2-dimensional) movement to reinforce interaccessibility at local level. However, what can be actually recognised in the area is the urban hollow phenomenon. Therefore, it is natural that the town centre loses attraction and economical vitality.

Additionally, the new shopping centres which appeared around the town centre might affect the town centre. Even though they are not complete attractor in commercial activity, their impact on the town centre is not light, considering their potential in spatial configuration. Since they would cause the economical competition including the town centre, undergoing redevelopment project should be reviewed to regain a vibrant town centre.

In conclusion, the new spatial layout introduced by the government is not suitable to recover the live town centre. Although the street based commercial activity was replaced by building based commercial activity, this would be one of the reason that the regional economy has not recovered yet. In order to recover the population of the area, more vibrant and more attractive town centre is required. However, it cannot be said that the new spatial layout brought by the redevelopment plan will generate an attraction represented by wide range of land use and activity.

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