



ERASMUS SCHOOL OF ECONOMICS

BSc Economics & Business

**Post-Disaster Recovery: Restoring Economic Growth through Urban  
Redevelopment**

Keywords:

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## Abstract

In this study I investigate how urban redevelopment can be a driver of economic growth after disaster. As urban redevelopment has many aspects, this study is narrowed down to physical entities and specified only to infrastructures. Two empirical evidences, Kobe Earthquake 1995 and Hurricane Katrina 2005, are being discussed in this paper. From two empirical evidences, it is found that the reconstruction of business infrastructures, public infrastructures, and housing have their respective roles to enhance economic growth after disaster. Furthermore, business infrastructures, public infrastructures, and housing have their different and unique ways to affect the regional economic growth.

#### NON-PLAGIARISM STATEMENT

By submitting this thesis the author declares to have written this thesis completely by himself/herself and does not used sources other than the ones mentioned. All sources used, quotes, and cites that were literally taken from publications, or that were in close accordance with the meaning of those publications, are indicated as such.

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## Chapter 1:

### Introduction

On March 11 2011, Japan hit by the strongest earthquake and tsunami ever recorded in its history. The 8.9 magnitude earthquake centered in Miyagi Prefecture, about 370 kilometers from Tokyo, causing tidal wave which lead to devastation in Northern Japan. In one year after the disaster, 350,000 people of Tohoku, one of the region which experiences major destruction, still displaced from their homes. Many of the victims were living in cramped temporary housing without jobs and hopes (Hayashi, Wakabayashi, & Obe, 2012).

Japan has the most advanced earthquake early-warning system in the world (Birmingham, 2011). But even the most advanced system could not avoid the impact after disaster. Aside of social impact felt by the victims, physical infrastructures were widely destroyed which led to big amount of loss. Also to make it worse, economic activities were thrown to the lower position. During the disaster, factories around Japan evacuated their workers and were halting production process. Furthermore, the disaster destroyed nuclear power plant in Fukushima which generates one third of Japan electricity demand and led to sequential blackouts. As Japan economy is export led, they depend heavily in those factories' production processes (Webb, 2011).

Disasters in general have different impacts to economy, unlike any other economic phenomena, which needs changes in public policies and careful treatment of economic behavior after it happened (Okuyama, 2003). Disasters leave a total destruction in infrastructures and make the majority of the victims jobless and displaced. Furthermore, it throws economic activity to the lower position and need a moderate time to catch up with pre-disaster condition. Because of the physical damages, post-disaster recovery needs urban redevelopment in order to rebuild the affected region. A careful attention and strong commitment should be paid here as urban redevelopment will not only just rebuild the region, but also to restore the economic activity to its original position. But the problem is recovery usually taking such a long time on the process. Therefore the following research question formulated: *How to accelerate economic growth after natural disaster through urban redevelopment?*

The analysis will be structured in order to address the following sub-questions:

1. What is the effect of natural disaster to: (a) economic activities, and (b) urban infrastructures?
2. What is the role of: (a) urban redevelopment and (b) urban infrastructures to economic activities?
3. What activities (in urban redevelopment) are required in post-disaster recovery process?
4. What factors affect the speed of post-disaster urban redevelopment?

The argumentation will be based on desk research through analyzing published literatures regarding post-disaster recovery process. The literatures found majorly are discussing about post-disaster recovery process in wider fields. In order to address the sub-questions and answering research question, thus the paper will be narrowing down more to the urban and economic redevelopment after disaster. Chapter 2 will provide the theoretical basis, specifically related with the role of urban redevelopment in economic activities, effect of natural disaster in both economic activities and urban infrastructures, and speed of urban redevelopment. Chapter 2 will be formulated in order to answer four sub-questions. Chapter 3 and 4 will provide case studies from Kobe earthquake 1995 and hurricane Katrina 2005. The case studies will focus on the urban redevelopment process and its role as the catalyst in economic recovery. Chapter 5 will provide a conclusion based on the analysis in the paper. This paper will focus on the large scale disasters which tend to paralyze affected regions and specify the urban redevelopment process on infrastructure reconstruction.

## Chapter 2: Literature Review

Inter-Agency Standing Committee (2006) defines natural disasters as “The consequences of events triggered by natural hazards that overwhelm local response capacity and seriously affect the social and economic development of a region”. In economic perspective, natural disasters imply losses of physical entities, human and financial capital, and reduction in economic activity. There are also severe effects in financial flows, like the revenue and expenditure of private and public institutions. (Benson and Clay. 1998).

Core characteristic of natural disasters are its infrequent occurrence. Added with its sudden happening and large amplitude, natural disasters cause larger welfare costs than continuous economic fluctuations. Barro (2006 and 2009) further explains in his observation that infrequent economic disasters bring greater effect on the citizens’ welfare. He compares between the turbulent time of World War I and II with the tranquil period post-war. In the turbulent time of World War I and II he found that the welfare costs amounted to be 20% of annual GDP while in the tranquil period post-war the welfare costs only amounted to 1.5% of GDP. Barro included large scale natural disasters (such as tsunamis, hurricanes, earthquakes, and asteroid collisions) in these economic disasters.

### **Natural Disaster Damages: Direct and Indirect**

Natural disasters are always followed by damages. Cavallo and Noy (2010) distinguish the damages into direct and indirect damages. Direct damages are damages to physical assets and capital. Physical assets here are infrastructures, raw materials and other exploitable natural resources. Direct damages also linked to the mortality and post-disasters’ diseases. The direct damages of disasters are calculated using this measurement (mortality, morbidity, and capital losses). Measuring the direct damages involve several determinants. First, the magnitude of the disaster determine the severity of the damage followed. The magnitude used here may ranging from Richter scale for earthquake to Beaufort scale for hurricane’s wind speed. Second, the vulnerability of the country. There are many findings about the factors affecting the vulnerability of the country.

Kahn (2005) found that economic development affect the vulnerability of a country. In the equal level of disaster, richer countries are experiencing lower death toll. During the period of the research, poor country with GDP per capita less than \$2,000 experienced 9.4 deaths per million people per year while wealthier countries with GDP per capita more than \$14,000 experienced around 1.8 deaths per million per year. Kahn further shows that if a country with 100 million population experiences GDP per capita increase from \$2,000 to \$14,000, they will likely have 764 fewer deaths from natural disasters. This is due to the exploitation of greater resources in prevention and mitigation efforts.

Another factor affects vulnerability is country size. Cavallo, Powell, and Becerra (2010) find that difference in country size is related with the level of direct economic damages. The bigger the country (in terms of land, population or GDP), the more wealth are exposed to direct damages. Auffret (2003) on another side reveals that bigger countries may be more diversified and able to manage inter-regional transfers in case of natural disasters. Because of the natural disasters originated only at certain regions, even though direct damages are high, they have relatively lower damage compared to the size of country. Aside of the size, geographical place is also important. Country that consists of several small islands will typically be more vulnerable (Heger et al, 2008).

Politics and institutions also play an important role in determining vulnerability. Kahn (2005) find that less democratic nations and countries that experience inequality are likely to suffer more deaths in case of natural disasters. Anbarci et al. (2005) conclude that what makes unequal societies suffer more damages because the inequality between them make them unable to do collective action within societies, thus lead them to have fewer resources on prevention. Plumper and Neumayer (2009) find the relationship between political regime and famine fatality rates. The political regimes being discussed are democracy and autocracy. Both regimes may have famines, but it will be worse in autocracy, as the democratic government will act with policies that benefited societies. Cavallo and Noy (2010) identified several economic, geographical, social, and political characteristics affecting vulnerability in which all (excluding geographical) could be enhanced by policy action.

Based on the measurement above, when a country hit by a high scale natural disaster and they are categorized as vulnerable, they will experience high direct damages. As explained before, the



direct damages involve infrastructures, mortality, and capital losses which are essential in economic activity. Thus, this chain effect will lead to indirect impact.

Indirect damages linked to the economic activity. Initial impact of disaster (direct damages) is being followed by damages in country's economy. Different with the direct damages, indirect damages is distinguished into two types: short run and long run. While short run usually lasted for around three years, long run usually considered to be more than five years.

Benson and Clay (2004) explain that natural disasters are likely to result in additional expenditures. With the sudden occurrence of disasters, committed financial resources will be reallocated to cover the costs of repairing and reconstructing public infrastructures. This causes the previous plan to be delayed, or even fall apart. Public revenue also affected. Since disasters decrease the level of economic activity within country and its international trade between countries, government revenue is going to fall. Even when after disaster the country receive external aid, it is unlikely to compensate entire losses. Fischer and Easterly (1990) explain in their study that government will eventually face increasing budgetary pressures which in turn oblige them to use financing options: by draining foreign exchange reserves, increasing the level of domestic, or external borrowing, or increasing the level of money supply.

Raddatz (2007 and 2009) on the other side analyze the effect of disasters to output dynamics. He concludes that natural disasters have adverse short-run impact to output<sup>1</sup>. He further extended the study by distinguishing short run and long run impact on countries with different income groups. He finds that less wealthy and smaller countries are more vulnerable to disasters. Furthermore he adds that most of output costs are incurred in the year of disaster and external aid plays only a very small role in weaken that output consequences.

Hochrainer (2009) investigates pre-disaster trend in GDP, post-disaster trend (up to five years after disaster), and develop counterfactual model if disaster is not happening. By comparing the models he finds that, in terms of GDP, natural disasters lead to negative impact. He further emphasizes that the effect is very much likely to happen in case of large disasters.

Rodriguez-Oreggia et al (2009) examine the poverty and human development level after disaster. They hold a comparative study within Mexico between before and after disaster happened. Their study shows an increased level of poverty from 1.5% to 3.6% and a decline of

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<sup>1</sup> Raddatz (2007 and 2009) defines output here as output growth. He uses output growth as the measurement of economic performances. Thus output costs here will mean loss of economic performances.

human development level (using Human Development Index by World Bank). Mechler (2009) examines consumption level during before and after disaster. He finds that household consumption in low-income countries decreasing after disaster.

The studies above cover natural disasters' impacts experienced by various actors in country's economy. In conclusion, based on those findings, natural disasters result in a negative impact to a country's short run economic growth.

Compared to short run, most studies in long run impact give quite contradictory outcomes. Skidmore and Toya (2002) find a counterintuitive conclusion that natural disasters may result in positive economic growth. They further explain that disaster can accelerate Schumpeterian's creative destruction by stating that "disasters may provide an opportunity to update capital stock, thus encouraging the adoption of new technologies."

However, Cuaresma et al (2008) investigate the creative destruction hypothesis empirically on how catastrophic risk affects research and development. They find that creative destruction most likely only happen in high per capita income countries. In developing countries, there will be less knowledge spillover and less new technologies introduced. Hallegatte and Dumas (2009) also conclude that disasters never have a positive effect on economy, especially large magnitude disasters which going to spend a big amount of money in reconstruction process.

Noy and Nualsri (2007) examine the relationship between natural disasters and human capital and find a positive relationship. They find that negative shock to human capital lowers GDP growth per capita. As human capital is considered a crucial factor in economic growth, they reach a conclusion that when natural disasters become a serious threat for human capital, it will lower human capital's rates of return and subsequently lower investment in human capital and long run growth. Raddatz (2009) also find a conclusion that in the long run, GDP per capita of the affected country will be at least 0.6% lower, although 90% of output costs incurred during the year of disaster.

These findings on long run indirect damages of disasters give quite inconclusive results. The occurrence of disasters may leave negative impact long run economic growth. But the difference will be located on the countries' stage of development. Developed countries accompanied with high per capita income will likely to have this 'creative destruction' dynamic while in developing countries it will less likely to happen. But still, to proceed to 'creative destruction' dynamic they

have to incur a big amount of costs and efforts. In conclusion, this ‘creative destruction’ dynamic only help to reduce the long run indirect damages because of natural disasters, not fully erase it.

Both direct and indirect damages bring negative impact to various sectors, especially economic situation and urban planning of the affected regions. In various large scale disasters, it is often found that urban planning and urban infrastructures in the region are physically destroyed. This eventually, as mentioned before, leads to the deterioration of economic situation. In this case, restoration of urban infrastructures is crucially needed. To restore the condition of post disaster to pre disaster is the ultimate goal. And one of the tools to reach this after disaster is through urban redevelopment.

### **Urban Redevelopment**

Urban development has a wide range of fields. It includes physical, socio-economic and environmental aspects in a given urban area (Peiris & Kumara, 2010). Concerning with the topic of the paper, a greater emphasis will be laid on the physical development of land within the urban entity. Thus based on the definition, urban redevelopment is about redevelop physical, socio-economic and environmental aspects in a way so urban areas will be more effective, efficient, and productive. Electus D. Litchfield (1872-1952) once explained that physical development has socio-economic implications. From the regional and national level, economic growth cannot take place without the contribution of the buildings and infrastructures as physical entities. Increases in productivity and output cannot be provided without the built fabric which is the place to hold production process (Peiris & Kumara, 2010).

Through this explanation of urban redevelopment and physical entities then the relationship between urban redevelopment and economic growth can be established. Chambers (2007) defines infrastructure assets as “the physical structures, facilities, and networks that provide essential services to the public”. Jochimesen (1966) defines infrastructure more to its role within market economy. He specified that infrastructure is “all material, institutional and personal assets, facilities and conditions available to an economy that contribute to the assimilation of factor remuneration, given an expedient allocation of resources”. Through these definitions, it can be concluded that transportation structure, communication, energy system, social services facilities, public housing, manufacturing plants, and other buildings used for economic activity are categorized as infrastructures.

The existence of infrastructure can't be separated from human's life and economic production. Lack of infrastructure considered as a major weaknesses which hamper economic growth. Canning and Pedroni (2004) investigate long run effect of infrastructure provision in several countries between 1950 and 1992 and conclude that infrastructure is boost long run growth effects. Infrastructure serves both supply and demand side in economy. Various actors in country economy utilize infrastructure. Household and government consume infrastructure service, such as transport, communication, energy, and water for their basic needs (United Nations (UN) ESCAP, 2006). The existence of infrastructure can directly satisfy demand, for example transport infrastructure.

The availability of infrastructure plays a big role in other demand sides, particularly foreign trade and investment. The existences of transport and communication infrastructure play a significant role in participating world trade. Not only opportunity to participate, but the more efficient infrastructure could also lead to the higher level of product competitiveness (UN ESCAP, 2006). Thus promoting infrastructure itself would lead to higher trade efficiency. Brooks, Roland-Holst, and Zhai (2005) find that improving trade efficiency can boost economic growth more than tariff reforms.

Good quality infrastructures also attract and improve the climate of foreign direct investment (FDI). Coughlin et al (1991) investigate factors of FDI in United States and find that extensive transportation infrastructure is related with the increasing number of FDI. Wheeler and Mody (1992) also find that the quality of infrastructure is important when developing countries want to attract FDI from United States, but is less important for developed countries which already have high quality infrastructures. Kumar (2005) also explain that good physical infrastructure will reduce cost of investment by FDI and thus increasing the rate of return.

Infrastructure is strongly correlated with economic growth. Caldeon and Serven (2004) examine more than a hundred countries in time span 40 years and find that economic growth is positively correlated with the amount of infrastructures.

All studies above point out the role of physical infrastructure in both macro and micro perspectives. In conclusion, physical infrastructure plays a crucial role in humans' life. As infrastructure is inseparable from humans' life, the occurrence of natural disaster will be a doom. Direct damages of natural disaster point out destruction of physical infrastructure. This destruction will lead to paralysis in humans' activities with no exception to, as this paper focus,

economic activity. Thus it will raise new question: what specific infrastructures need to be restored? This will be answered through the following section.

### **Urban Redevelopment after Disaster: First Action to Do**

As the physical infrastructure is heavily damaged, urban redevelopment is playing as a tool to reconstruct the region. Considering its significance to citizens, private sectors, and government, basic infrastructure should be the first thing to be redeveloped.

World Bank Guide Planning (2010) mentioned that network infrastructure (transportation, communication, and road networks) is crucial for stimulating communities' recovery. The existence of local roads will enable the transportation of materials and labors to the affected area. It will also enable the usage of various transportation means in order to support livelihood activities. Energy infrastructures (such as gas, water, and electricity) also have to be immediately restored, considering it is inseparable from humans' life.

The damages resulted from natural disasters often leave people displaced. For this reason, temporary shelter is crucial. But too long in temporary shelter can increase the morbidity effect after disaster. Usually diseases affect victims because of unplanned and overcrowded shelters, poor water and sanitation, and poor nutritional foods (Isidore, Aljunid, Kamigaki, Hammad, & Oshitani, 2012). Because of this, temporary housing has to be provided immediately. Compared to shelter, temporary housing enable victims to reestablish their household daily life until permanent housing is provided (Quarantelli, 1985).

Other basic infrastructures such as health services are also important to be restored immediately. Health services are usually provided by various establishments such as hospitals, health centers, health posts, and clinics. Hospitals usually provide emergency services and tertiary medical care; while health posts are usually provide primary or first aid care. Because of their roles in treating injury and illness, health services play an irreplaceable role in communities (World Health Organization, 2000)

Restoring basic infrastructures mentioned above helps to recover affected populations' life. Human capital act both as physical labor and the source of knowledge in economic cycle. The existence of human capital will give an opportunity to spread the knowledge among societies (Commission of European Communities, 2003). Considering humans' capital role as the driver behind economic activities, restoring basic infrastructures will help to recover economic

activities of the affected area. But restoring humans' capital only is not enough. Production activity can't proceed without the existence of production plant. Thus immediately restoring business facilities after disaster is important considering its irreplaceable role in economic activity.

### **Factors Affecting the Speed of Urban Redevelopment**

This paper is focusing on how to accelerate economic growth after disaster through urban redevelopment. The key point here is the word 'accelerate'. Then it is important to know how the speed of urban redevelopment can be enhanced and subsequently accelerate economic growth.

Speed of recovery is the important factor to prevent future losses and preserve the market function (Schwab, 1998). There are three important factors affecting the speed of urban redevelopment that are going to be discussed here: planning preparation, financial support, and political support.

Planning preparation is important to determine the speed of urban redevelopment process. A pre disaster plan can help to ensure fast and high quality recovery. It can also play a role as the measurement of success during the process (Schwab, 1998). This implies that the existence of plan immediately after disaster will affect the overall speed of urban redevelopment. Not only they will be able to start the urban redevelopment immediately, but it also can act as guidance for redeveloping the affected area. It avoids disruption during the implementation and helps to fulfill the designated plan in a timely manner.

Financial support also has a significant role to determine the speed of urban redevelopment. Reconstructing infrastructures need costs to pay for raw materials and labor costs. Nakabayashi and Ichiko (2004) stated that lack of finance is one of the most crucial factors hampering reconstruction. They further explained that lack of finance could be categorized as shortage of capital, lack of government support, and complicated application process for funding.

Reconstruction after disaster also needs good coordination between various figures in communities. Berke, Kartez, and Wenger (1993) explain that recovery program must be flexible and involve local opinions. Fujieda et al. (2004) further assert that social capital together with strong leadership of community organizations is important for fast recovery. In addition, communities' involvement will provide high satisfaction for communities. In this case, political support is important in order to reach a good coordination. A stimulus from government official

to initiate coordination in reconstruction process is important. Government has the capacity to invite community to be involved in reconstruction process.

Each factor is important for the urban redevelopment speed after disaster. Lack of each factor will subsequently lead to the delay of reconstruction. Lack of planning preparation will hamper or, in the worst case, make urban redevelopment project can't start. As there is no guidance to the reconstruction project, people will easily be confused and lose track of what needs to do. Lack of financial support will obviously hamper reconstruction project as it pays for the reconstruction costs. Lack of political support will also hamper reconstruction project. If there is no good coordination between the affected communities, reconstruction project tend to be disrupted because of various different goals they want to achieve.

### **Conclusion**

The speed of starting urban redevelopment project influences on how fast the urban infrastructures are restored. Like what have been discussed before, natural disaster, urban redevelopment, and economic activities have a strong relationship. In respect of town planning, urban redevelopment prioritize physical development, such as infrastructures and building, where infrastructures have an irreplaceable role in economic activity. On the other side, when large scale natural disaster happened, it has a tendency to destroy physical entities in the affected region. This is one of the proofs why when disaster happens economic activity comes to a halt. Reflecting from this, it is clear that one of the ways to restore economic growth is through urban redevelopment. Then the question would be: how this economic recovery process can be accelerated? The following chapters (chapter 3 and 4) will provide case studies from Kobe Earthquake 1995 and Hurricane Katrina 2005. The case studies will talk specifically on their urban redevelopment after disaster and how they tend to affect the speed of economic recovery process.

## Chapter 3

### Empirical Evidence: Kobe Earthquake

This chapter will discuss empirical evidence in Kobe, Japan, after large scale disaster happened. This empirical evidence will be divided into two sections: Description and analysis. Description part will be specifying on the losses suffered, planning, reconstruction process, and the speed of urban redevelopment. Analysis part will dissect and analyze the urban redevelopment process and how it impacts economic growth. As the emphasis of this paper is about physical assets, thus the words ‘urban redevelopment’ and ‘reconstruction’ will have similar meaning and used interchangeably.

#### **Description**

January 17, 1995 at 5.46, Kobe hit by 7.2 Richter scale earthquake. This 20 seconds-lasting earthquake became the worst earthquake happened in Japan during 19<sup>th</sup> century after Great Kanto earthquake in 1923(Fukushima, 1995). Kobe is located in the western part of Japan. It is the second most populated and industrialized region in Japan after Tokyo (“Kobe Earthquake, n.d.). The port of Kobe was one of the world’s busiest port before the Great-Hanshin earthquake struck. The following table consists of some direct and indirect damages Kobe earthquake resulted.

Direct Damages	Indirect Damages
Deaths: 6,400	Fire (because of damages in gas system) consumed <b>82 hectares urban land</b>
Injuries: 15,000	Utilities paralysis because direct damages in infrastructure: 1. Gas service: Unavailable for 845,000 households <b>(resumed: 2.5 months after disaster)</b> 2. Water and sewer service: Unavailable for 1.27 million households <b>(resumed: 4 months after disaster)</b>
Damaged Buildings: 100,000 (complete damage) 300,000 (partially and minor damage)	
Damaged Housing: 200,000 units (completely and partially)	

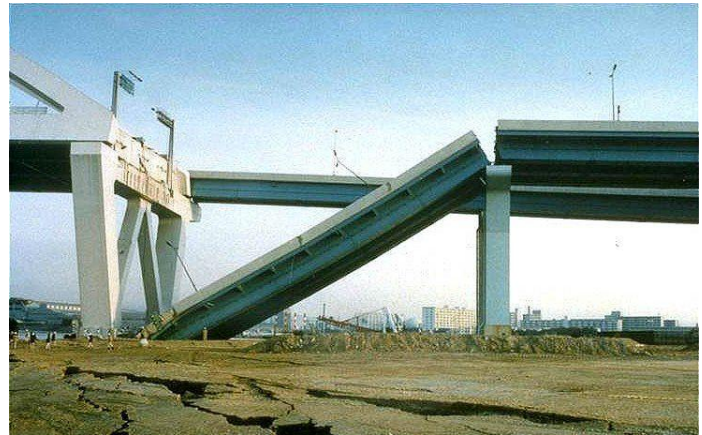
*Table: Estimation of Damages in Kobe 1 (Source: Risk Management Solutions (RMS), 2005)*

Other urban infrastructures, such as public physical infrastructures and network infrastructures were severely damaged. 85% schools, hospitals and major public facilities of the region were experiencing severe damage. The network infrastructures which connect in the region also



destroyed. The strong shaking and subsequent ground deformation brought extensive damages to water, gas, and sewer system. Rail and road network in the region also heavily damaged. The most losses would be coming from the heavy damage in port of Kobe, as it was the leading container shipping port in Japan. Direct losses from the disaster were mainly in urban infrastructures and mortality (Risk Management Solutions (RMS), 2005).

The worst thing is when the disaster happened Japan was in a recession era. At that time Kobe was transitioning the economy to focus on offices, service, retails and small businesses. The disaster was hitting this urban area the hardest. Unemployment was reported to raise until 80% and over 2,000 small and medium businesses were failed. Added with the damages experienced by Port of Kobe, the disaster affects the overall economy in Japan. Kajitani, Tatano, and Okada (2000) find that the earthquake not only affects Port of Kobe but also disturb the stable relationship with other five Japanese major ports. The total economic losses resulted from the disaster was estimated to be \$150 billion, with \$100 billion in infrastructures and \$50 billion in economic disturbance (RMS, 2005).



Figures: Damages in Kobe (Sources: [telegraph.co.uk](http://telegraph.co.uk) & [ce.washington.edu](http://ce.washington.edu))

Around one hour after the disaster, City of Kobe established Disaster Relief Headquarters and started emergency response operations. Immediately nine days after disaster, Earthquake Restoration Head Office established to boost restoration process. In just five months, June 1995, the long term plan already established and comprised of wide range goals. Prior to disaster, the government have developed a plan to revise the city of Kobe, thus they integrated the previous

plan with the post-disaster condition. Rather than to recover the city condition to pre-disaster level, government was seeking to create a new growth through the restoration project (Ota, 2009).

Recovery project for public facilities was fully funded by central government. As a supplementary resource, in April 1995 Earthquake Disaster Reconstruction Fund founded to support victims, housing reconstruction, and other unreached recovery projects. In this project, private banks provided \$9 billion in long-term loans without interest. This project succeeds to ensure other reconstruction activities that were not covered by government (RMS, 2005).

Infrastructures	Finished Date
Telephone (Communication)	<b>Exchanges:</b> 18 <sup>th</sup> January 1995 (1 day after disaster) <b>Subscriber Lines:</b> 31 <sup>st</sup> January 1995 (14 days after disaster)
Electricity	23 <sup>rd</sup> January 1995 (6 days after disaster)
Water system	<b>Mostly:</b> 28 <sup>th</sup> February 1995 (45 days after disaster)
Gas system	<b>Completely recovered:</b> 11 <sup>th</sup> April 1995 (around 3 months after disaster)
Railways	<b>Earliest finished date:</b> April 1995 <b>Latest finished date:</b> August 1995
Roads	<b>Earliest finished date:</b> July 1995 <b>Latest finished date:</b> September 1996

**Table: Infrastructures Recovery** (source: *Murata, M., International Recovery Platform, n.d.*)

In recovery process, the very first action done by government was repairing basic infrastructure for victims such as water, gas, electricity, communication, and temporary housing. The table above presents the infrastructures and the reconstruction's finished dates. Meanwhile for Port of Kobe, it was fully recovered in March 1997 (Murata, M., n.d.).

Long-term planning was also immediately organized by government and urban planning experts. The planning was published in the end of June and was the revision of pre-disaster planning. The plan was addressed specifically to three certain goals: citizens' support, economic activities, and urban infrastructure (Ota, 2009). As it has been said before, prior to disaster government already have plan to revise the city and thus the pre-existing plan integrated to achieve these goals. The plan focused on the infrastructure rehabilitation, land readjustment, and urban redevelopment. These three projects were covered by government funds. Land

readjustment project was used to widen roads, add parks, and construct other public facilities. Government compensated each property owner in this project by giving new parcel. The parcel received was smaller than the original parcel and not all parcels were necessarily in the original place. In urban redevelopment together with infrastructure rehabilitation, all properties in the project area were purchased. As it has been informed before, the damages to physical infrastructures were either complete or partially. In this urban redevelopment project most of the physical infrastructures are demolished and fully reconstructed with large commercial and residential development (RMS, 2005). Even though the projects were still ongoing until 2003, but this urban redevelopment had succeeded to boost the economic growth of the affected area. This rapid planning and hard work brought an outstanding result. In March to July 1996, manufacturing sector in Kobe reach 98% of pre-disaster condition, department stores and 79% of shops were reopened, and department stores' sales were reached 76% pre-disaster condition. Port of Kobe, even though it was not fully recovered, but import volume already back to pre-disaster condition while export volume was reached 85% pre-disaster condition (Horwich, 2000). In 1999, this restoration project and central government prioritization to infrastructure rehabilitation brought Kobe's economy recovered 75%-90% of pre-disaster (RMS, 2005).

Following the disaster, reconstruction process started immediately. Considering the destruction, many parties predict that the rebuilding and recovery process would take at least 10 years (Horwich, 2000). Comparing the damages resulted and the actual recovery process it would be impossible to imagine. But Japan already proved that it is reachable by a thorough urban redevelopment, especially infrastructure rehabilitation. The first quarter of 1995, the time when disaster struck, the economic growth was in the level of 3.2%. When most constructions almost completed in 1996, the growth rate showed an improvement. The first quarter of 1996 the rate was 3.7% and the last quarter of 1996 was 5.9% (Fullick & Kihara, 2011). This is recognized by Japan's authority as the effect of rebuilding after disaster.

### **Analysis**

Japan is one of the countries in the world that geographically vulnerable to earthquake. Added with the high magnitude of the earthquake, it is normal that the direct damages were high. Regardless of the high direct damages, the case of Kobe demonstrates a proper response from Japan's government. Right after the disaster government immediately recovered the basic

infrastructures in the city such as water system, gas system, electricity, and communication. They also started to recover network infrastructure such as road and railway. While the restoration of basic infrastructure and health care were being implemented, the government of Kobe also started to construct temporary housing for the victims. Construction of temporary houses also mostly done in around two months after disaster, which helped to press down the morbidity effect. Not only that, Japan's government also paid a big attention to business infrastructures as they started to reconstruct it almost immediately.

The speed of reconstruction also categorized as fast. Prior to disaster, government already created a plan to revise the city, so basically they already had a blueprint about what and where to do regarding the reconstruction process. Japan's government also fully financed the whole reconstruction process of the city. Also to ensure the communities can recover, they provided long-term loans by the help of private banks. The support of the government was considered as outstanding. They initiated the reconstruction process from zero and coordinated everything until most of the projects completed. The thorough collaboration of three factors here (planning preparation, financial support, and political support) caused the rapid urban redevelopment process. All urban redevelopment processes nearly completed in 1996, which was one year after the earthquake happened. In the end of the description part, it is mentioned that the economic growth one year after disaster almost doubled and being recognized as the effect of rebuilding. So, how exactly the urban redevelopment accelerate economic growth?

The first way to accelerate the economic growth is **restoring vital infrastructures for economic activities**. Japan's government nearly finished reconstructing business infrastructures one year after disaster. Logically, restoring business infrastructures can help the economic situation through several ways. The government finished reconstructing retails and department stores one year after disaster. This helped the victims to get their jobs back. In general, this implies that reconstructing retails and department stores are restoring jobs and income of victims so that they have a chance to recover their economic situation. Furthermore, the existence of retails and department stores helps to increase economic transaction between producers and consumers in post-disaster condition. This will result in 'earning profit' trend for the retails and department stores. In short, they will: **1. Help to increase the welfare level of victims as they have job and income to support their own life and families, and 2. Help the businesses running back.**

When the businesses have restored, the benefit do not stop until the employees and store owners only. From a bigger perspective, restoring businesses infrastructures, i.e. manufacturing plants, help to increase the production activities. Once the production activities increase, the output will also increase. The increase in output will subsequently increase GDP of the affected region. As the GDP is an indicator for economic growth, this implies that economic growth is steadily increasing after disaster.

As the infrastructures destroyed and economic activities hampered, businesses are experiencing loss. The delay in reconstruction will lead to stagnant economic growth. In the perspective of businesses owner the prospect to stay in the disaster area will not be profitable. Refer to the case of Kobe, reconstruction gave hope to the business owners there. Firms saw this as a new opportunity and it decreased the level of business migration out of the area. Not only it will reduce the relocation rate of firms but also it is possible to attract new businesses to start around the disaster area.

To generalize, through restoring business infrastructures, economic activities can be started again. The increasing number of economic activities will participate to increase the economic growth in the affected region. This intervention may be seen from **a wide perspective (macro)** considering that the stimulus (reconstruction of business infrastructures) will directly affect economic growth as a whole.

## Chapter 4

### Empirical Evidence: Hurricane Katrina, New Orleans, United States

#### Description

Hurricane Katrina hit Louisiana Coast 29 August 2005. It was one of the worst natural disasters in U.S. history (U.S. Department of Commerce, 2006). Hurricane Katrina was reaching category 5 which means a deadly storm and the previous category 5 storm experienced by U.S. was in 1992, Hurricane Andrew. The impact brought by Hurricane Andrew included 23 deaths and \$25 billion damages in Florida and Gulf Coast (Neal, 2005). But the worse thing is New Orleans regions, one of the most affected areas, are mostly below sea level and bordered by Gulf of Mexico, Mississippi River, and Lake Pontchartrain (Eisler and Watson, 2005). Following the hurricane, the levee in the border of New Orleans destroyed and extensive flooding happened which made a complete destruction to the region.



Figures: Aerial views of New Orleans during the flooding.  
(Sources: [michaelapleton.com](http://michaelapleton.com) & [notesonneworleans.net](http://notesonneworleans.net))

As the flood swept New Orleans, the death toll is much bigger than Hurricane Andrew which is 1,200 deaths. Other most affecting direct damages were infrastructures destruction. The destruction left the entire city paralyzed with no communications, water, electrical sources, sewage system, and gas for weeks. The city announced as uninhabitable in 31 August 2005 and 80,000 evacuees transferred to Houston. It was the second wave of evacuation after the first

wave was held before disaster (Comfort, 2006). The flood finally receded 2 weeks after disaster. Around 80% of flood damages were hitting residential structures.

The damages throughout the city subsequently affected its economic activity, particularly employment. Three major economic sectors in New Orleans before Katrina happened were tourism, port operations, and educational services. The city’s economy was heavily depended on low-wage tourism jobs which accounted for almost a half of the employment (Swanson, 2002). There were some other sectors that paid above the average wages (such as shipping and oil & gas extraction) but these sectors only composed for relatively little employment when the disaster hit (Glaeser, 2005). After disaster, in November 2005, employment was 105,300 below November previous year (see the following table).

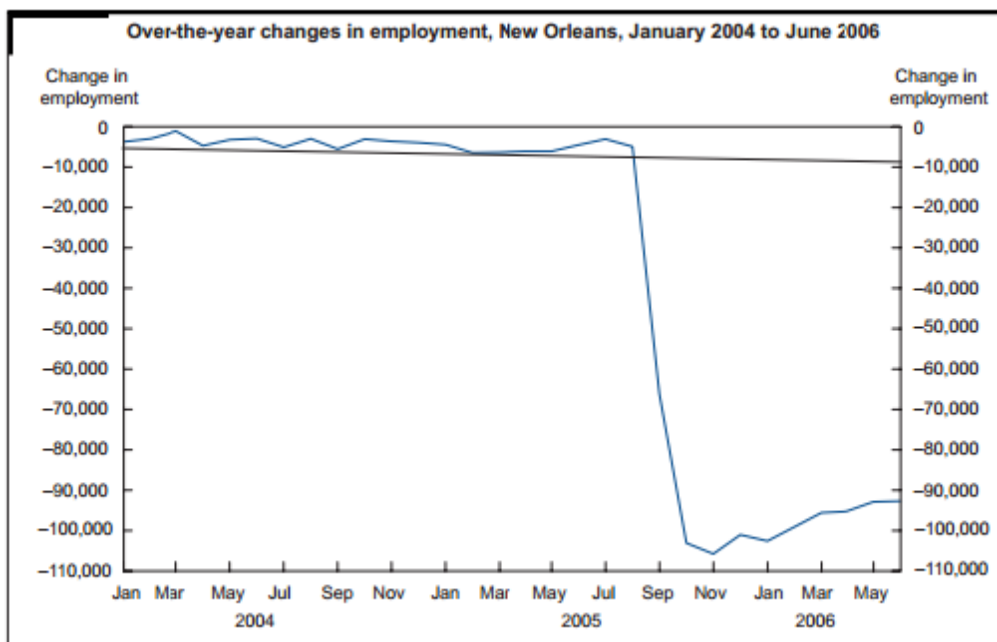


Table: Changes in Employment, New Orleans. source: Dolfman, M.L., Wasser, S. F., & Bergman, B. (2007). The Effects of Hurricane Katrina on the New Orleans Economy. *Monthly Labor Review* 130(6).

In June 2006, even though it was decreasing the employment losses were still high (in the amount of 93,594). Even though after disaster all economic sectors experienced the losses in employment, but there were several sectors which hit the hardest. These sectors were accommodation and foods, retail trade, and health care & social assistance which in the last quarter of 2005 lost 46.1% of employment. These sectors were where the most of New Orleans’

citizens worked and was among the lowest paid in the city's economy. These job losses were particularly driven by destruction of city's infrastructures, residential places and lack of public health which forced them to leave. In the second quarter of 2006 (April-June) employment losses were decreasing to 93,594 or 38.1% employment pre-disaster. Even though the employment losses were still substantial, this marked an improvement on the economic climate of the city (Dolfman, Wasser, & Bergman, 2007). This economic climate started to grow together with the effort to reconstruct the city.

One notable fact from the case of New Orleans is the delay of city reconstruction. The Unified New Orleans Plan (UNOP) was not finalized and reviewed by city and state government until March 2007. Prior to UNOP, in nearly two years after Katrina, New Orleans had three other recovery planning: ESF-14, Bring New Orleans Back Commission (BNOB), and City Council. These publications were all aiming for recovery process in New Orleans but there were not a single effort to elaborate these three plans. In the second quarter of 2006, it became clear that these plans were lack of political support and comprehensiveness. Then afterwards, Louisiana Recovery Authority (LRA) approached Rockefeller Foundation whom then agreed to partially fund the recovery of entire New Orleans city with one condition: all key entities (government, planning commission, and societies in general) involved in the planning process. This driver then resulted in UNOP which integrate previous three planning efforts into one citywide recovery plan (Johnson, 2007).



Figure: Crowded temporary shelter. Source: *Affrodite.net*



UNOP developed a 10 year timeframe and aiming to balance the recovery vision to bring back the entire city and enable all citizens to return. One of key risk in this plan was the pace of repopulation. In January 2007, only half of the pre-Katrina populations were back. Actually years before Katrina hit, New Orleans already faced a declining population. Over the last 40 years before Katrina, population density dropped from 17,053 to 7,266 per square mile. As the population dropped, the economy strained thus it led to many local budget cuts which then affected the quality of local infrastructures and services. Reflect to this situation, UNOP proposed a prioritization to infrastructures and public facilities. The physical reconstruction was also accompanied with voluntary program to bring residents and businesses back by giving incentives (Johnson, 2007). Until December 2007, reconstruction for public infrastructures was not completed yet, but showed a good improvement. At that time the development was: 57% for hospitals, 62% for public schools, 68% for private schools, and 19% for regional transportation network compared to pre-disaster condition (Kondo, 2008). In addition, the accompanying voluntary program subsequently founded and called “Road Home.” This program distributed funds to homeowners and small rental property owners. This program showed a significant improvement of New Orleans’ repopulation pace. In second quarter of 2007, population in New Orleans estimated to be 273,598 or 60% of pre-Katrina level (Johnson, 2007). The growth of the population marked a good sign for New Orleans’ employment. The population growth is strongly related with job growth (Plyer, 2010).

### **Analysis**

The damaged levees and subsequent flood is one of the proofs of Hurricane Katrina’s strength. Furthermore, the stage of economic development in New Orleans is categorized as low (considering the majority of populations depend on low wage jobs and face declining population) thus high direct damages couldn’t be avoided. Compared to the case of Kobe, there are some differences in urban redevelopment process in New Orleans. As the description part explained, the major effect from the disaster aside of physical destruction was **significant decrease of population**. In addition, after disaster, there were many different plans carried by various political figures. These plans were contradict to each other; they were focusing on different goals rather than acted as complementary to other plans. This was happened because of no coordination between the communities’ figures. Government did not show any intention to start

the plan coordination with key communities' figures. This lack of political support caused a mess in planning preparation. Confusion because of many published plans led to the delay of reconstruction. These two things, significant decrease of population and delay of reconstruction, had reciprocal relationship. Before the disaster happened, infrastructures were already worsening. In addition with the delay of reconstruction, public and business infrastructures after disaster became more deteriorating and this matter made citizens could not go back to the city. Subsequently, the significant decrease of population brought the delay in public services.

Based on the case, one of urban redevelopment speed factors: Lack of political support, subsequently affected another factor which was planning preparation. This case gave an example on why all urban redevelopment speed's factors should go hand-in-hand in order to enhance the speed of reconstruction. Lack of one factor will slow down the reconstruction process.

The speed differences between New Orleans and Kobe cases proven to give contradictory result. Kobe reconstruction project was done in a fast pace and without any delay while New Orleans project suffered delay for almost two years. As a result, during the delay communities suffered a low quality life. They did not have a proper space to live (improper temporary housing) yet proper public infrastructures. Because of this, direct spread of diseases was unavoidable. In addition, indirectly, the poor condition lowered the incentive of locals (who previously lived in the affected region) to go back to their initial place.

Previous paragraphs have emphasized that delayed and slow reconstruction process can cause many socio-economic problems to arise (in this case: **Morbidity** and **Significant decrease of population**). These problems will be greatly felt in household level. Subsequently when every household experiences similar things, the life quality of that community will be worsen. As the quality of life is worsening, the quality of human resources, as one of the drivers of economic growth, will be decreasing. This is why urban redevelopment after disaster not only focusing on restoring business infrastructures, but also any other basic infrastructure and housing for the victims.

The availability of proper housing and daily necessities (in this case are water, electricity, and gas) give incentive to the victims to stay in the affected region. This in turn will help to press down the level of emigration and, specifically in the case of New Orleans, attracts the evacuees to come back to the city. Human capitals are one of the important drivers in economic growth.

Refer to New Orleans case, the delay of urban redevelopment was indirectly cause losses in employment sector.

To generalize, reflecting from New Orleans case, one of the ways to accelerate economic growth after disaster through urban redevelopment is by reconstructing public infrastructures and proper housing. This plays a role as the incentive to guarantee communities to stay in the affected region and attract the evacuees to return. Emigration is a result that cannot be avoided from natural disasters, through reconstruction of public infrastructures and proper housing the level emigration **at least** can be pressed down. When the population is more or less constant compared to the pre-disaster condition, the affected region is likely to experience **less employment losses**. Considering their reciprocity with each other, when public infrastructures are being reconstructed and population stays in the affected areas, public services can be held again. Thus the benefit from this can be distributed to the victims and government. The benefit for victims can be divided into two categories: First, for the victims who work in the public service. The restoration of public service will guarantee them a job thus they will earn money again. Second, for the victims who are being served by public services. The restoration of public services guarantee an increased life quality compared to the condition during the disaster or right after the disaster happened when everything is paralyzed. It participates in the recovery of communities and restoration of welfare within communities. Considering human capitals role in economic growth, the establishment of public service will help communities to heal (mentally and physically) and ensure that they can go back to their normal life **faster**. And by 'normal life' here is to go back to their daily life during pre-disaster condition and perform their role as human capitals in economic cycle. In this category, the stimulus will affect the **micro** side of economies as it affects per households and thus lead to employment recovery and subsequently affect economic growth.

## Chapter 5

### Conclusion, Limitation, and Recommendation

#### **Conclusion**

Large scale natural disasters in general always bring harm to the affected region. Even though it is rarely occurred, but once it occurred it will leave a grand scale of damages. The damages itself distinguished between two: Direct and indirect damages. Direct damages are damages that resulted from the direct hit of the disaster. Physical assets, such as infrastructures, are included in this category. When the magnitude of natural disasters are higher, direct damages resulted will be higher. Furthermore, when the affected region is vulnerable, direct damages resulted will also get higher. The severity of direct damages will subsequently affect the severity of indirect damages. Direct damages are strongly related with the damages in country's economy. Thus, more severe the damages in physical asset will result in higher damages in country's economy.

Physical assets have an irreplaceable role in economic activity. Economic activity can't be done without the existence of manufacturing plants and infrastructures. Human capitals also can't be properly working without the existence of public infrastructures and proper housing. When natural disasters destroy these physical assets, there is nothing people could do aside of reconstructing those physical assets and restoring economic growth within the affected region. Urban redevelopment is defined as redeveloping urban areas in order to be more productive; thus reconstruction of physical assets is covered in this field.

Two case studies are discussed in this paper: Kobe Earthquake and Hurricane Katrina in New Orleans. The two cases are analyzed in order to answer the research question of this paper: How to accelerate economic growth after disaster through urban redevelopment.

The case of Kobe has shown a fast pace of urban redevelopment. Immediately after disaster the government started the reconstruction project. Before the disaster happened, they already had a detailed plan to revise the city. Because of this, it was easier for them to start the reconstruction project. In addition, a full financial and political support made the reconstruction process ran smoothly. They covered almost everything in their reconstruction process, from public infrastructures, temporary housing, and business infrastructures. They finished major reconstruction in one year period. One thing that should be emphasized here is the fast reconstruction of business infrastructures.

The case of New Orleans gives a contrast speed of urban redevelopment project. The reconstruction project was delayed for about two years after disaster. The coordination of planning preparation was not synchronized and political figures showed signs that they did not have any intention to solve the differences. The plan was finally unified because the financial supporters would not give any fund if the urban redevelopment plan was still scattered. One major hit from the disaster to New Orleans was significant decrease in population and this subsequently resulted in employment loss. Added with the delay of reconstruction, many local evacuees did not have any incentive to go back to their initial place. Because of this, the unified plan was emphasized on reconstructing public infrastructures and housing. The focus of the plan was to attract local evacuees to go back to New Orleans.

The two cases give different alternatives from two different perspectives. Kobe emphasized on wider perspective through business infrastructures' reconstruction. By doing redevelopment of business infrastructures they could restore jobs in a larger scale, means that they directly enhanced the economic growth through production and consumption process. On the other hand, New Orleans enhanced the economic growth from micro perspective. They prioritized reconstruction of public infrastructures and housing to persuade local evacuees to go back to the region. Through this way, as per household came back to the disaster area, employment losses could steadily be reduced. Furthermore with the comeback of human capitals to the disaster area, public services could be performed. Afterwards, step by step the quality of life in the disaster area could be restored. When the victims are recovered from disaster shock and get back to their normal life, they can participate in economic cycle as human capitals in more efficient and productive way.

Another important thing beside the ways to enhance the economic growth is the **speed of urban redevelopment**. Kobe and New Orleans cases have shown contradictive result when the speed of urban redevelopment is different. The slower the speed of urban redevelopment, the reconstruction process will likely to face more socio-economic problems. And then these problems have a high probability to hamper the overall urban redevelopment process. On top of that, three factors of urban redevelopment speed (planning preparation, financial support, and political support) should go hand in hand with each other. The lack of one factor will make urban redevelopment process get slower.

In conclusion, there are two ways to accelerate economic growth after disaster through urban redevelopment: 1. **By reconstructing business infrastructures so that economic activities restored (from macro perspective)**, and 2. **By reconstructing public infrastructures and housing so that human capitals can get back to their normal life faster thus do their obligation again as the driver behind economic activities (from micro perspective)**.

### **Limitation**

Investigating urban redevelopment after disaster and its relation with economic growth is interesting. However, the literatures of urban redevelopment after disaster which have explicit relationship with economic growth are almost nothing. Fortunately, the literatures found have favorable relationship between one and others (such as from natural disasters to damages in physical infrastructures to the role in economic growth). Thus it can be directed to answer the research question.

In literature review, it is already mentioned that urban redevelopment has a wide meaning. It involves not only physical assets but also other social, economic, and environmental entities. In this paper, the attention is only paid on physical assets in urban redevelopment. And within those physical assets, it is being narrowed down again to infrastructures.

Regarding with the wide meaning of urban redevelopment, it is actually quite hard to analyze only one aspect (physical entities) without intervention of other aspects (social and environmental). This paper emphasizes more to the physical entities, but it does not mean there are no other aspects in the content. In some discussion before, there are some social aspect mentioned in order to establish the relationship between urban redevelopment and economic growth.

### **Recommendation for Further Study**

This paper focuses on accelerating economic growth through urban redevelopment. But the urban redevelopment here is only specific to physical entities. Meanwhile, there are still other aspects of urban redevelopment such as social and environmental. To further study about other aspects, I believe it will be a valuable finding, considering that these aspects have a strong interdependent relationship among them.

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