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Real estate perspective on redevelopment following natural disasters

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Abstract

A real estate perspective on redevelopment following natural disasters offers an approach to the problem of displaced population by implementing techniques used in the real estate branch.

Solving the problem of displaced population and their settlements are mainly the field of UN (United Nation) bodies and various humanitarian organizations. This topic is not accessed directly from the real estate perspective. Yet, there are various articles about distressed properties, a field which gathers all issues of malfunctioned properties.

This thesis includes the definitions and detailed insight in various elementary factors which influence the redevelopment decisions and their options. These are: disaster management, urban and non-urban context, stakeholders, temporary occupancy, transitional settlements, existing technology and products. Further on, the complexity and interference of these factors are ordered and prepared for the implementation of real estate techniques.

Used methods System Diagrams, General Electric / McKinsey Matrix (GE Matrix), and Decision Tree Analysis (DTA) are interpreted through qualitative reasoning. Data sources used by these methods include official reports with economical, political, technological, and environmental background. The methods and data are applied in the Sri Lanka case study.

Key results show the approximate investment risk in distressed properties caused by natural disasters. Also, the insights in redevelopment options in these areas are presented. Results can be applied in real estate project developing and disaster management preparedness.

Key words: transitional settlement; distressed properties; value; tech*; risk; model; disaster recovery.
STEP 1 • PROBLEM DEFINITION

CHAPTER 1 • EXPLORING
1.1 Motivation
1.2 Example in place and time, Sri Lanka case study, Tsunami December 2004
Country Profile
Displaced population
Financial impact
Housing status
Transitional shelter
1.3 Problem outline
Risk in distressed properties
Involved parties
Conclusion: Some Suggestions by Stan Ross
1.3 Problem definition
1.4 Research questions
1.5 Research objectives
1.6 Research approach
1.7 Research outline

CHAPTER 2 • DEFINING AND CLASSIFYING
2.1 Introduction
2.2 Natural disasters
Definition
Structure
Types
Affected regions
Trends
Disaster management
2.3 Transitional settlement
2.4 Real Estate development
2.5 Transitional settlement in the context of real estate
2.6 Classification
Lack of information
Different approaches
Different classifications
Elaborated classifications
2.7 Conclusion

STEP 2 • ELEMENTARY FACTORS.

CHAPTER 3 • DISASTER MANAGEMENT
3.1 Introduction
3.2 Process
3.3 Phases
Chapter 4 • Urban and Non-Urban Context ........................................ 42

4.1 Introduction ............................................................................ 42
4.2 Population density .................................................................. 42
4.3 Level of urbanization .............................................................. 43
4.4 Quality of living ....................................................................... 44
4.5 Conclusion ............................................................................... 45

Chapter 5 • Stakeholders .............................................................. 46

5.1 Introduction ............................................................................ 46
5.2 Stakeholder analysis ............................................................... 46
5.3 Stakeholder’s involved in transitional settlement .......... 47
   Displaced and local population ................................................. 47
   Community-based organizations (CBO) .................................. 47
   Host governments ................................................................... 47
   Police and military .................................................................. 47
   Local non-government organizations (LNGO) ....................... 48
   Coordinators ........................................................................... 48
   Specialists ............................................................................... 48
   Other sectors of response ...................................................... 48
   Development workers ............................................................ 48
   Suppliers / Contractors .......................................................... 48
   Media ..................................................................................... 48
   Donors ................................................................................... 48
   United nation bodies .............................................................. 48
   International non-government organizations (NGO) .......... 48
   Peace keeping forces ............................................................. 49
5.4 Conclusion ............................................................................... 49

Chapter 6 • Temporary Occupancy .............................................. 51

6.1 Introduction ............................................................................ 51
6.2 Nomadism ............................................................................. 51
   Types ..................................................................................... 51
   Object/Land Temporary Occupancy ....................................... 51
6.3 Hotel ...................................................................................... 52
   Definition ............................................................................... 52
   Object/Land Temporary Occupancy ....................................... 52
   Complexity of hotel management ......................................... 52
   Privatization or similar concepts ......................................... 52
   Users ..................................................................................... 53
6.4 Transitional settlement ............................................................. 54
   Object/Land Temporary Occupancy ....................................... 54
6.5 Summary ............................................................................... 54

Chapter 7 • Types of Transitional Settlement ......................... 55
Real Estate value ................................................................. 83
Environment risk ............................................................... 88
Stakeholder’s complexity ...................................................... 92
11.4 Conclusion ................................................................. 96

CHAPTER 12 • REDEVELOPMENT OPTIONS ......................... 97
12.1 Introduction ............................................................... 97
12.2 Decision tree analysis ................................................ 97
12.3 Decision tree analysis implication on redevelopment options after natural disasters ......................... 98
Tree drawing ...................................................................... 99
Evaluating Decision Tree .................................................... 99
Steps 3, 4 and 5 ................................................................. 99
12.4 Summary ..................................................................... 100

STEP 5 • RESULTS ............................................................. 101

CHAPTER 13 • CONCLUSION .............................................. 102
13.1 Introduction ............................................................... 102
13.2 Implications ............................................................... 102
13.3 Limitations ............................................................... 102
13.3 Areas of further interest .............................................. 103

APPENDIX ........................................................................ 104

DESCRIPTION OF NATURAL DISASTERS ............................. 104
TIMELINE OF DISASTER RESPONSE .................................... 108
DECISION TREE ANALYSIS (DTA) ..................................... 113

REFERENCES .................................................................... 115

BOOKS ........................................................................... 115
ARTICLES ....................................................................... 115
INTERNET SITES ............................................................. 116
INTERVIEWS AND WRITTEN CORRESPONDENCE ............... 116
Step 1 • Problem definition
Chapter 1 • Exploring

1.1 Motivation

The central point of this thesis is to provide insights in the real estate approach regarding the problem of displaced population caused by natural disasters. The purpose is to find a new approach and durable solution by understanding the meaning of the real estate in the mentioned circumstances and power of its tools.

What are the locations and issues involved with the problem of displaced population? Is the whole world turning into a more dangerous place? Is the human society becoming more vulnerable to the effects of some of natural phenomena? Can natural disaster be predicted? Some parts of the world are highly technologically developed. This technological progress strongly influences our society. The biggest influence is on informational technology. Information these days travels so fast and touches almost every part of our life - personal, economical, sociological, political and environmental. It looks like that if we have the right source of information it is possible to control and fix everything. But, natural disasters are still happening. They can be predicted but not stopped. By considering these two facts and having a right source of information, it is possible to ease suffering of the people hit by a natural disaster. Some organizations are already dealing with this issue. Already prepared care package will shorter the time for recovery. This package can be of different size and meaning, it can vary from the necessary supplies to survive one month up to putting the roof over the head and finally organization of the activities within the settlements which can also vary depending of their concept.

The problem of settling people down is actually the biggest concern regarding displaced population because in this process all kind of factors are involved. Some of them are humanitarian, political, economical, etc. The complexity of this situation is a challenge by itself. Also, all these influences are constantly present in the field of the real estate which makes this problem close enough to be looked from this aspect as well.

In the efforts deployed up to now, there is no trace of possible different solution. These previously mentioned organizations are dealing with this subject with an effort, still since the first historically noted disaster response in 1906 (Architecture for Humanity 2006) they all use the same patterns. The most probable effect is non-sustainability. For the durable solutions more feasible approach followed by new technologies and new concept of temporary settlements is required. Because of these three components and the involvements in humanitarian, political, environmental issue the problem of displaced population can be seen through the Real Estate subject. To be more specific, the motive for finding a new approach and hopefully a solution stands in well known distressed properties.

1.2 Example in place and time, Sri Lanka case study, Tsunami December 2004

To realize the picture of standard disaster management and to understand the situation after the disaster, an example from the history of natural disasters is necessary. In this subchapter elementary information concerning the disaster impact will be presented. The most important are figures about displaced people, number of homes which are destroyed, economical impact of the disaster and some historical background which is necessary because it influence the choice, duration, phases of redevelopment.
The choice of affected regions and countries by the natural disaster is unfortunately quite big but the choice of the proper example is accompanied with several attributes. At first, the tsunami which hit Sri Lanka on December 2004 was strongly followed by media (tourist center), because of that everybody are familiar with that disaster. It happen recently which makes the gathering of necessary data easier and more reliable. And the third reason is that the concept of the transitional settlement if fully accepted and realized.

*Country Profile*

Sri Lanka is a pear-shaped island situated in the Indian Ocean. With its strategic location, the island had always attracted foreign influence. Since the 1500s, the country had been under the domination of the Portuguese, followed by the Dutch and the British. The country inherited a well-developed legal infrastructure and a democratic form of government. However, since independence in 1948, the country has failed to realize its full potential (W Don Barnabas 2006). The country has faced a civil war between the majority community Sinhalese and the minority Tamils for the last two decades. Currently there is a ceasefire.

The political instability has affected the economic performance of the country as well. In addition, two main political parties after independence had opposing economic policies that lead to the economic suffer. However, since 1977 economic policy started to be more liberal followed by switching from a plantation-oriented to a service-oriented sector (W Don Barnabas 2006). Still the ethnic fighting began in 1983 which has obvious bad consequences on the growth potential. Now that a ceasefire is in place, with proper management and discipline, there is potential for sustained high growth in the future.

*Displaced population*

On 26 December 2004 a tsunami devastated large parts of the coastal areas of Sri Lanka damaging or destroying approximately 90,000 houses, killing more than 30,000 people and displacing about 141,000 families consisting of more than 450,000 individuals. Those who survived this unprecedented natural disaster initially found shelter in emergency accommodations such as tents, public buildings or religious institutions or sought refuge with friends and relatives (UNHCR - National Transitional Shelter Update 14 November 2005).

In the following maps different information concerning the tsunami displaced population will be presented.
Displaced by district, total.

Displaced by district, total & amount of total population pre Tsunami.

Displaced by district, average per division.

Tsunami Displaced Population
District Overview March 2005

No of Persons Displaced
Average per Division

- 420 to 500
- 340 to 420
- 190 to 340
- 160 to 190
- 30 to 160

Total of current population displaced
- 520,000
- 260,000
- 52,000

Displaced By District
- 37,000 to 42,600
- 19,000 to 37,000
- 13,300 to 19,000
- 10,600 to 13,300
- 0 to 10,600

Source: UNHCR & HIC GIS Units
Financial impact

Beside the human losses the built environment and overall economy are also influenced by the impact of tsunami disaster. These losses are measurable in the quantity of money. The source (Agence France-Presse (AFP), Date: 23 May 2005) states the following. The island suffered an estimated one billion dollars in direct losses, while reconstruction costs are pegged at 1.5 billion dollars. The latter amount is equivalent to seven percent of Sri Lanka's GDP. About 450 million of the damages involve "social sectors" such as housing, and nearly 300 million for the tourism industry. One hundred thousand homes have been destroyed. Some 516,150 people are affected by the disaster, and most of them are displaced.

In order to realize how big is the financial impact of tsunami disaster a certain level of general knowledge about financial situation in the country is necessary. Sri Lanka is a small developing country. The total assets in the financial system amount to Rs 2,729bn, which is 135% of the GDP (W Don Barnabas 2006). The banking sector dominates the financial system, accounting for almost 70% of the assets. Commercial banks comprise the largest segment of the banking sector. Contractual savings institutions account for second largest contribution.

Housing status

As per the 2001 survey, there were 4.7mn housing units in the country. The Central Bank annual report of 2003 estimated the housing shortage in the country at 400,000 units. The report also stated that the shortage is expected to increase to 600,000 units by 2010. This means that the annual demand for new housing is not being met by new construction. In addition, the above shortfall is prior to the December 2004 tsunami. The housing need of the war-affected regions of the Northeast of the country is also acute. Moreover, analysis of the quality of housing reveals that significant upgrading of existing housing can be effected (W Don Barnabas 2006).

Transitional shelter

Emergency accommodation could only be a temporary solution but at the same time re-construction of housing stock will take several years. Under these circumstances it is logical that transitional shelter was required to bridge the gap between emergency accommodation and durable solutions.

Throughout the process it became evident that the total requirement for transitional accommodation is close to 60,000 shelters. (W Don Barnabas 2006)
Transitional shelter should provide secure and healthy living space besides protection from the environment. It should have access to water, sanitation and other facilities, which enables normal household activities. Starting to conduct the similar life they had before, population is becoming more reliable on themselves and not just on external assistance. This process is the key of redevelopment.

Transitional shelters in Sri Lanka vary greatly in design and materials used. All shelters should be of approximate size 20m², have a minimum height of 1.8m and a cemented floor slab that raises 15cm above ground. Supporting structure and in filled elements vary. Most shelters also have an internal partition and some have an individual kitchen attached. If there is no incorporated kitchen within the shelter some collective kitchen is present. The Shelter & Settlement Sphere Standard was used as a guideline.
1.3 Problem outline

Problem of displaced population start to be responded from the begging of the 20th century (Architecture for humanity 2006). In 1906 the earthquake in San Francisco left thousands of people without their homes. After this disaster the first respond from authorities is noted. Until now, the real estate approach in this field was not present. This thesis will look at this problem from that perspective.
To be more precise, the damaged urban and rural areas can be seen as distressed properties, individual part of the real estate. The insights in risks and benefits of distressed properties make somebody able to decide is it feasible or not to deal with this subject. One of the world's best known investors stated his thought about this topic very dramatically. This thought is interpreted by Stan Ross, co-managing partner of Kenneth Leventhal & Company and it states as follows: “Baron Rothschild believed in buying where there was blood in the streets, but there’s no need to wait for that – would-be investors can pick and choose among distressed properties today. This overview presents the basic factors to consider, and discusses the selection process as well as sources of troubled properties” (Stan Ross 1995, The Real Estate Reader, pp 336)

Common for distressed properties is that they do not generate sufficient cash flow to service the underlying mortgage debt (Stan Ross 1995). By this statement, it is possible to see that the expression distressed properties is related to the financial construction of the real estate. But these initial characteristics can be implemented into the areas which are physically reshaped and in that way distressed. Therefore, there is variety of portfolios of distressed properties and land in various stages of development that can be regarded as interesting for investments. For investiture these properties presents opportunities for making a profit without risking too much cash. Specific factors by Stan Ross include:

- Relatively low acquisition costs. Distressed properties can be bought cheap and owners want to sell them quickly with accepting a lower price.
- Sellers may be more flexible in for example negotiating sales terms and conditions.
- Lower cash returns may be acceptable. New owner may accept a cash flow position or a holding period that would not be acceptable with a premium-priced, highly-leveraged transaction.
- Enhance value through alternative uses. Like converting existing properties to new uses, or changing plans for land development.
- Recovery potential through workouts and turnarounds. Successfully complete workout programs to restore distressed properties, can realize significant returns (Stan Ross 1995).

Risk in distressed properties

By definition, distressed properties are risky investments. Among the risk factors are:

- Loss of investment. Compared with healthy properties, the risk is greater to lose equity capital.
• Complexities of workout programs. Workout programs are complex, involving a number of legal, accounting and tax considerations; they require close cooperation of the properties owners, mortgage lenders, prospective investors and other concerned parties. They are often followed by complex technical issues or simple failure of the parties to cooperate.

• Costs of workout. Substantial expenditures may be required to complete partially developed properties, to correct structural defects or to remove hazardous wastes. In addition, if the investor plans to finance its investment partly with borrowed capital, it could have difficulty in obtaining financing because many lenders are extremely cautious in financing real investments, particularly investments in distressed properties.

• Need for expertise. Individuals or firms are often contact to restore manage and sell distressed properties. In that way workout's depends partly on the competence of these workout experts. Investors who fail to select proper firms could pay the consequences.

• Substantial commitment of time and resources. For example, investiture could devote so much time to their distressed-property investments that they neglect their other investments or business operations (Stan Ross 1995).

**Selecting Properties for Investment**

Investment in distressed properties, like in every real estate, could begin with the selection process with an analysis of the economies, demographic trends, and real estate markets. Areas can be classified based on projected growth of their economies and projected performance of their real estate markets over a specified time period. This estimation is going to be presented in the chapter 12. "The investor can then decide whether to invest in fast-growing markets - markets that have had and will continue to have strong rates of growth, areas in which normal growth or new attractions indicate that property values will increase significantly, markets that are currently depressed but may be poised for recovery, or those that are in the early stages of recovery" (Stan Ross 1995, The Real Estate Reader, pp 339). After decision about choice of a market, investor can examine particular properties to determine the cause of the cash flow problems, and realize if the problems can be corrected with effective costs. Finally, the forecast of demand for the workout properties may be developed between "worst case" and "best case", the most probable scenario for the rental or sale of the properties is a judgment call.

**Involved parties**

Finding out the solution of redevelopment always has a connection with different interest of different stakeholders. Concerning the property itself it is possible to distinguish three main parties: investors, owners and lenders. They may use a variety of strategies to provide necessary capital to achieve a turnaround of a distressed property. Standard procedure is when the owner contributes the workout properties, possibly with some of its healthy properties to newly-formed partnership of which it is the general partner. The investor contributes equity or debt capital and it is the limited partner. It receives priority interest in the properties' cash flow. The owner and lender negotiate a restructuring of the owner's existing loan, including terms of the partnership.

**Conclusion: Some Suggestions by Stan Ross**

- Pay cash, and structure "clean deals".
- Aim to acquire large portfolio.
1.3 Problem definition

The problem definition can be addressed with this question:

Can real estate development project contribute to resolve the problem of displaced population?

1.4 Research questions

The problem definition has been divided into the following questions considering different part of research process:

Step 1 • Problem definition

What is the cause of displaced population?
What is a transitional settlement?
What is the real estate development project?
What is the significance of this part comparing to overall real estate?
How to order these questions?

Step 2 • Elementary factors

Which are the basic factors that structure the transitional settlement?

Step 3 • Factors interaction

How do factors correlate?
Which are the missing factors?

Step 4 • Strategy

How to deal with all previous factor and their relations?
How to translate them to strategy?

Step 5 • Results

Can real estate development project be used to resolve the problem of displaced population?
Can new product be developed?
Can this research process be used for further investigation?

1.5 Research objectives

The research objective states:

Determine if the real estate developer’s techniques can be used for resolving the problem of displaced population.

The research objective has the following scope:

- The existing elements of distressed properties by natural disaster and the response in the form of transitional settlement will be identified.
- The necessary data will be discussed.
- The appropriate real estate developer’s techniques will be used.
- The valuation techniques for the products and market will be used.
- A general conclusion about the real estate developer’s usability in the term of displaced population will be given.
1.6 Research approach
The chosen research approach in this thesis, considers the broader view of the real estate meaning or even better to say with its full complexity. This approach is recognized by Stephan E. Roulac. The main idea can be found in his following sentence. "The dynamic forces of change realigning the environment in which the real estate/property professionals operate are similar to those occurring within society, the global economic system, and the financial services markets in particular" (Stephen E. Roulac 2001, Requisite Knowledge for Effective Property Involvements in the Global Context, Book / Theory of place. Place and Property Strategy, pp 6).

This thesis tries to follow the perspective of real estate issue with corresponded framework of knowledge. This approach is specifically important for the subject such as Transitional Settlement, because this topic involves different aspects and different disciplines which are gathered under the same title. In addition, his kind of approach is even more valid because there is no real estate research based on transitional and temporary settlements. This means that one overall picture is suitable to the introduction into this field.

The forces which redefine property attributes and introduce new expectations are:

Urban form – Example of importance could be the picture of urban sprawl and crime as two social concerns.
Technology Advances – Information and telecommunications technologies increase the economy, portability, power and accessibility of information. These technologies advance introduce new organizational schemes, which in turn lead to different physical forms of working, shopping, living and leisure.
Environmental concern – There is a greater emphasis on spirituality and environmental sustainability.
Globalization – Resources are driven from distant markets and selling throughout the world, physical proximity no longer is the primary defining guideline.
Strategic Resource - Economic activity is more and more influenced by social values, product concepts and designs, technologies, suppliers, manufactures, and merchandisers who are located far distant from where goods and services are consumed.
Public-Private concern – There is an underlined motive for urban development which involves linking of public policy objectives and private sector motives (Stephen E. Roulac 2001).

To conclude, this global picture involves strategic orientation towards the real estate issue, certainly opposite of traditional real estate approach which had attributes such as:

- Property involvements were based primarily on an outmoded deal-making transaction approach without policy and portfolio issues
- Fail to address how large scale political and economic forces drive markets and therefore property values
- Ignore information and communication technology concerning how society relates to space and place
- Scant attention to corporate management (Stephen E. Roulac 2001).

The complexity of the Roulac knowledge frame work can be present by his Property discipline edifice in which the property outcomes are the by-product of how values are translated into societal spatial patterns through a multitude of institutions, process, regulations, and practices, as reflected in these multiple elements of the property discipline.
1.7 Research outline

This research is split into the six steps which follows each other. These steps are presented in the following figures.

Step 1 • Problem definition

Every problem is surrounded with a big amount of information. In this step, the size of this information is going to be defined. Chapter 1 begins with the motivation for this work. The problem definition and the research questions are formulated along with the research objectives and scope. Chapter 2 deals with the classification approach and definitions which are necessary for the following research.
Step 2 • Elementary factors
The next step is to provide an elaboration about different aspect with which the problem could be viewed. Chapter 3 will explain basic principles of managing the disaster risk. Chapter 4 will indicate main differences between urban and non-urban areas. Chapter 5 will provide information about participants or stakeholders in the whole process of settling down. Chapter 6 will provide insight into the structure of temporal space occupancy. Chapter 7 will explain an existing classification of transitional settlements. Chapter 8 is also descriptive part of the thesis. In this one the possible technology and products for the transitional settlement will be elaborated.

Step 3 • Factors interaction
The step will identify correlations between different situated factors or problem aspects. This step is formed with just one chapter. It is an important independent cognitive part of research and it deserves a proper place in this thesis. Chapter 9 will introduce the technique of system diagrams which will help to understand how the previously explained factors are connected. The chapter 10 will search for the factors that actually could influence the technical development of transitional settlement.
Step 4 - Strategy
The strategy will be formed by using previously defined missed factors as well as using the factor correlation. Chapter 11 will provide information about risk analysis based on GE Matrix. Chapter 12 will deal with possible redevelopment options in concept by using the Decision Tree Analysis (DTA).

Step 6 - Conclusions
Finally, under the impact of strategy some conclusions will be made.
Chapter 13 will give overall conclusions about this research.
All five steps with their basic elements can be summarized in this figure. 

Figure 1 12 – Five step diagram
Chapter 2 • Defining and Classifying

2.1 Introduction
This chapter will provide some information to put the basis of this thesis. Like in every discussion or investigation, the first thing to do is to define a framework. Words can be understand on different levels and have different meanings – it is also reason why this definition will be presented here. There is one more reason for using definition. It is the narrowing of the problem. First it considers the people who are displaced. They can be in that situation because of very different reasons. Here only the problem of people displaced during the natural disaster will be presented, further research is necessary to complete entire topic. The second thing which is going to be defined and at the same time to narrow the problem a bit more is the type of settlement in which the people are supposed to stay.

Another part of this chapter will be introduction to existing methodologies of classification. This part will deal with the questions like: What are the problems of classification? What are the possible approaches? What kind of classification will be used?

2.2 Natural disasters
At first, it is important to mark what type of settlement could emerge under different circumstances. These are: natural disasters, man-made disasters, military interventions, humanitarian rescue missions, scientific research missions, construction company building sites outside urbanized areas, commercial happenings - fares. All of these circumstances are based on different ground which influences the entire process of making a final product for each of them. This research is focused on the natural disasters only, and further research is needed for potential settlement concerning other aspects. In the following subchapters the phenomenon of the natural disaster will be elaborated in order to realize the particular cause of making people move.

Definition
- n.
1. a sudden accident or a natural catastrophe that causes great damage or loss of life.
2. an event or fact leading to ruin or failure. • (informal) a complete failure: my perm is a total disaster.

A disaster (from Middle French désastre, from Old Italian disastro, from Latin pejorative prefix dis- bad + astrum star) is the impact of a natural or human-made hazard that negatively affects society or environment. Disasters occur when hazards strike in vulnerable areas. Disasters are generally more limited in scale than doomsday events, the global impact of which would threaten a large proportion of life on earth. The word disaster's root is from astrology: this implies that when the stars are in a bad position a bad event will happen.
Man's life on the planet develops in a framework of permanent interaction with the planet's natural systems. A natural disaster takes place due to the inadequate relation between people and such systems. Natural risks are perceived by man as extreme natural events that pose a threat to man's life and property. A natural disaster is the realization of the perceived risk. It is man whom, upon occupying high-risk areas, set up the potential damage for a natural event to occur. Consequently, an extreme natural event acquires the connotation of disaster only when man and/or his activities and goods are involved (P. Larrain and P. Simpson-Housley, 1994).

A natural disaster is a dangerous event that causes environmental effects or alterations (physical, biological, social, economic), and these are of such magnitude that the ecosystems and/or society are unable to tolerate them without witnessing their basic functioning elements and dynamic balances being destroyed. A disaster is always a social product where the physical phenomena do not necessarily determine the outcome. Political, social, economic and environmental factors are combined in such a manner that they undermine a society's and its ecosystem's capacity to support new tensions (Ball, 1979). In this context, a natural disaster is defined as an extreme relationship between physical phenomena and a society's structure and organization. During those extreme relationships, a population's capacity to absorb, dampen or avoid the negative effects of an event, is surpassed.

There is a distinction between the physical event, natural phenomenon, natural threat and dangerous event. In general, a physical event that does not affect people is considered a natural phenomenon, not a natural threat. A natural phenomenon happening in a populated area is a dangerous event and thus, it is considered a natural threat. Natural threats are, therefore, "environmental elements that are dangerous to man and that are caused by forces external to him" (Burton, 1978).

Types
In the last decades, the most important natural phenomena (according to their world-wide recurrence) have been: floods, typhoons and hurricanes, wind and snow storms, heat waves, cold fronts, thunder-storms landslides and avalanches, tsunamis, earthquakes, hail, frost, drought, and sand and dust storms.

The historical overview gives more information about changes in occurrences of different natural phenomena. Statistical analysis of catastrophes of natural origin shows that, in the last century, hydro-meteorological type of disasters have increased in frequency while geological ones (seismic, volcanic) have maintained their historical levels. This is in high correlation with global warming problems.

Traditional classification of environmental risk is based on geophysical processes and they emphasis as a single impact element, such as wind or storm. However in practice, the most severe risks are the interpolated natural phenomena, like winds with rain cause tree-falling, which in turn leads to rivers being blocked, floods or landslides.

Table 2.1 shows the relations between natural disasters and environmental vulnerability expressed as: effects on the geomorphology and the ecology and damages on infrastructure.
<table>
<thead>
<tr>
<th>Type of disaster</th>
<th>Geomorphologic and ecological effects</th>
<th>Effects on infrastructure</th>
</tr>
</thead>
</table>
| **Earthquakes**  | • Tremors and fissures  
• Land slides  
• Liquefaction  
• Underground settling and collapses  
• Avalanches and landslides  
• Changes in water courses | • Damage to constructions  
• Damage to roads, bridges, levees and canals  
• Damages to pipelines, posts and cables  
• Undermining and burying of structures  
• River embankment causing local floods  
• Sinking of structures and buildings  
• Underground constructions are affected  
• Damage and destruction of urban infrastructure (networks, streets, equipment and furniture).  
• Destruction of hazardous waste storage tanks |
| **Hurricanes,**  |  
• Gales and constant winds  
• Flooding (due to heavy rains, swelling of rivers and rivers braking their banks)  
• Landslides  
• Avalanches  
• Soil erosion  
• Sedimentation of rivers  
• Damage to coral reefs | • Damage to buildings  
• Interruption, rupture and/or collapsing of distribution lines  
• Damage to bridges and roads due to landslides. |
| **Typhoons,**  |  
• Gales and constant winds  
• Flooding (due to heavy rains, swelling of rivers and rivers braking their banks)  
• Landslides  
• Avalanches  
• Soil erosion  
• Sedimentation of rivers  
• Damage to coral reefs | • Damage to buildings  
• Interruption, rupture and/or collapsing of distribution lines  
• Damage to bridges and roads due to landslides. |
| **Cyclones,**  |  
• Gales and constant winds  
• Flooding (due to heavy rains, swelling of rivers and rivers braking their banks)  
• Landslides  
• Avalanches  
• Soil erosion  
• Sedimentation of rivers  
• Damage to coral reefs | • Damage to buildings  
• Interruption, rupture and/or collapsing of distribution lines  
• Damage to bridges and roads due to landslides. |
| **Tropical Storms** | • Gales and constant winds  
• Flooding (due to heavy rains, swelling of rivers and rivers braking their banks)  
• Landslides  
• Avalanches  
• Soil erosion  
• Sedimentation of rivers  
• Damage to coral reefs | • Damage to buildings  
• Interruption, rupture and/or collapsing of distribution lines  
• Damage to bridges and roads due to landslides. |
| **Droughts** | • Soil drying and cracking; loss of the vegetative cover  
• Exposure to wind erosion  
• Desertification  
• Fires | • Doesn't provoke major effects |
| **Floods** | • Erosion  
• Soil over-saturation destabilization and landslides | • Loosening of building foundations and piles.  
• Burying and sliding of infrastructure and |
Figure 2.1 – Types of natural disasters.


Figure 2.2 presents the distribution of different types of natural phenomena all around the world divided in sub-regions which have similar environmental characteristics.

Disaster Type Proportions by United Nations Sub-Regions: 1974-2003

**Affected regions**

In the last two decades more than one and a half million people have been killed by natural disasters. The total number of people affected each year has doubled over the last decade. Human deaths are the most reliable measure of human loss. Worldwide, for every person killed, around 3,000 people are exposed to natural hazards. This reveals only the small part of development losses and human suffering. The bigger picture is captured when we add the economical data.

These estimates are based on appraisal of the number of people experiencing damage caused by natural disaster. These data are difficult to collect in a post-disaster period, particularly if there is not an accurate pre-disaster baseline.

The Asia-Pacific region experiences the greatest impacts both in terms of total lives lost and when lives lost are calculated as a proportion of regional population, due to earthquakes, tropical cyclones and floods. The exception to this comes from the high concentration of deaths associated with drought in Africa. Drought events are often part of a bigger picture that can include armed conflict, extremes of poverty and epidemic disease with death touching only the surface of livelihood disruption and human suffering. The erosion of development gains under such circumstances is clear.

**FIGURE 1.3 TOTAL REGIONAL MORTALITY, EARTHQUAKES, 1990–1999**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of people</th>
<th>Number of people killed per million inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>Asia and the Pacific</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>Europe</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>North America</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>West Asia</td>
<td>10,000</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database

**FIGURE 1.5 TOTAL REGIONAL MORTALITY, TROPICAL CYCLONES, 1990–1999**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of people</th>
<th>Number of people killed per million inhabitants</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Europe</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>North America</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>West Asia</td>
<td>10,000</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database

**FIGURE 1.4 TOTAL REGIONAL MORTALITY, FLOODS, 1990–1999**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of people</th>
<th>Number of people killed per million inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Europe</td>
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</tr>
<tr>
<td>Latin America and the Caribbean</td>
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</tr>
<tr>
<td>North America</td>
<td>10,000</td>
<td>0.01</td>
</tr>
<tr>
<td>West Asia</td>
<td>10,000</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database

**FIGURE 1.6 TOTAL REGIONAL MORTALITY, DROUGHTS, 1980–2000**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of people</th>
<th>Number of people killed per million inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>10,000</td>
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<tr>
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<tr>
<td>North America</td>
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<td>0.01</td>
</tr>
<tr>
<td>West Asia</td>
<td>10,000</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database

*In the case of drought, the period 1980–2000 better represents the regional distribution of deaths.*
Figure 2.4 – Number of persons reported killed by natural disasters in 2005

Figure 2.4 – Number of persons reported affected by natural disasters in 2005

([Image: Maps showing the number of persons reported killed and affected by natural disasters in 2005])
Countries have different capacity to resist similar natural phenomena. There is a close relationship between the threat of a phenomenon to a region, the region's vulnerability and the risk that may exist. The risk of a country or region to be affected by a natural event will be determined by the magnitude of the threat and the country's (or region's) vulnerability to that threat.

Regional losses in Latin America and the Caribbean are dominated by disasters triggered by tropical cyclones and flooding. Africa and West Asia also suffer from high losses from flooding. Europe and North America show lower absolute and relative numbers of deaths to all hazard types, with the highest impact for these regions being registered by Europe's relative losses to earthquakes. The severe famines associated with drought that unfolded in sub-Saharan Africa in the 1980s are shown by extending drought losses to a time period of 1980-2000.

As mentioned before, one of the important monitors of damage followed by natural events are economical data. Annual economic losses associated with natural disasters averaged US$ 75.5 billion in the 1960s, US$ 138.4 billion in the 1970s, US$ 213.9 billion in the 1980s and US$ 659.9 billion in the 1990s. Historical augmenting of damage costs becomes alarming. The majorities of these losses are concentrated in the developed world and fail to adequately prevent the impact of the disaster on the poor who often bear the greatest cost in terms of lives. Today, 85 percent of the people exposed to earthquakes, tropical cyclones, floods and droughts live in countries having either medium or low human development.
Trends
People even now feel the consequences of the global warming. But in a longer term it may be more dramatic.

The Earth's climate is being directly affected by human activities. These changes are having negative effects on our environment. Proven evidence is that the records show that 11 of the last 12 years were among the 12 warmest on record worldwide. The just-released Intergovernmental Panel on Climate Change (IPCC) Summary for Policy Makers states that scientists are more than 90% confident that human industrial activity is driving global temperature rises. Carbon dioxide levels today are nearly 30 percent higher than they were prior to the start of the Industrial Revolution, based on records extending back 650,000 years. (The Earth Institute at Columbia University, Intro to Climate Change)

According to NASA, the polar ice cap is now melting at the rate of 9 percent per decade. Arctic ice thickness has decreased 40 percent since the 1960s.

The current pace of sea-level rise is three times the historical rate and appears to be accelerating. The number of Category 4 and 5 hurricanes has almost doubled in the last 30 years. The IPCC 4th Assessment Report said that this trend would likely continue. Droughts in the Sahel during the 1970s and 1980s were found to be caused by warmer sea surface temperatures, and the current drought in the Amazon is suspected to be a result of rising ocean
temperatures. Poverty and food insecurity has also been tied to climate variability. (The Earth Institute at Columbia University, Intro to Climate Change)

**Disaster management**

Emergency management (or disaster management) is the discipline dealing with and avoiding risks. It is a discipline that involves preparing, supporting, and rebuilding society when natural or human-made disasters occur.

Emergency management is the continuous process by which all individuals, groups, and communities manage hazards in an effort to avoid or ameliorate the impact of disasters resulting from the hazards. Actions taken depend in part on perceptions of risk of those exposed. Effective emergency management relies on thorough integration of emergency plans at all levels of government and non-government involvement. Activities at each level (individual, group, community) affect the other levels. It is common to place the responsibility for governmental emergency management with the institutions for civil defense or within the conventional structure of the emergency services. In the private sector, emergency management is commonly referred to as business continuity management. (John M. Last "disaster management" The Oxford Companion to Medicine. Stephen Lock, John M. Last, and George Dunea. Oxford University Press 2001. Oxford Reference Online. Oxford University Press. Eindhoven University of Technology. 24 April 2007 )

2.3 Transitional settlement

The term "transitional settlement" was initiated by shelterproject and continued by shelter center, first published 2005. It means "settlement and shelter resulting from conflict and natural disasters, ranging from emergency response to durable solutions" (Shelter Center 2005). This statement extends beyond the traditional response (tents and camps) with the emphasis on the need for transition to durable settlement solutions and local development.

Similar term "shelter sector" is used by UNHCR to describe respond to the settlement and shelter needs of refugees only. This is different from "transitional settlement" approach which engages the needs of non-refugees as well. There are several more things which indicate differences between these two terms in the favor of "transitional settlement": broader focus of shelter response (local security), concerned about collective needs (not just family needs), wider continuum of relief.

2.4 Real Estate development

A real estate developer (American English) or property developer (British English) makes improvements of some kind to real property, thereby increasing its value. The developer may be an individual, but is more often a partnership, limited liability company or corporation.

There are two major categories of real estate development activity: land development and building development (also known as project development).

In this thesis building development is more appropriate to analyze, because of that, just that definition will be presented. Building developers acquire raw land, improved land, and/or re-developable property in order to construct building projects. The buildings are then sold entirely or in part to others, or retained as assets to produce cash flow via rents and other means. Some building developers have their own internal departments for designing and constructing buildings (more common among larger developers), while others subcontract these parts of the work to third parties (typical of small developers). Although the process for development of real estate varies from project to project, the various phases can be categorized roughly as follows (in approximate chronological order):
Market research, Site selection / feasibility analysis, Due diligence / preliminary pro forma, Property acquisition, perhaps using option to buy, Project design / refined pro forma, Obtain entitlements, Financing / final pro forma, Construction, Lease-up / sales, Operation (in cases where the project is retained as an asset).

2.5 Transitional settlement in the context of real estate

It is known that the half of the human wealth on planet is actually in built environment. This is the field of real estate development as well as the land itself. This make the real estate field waste in the terms of economy, demography, geography, laws, etc.

Are the following indicators big enough for the real estate? The United Nation High Commissioner for Refugees (UNHCR) estimated that there were about 20 million refugees living world wide. Also, 25 million people were displaced within borders of their mother country. These figures are augmenting, which make this situation even more sensitive. To these people some kind of settlement is needed. Since the settlement must be built it also can be considered as the real estate problem. For some researcher and may be even some investors in the field of real estate, the humanitarian reason is enough to use their knowledge and tools in order to contribute resolving this problem.

On the other hand, entering into the new field can open many theoretical discussions and discover some new ways of guiding the business.

2.6 Classification

Any social or scientific analysis without order and systematical classification is incomplete. Classification deeply impacts all disciplinary fields. Studies in biology, chemistry, and in this case real estate all involve some sort of the classification. However, making classifications has many traps. Choosing the wrong classification can lead to finding the wrong conclusion about a topic.

Lack of information

The lack of information means that we can not conclude some very important information about some attributes just with the name as description. For example, if we are talking about real estate the size, by some name we can not conclude area of influence, place and selling goods. If it is somehow manageable to see all this information, we have another pitfall. This is the redundancy of their names. Also many of classifications have some marketing background inside. Their origin is willing to mislead the consumer and offers them something "new". This alienation in any classification is dangerous and may lead to total abandoning of it. For illustration, the Borges description in The Analytical Language of John Wilkins is used. In this essay, he mentions a Chinese Encyclopedia, the Celestial Emporium of Benevolent Knowledge, "in which the animals are divided into: a) belonging to the emperor, b) embalmed, c) tame, d) sucking pigs, e) sirens, f) fabulous g) stray dogs, h) included in the present classification i) frenzied, j) innumerable, k) drawn with very fine camelhair brush, l) et cetera, m) having just broken the water pitcher, n) that from a long way off look like flies."

Different approaches

There is one more reason which makes classification unstable. For sure the scientific and market approach will have at least slight differences. Their goals and priorities are different, so the starting picture for research either is
scientific or market oriented. There is a trend of cooperation between these two areas, but the reason is because they are different.

**Different classifications**

There are numerous classification and typologies used in different fields of study. Cormack (1971) summarized the benefits of a hierarchical classification. "The information about entities is represented in such a way that it will suggest fruitful hypotheses which cannot be true or false, probable or improbable, only profitable or unprofitable (p.346)". For an organizational classification, Romanelli (1991) states: "despite the ease with which we may identify meaningful groupings of organizations, no commonly accepted classification scheme has been developed". Beside these, there are also biological schools of classification with two main principles the phenetic and the phylogenetic divided into three schools of classification: phenetic, evolutionary and cladistic. Biological school of classification will be elaborated thoroughly in the next chapter. To be even more complex, usage of classification can be scientific and non-scientific.

**Elaborated classifications**

The following three classifications are different by their approach. For the first two the non-scientific method is used. This is done not because the lack of importance but because the lack of information and difficulties to collect the same. The third one has been study profoundly, because the availability of the necessary information.

2.7 Conclusion

This chapter gathered the basic questions which define the framework of the problem. The definitions and structures of natural disaster, transitional settlement, and the real estate development picture are the basic fields of this research.

![Figure 2.7 - Basic fields of research](image-url)
Step 2 • Elementary factors
Chapter 3 • Disaster management

3.1 Introduction
In previous chapter some definitions were noted in order to clarify the starting point. This chapter will introduce the standard way of dealing with disasters. Like it was elaborated in the first chapter, the standard process of dealing with this issue is lacking of sustainability and some new aspects in solving the problem of displaced population should be investigated. On the other hand, the disaster response with the history of hundreds of years (Architecture for Humanity 2006) has an educational value in learning the basics of this problem. By understanding the general process and phases of disaster response it is possible to implement them on the settlement and to recognize the similarities.

3.2 Process
A disaster can be natural, man-made, and also associated with some violent conflicts. In any case some service must be developed. In developed countries strategies for these unwanted occurrences are planed in advanced. There are different kinds of parties involved in such projects from local to national level, connected with health, security and media services. The money to pay for these services comes mainly from national treasuries and additional funds come from voluntary donations and several forms of insurance.

Urbanized places hit by floods, wind storms, and earthquakes often make dwellings non useful and temporary shelter is necessity for many people. Disturbance of involved people is inevitable. This is especially unpleasant for children and elderly who might get separated from other members of family. Actions to reunite scattered family members as well as to provide them with shelter are therefore a priority. Food, washing and toilet facilities must be provided for displaced people. All these services must be coordinated. Most developed countries train and retrain staff members of the relevant sectors and have an established plan to deal with unexpected disasters.

The established infrastructure of organized society may be disrupted also. In floods, road and rail communication is impossible and local airports may be under water. Evacuation of large numbers of people is still necessary and must be coordinated. Under these circumstances military forces for the transport use are often mobilized. Earthquakes also may sever transport and communication routes but destruction of many dwellings is far more dangerous. Often people are trapped indoors and heavy lifting equipment and the use of transport vehicles to move the equipment is needed.

In floods and earthquakes, sewage system is disabled and water supplies become contaminated. Decomposing dead bodies of humans and animals pose an additional threat. Health services have a responsibility to protect vulnerable populations against fecal-oral and other epidemic diseases.

Natural disasters are usually time limited except global warming effect which is connected with human disappointing behavior. Other man-made disasters associated with violent conflict are even more severe and may continue for many years or even decades. Disaster management process in these cases is more complex and not going to be elaborated in this thesis.
In order to decrease the influence of dangerous natural events, strategic frameworks to face natural disasters are made. Such frameworks should take into account different environmental effects and classify them into the different phases of the disaster management cycle (ex-ante and ex-post). Neglecting of the rules and regulations which follow the disaster management cycle process, combined with the progressive deterioration of the environment caused by human activities, leads to an increase in the impact of natural disasters.

The strategic framework of the disaster management cycle foresees that prevention, mitigation and preparation measures be introduced in the restoration, reconstruction and definition of policies for national development, in order to improve prevention of the impact of future disasters.

The disaster management cycle can be divided in four major phases: response, recovery, mitigation and preparedness. The first two phases correspond to the so called ex-post state; i.e. the response that is given after a disaster takes place, such as humanitarian aid (including life-saving activities), reconstruction of basic infrastructure (roads, hospitals, houses). The second two stages correspond to the so called ex-ante phase, i.e. those measures intended for the prevention and mitigation of the impact of a disaster.

With the exception of the “response phase” immediately after a disaster hits (which is basically of emergency and humanitarian aid nature), all the other phases should take into account environmental variables, particularly the two ex-ante phases. Together, those two phases reflect the degree of preparedness of a community to face a disaster.

Mitigation phase try to prevent hazards from developing into disasters. Also, reduction of the disasters effects is part of it. The mitigation phase uniqueness is in its focuses on long-term measures for reducing or eliminating risk. The implementation of mitigation strategies can be considered a part of the recovery process if applied after a disaster occurs.

In the preparedness phase, emergency plans for the disaster strikes are developed. Preparedness measures include the maintenance and training of emergency services, making people aware of disaster danger by using the warning methods combined with positioning of emergency shelters, developing evacuation plans, stockpiling the inventory, and maintenance of supplies and equipment, and the development and practice of multi-agency coordination. Another preparedness measure is to develop a volunteer response capability among civilian populations. In addition to this phase, even more sophisticated methods could be used. Some natural events are easier to be predicted than some others. Also there are various techniques of predicting them. The most sophisticated is by usage of various kinds of satellites, including communications, meteorology, remote sensing and geophysics satellites. They are, or may become, useful tools in disaster prevention, preparedness and relief. They already provide operational capability from storm warnings and search-and-rescue efforts. Other capabilities such as improved flood prediction and global mobile communication during relief are close within reach. Still others, such as earthquake prediction, require considerable research. Close cooperation and communication between space
technologists and disaster-management specialists will be needed in guiding research and designing and testing satellite systems. It is hoped that the international decade for natural disaster reduction can provide a framework for such activities.

The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area, such as firefighters, police, volunteers, and non-governmental organizations (NGOs). A well-rehearsed emergency plan developed as part of the preparedness phase enables efficient coordination of rescue efforts. In the response phase, medical assets will be used in accordance with the appropriate triage of the affected victims.

The aim of the recovery phase is to restore the affected area to its previous state. Recovery efforts are concerned with issues and decisions that must be made after immediate needs are addressed like rebuilding destroyed property, re-employment, and the repair of other essential infrastructure. An important aspect of effective recovery efforts is making a positive picture for the implementation of mitigation measures that might be unpopular. Citizens of the affected area are more likely to accept these requirements when a recent disaster is in fresh memory.

In many occasions, reconstruction plans do not necessarily take into account environmental changes and factors to the full extent. Repeating mistakes may be fatal since there is cumulative effect of most of those factors, this will make the existing environment more vulnerable to the impact of new disasters. Disaster prevention and environmental issues should be included in the development program of the countries. This program should be universal, dealing with economic and social themes at the same time, and have a strong scientific foundation.

**Transitional settlement phases**

Previous diagram present the four main phases (Response, Recovery, Mitigation and Preparedness) of disaster management. The next diagram will be more specific concerning the topic of this thesis. In the following one the development of settlement is presented in the context of time line and the number of hit population by disaster. It is possible to conclude from this diagram that housing reconstruction option is going to be more present at the later stage of redevelopment. Second important conclusion is the fact that the number of displaced people plays the main role in the decision about the choice of redevelopment option. If the population hit by natural disaster is large there is certainly not possible to start the reconstruction process immediately after the disaster occurs and the usage of some type of transitional settlement would be appropriate. For example, if an island is hit by natural phenomenon and the most of population lose their homes and work place that means that each family should reconstruct their own property. For that process a large amount of time is needed and the only remain option is additional help and usage of transitional settlements.
Types of transitional settlement by phases

The cycles or phases can be additionally divided into different transitional settlement types. Every different type or program has its own development. The overview of these different possibilities can be seen and analyze by using the following diagram. Here it is represented how population move between different TS options. There are several important points in time than can influence the way of development drastically. These are:

Event A: When the natural phenomena occurs the population move. The population chooses one of many options.
Event B: Planned camps are build-up, in that moment the self-settled camps start to be transferred.
Event C: The closure of the collective centers is accompanied by population movement to host families.
Event D: during the maintenance and care phase, under the favorable weather condition, some of the population moves to rural self-settlement to begin farming.
Event E: most of the displaced population is being repatriated. However, other will find a durable solution in the host or in the third countries.
3.5 Summary

This chapter provided insights into the process and phases of the disaster response. Also, these findings have implication on the settlement (Transitional Settlement) which is also elaborated through the phases which are important for the development of the settlement in general and also specific distinction through different phases in Transitional Settlement types were elaborated. The information presented in this chapter makes a valid starting point for the further research.
Chapter 4 • Urban and Non-Urban context

4.1 Introduction
The second chapter (see 2.2 Natural Disasters) has provided information where the most probable geographical location of natural phenomena is. People and the property in all these regions are vulnerable to the disaster impact. Although, this information is not enough in order to go into depth analysis necessary for the choice of redevelopment process. The distinction must be made between urban and non-urban areas. Living in one of these environments deeply influences the consequences of natural disaster. In both cases areas have different, population density, level of urbanization, social patterns and quality of living. All these attributes can give an answer about how to manage the natural disaster impact and which transitional settlement option is appropriate. These main attributes are going to be introduced in this chapter.

4.2 Population Density
The necessity for temporary settlement for sure will occur in some of identified regions with high possibility of natural event occurrence, but not in all of them. Urban or non-urban, habitant or non-habitant or it is possible to say more or less populated. Information about the impact of the natural event is in high correlation with the population density. For example, winds storms in a middle of Pacific Ocean do not influence on humans in the big scale. Tracing the definition of natural disaster from the second chapter, it could be concluded that it is just a natural phenomenon, which means that there is no affect on people and built environment. With help of population density it is also possible to distinguish the scale of natural disaster. In comparison between India and United States of America, we can see where more people will be affected with wind storms characteristic for both of regions. To conclude, location with high density is more vulnerable in terms of natural disaster. There is a high possibility that if hit by natural event the temporary settlement will be needed.

![Population Density Map](image-url)
4.3 Level of urbanization

Beside the people, the built environment or urbanization is also influenced by natural events. Importance of urbanization has been discussed previously in context of economical losses. In this chapter the level of urbanization will be used to identify the need for the temporary settlement.

There are several ways to measure the urbanization. The one is presented in this paper is called "Earth at Night". This image of Earth's city lights was created with data from the Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS). This satellite was originally designed to view clouds by moonlight and used to map the locations of permanent lights on the Earth's surface. This picture is capture from more than 100 smaller one, and later digitally connected.

The brightest areas of the Earth are the most urbanized, but not necessarily the most populated. Comparison of the United States of America with China or India from the Map 5 and Map 6 gives illustrative example. Cities tend to grow along coastlines and transportation networks. Even without the underlying map, the outlines of many continents would still be visible. The United States interstate highway system appears as a lattice connecting the brighter dots of city centers. In Russia, the Trans-Siberian railroad is a thin line stretching from Moscow through the center of Asia to Vladivostok. The Nile River, from the Aswan Dam to the Mediterranean Sea, is another bright thread through an otherwise dark region.

After more than 100 years of the electric light invention, some regions remain low populated and unlit. Antarctica is entirely dark. The interior jungles of Africa and South America are mostly dark, but lights are beginning to appear there. Deserts in Africa, Arabia, Australia, Mongolia, and the United States are poorly lit as well, along with the northern forests of Russia and Canada, and the great mountains of the Himalaya.
During this previous decade, population increased most rapidly in urban areas in the countries of Africa, Asia and Latin America and the Caribbean. More than half of the world population is becoming urban by 2007. The average size of the world's 100 largest cities increased from 2.1 million in 1950 to 5.1 million in 1990.

The complexity and big scale of humanity concentrated into large cities creates a potential risk, however the majority of the urban population lives in small- and medium-sized towns. Smaller cities contribute less pollution to global climate change, but show high levels of internal environmental pollution and risk. Therefore, urbanization is a real challenge and the right choice must combine good functionality, market which is necessary for overall development, and avoiding as much as possible on money spending for additional protection against disasters.

There are several factors that can be potential risk in cities. At first, that is the history or location of cities which have been founded in or expanded into hazardous environment. Second, the urbanization process leads to the concentration of risk vulnerable populations in informal part of cities. These settlements are inevitable when populations expand faster than the capacity of urban authorities or the private sector to supply housing or basic infrastructure. Third, in cities with temporary populations or immigrants, social and economic networks function heavily. Many people, especially minority or groups of low social status, can become socially excluded and politically marginalized, leading to a lack of access to resources and increased vulnerability.

Urban expansion can change the existing hazard patterns. Cities transform their surroundings and generate new risks. One example is increasing flood and landslide risk caused by changes in surface and underground water systems. Further on, physical hazards can provoke loosing buildings and open spaces of high cultural value. Cities without these kinds of gathering points have deterioration considering collective quality of life. Urbanization is not focused just on cities. It also makes changes at regional scale. New infrastructure, productive facilities, new urban areas, trade corridors and especially the unplanned urbanization of new regions present impact on the natural environment and can cause augmenting disaster risk.

Urbanization does not necessarily have to lead to increasing disaster risk and can actually, if managed properly, help reduce it. For example after Katharina hurricane large amount of people were safely displaced. The reason is high urbanization, particularly developed housing sector and transportation system extremely needed during the natural disasters. In this region shelters (housing in emergency) are not necessary in bigger scale. People can evacuate quickly and live in nearby areas which are not influenced by major natural disaster. The situation will not going to be the same for example in China during the floods. Existing structure of housing market can not offer that much comfort and additional houses will be needed (shelter).

4.4 Quality of living

In addition to urban environment more detailed picture concern the quality of it, may be used like additional indicator for measuring the need for temporary housing. Like mentioned before, informal settlements like slums can be epicenter of disaster concerning human lives. In these areas structures itself are badly designed and unresisting to almost any natural event. Even bigger problem represent the fact that the urban network is far from developed. This stops the possibility for people to evacuate quickly and at the same time prevent help from outside that region to intervene. If the area is vast, which is not unusual, not all part of that settlement will be directly hit by natural event. But the quality of housing in nearby area will not be sufficient to accommodate displaced people. Only solution is to
react after disaster happen, because of insufficient funds for protection. This represent response and recovery phase defined by natural management cycle. For that phase the temporary settlement is inevitable according to previous condition of urban area. These areas are poor and their output is not relevant and the world economy is not going to be influenced. But the human lives are equally valuable, and proper reaction must be made. Table 2 represents people who live in slums. These are the most vulnerable population especially if they live in hazard areas. In appendix more detail information concerning these data is available.

### Table 4 Slum population projection 1990-2020 (based on slum annual growth rate (1990-2001))

<table>
<thead>
<tr>
<th>Major area, region, country or area</th>
<th>1990</th>
<th>2001</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed regions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>32,234</td>
<td>33,124</td>
<td>33,368</td>
<td>33,750</td>
<td>34,347</td>
<td>34,543</td>
</tr>
<tr>
<td>Other</td>
<td>20,773</td>
<td>20,904</td>
<td>21,963</td>
<td>23,079</td>
<td>24,318</td>
<td>25,623</td>
</tr>
<tr>
<td>Developing regions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Africa</td>
<td>21,719</td>
<td>21,546</td>
<td>21,224</td>
<td>21,962</td>
<td>22,901</td>
<td>24,741</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>91,847</td>
<td>92,612</td>
<td>93,378</td>
<td>94,121</td>
<td>94,924</td>
<td>95,750</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>1,659,324</td>
<td>1,674,207</td>
<td>1,689,535</td>
<td>1,705,201</td>
<td>1,721,204</td>
<td>1,737,581</td>
</tr>
<tr>
<td>Eastern Asia</td>
<td>213,984</td>
<td>215,707</td>
<td>217,418</td>
<td>219,121</td>
<td>220,824</td>
<td>222,527</td>
</tr>
<tr>
<td>South-central Asia</td>
<td>5,113,324</td>
<td>5,224,207</td>
<td>5,335,535</td>
<td>5,446,201</td>
<td>5,556,204</td>
<td>5,667,581</td>
</tr>
<tr>
<td>South-eastern Asia</td>
<td>1,159,324</td>
<td>1,174,207</td>
<td>1,189,535</td>
<td>1,205,201</td>
<td>1,221,204</td>
<td>1,237,581</td>
</tr>
<tr>
<td>Western Asia</td>
<td>29,524</td>
<td>41,356</td>
<td>46,709</td>
<td>54,426</td>
<td>63,418</td>
<td>73,896</td>
</tr>
<tr>
<td>Oceania</td>
<td>350</td>
<td>499</td>
<td>568</td>
<td>668</td>
<td>786</td>
<td>924</td>
</tr>
<tr>
<td>Total slum population (in thousand)</td>
<td>721,608</td>
<td>924,107</td>
<td>1,015,255</td>
<td>1,145,964</td>
<td>1,298,552</td>
<td>1,477,291</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed regions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>4.47</td>
<td>3.58</td>
<td>3.29</td>
<td>2.95</td>
<td>2.63</td>
<td>2.34</td>
</tr>
<tr>
<td>Other</td>
<td>2.29</td>
<td>2.27</td>
<td>2.16</td>
<td>2.01</td>
<td>1.87</td>
<td>1.73</td>
</tr>
<tr>
<td>Developing regions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Africa</td>
<td>3.01</td>
<td>2.31</td>
<td>2.09</td>
<td>1.84</td>
<td>1.61</td>
<td>1.40</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>1.99</td>
<td>1.78</td>
<td>1.62</td>
<td>1.42</td>
<td>1.21</td>
<td>1.04</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>15.36</td>
<td>12.79</td>
<td>12.22</td>
<td>12.49</td>
<td>11.75</td>
<td>11.01</td>
</tr>
</tbody>
</table>

### 4.5 Conclusion

Using these three elementary indicators with previously identified the most affected regions by natural phenomena it is possible to foresee the potential place of transitional settlement. To conclude the most possible location is at the wider Equator region because of the persistent natural phenomena's. In different regions both the humans and the built environment are under the impact. In accordance with the relation between humans and environment, different program or scenario of transitional settlement can be used to natural disaster response. In addition to the region of the Equatorial line, the most threaten areas are in South America and Africa mostly because of the inappropriate building techniques in urban areas which are crowded. Besides defining potential transitional settlement this chapter provides information which can distinguish different regions and countries to potential investments by using these findings into the investment risk model (see Chapter 11).
Chapter 5 • Stakeholders

5.1 Introduction
This chapter will introduce the main stakeholders involved in redevelopment of areas hit by natural disasters. Information about the stakeholders is crucial in this thesis because the specific group of stakeholders influences important questions such as the validity of the investment in Transitional Settlement and which TS option will be appropriate (see Chapter 9). This chapter will provide information in the following order. First, the importance of the stakeholder analysis will be elaborated. Secondly, it will provide information about stakeholders involved in the specific issue - transitional settlement. And finally, a conclusion will present the general attributes of each stakeholder by using modified PEST (Political, Economical, Socio-Cultural, and Technological) Analysis tool.

5.2 Stakeholder analysis
Stakeholder Analysis is a vital tool for identifying those people, groups and organizations that have significant and legitimate interests in specific urban issues like a transitional settlement. To ensure a balanced representation, the analysis should examine and identify stakeholders across a number of different dimensions. For example, the analysis should separately identify relevant groups and interests within the public sector, within the private sector, and within social and community sectors. In addition, the analysis can seek out potential stakeholders to ensure proper representation in relation to gender, ethnicity, poverty, or other locally relevant criterion. Cutting across these categories, the analysis can also look at stakeholders in terms of their information, expertise and resources applicable to the issue. However, stakeholder analysis by itself only identifies potentially relevant stakeholders - it does not ensure that they will become active and meaningful participants; other measures to generate interest and sustain commitment will be necessary as well (Tools to support participatory Urban Decision Making, The United Nations Centre for Human Settlements, Nairobi, July 2001).

Purpose of stakeholder analysis has two main points:

1. All relevant stakeholders should be involved because only the full range approach is a way for successful decision making process and promotion of equity and social justice. Misguidance from this course can lead to wrong decisions and actions followed by inappropriate strategies with negative effects.

2. Maximize the role and contribution of each stakeholder. "The stakeholder analysis facilitates mapping of potential stakeholder roles and inputs and access to implementation instruments. This will indicate how best to maximize the constructive potential of each stakeholder whilst also revealing bottlenecks or obstacles that could obstruct realization of their potential / contributions. For example, an analysis could identify a particular stakeholder's lack of information and skills for dialogue and negotiation, factors which undermine the contribution or influence of an otherwise importantly affected group of stakeholders" (Tools to support participatory Urban Decision Making, The United Nations Centre for Human Settlements, Nairobi, July 2001). Mapping of stakeholders can be done by analyzing different criteria or attributes. "This will help determine partitions of stakeholders that may exhibit different levels of interest, capacities, and relevance for the issue. Knowledge of such differences will allow systematic exploitation of positive attributes. Identify areas where capacity building is necessary for effective stakeholder

One of the several forms of stakeholder mapping is by degree of stake and degree of influence, as shown in the matrix below:

**Influence-Interest Matrix**

<table>
<thead>
<tr>
<th>Low Influence</th>
<th>High Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Stake</td>
<td>Low Influence</td>
</tr>
<tr>
<td>least Priority Stakeholder Group</td>
<td>useful for decision and opinion formulation, brokering</td>
</tr>
<tr>
<td>High Stake</td>
<td>important stakeholder group perhaps in need of empowerment</td>
</tr>
</tbody>
</table>

5.3 Stakeholder's involved in transitional settlement
Stakeholders have similar and different interests in the process of transitional settlement. By reviewing it, possible common operational guidelines could be found to improve co-operation and co-ordination of different organizations. In the following text identified stakeholders in the context of the transitional settlement will be presented.

**Displaced and local population**
Displaced and local population is involved in several issues which are the crucial for the transitional settlement. Need for security, health and social care are essential. Also, very important is economic stability which is connected with natural-resource management. Transport and other communal service infrastructure are necessary for coordination of previously described issues.

**Community-based organizations (CBO)**
Community based organizations provides building or land capacity and their skills. They are making contacts and maintain relations with local population, local and national government international aid community and donors.

**Host governments**
Host governments are mainly responsible for internal and external security. This is highly related to conducting an environment with political and economical stability. The host governments also provide a national service infrastructure and national construction industry.

**Police and military**
Like under any other circumstances, police and military service are responsible for internal and external security and stability. Also they are the main actor in the population transport missions.

Local non-government organizations (LNGO)
They offer their skills in maintaining relations with population, CBO, local and national government, international aid community, and donors.

Coordinators
The first goal of coordinators is the strategic effectiveness. In order to accomplish that, they are willing to maintain relations between local, national, and international relations.

Specialists
Specialists are dealing with particular part of overall problem and there are the most interested in relevant sector effectiveness. They are in close relations with strategic coordinators, governments and donors.

Other sectors of response
They are related to the sector effectiveness as well but with the strong influence of settlement options.

Development workers
Development workers maintain operational continuity and assessment, monitoring, and evaluations.

Suppliers / Contractors
This group provides economic stability, enabling capacity. In order to accomplish their goal they have strong developed relations with government and international organizations.

Media
Media add up economic stability. Also big part of their work is coordinating communication between local, national and international organizations and governments.

Donors
Donors are primarily interested in the strategic effectiveness. Also they have some local, national, and international relations.

United nation bodies
They are also primarily interested in the strategic effectiveness and dealing on the local, national, and international level.

International non-government organizations (NGO)
This group is concerned about local, national, and strategic effectiveness. They also have impact on different sector range. They are maintaining local, national and international relations with populations, governments, donors, and the media.
Peacekeeping forces

Similar like police and military institutions, they are providing internal and external security and stability. Also, they can service the population mobility.

5.4 Conclusion

In order to make a valid mapping of previously mentioned stakeholders it is necessary to pay more attention to attributes of each stakeholder. In this purpose, the modified PEST (Political, Economy, Social, and Technology) analysis (http://www.mindtools.com/rs/PEST) will be used. These analyses are used to picture the problem from different indicated aspects and at the same time the stakeholders are direct representatives of the different fields. Because of this connection, the decision is made to describe stakeholders through PEST analysis. An analysis followed by this way is easier to manipulate with the issue of transitional settlement because the main attributes of each stakeholder can be easily distinguished by clustering into the four different aspects of the problem. In addition, using this approach presented in the following diagram, it can be understood which part of the problem is mostly involved in particular issue (Transitional Settlement) and in the particular region (ex. Sri Lanka). By understanding this specification of some problem, the strategy can be created from the dominant aspect of problem. For example, in the following figure that will be Economic and then the Political aspect, because most of stakeholders are involved in these areas of influence.
Legend:
01. Displaced and local population
02. Community-based organizations (CBO)
03. Host governments
04. Police and military
05. Local non-government organizations (LNGO)
06. Coordinators
07. Specialists
08. Other sectors of response
09. Development workers
10. Suppliers / Contractors
11. Media
12. Donors
13. United nation bodies
15. Peace keeping forces
Chapter 6 • Temporary occupancy

6.1 Introduction
This chapter represents conceptual background of this research. The three main modes of temporary occupancy are presented here. At the first sound, words like nomads, hotel, and transitional settlement regarded separately have nothing in common. This can launch the question about the validity of this kind of comparison. But every meaning of these three words has enclosed some type of occupancy of land and object itself which makes it suitable for distinction amongst each other. The reason of using this comparison is for fully understanding the concept of transitional settlement.

6.2 Nomadism
The first of three presented modes of temporary occupancy is nomadism. This mode is based on the nomad's way of life. The other reason to start with this example is its philosophical background. In that sense “Nomad thought” term is used by Deleuze in relation to the process in the philosophical work of F.W.Nietzsche, describing his way of thinking outside and across institutional boundaries, as decodification and recodification of thought. This way of thinking offers potential new solutions or new paradigms.

Types
It is known that the first way of organized human beings society was based on the gathering necessary ingredients for survival. Because of that the settled life compared to nomad is often regarded as more civilized. This distinction is created and maintained during the history by sedentary peoples.

Based on research by UNESCO, The Commission on Nomadic Peoples, by Khazanov and others, New Internationalist magazine in 1995 produced a facts sheet on Nomads. (Wayne Ellwood, "Nomads," New Internationalist, no. 266 (1995): 18-19.). Three main groups of nomads are identified: pastoralists, hunter, gatherers and traveling workers. Number of people involved in the today's nomad way of life is not small. Estimations indicate about 30 to 40 million being pastoral nomads on the world, moving with their households in search of pasture for their animals. The group of hunter-gatherer nomads is much more difficult to quantify because of their living environment. The third group of nomads is more appropriate to be classified under the next subtitle.

Object/Land Temporary Occupancy
For these two groups of nomads they are two things which can be identified concerning the temporary occupancy. It is the temporary occupancy of the object and the temporary occupancy of the land. This distinction will be used to picture all other types of temporary occupancy as well. These two elements provide good information about the structure of the modes.

Nomads according to their way of life, travel with their households which mean that their home is constantly occupied. On the other hand, land is being temporary occupied by them, since they are moving when the natural resources are exhausted.
6.3 Hotel

The second described model of temporary occupancy is based on the hotel concept. Everybody is familiar how the hotel functions. Hotel is an establishment which provides paid lodging, usually on a short term basis.

Definition
The word hotel derives from the French hôtel, which referred to a French version of a townhouse or any other building seeing frequent visitors, not a place offering accommodation (in contemporary usage, hôtel has the meaning of "hotel", and hôtel particulier is used for the old meaning). The French spelling (with the circumflex) was once also used in English, but is now rare. The circumflex replaces the 's' once preceding the 't' in the earlier hostel spelling, which over time received a new, but closely related meaning. ([http://en.wikipedia.org/wiki/Hotel](http://en.wikipedia.org/wiki/Hotel))

Object/Land Temporary Occupancy
More complex thing is how it operates. The interesting part of analyzing the hotel for this part of research is the relation between the object and people. Object or the hotel like a building always stays the same while the visitors are changing. This mean that the object (hotel) is temporary occupied by people and the land remains constantly occupied by object. This is opposite than the previous example in which we can see that the land is being temporary occupied and not the object (nomad’s house).

There is one specific example which shows the possibility of this mode to have an attribute of temporality concerning the object as well as the land (in this example sea, the term "space" is not used instead of "land" because the object itself represent some space and the confusion with the terms will be present). This is the ship. The Big tourist ships are actually hotels on water. This means that they have temporary occupancy of the object since the users are changing and the ship itself is moving, so there is a present temporary occupancy of space on sea. This is the patter which is actually used in the transitional settlements and makes it valid for an observation.

Complexity of hotel management
Hotel like an establishment provides a number of services: restaurants, bars, swimming pools, child care, meeting rooms, etc. All these functions make him very respectable concerning the complicity of the management process. This process could be even more complicate when we have in mind a biggest hotels with 2000 rooms available or even the biggest one MGM Grand Las Vegas in Las Vegas with 6,276 rooms available. Can they be regarded as small towns, practically they are. This insinuation is mentioned on purpose, because all these process can be used in some temporary settlement for displaced population, especially because the elementary need in all phases of redevelopment is accommodation. More about this possibility of transitional settlement redevelopment will be elaborated.

Privatization or similar concepts
There is more interesting things involved in the concept of hotel. This is the trend of privatization. It is going so far that even prisons become private property, operating like some kind of hotels for the convicts. Hospitals also operate by offering services and accommodation especially within the different programs for elderly. One of the assumptions of privatization is that it busts the entrepreneurial spirit which is necessary for development and good functioning.
Besides the prisons, hospitals, home for elderly, there are hotels for rent between one to three months. Isn’t even possible to conclude that the rented apartments can be look like hotel units and the all units portfolio of housing associations operates similarly like hotels especially if we have in mind trends which incorporate different services besides just offering an accommodation.

Users

Until now it is discussed about complexity of hotel management, privatization trends but what about the users. Of course the users correspond to the function of each possibility previously described at privatization concept. In addition to all these groups of users it is possible to include the third group of the nomad’s classified as traveling or seasonal workers. They are neither hunter-gatherers nor pastoralists. This tradition dated about 1000 years ago, when Roma or Gypsies supposed to have traveled from North India to Europe. Elements of this culture are spread all over the world. This is the reason why this part of population can not be mapped. This last group is enlarging in the last decades. Previously, usually the poor part of population was contempt to this practice. These days the group of urban nomads gathers all parts of our society. This is caused specially because of different existing transfer technologies. This trend is really augmenting. To present this the following figure “Reason for moving by type of movement” will be presented. This figure is based on movers within the United States.

Figure 1. Reason for Moving by Type of Move: March 1999-2000
(Percent distribution of movers within the United States, age 1 and older)

[Diagram showing the distribution of reasons for moving by type of move for intracounty and intercounty movers, with housing-related reasons being the largest, followed by family-related and work-related reasons, and other reasons being the smallest.]
6.4 Transitional settlement

The last presented mode of temporary occupancy is transitional settlement. The transitional settlement offers shelter after the disasters ranging from emergency response to durable solutions.

**Object/Land Temporary Occupancy**

The object and the land temporary occupancy are present within the transitional settlement. In transitional settlements, the design of units contains diversity to be able to answer on different needs of different users. This is necessary since the unit itself could be occupied by different persons in the short period and may be even the function of some unit could be changed. It means that the temporary occupancy of object by displaced population is present. Transitional settlements are designed that they could be mobile. The mobility may vary, but still it exists. That means that the temporary occupancy of land is present in this mode.

There is an additional attribute. Occupancy of the object as well as for the land should be designed in such a sense that it could be continuous also. After all this is the basic principle of the transitional settlement which concerns the disaster response ranging from emergency to durable solutions.

6.5 Summary

The summary of the temporary occupancy is presented in the following matrix.

<table>
<thead>
<tr>
<th></th>
<th>Object</th>
<th>Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nomads</td>
<td></td>
<td>☐</td>
</tr>
<tr>
<td>Hotel</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>TS</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Besides understanding the underlying structure of the transitional settlement, these modes offer can be used for the development of some similar settlement which can be used for other purposes except the settling displaced population.
Chapter 7 • Types of transitional settlement

7.1 Introduction
The types of transitional settlement will be presented in this chapter. First, the general distinction on two possible classifications will be presented. Secondly, the attention will be put on the each of individual types. The insight in different transitional settlement options is crucial.

7.2 Classification
There are several options for finding a shelter after the disasters. They are categorized into six transitional settlement options by shelterproject organization. It is sure that more than one option is going to be appropriate. By choosing one of them, displaced families can make a best use of their own coping strategies for livelihoods, community development, and security. In general, displaced people will move from one option to another during their displacement especially because people will already choose one options before the organized assistance come. But the relocation of settlement should be avoided because this process is usually followed by social difficulties, material expenses, and a lot of hard work.

In addition to complexity, the quality of settlement and the managerial skills of responsible organizations or persons could make this problem smaller or even bigger if the problem is not addressed properly.

Before discussing about the every possibility of settlement program individually, it is necessary to mention the possible sub groups. These options can be viewed as three dispersed option and three grouped. The other way of looking on this subject is to divide them into the self-settlement and planed settlements. In these two distinctions two different issues are involved.
Displaced population often chooses dispersed type of settlement. This shows their willingness for the self-sustainability and keeping their individuality. Also these settlements can offer greater development benefits to the local population. In addition they are in the lower risk security group. Supporting dispersed settlement over grouped settlement is often preferable, for several reasons. It can be more responsive to the changing needs of displaced population since in this situation they are better integrated in the local community. Contact with the local authorities can offer better use of coping strategies. It can be more effective in offering development opportunities by allowing the aid communities to support common infrastructure and services. It can be more cost-effective because this type of settlement does not need the large-scale investments. It also reduces the tension between local community and displaced one because the impact is scatter to whole region not just at one spot. However, if the dispersed settlement is unsupported, it may have similar negative effects, such as over burdening local infrastructure, services and environmental resources.

Sometimes displaced population chooses grouped settlements for security reasons, to support communal coping strategies and to increase visibility to local and international institution which can provide them with help. Grouped settlement provides better control by community leader of both displaced and local populations. However there is a
risk that the power of the group control can be abused. In grouped settlement the population is only able to react collectively through their leaders and external assistance. On the other hand grouped settlement could be proposed for the program of resettlement. But there is a little point of resettlement if there are no opportunities for sustainable living of displaced population or if they must to compete with local community. The support of grouped settlement when one ore more criteria are encountered. The only sites available are the in environments where is no local community. When political, social and financial costs of emergency and long term support for dispersed settlement are too high. The need is so urgent that there is insufficient time to provide infrastructure for dispersed settlement. The local population or the host government is unwilling to accept the integration. The dispersed settlement would result in competition for insufficient resources. The dispersed person require greater service infrastructure than local population. Local community is fragile, and the impact of displaced population should be contained in groups.

Self settlement vs. planned

![Diagram of self settlement vs. planned settlement](image)

The choice of choosing either self-settlement or planned is define mostly by the point in time when each option becomes available. These are not two alternatives since may be just one of them is available.

On the other hand easily organized self settlement is followed by the poor condition and they are appropriate just for a certain period. Self-settlement needs the following; access to sufficient land for settlement and agriculture; access
to water, fuel woods and construction materials; protection and security; access to food aid until agricultural self-sufficiency might be expected; access to services such as hospital, schools...

It is important to remember that the factors that led to selection of certain TS program are changeable during the process of settlement. The self settlement should be recognized as soon as possible, and decided if the existing concept of settlement should be supported or not, depending for example on the risk to local security.

There are two main reasons when the self-settlement should be supported. The first one is when the decision was made by the displaced people themselves, who usually have better understanding of their needs and circumstances than those who wish to support them. And the other one is when the displaced population made some efforts like investing time and human recourses in building houses or cultivate agriculture land or in developing constructive relations with local population.

Planned camps are usually not available until some time after the disaster. At the same, they are often the only from of transitional settlement supported by the aid community.

7.3 Types

Dispersed settlement: with host families

"This settlement option involves sheltering the displaced population within the households of local families, or on land or in properties owned by them
(Transitional settlement - displaced population, Corsellis and Vitale, University of Cambridge 2005)." Within this option displaced population can live with their relatives, friends, or strangers. Potential place of allocation is the host house, different house owned by host, or on the host's land. The stay could be allowed without payment, or with the rent-paying bases. Payment could be in cash or like a labor work for example.

This option offer more opportunities for positive interaction with the local population. Because of this a wider social support network is available. Another benefit is that the existing coping strategies can be supported by keeping families together and within a stable household environment. The period of this program is crucial. If it prolongs, the consequences will consider social and financial stress. Because of this the change to different TS option is very possible.

Dispersal stretches the capacity of aid organization and put the limits on logistics capacity. On the other hand, a displaced population which is dispersed has much better relations with the host population which enables more direct access to resources. This access can greatly reduce their vulnerability. Potential risk for the both entities in this type of resettlement program can be: the risk from external attack; opportunities for sexual abuse, or for financial exploitation; host's violence if the assistance offered to displaced population is perceived to be unfairly generous; environment vulnerability considering distribution of established patterns of natural-resource management which may led to violence; difficult access to local aid supported communal services; difficult access to distributed aid. All of these potential risks can be reduced if the host families and hosted families know each other. Also, vulnerabilities can be reduced on regular direct contact between the populations.
In order to mitigate an impact of displaced population and to reduce the potential risk, it is important to ensure that support offered to the displaced population does not raise their standard of living beyond that of the local population. This can happen especially because the host families can live far below the international standards. So the used standards should be appropriate to local condition and just based on the internationals.

The host families may offer opportunities for the hosted families in order to bring more money in the household, so that the rent can be charged. The opportunities for producing an income may be small-scale manufacturing. This is preferable than land cultivation which may include competition for local resources. The presence of new workers on the market increase competition for casual labor opportunities. Considering all these statements, the help for both host and hosted families is probably the best possible solution.

**Dispersed settlement: rural self-settlement**

"Rural self settlement takes place when displaced families settle on rural land that is owned collectively, rather than privately. (Transitional settlement - displaced population, Corsellis and Vitale, University of Cambridge 2005)."

Displaced people can cross a border, and stop at the first village to negotiate the use of land for their settlement. This option offers sort of self-sufficiency, if agriculture or animal husbandry is possible. Also it promotes integration with the local population. In the case when the hosted population is growing, and if it is going to be competition for resources, the local authorities may refuse their hospitality.

Dispersed settlement stretches the capacity of aid organization and local authorities to assess and support displaced population comparing to concentrated settlement. On the other hand, displaced population has more direct access to resources, work opportunities, infrastructure, and support mechanism. In this way the rural self-settlement reduces its vulnerability. Still it is important to assess the impacts of the displaced population on the local population.

In the case of rural self-settlement, the main source of vulnerability is proximity to the border or an area of conflict. In such circumstances, support should be offered for the viable Ts options, located away from the conflict. The most common vulnerabilities are: Sexual or financial exploitation by a host landowner, risk to security of one or all of host, displaced and rebellious group, difficult access to local and aid-supported communal services, difficult access to distributed aid.

Appraisal process of displaced and local population is important to identify opportunities for the displaced population become more self-sufficient. The help offered to the displaced population should not be in disproportion with the local standard of living. Beside that the offered standards should be appropriate, both side should benefit from outside support in order to prevent tensions between them.

This type of settlement may not be sustainable, except on the short term, basically because of the competition for resources between the local and displaced population.

Close living area to the local community, gives opportunity for displaced population to have a chance for selling their surplus in local market. This will create interdependence which may lead to social and cultural pressure on
displaced population to submit the tradition of local population. One positive result might be improved management of natural resources.

Just in some particular cases under severe security condition, the displaced population can continue to use their own land during day and to be transported to the transitional settlement for the night.

**Dispersed settlement: urban self-settlement**

Displaced populations from an urban background may decide to settle in a town, occupying unclaimed properties or land, or settling informally.

If a displaced family is living in a property owned by someone, this is considered as living with the host family. Urban self-settlement is the modification of the previous one, when the land has not been claimed or it is owned communally or by state. Displaced population can occupy unclaimed property in a city for safety reason or to find a job. Generally, they will not own the property or land where they live, but may be some upgrade is necessary. Agencies providing assistance may need to define a strategy with the local government to provide support for this population, regardless of the ownership of the property or land.

Urban displaced population often increases the existing size of the informal sector of some town. Planning and assistance therefore should be in full consultation with formal as same as informal local authorities. Also, offered support should take care of existing inhabitants. If urban self-settlement is an option that confronts aid organizations when they arrive, it must be assessed and supported within the coordinated transitional settlement strategy.

Vulnerabilities are similar with other dispersed settlement. Access and logistic capacity are bad. This can be reduced by direct contact with local population. In that case support should aim to mitigate any negative impacts of the displaced population on the local population. It is necessary to underline especially these vulnerabilities: (Dense) urban settlements can prove very difficult to up-grade to meet minimum standard of humanitarian response, access to communal service is more difficult, as well as access to distributed aid.

There is always an existing community of informal settlers which offer the easiest self-help model to follow. Usually it is not wholly legal, so settlers often intentionally avoid contact with local authorities. The displaced will tend to follow the same patterns as the local informal habitants with whom they live, in order to maintain good relations with them and to take advantage of the self-help methods that they have developed. This is one reason more why the support should be based on an understanding of the needs of both the displaced and local informal settlers.

Choice of urban self settlement should be like there is no increased vulnerability of some groups of population, like children or minorities. For example, it is common to find a disproportion of population in refugee camps. There are a big number of children and elderly and the less vulnerable population is searching is dispersed in urban self-settlement in order to maximize the opportunity for work. This can fracture communities, or result in vulnerable individuals moving into inappropriate urban environments in order to maintain family structures.
The advantage for displaced population is that the cities and towns tend to be wealthier because their local markets are larger, and opportunities for development are generally greater for the population which has no farm land. If the displaced population comes from rural area, their incorporation will be slightly possible and vulnerability grater.

Support should not go beyond the standard of living of local population. Also, support should be offered to both local and displaced populations to prevent tensions.

**Grouped settlement: collective centers**

"Collective centers, also referred to as mass shelters, are usually transit facilities located in pre-existing structures, such as community centers, town halls, gymnasiums, hotels, warehouses, disused factories, and unfinished buildings. They are often used when displacement occurs inside a city itself, or when there are significant flows of displaced people into a city or town."

They are appropriate for short-term accommodation while their transit to other option is being arranged. They are not long-term solutions except when they can insure the privacy of displaced people. A prolonged period of stay is likely to result in stress, possibly leading to depression, social unrest, or other individual or communal psychosocial problems.

The local government could offer a number of different structures or facilities. In that case some issue must be investigated: Is the structure appropriate to that task, the time for which it is available, ownership, types of access, and in which condition structure should be given back to owner.

Planned structure or building for settling people had previously some function in society. Because of that reason it should be looked carefully what is the impact of the change of use. For example, if the local government offers school, the question is where those children are going to be educated?

Collective centers facilitate assistance from agencies, because they improve access to services: a help tem can, for example, visit a center and identify problems more easily than it can do when a population is dispersed.

The presence of the center could increase vulnerability to attack. Therefore the security of center is important. It may become a focus for hostilities, or it may become a safe haven. Fire risk is also very present. Usually the temporary used building is not compatible with the new number of people who are using it. The risk is even higher when the population is settled in the multi-storey building. Also the spread of communicable diseases is more likely to happen in densely populated environment.

In general collective centers reduce the variety of income-generating opportunities because they do not provide premises where the activities may take place, or because they constraint the access to local population and at the same time to local market. On the other hand, collective centers can offer a case for casual labor force, so it will be necessary to consider the potential competition for job opportunities.

The size of accommodation can influence the economical aspect of life as well. If the building offers just the housing accommodation without additional rooms, it will be impossible to offer services, to sell or store goods. If displaced
people are from rural area, it is unlikely that they be able to sustain previous connection to land cultivation or animal husbandry. The sited land can be used to for cultivation, but further access to new land must be negotiated.

Appropriate support for both local and displaced population is obligatory

**Grouped settlement: self-settled camps**

“A displaced community or displaced groups may settle in camps, independently of assistance from local government or the aid community. Self-settled camps are often sited on state-owned or communal land, usually after limited negotiations with the local population over use and access.”

Camps incorporate entire support system and not just simple adding for necessary components. A lot of factors are involved which needs several things: strategic planning, site selection, camp management, options for phasing or development, demography analysis, supply analysis.

Grouped self-settlement is usually established before the arrival of aid organizations. The choice for this type of settlement often is living in a group for social reasons like feeling more secure, and hope for receiving external assistance.

The main strategic decision is whether it is better to support improvement of such settlement, or to support to move to different site, or some alternative TS options should be developed. The main reason for resettlement is security reasons like nearby border or risk from natural disaster.

If it is decided that the location is appropriate some adjustments must be made to its density, water supply, sanitation infrastructure, fire risk conditions.

Camps can be vulnerable to both external and internal factors. It is important to assess security threat; particularly the local population may become a target.

Aid delivery to camps affects both the communication with local society and the self-sufficiency of displaced population. It is very rare that organized settlements do not have formal or informal interaction with local population or economies and where settlements do not have any self-sufficient methodologies. In reality, most camps fall between these extremes.

Same as for all other TS options, it is important that appropriate support for both local and displaced population is provided.
Grouped settlement: planned camps

"Planned camps are places where displaced populations find accommodation on purpose-built sites, and a full services infrastructure is provided, including water supply, food distribution, non-food item distribution, education, and health care usually exclusively for the population of the site."

These camps replicate an entire system, rather than simply adding the necessary components. Factors involved are: strategic planning, site selection, camp management, options for phasing or development, demographic analyses, supply analyses. The guidance in this type of TS program requires more detail approach. These camps are last option for organizations such as UNHCR because they are promoting dependency, disproportion of support compared with other options, difficult withdrawal, posing more challenge to achieve durable solutions.

Camps are under the security threats, both external and internal, particularly because the local population can become a target.

Aid delivery affects communication with local population and prospects for self-sufficiency. Most of the camps will have these two modes of functioning. The support should not raise more than the standard of local's population living. And support should be equally offered to both local and displaced population.

7.4 Summary
This chapter provides extensive information about every mentioned program option of transitional settlement. From these descriptions it is possible to realize what the structure of each of them is. This addresses especially on the different vulnerabilities, livelihoods and overall benefits. This information is crucial for the possible redevelopment options. Attributes of each type can be matched with different users or specific group of stakeholders.
Chapter 8 • Existing technology and products

8.1 Introduction
This chapter will provide insight in timeline as well as the product and technologies which are used for solving the problem of disaster response. By understanding these two facts it is possible to see how the problem is conducted now and what could be possible inventions.

8.2 Timeline of Disasters and Response
This timeline appears in the book Design Like You Give a Damn, edited by Architecture for Humanity. Some reductions are made in order to be more focused on the main topic “Transitional settlement”. The full timeline of disaster response it is possible to find in appendix.

Conclusions
This history line of natural disaster and its response offer different valuable information, since this history line is exactly one hundred years old.

Retrospective of just the biggest disasters gives information how many people are influenced and how much our world society is vulnerable. This recognition makes us aware of our environment and hopefully prepared for coming times.

Another conclusion from this time line is the fact that we can see that in the last two decades the number of disaster cases is augmenting rapidly. To look closely to these circumstances the following figure is presented.

![Figure 8.1 - Disasters Recorded by EM-DAT](image)

Finally, this is also the retrospective of the disaster response. In that context, it is possible to make some remarks on the tools or emergency units which are being used. Unfortunately, the conclusion is that the units are more often donor oriented and not the survivor oriented. This fact is even more unpleasant when it is known that there are lot of diversity solutions and approaches to this happening. Further research about the respond for the disasters should paid more attention to this fact.
8.3 Technology and products

Today, there are different kinds of technologies and products which may be used to respond the needs for accommodation of displaced population. Designers of different products have obviously a different approach to conduct this problem. Another fact is that the most of these products are not design initially for the purpose of displaced population. It should be underlined that they just can be used for it. These products have big variety of construction complexity. But the most important attributes are their quality of accommodation, building speed and a visual impression.

Containers
Containers are monolith units which can be equipped very different depending on thermo isolation and the interior finishing. They can be built as group sleeping quarters with the separate sanitation part. On the other hand, they could be individual units with kitchen and bathroom. Foundations are not needed, for this product it is enough to use simple bases. They are every durable which enables long time of usage and numerous time of movement. Transport must to be arranged with heavy machinery.

Quality of accommodation is suitable just for temporary living. This concerns both collective and individual types of usage; mostly because of small living space which is previously designed (no changes are possible).

Building speed is high. The building process involves just putting down the container on simple foundation. It takes approximately one hour with previously arranged foundation.

Visual impression is poor, mostly because of usage of same looking units and without having possibilities for innovative changes. This make a complex like this monotone.

Trailer
Trailer have similar accommodation performance like containers. Difference is in easier positioning on the field (parking and putting on surface). For the transportation also some support vehicle is necessary but the number of vehicles is bigger comparing to one unit. Also it depends on infrastructure, roads particularly. If they are completely damaged, shipment will not be possible.

Quality of accommodation is limited to temporary use only. The biggest minus is lack of space.
Building speed is extremely high, half an hour without any necessary foundation.

Visual impression stays monotone but can be improved by using large variety of shed types.

**RV**

Recreation vehicles (RV) have the most similarities with the trailers with the difference in positioning on the ground (it concerns just parking). It is a self transport accommodation. Damaged infrastructure also influences the competence of this product in large scale.

Quality of accommodation is slightly higher than the trailer case, because these vehicles are vast.

Building speed is almost instant.

Visual impression stays monotone but can be improved with the usage of diverse shed types.

**Tents**

Tents are on the lowest possible level of accommodation. This type of accommodation is developed in construction sense by using light weight metals and composite materials. This enables bigger surface of sheds and faster assembling. Cover is developed by using special materials which are more durable and have better thermo performance.

Quality of accommodation is low because sanitation units are isolated and serves to all potential population of camps.
Building speed depends on the type of product. It can be from half an hour to three hours.

Visual impression is monotone if the same type of tents is used. This can make confusion during the movement through the camp, because there are no referent spot.

Light building units
Light building units are another type of affordable and fast usable accommodation. They can be compact small units, but because of their light weight and easier transport they are usually made of prefabricated parts. Comparing to tents they are more durable and more resistant to outdoor environment. Because of these characteristics they can be moved and reused several times more then tents.

Quality of accommodation is still low, but better then in the tents. Sanitary units are separated and they are for collective use only.

Building speed depends of manufacturer and the size of the units. It is estimated that it is enough three to six hours for installation.

Visual impression can be monotone if the same type of units is used.

Prefabricated houses
Prefabricated houses can be developed within the open or closed building system. In both of them the equipment possibilities is satisfying. Comparing to previously described products this one can be arranged in more functional diversity which is important for various users. On the other hand transport is more complicated because of heavy construction parts. Reuse is slightly possible.

Quality of accommodation is suitable for permanent settlement especially because of possibility of individual interior design and more important the possibility of divers functionality. The later is important because of two things. The first is at the start different users have different way of lives which influence directly on functional arrangement of accommodation. The second one is concerning the modification during the different phases of transitional settlement program.

Building speed is about 450 hours (for unit of 30m²), without ground preparation.
Visual impression is most similar to unique planed architectural design. For sure that it is better than previously described products. With the usage of different types and their modification it is possible to avoid monotone impression.

Architectural designed traditional buildings
These buildings are the most convenient for individual user because this kind of design enables different functional possibilities and diverse equipment. The only minus is their building speed and incapability for relocation.

Quality of accommodation responds to permanent living space. Adaptability for different users is on the highest level. Reconstruction of building for different phases in transitional settlement is not possible. In the field work, besides building new units, this approach can be used for the renovation of existing housing units.

Building speed minimum is 750 hours (for unit of 30m²), without ground preparation.

Visual impression depends of the quality of architectural design.

Traditional local buildings
Traditional local buildings can vary depends of their region or even country of origin. This makes characterization impossible. They can be in the whole range of previously described product’s attributes from the quality of accommodation to building speed and even transport abilities.

8.4 Conclusion
This chapter gives information about all possible products which are and can be used for the purpose of accommodation of displaced population. This typology provides background information with some attributes which are measurable. This makes them valid for further investigation where the choice of their usage can be made.

To capture the picture of the possible products and techniques that can be used a preliminary valuation of products will be presented in the following figure.
Previously presented attributes are valorized in the context of the research field of transitional settlement. Point of the valorization is to measure elementary characteristics of different products which are available for purchase.

Valorization at this stage is preliminary. This means that in the further research more characteristics should be identified and more precise indicators for measurement should be introduced (for present characteristics and further ones). The further research could be in direction of finding the right match within one of the six possible TS options. Different options can have different products which suits them most. In addition, final valorization can help by discovering the existing characteristics of products to find the potential new hybrid product which will satisfy the needs of displaced population more than existing ones.

**Acceptability of product for the TS**

![Figure 6.6 - Acceptability of existing products for the Transitional Settlement options]

- Containers
- Trailers
- Recreation vehicles (RV)
- Tents
- Light building units
- Prefabricated h.
- Arch. traditional h.
- Traditional local h.

Gradual scale

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Step 3 • Factors interaction


**Chapter 9 • System diagrams**

9.1 **Introduction**

In this chapter, the interactions of different elementary factors will be presented. Different interactions bring the questions and some insights of different aspects of transitional settlement problem. These questions can be answered by using the system diagrams with the usage of computer. For this level of research within this subject, the satisfactory level would be the understanding of main concept with the usage of basic qualitative valuable.

The tool which is going to be used is a system diagram. The system diagrams are tools which can be used to resolve how a complex system works. These diagrams can be used for different purposes: in a business environment, for biological researches, social impact on some issue, etc. System diagrams are particularly helpful in showing how a change in one factor may impact another one. Also, a good system diagram will show how changing a factor may influence to affect itself. It pictures the factors and relations that are important. Also, this tool provides a help to start to measure interactions between different factors. In possible further research a system diagram can be used to build up a computer model. This technique helps to map out the structure of the system which could be modeled.

9.2 **System diagrams**

The heart of the idea is to show the type of linkage between different factors. In order to understand them, the basic elements of the system diagrams are going to be presented.

Same way link – The symbol S shows that the two factors are moving in same direction. To describe this process, the example with the Natural disaster factor and the existence of the transitional settlement will be presented. This diagram indicates that the bigger the impact (or if we want to measure it the number of occurrence) of natural disaster the more people will be involved.

![Same way link](image)

Another example which is present in this thesis concerns the factor of geographic location and the transitional settlement. The influence of the geographic location factor is two sided. At one point, it determines the possible existence (or number) of the transitional settlement. The existence of the certain numbers of the geographic location indicators (affected regions, population density, urbanization, quality of living) determine the volume of the transitional settlement. On the other hand, these different indicators will influence the potential program of TS.

![Opposite relation link](image)

Opposite relation link – the relation could be in opposite direction as well. For example, if some region has better (or a bigger number) security measures the possibility that disaster happens will be lower.

![Feedback loops](image)

Feedback loops – Feedback is an important concept in the use of system diagrams. In many cases changing one factor will impact on another factor, which will then affect the first. Feedback will either reduce the impact of the
change, or will amplify it. The example of reinforced loop is the relation between the stakeholders and the possible type of transitional settlement. Complexity of problem involves the bigger number of stakeholders this will influence which type of settlement will be selected. When the selected type becomes available and used, it will impact social, political, spatial and several more attributes. These new developed circumstances will affect the number and complexity of the stakeholder group. What is going to be a starting point TS option or the stakeholder group depends on who is the initiative side.

Displaced population can be organized within self-settled camps or the camps can be planned in advance.

Similar linkage is between the factor of existing technologies and products and TS options. The existing technologies directly impact how the potential camp is going to look like. When the certain technology is applied some modification could be made because of the constant changing need of population and accommodation to certain environment. This will send a feedback and new technologies could evolve.

Delayed link - Ideally when a change comes to a system it should adjust immediately to its new state. In reality there is almost always a delay before other factors adjust. This delay may occur in a mechanical system simply as a result of inertia and friction. In a human system it will occur as people take time to communicate, get used to new ideas, and implement change. In the example of transitional settlement the most valid delay is communication. The negotiation between displaced population and local one is the biggest obstacle. Also, the time is needed for the formation of the settlement itself. This relation corresponds to the following diagram.
9.3 Conclusion

To finalize this chapter the three main diagrams will be presented. All of them concern the transitional settlement but from the different aspect. One diagram will show the factors which influence the potential existence of the transitional settlement. The other will describe the factors which dictate the choice which is going to be made for choosing the right TS option. Finally, the third is going to present the factors that influence the decision about the investment in Transitional Settlement. They all present the parts of one picture but they are divided in three diagrams because they can not be measured with same parameters.

The concept of these diagrams is separately explained in the previous examples. Following the principle of non-redundancy descriptions will not be written again. For the third diagram more information could be found at chapter 12, which investigate this subject more thoroughly.

Diagram of the potential existence of transitional settlement (number of them):

```
Natural Disaster -------+ Displaced Population ------+ Transitional Settlement
                      Security Measures                             Geographic Location
```

Figure 9.7 – System diagram of potential existence of transitional settlement

This diagram presents factors that can influence which TS option should be used:

```
Stakeholders ------+ Transitional Settlement ------+ Existing Technologies
                      Geographic Location
```

Figure 9.8 – System diagram of influence on transitional settlement type

The validity of the investment in Transitional Settlement is presented in the following figure:

```
Real Estate Value ------+ Transitional Settlement ------+ Environmental Risk
Economic Indicators ------+ Stakeholder Complexity
```

Figure 9.9 – System diagram of investment validity on transitional settlements

In further research, when the relationships between factors on the diagrams are established, it is possible to attach numbers to them. Even further this can be developed into a computer model. This model can be used to make predictions by changing factors within it. This would assess the likely impact on the system of external changes, and investigate the effect of changes that can be made within the system.
Chapter 10 • Technology interaction with other factors

10.1 Introduction
This chapter will debate about some of the observations on the existing temporary settlement concept. These observations are mainly on the technology base but they interfere in all elements and segments of the life of displaced population. Further on in this chapter possible concept of the so called "hybrid" unit will be introduced. This part will deal mainly with the possible technical and conceptual solution for this problem.

10.2 Some observations on the existing temporary settlement concept
In the concept of the settlement it should be underlined that no town is ever temporary. This is the initial attribute for every settlement and also for the settlements emerged after the natural disasters. When the settlement go beyond plastic-sheeting or tent-shelters (rapid response) than the town will develop but hardly contract or retreat, especially in sub-Saharan Africa, same goes for the Middle East, and Asia (Rene John Dirkx 2007). In addition to an example of the non-temporary attribute is the fact that while aid is pouring in, the conditions in the 'temporary towns' are often better than in the surrounding communities and settlements. This has a pulling effect on these communities - and services (hair-salon, butcher, kiosks, bicycle - repair shop, cell-phone top-up) start appearing. Hence, the town expands and consolidates.

Another important attribute of these settlements is the products limitations. An extensive survey of the success of the so-called pre-fabricated shelters indicated that their use as emergency shelter or as temporary housing has been: extremely limited, their performance poor, acceptability poor, costs very high (Sultan Barakat 2003). Of all the numerous proposals during the period of really hundred years (Architecture for Humanity 2006), the design-criteria tend to be donor-oriented instead of survivor-oriented.

The recipients or beneficiaries of the aid wish a 'town' which is socially, culturally, and climatically accepted and which links the 'new town' to others and surrounding settlements. Also, the technology is often inappropriate, requires too much knowhow and skill which are not at hand and the transport costs are too high. In other words there are no one-suits-all solutions due to the fact of the different cultures, climates, contexts, constructions, costs, etc in the diverse regions in the worlds. So, it should be thought twice before embarking on 'instant solutions' or a 'pre-fabricated house-kit' mostly offered in history.

Diversity in shelter is the key-word. One needs to have a thorough knowledge of the area where the disaster has taken place when you move beyond the plastic sheets and tents otherwise failure is likely, for example the famous architect Shigeru Ban - designed a 'house' for refugees with polyester/canvas cover and aluminum frame so as to 'conserve the environment'. Well, the refugees sold the aluminum and cut down all the trees for firewood and for making the structures for the tent-houses......
10.2 Concept of the hybrid unit

A "hybrid" unit can be developed but only up to the conceptual level. That means it is possible to develop a plan which has several attributes:

- It focuses on developing functional modules. Which means that they are movable and therefore re-arrange of the layout plan with many different options (taking in account the different contexts) can be possible.
- The concept should not be 'materialized'. That should be let to the 'forces in the field' to give the final say on how and with which materials should be build with.
- The possible options for this 'phase-house' or 'house in constant transition' could be in-built by yourself like a series of optional blue-prints from which the families can choose according to their budget.
- This means that product-development should for best results preferably happens 'on-the-ground' not in advance for the better symbiosis existing natural, social, and technological environment.

10.3 Conclusion

Without these attributes and in the same time misunderstanding about all elements which influence the everyday life of some society, the failure is highly possible. An example is the failure of Shigeru Ban pre-fabricated product. Here, the refugees turned existing unit actually into their own hybrid as they used only the polyester/canvas and what they found on the ground. This is a process which allows communities to alter the 'materialization' of 'hybrid unit' according to their own life-style pattern, needs/desires, and budgets.
Step 4 - Strategy
Chapter 11 • Investment risk

11.1 Introduction
In the chapter 9 the three main elements of the transitional settlement were presented: 1. Potential existence of transitional settlement; 2. Potential type of TS options and 3. Validity of TS investment. All of these questions concern deeply the overall subject of this thesis and in further research they will be developed thoroughly due to their interconnection. At this stage, from the Real Estate perspective the most important is the validity of investments. It is an initial decision which can be followed by redevelopment in some areas if the estimations are positive.

A lot of attention should be put in making assessment of the future investment in area hit by a natural disaster. Like any investment in distressed property this one also brings an initial amount of risk. To be able to do such assessment a specific tool is required. In this thesis a General Electric / McKinsey matrix is used. This matrix is proven in the field of the real estate like a valid tool. But due to the specific estimation and considering the nature of the distressed properties caused by natural disaster, some modifications and additions were made in this model.

11.2 Tool – General Electric / McKinsey Matrix
The explanations of this model are collected from the internet site:
http://www.valuebasedmanagement.net/methods_ge_mckinsey.html, on which it is possible to find more information.

Initially the GE matrix is “a model to perform a business portfolio analysis on the Strategic Business Units of a corporation” (http://www.valuebasedmanagement.net/methods_ge_mckinsey.html). One of the aims of portfolio analysis, which is important for this thesis, is to develop strategies for new products and business.

The GE / McKinsey Matrix is composed of two attributes:
1. Market attractiveness - includes a broad range of factors that can determine the attractiveness of an industry / market. This thesis considers the real estate market of distressed properties caused by natural disaster.
2. Competitive strength - includes a broad range of factors that can determine the competitive strength of a Strategic Position. In this thesis competitive strength considers one country in the previously described field which is taken to be Sri Lanka.

These two attributes are presented in the matrix which works with 3*3 grids. This allows certain amount sophisticated outcome possibilities.

An implementation of analysis using the GE / McKinsey Matrix could look like this:
“1. Specify drivers of each dimension. The corporation must carefully determine those factors that are important to its overall strategy
2. Weight drivers. The corporation must assign relative importance weights to the drivers
3. Score SBU’s each driver
4. Multiply weights times scores for each SBU
5. View resulting graph and interpret it
6. Perform a review/sensitivity analysis using adjusted other weights (there may be no consensus) and scores* (http://www.valuebasedmanagement.net/methods_ge_mckinsey.html).

Like every model there are some limitations on which it should be paid attention:
- Valuation of the realization of the various factors
- Aggregation of the indicators is difficult
- Core competencies are not represented
- Interactions between Strategic Business Units are not considered* (there may be no consensus) and scores* (http://www.valuebasedmanagement.net/methods_ge_mckinsey.html).

11.3 Factors of valorization
The key factors concerning this assessment are:

- Real Estate Value
- Standard GE matrix factors
- Environmental Risk
- Stakeholder’s Complexity

The real estate value is elaborated in one of the previous chapters. This element has the biggest impact on the decision what should be done. If the estimation of the real estate value in some area is low, the decision about the investment is rather to be a positive. The valorization of the value will be based on the modified decomposed trilogy value by Stephan Roulac presented in some of the previous chapter. But the inner valorization of the real estate value itself is not enough. An additional importance factor must be assigned to its original value in order to be measurable with other key elements. The Real Estate Value like a factor will be weighted 0.35 (35% importance of the final decision) for this purpose.

Like in every real estate the investment general indicator of growth are important. Information which indicate the growth and economical feasibility are gathered in the Standard GE matrix factors which are weighted by 0.3 (30% importance of the final decision).

The environment risk factor is going to be weighted 0.2 in order to be measurable with other key factors. This attribute is more important that the number of stakeholders but less important than the Real Estate Value. If there is a valid approximation of real estate value which indicate that area is on low development level without opportunities there is no point to go into the investigation of environmental risk. That is why this factor is less important and graded with lower factor.

The fourth attribute concerns stakeholder, in particular the number of stakeholders. The bigger the number is the more complicated will be the solution realization. For example, if one area is hit by natural disaster and followed by political instability the result will be a lot of stakeholders who are involved in finding the solution. That means that the solution is going to be reached with more difficulties. This attribute is graded with the lowest factor (0.15) because the solution will eventually come it is just the matter of time. Of course this is the matter of time in historical perspective which can be more than some person’s life.
All key factors must be valued in the range from 0 to 1 (it resembles the range from 0% to 100%) in order to be measurable among themselves. Every of the key factors will have a specific approximation and different way how to reach the qualitative indicators. It must be underlined that all approximations were performed by making assumptions based on the information provided in the Step 2 of this thesis, as well as information gathered in books, text, and internet sites cited in references.

Finally, these four factors will be explained in detail and elaborated in the form of described matrix.

**The McKinsey / General Electric Matrix Standard Factors**

The standard factors provide an overall picture of the market, particular product or, as in the context of this thesis, of the real estate distressed properties made by natural disaster - such as the case of Sri Lanka. The final diagram can be made just with its two initial factors for market attractiveness and competitive strength. But the more valid and broader picture can be captured by using additional factors mentioned in previous text. In the following table the initial drivers for the standard GE Matrix factor are presented:

<table>
<thead>
<tr>
<th>Typical (external) factors that affect Market Attractiveness:</th>
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<tbody>
<tr>
<td>Market size</td>
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<tr>
<td>Market growth rate</td>
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<td>Market profitability</td>
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<td>Pricing trends</td>
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<tr>
<td>Competitive intensity / rivalry</td>
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<td>Overall risk of returns in the industry</td>
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<td>Entry barriers</td>
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<td>Opportunity to differentiate products and services</td>
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<td>Demand variability</td>
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<td>Segmentation</td>
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<td>Distribution structure</td>
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<td>Technology development</td>
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<table>
<thead>
<tr>
<th>Typical (internal) factors that affect Competitive Strength of a Strategic Business Unit</th>
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<tbody>
<tr>
<td>Strength of assets and competencies</td>
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<tr>
<td>Relative brand strength (marketing)</td>
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<td>Market share</td>
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<td>Market share growth</td>
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<td>Customer loyalty</td>
</tr>
<tr>
<td>Relative cost position (cost structure compared with competitors)</td>
</tr>
<tr>
<td>Relative profit margins (compared to competitors)</td>
</tr>
<tr>
<td>Distribution strength and production capacity</td>
</tr>
<tr>
<td>Record of technological or other innovation</td>
</tr>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>Access to financial and other investment resources</td>
</tr>
<tr>
<td>Management strength</td>
</tr>
</tbody>
</table>

*Figure 1.1 - Standard GE Factors*

*Source: [http://www.ValueBasedManagement.net/articles_ge.mcKinsey.html](http://www.ValueBasedManagement.net/articles_ge.mcKinsey.html)*
The editing of these drivers was necessary to properly address the problem of the real estate investment in distressed properties. In the following table it is possible to see which one are considered as a crucial for this thesis. Beside this information, there are also given a score and weight of each driver and factor. At the bottom of this table there is a score range which indicates the qualitative importance of each driver and factor. The scores were considered as assumption, and because of that only the qualitative values can be given to each of them. For the quantity measures the broader research should be done on more scientific bases which understand a considerably longer process to collect and organize data.

GE Matrix - Modification for Distressed Real Estate Property after the Disasters

Factors (external) that affect Market Attractiveness:

<table>
<thead>
<tr>
<th>Standard GE Factors</th>
<th>Score</th>
<th>Weights</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market size</td>
<td>6</td>
<td>100%</td>
<td>6</td>
</tr>
<tr>
<td>Market growth rate</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market profitability</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive intensity / rivalry</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall risk of returns in the industry</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry barriers</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity to differentiate products and services</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand variability</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution structure</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology development</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factors (internal) that affect Competitive Strength of a Strategic Business Unit:

<table>
<thead>
<tr>
<th>Standard GE Factors</th>
<th>Score</th>
<th>Weights</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market share</td>
<td>6</td>
<td>30%</td>
<td>1.80</td>
</tr>
<tr>
<td>Market share growth</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative cost position (cost structure compared with competitors)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative profit margins (comparing to competitors)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution strength and production capacity</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record of technological or other innovation</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to financial and other investment resources</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management strength</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Score Range:
- 0.0 - 3.5 Low
- 3.5 - 7.0 Medium
- 7.0 - 10.0 High

In the following text the estimated valuation of the standard GE Matrix factors will be introduced. They are divided on the external and internal factors which dictate two main attributes market attractiveness and the competitive strength.
Standard factors (external) affect market attractiveness:

Market size is estimated with the score notably smaller than average (5). This estimation is based on the fact that the market size of the distressed properties affected by natural disaster is small comparing to the overall market of real estate, especially if it is known that the half of human wealth is located in real estate. The market size is scored with 3.

Market growth rate of the distressed properties under the natural disaster is augmenting. This is especially connected with the global warming trend. The conclusion is that this market grow rate is more than average and it is scored with 8.

Market profitability is slightly less than average scored with 4. This grade is accredited by the fact that in this kind of development lot of attention and at the same time priority is given to the social and environmental issue. These priorities make eventual investments in this type of properties slightly discouraging on the short run.

Competitive intensity / rivalry at this field of real estate are low. There are not so many individuals and organizations (except humanitarian and UN – bodies) who participate within this field. Therefore, this factor is scored by 9.

Overall risk of returns in the industry is quite high. This stays for all distressed properties but especially for those driven by natural disaster. This factor is scored by 4, a score less than average (5). This number is not smaller (ex. 3 or 2) because investments in these particular investments are not fully elaborated and there are some indications that those investments can be profitable as well (see more in conclusion).

Entry barriers are not extreme. The participants for now are well known humanitarian organizations and UN-bodies. These are very influence and big organizations. Still this field is not yet very much interesting for real estate developers. Regarding to these two facts, this factor is graded with 7.

Opportunity to differentiate products and services is significant. This stays especially because distressed properties caused by natural disaster can be found in any country and continent. This involves different approach because the natural and social environment can be extremely different. This causes different solutions and possibility for diversification of the products. This factor is scored with 8.

Demand variability is relatively constant especially in last decade. Tracing the occurrence of big natural disasters it can be concluded that every couple of years there is some major event. Considering this fact the demand for the eventual products is scored with 8. In addition, the demand for these products can be even bigger if we take in consideration that the same consequences on society and property can be produced by human-made disasters.

Distribution structures of products or houses, for example, which are mention to be located soon after the natural disaster is not an easy task. Usually infrastructure (mostly roads, electricity, water…) is also devastated during the natural phenomena. That is the reason why this factor is scored with 4.
Technology development is taken to be average, scored with 5. The reason for doing this is because natural disaster can occur anywhere. The regions and countries under the impact are in a wide range of society and technology development.

Standard factors (external) affect Competitive Strength of Strategic Business Unit:
This aspect of competitive strength considers the Sri Lanka, country recently hit by natural disaster. This makes this country valid for analysis. The factors are following:

Market share of Sri Lanka comparing to other countries (United States, China, Caribbean Countries, Africa) hit by natural disaster is small. This is the reason why this factor is scored with 4.

Market share growth is estimated to be average, or scored with 5. All countries which are more vulnerable to environmental risk are growing comparing to countries which are not vulnerable. This fact can be seen as the sign of the global warming threat. The global warming effect is present at the whole planet so the constant grow is equivalent to this fact.

Relative cost position (cost structure compared with competitors) are pretty average because the most vulnerable regions are also vulnerable within the economic aspect, except United States. Considering this cost are pretty much equal because of the similar economic situation. This stays for the Sri Lanka as well and it is scored with 5.

Relative profit margins (compared to competitors) in Sri Lanka are relatively higher than in other countries frequently hit by natural phenomena and with the similar economic situation. This particularity has a rout in the profitable tourist sector of commerce and industries like thee, rubber, and fish production. The profit margin of Sri Lanka is scored with 7.

Distribution strength and production capacity is estimated to be positive and scored with 7. Like ex colony rich with resources, the traffic was developed in order to fast transportation of goods. For the Sri Lanka it was not a heavy task comparing to railroad building in India, since the country is small. Also, like a kingdom on one island it always had developed trade routes with sea traffic. So, the distribution strength of this island country is relatively good. Production capacity is slightly more than average comparing the countries in the same field of real estate development because of the present building industries connected to the high developed tourist market. The overall score for these factors is 7.

Record of technological or other innovation is average comparing to the countries in the same field of real estate development (except United States). The score is 5.

Access to financial and other investment resource is estimated to be more than average and scored with 7. One reason is the popularity of this country like a tourist destination. Because of this some funding can be raised from the companies which are involved in this business. Secondly, the humanitarian organizations and UN- bodies are present as well.
Management strength is considerably higher because of the frequent foreign investments. This is the reason why this factor is scored by 8.

Real Estate value
The property's physical and location attributes are mixed into product that is called "real estate" (Location! Location! Location! What is Location? Thomas D. Pearson). But the physical attributes (soils, vegetation, and structures) of real estate are separate and distinct from the location attributes (travel distances and time, and neighborhood). For the needs of this part of research both the physical and location attributes are valid for analysis. This makes a decision valid for use expression “Real Estate Value”. Initially this remark from above mentioned author came from understanding and analyzing the first theorists of location. Since in their conclusions they did not make such a strong distinction between location and physical attributes, it is valuable to mention the most important ones.

Historical overview of location theory
The following historical overview is based on the writing of initial location theorists. First, Von Thunen and Weber line of classical location theory. Then, moving from traditional to applied theory, the ideas of three land economists, Hoover, Ratcliff, and Andrews.

Von Thunen described model in 1826 in which net income from agricultural production is entirely a function of transportation costs. Basic conclusions were: 1. location rent and transport costs are inversely related, 2. land-use intensity, and for this reason value as well, will increase toward the market, and 3. different agricultural crops will compete and be ordered according to the principle of highest economic rent.

Alfred Weber focused on the location of the manufacturing facility. Weber was concerned with the discovery of locations that would minimize raw-material-gathering and finished-product-distribution transportation costs. Weber’s theory is from the perspective of an entrepreneur seeking a site. But Weber provides valuable insights into the location problem because he demonstrates that transportation costs influence where a manufacturing facility will be located.

A series of spatial equilibrium models are developed in recent years which are based on Von Thunen theories. The main purpose of these models is to explain generalized land-use patterns in urban area. Within this, the most significant finding is that the land values are highest at the central business-district (CBD) and decline according to how far from the CBD they are.

Edgar M. Hoover introduces the concept of “transfer costs” and “processing costs”. Transfer costs are caused by the inconvenience inherent in accumulating materials at a production point and distributing products to distant consumers. Transfer costs are analogous to Weber’s transportation costs but extended the concept by including all infrastructures. Still perspective is than of an entrepreneur. Processing costs are a function of land, labor, and capital costs, and are incurred in the manufacture of a distributable product. The intensity of land use, therefore, is a function of geographic differences in land prices as well as other factor prices and their transfer costs.

Ratcliff propose that location produces convenience and exposure services that contribute to the productivity of the real estate. The critical distinction here is that Ratcliff’s offsite improvements are linkages that contribute to the
movement of goods, services, and people between geographically separate, but complementary, parcels of real estate; they contribute to a location's output of services. Movement convenience, for Ratcliff, is a function of the establishment, linkage, tributary area, and cost of friction. Exposure, the other location product, may be positive or negative. Positive takes two forms: prestige and aesthetic satisfaction. Negative is a product of "activities which are objectionable, inharmonious or incompatible".

Richard Andrews discussed the concept of situs developing three ideas of interest. The first is "movement to or from external uses" - route over which people, goods, services and information are transported. Next is a concept of "the environment of access" means that there are potential externality (or exposure) effects on transport routes. Finally, the site and its neighborhood, which is made up of several environments generate their own spillover effect.

Remarks on previous theories
As indicated in the text above the first location theory emerged in 1800s. There were shortcomings since that time. First, location theory tends to be transportation-oriented which means that it is not looking at the real estate parcel as the end product but like an intermediate product. From today's real estate perspective this statement is not valid. Second, traditional theorists focus attention on such end products as cars, shoes or it attempts to explain urban land-use patterns rather than view the spatial aspects of location enter into the product analysis as transportation costs and neighborhood effects. Also, transportation costs traditionally refer to surface costs such as auto, while costs for transporting water (infrastructure) are ignored. Third, as mentioned in introduction of this chapter the property's physical and location attributes are all mixed into product that is called "real estate".

Because of these differences, traditional location theory tends to be wrongly focused for real estate analysis purposes.

Property value
The final part of the thesis elementary factors is finding what makes some area more or less valuable. This issue can be approach with the understanding of the previous theorists of value. There are many approaches during the history, and like any other theories they are changing and developing non-stop. In order to give a swift and valid solution of this issue just the conclusions of the author of "Towards the Theory of Property Value" Stephen Roulac is presented.

The value of a real property is the function of three attributes - (1) utility, (2) brand and (3) beauty. Concerning these attributes the mantra of "location, location, location" is a less than articulate expression of what derives property appeal, value, and development potential (Towards a Theory of Property Value, Book V Property Markets, Place and Property Strategy - Stephen E. Roulac).

On a concept level, property value theoreticians proclaim that a property's value determined by its use, specifically what people will pay for the right to the use of the property. More specifically, still, value is defined to be the present worth of all future payments for that right to use that are expected to be realized from the valuation date into perpetuity.
The definition of property value regarding to Stephen Roulac states the following. Accesses to the resources of utility, brand and beauty, which are provided by property interest to support living, are paid for by rent. Rent, when reduced by operating expenses, vacancy and non-collection allowances and any other claims on the property's income results in cash flow. When cash flow is multiplied by an income multiplier it reflects property value.

Previously mentioned three ingredients are the explanatory factors as to why a property that appears very similar to another may command a very different rental rate or sales price. Implication of this can be seen on the example of the price of space in suite 2900 and suite 200. Concerning, first, the brand of upper floor addresses commands a higher rent price. In the context of beauty, the higher floor has superior views and vistas to what is available from the lower floor. The upper floors additionally offers enhanced utility like much more quite, often cleaner, more secure.

These three attributes can be look through the site, design, and constructional quality.

<table>
<thead>
<tr>
<th>Site</th>
<th>Brand</th>
<th>Beauty</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Properties with similar</td>
<td>Properties with similar</td>
<td>Properties with common</td>
</tr>
<tr>
<td></td>
<td>physical attributes have</td>
<td>physical dimensions and</td>
<td>outlooks and brand identity vary because</td>
</tr>
<tr>
<td></td>
<td>different prices because of</td>
<td>features, in same or similar</td>
<td>of their design, functionality, proximity</td>
</tr>
<tr>
<td></td>
<td>place brand premium.</td>
<td>communities may vary in the</td>
<td>and quality of resources and opportunity.</td>
</tr>
<tr>
<td>Design</td>
<td>Properties with and identified</td>
<td>Properties with superior</td>
<td>Superior setting of</td>
</tr>
<tr>
<td></td>
<td>brand architect command a</td>
<td>exterior and interior</td>
<td>improvements, flow inducing</td>
</tr>
<tr>
<td></td>
<td>premium price over those</td>
<td>appearance, functionality,</td>
<td>layout, and a spatial</td>
</tr>
<tr>
<td></td>
<td>lacking that distinction.</td>
<td>and landscaping command</td>
<td>relationship command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>premiums over properties</td>
<td>property premium values over properties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>that are otherwise similar.</td>
<td>with comparable beauty and brand attributes.</td>
</tr>
<tr>
<td>Construction</td>
<td>Properties with an identified</td>
<td>Properties with superior</td>
<td>Properties superior</td>
</tr>
<tr>
<td>Quality</td>
<td>brand builder command a</td>
<td>craftsmanship and attention</td>
<td>durability, solidness, and structural</td>
</tr>
<tr>
<td></td>
<td>premium price over those</td>
<td>to detail command premiums</td>
<td>integrity, command premiums over properties</td>
</tr>
<tr>
<td></td>
<td>lacking that distinction.</td>
<td>over properties whose brand</td>
<td>with properties with similar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and utility attributes are</td>
<td>brand and beauty attributes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>comparable.</td>
<td></td>
</tr>
</tbody>
</table>

A property's value can be "decomposed" into its component ingredients of brand, beauty and utility, in aggregate, and the subcomponents of each of these three value elements. Such an approach can yield powerful insights into the comprehension of the sources of property value. In application, this decomposition provides the foundation for implementing property valuation. One approach to the decomposition of property value elements appear in following table done by Stephan Roulac.

<table>
<thead>
<tr>
<th>Country</th>
<th>State</th>
<th>Region</th>
<th>Metro</th>
<th>Community</th>
<th>Neighborhood</th>
<th>Street</th>
<th>Building</th>
<th>Architect</th>
</tr>
</thead>
</table>

Figure 11.3 - Brand-Beauty-Utility reflected in Site-Design-Construction quality
Source: Stephen Roulac 2001
Every property reflects to some degree the value of components identified in previous table. That degree might be strongly positive, strongly negative, varying ranges in between, or even nominal/neutral. By comprehending what is important to a purchaser, more informed decisions can be made about development, improvement, building, merchandising, and evaluation of property interests.

Since the needs of this thesis are not a valuation of property itself but the value of a bigger area, some modification will be introduced.

As it was stated, the Real Estate value will be based on the Decomposed Property Value Trilogy done by Stephan Roulac. Since it was initially made for the single property some modifications must be made to be compatible with the bigger land area of the research.

In order to make proper valorization each driver was scored and the weight was multiplied with the average scored number of each driver within the three main components (Brand, Beauty, and Utility). They are weighted with the percentage which signifies the importance for the final decision. The most weight gained a beauty component. This conclusion is founded in the fact that more important is the natural landscape than some designer’s thought about how some place should look like. To this it is possible to add that the human made urban and functional designs are still easier to change than the natural environment and at the same time they are more valuable. This is the reason why the “beauty” is weighted with 45%. In comparison with “Brand” and “Utility” the weight measures are in the proportion 35 : 20. Generally, utility with its drivers is harder to change than the brand of some place. For the country itself it is may not be like that, especially when this branding start to be part of every day life. But still in overall conclusion about this proportion the utility have more importance in this estimation.
The following table presents score of each driver correspondent to the region of Sri Lanka.

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
<th>Weight</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand</td>
<td>7</td>
<td>20%</td>
<td>1.4</td>
</tr>
<tr>
<td>Country</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metro</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architect</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Builder</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape Designer</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Components</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beauty</th>
<th>Score</th>
<th>Weight</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvements - Infrastructure</td>
<td>8</td>
<td>45%</td>
<td>3.6</td>
</tr>
<tr>
<td>Site - Natural Features, Landscapes</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Views/Vistas</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utility</th>
<th>Score</th>
<th>Weight</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Design</td>
<td>7</td>
<td>35%</td>
<td>2.45</td>
</tr>
<tr>
<td>Urban Functionality</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Quality</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity and Quality of Resources</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Score Range:
- 0.0 - 3.5 Low
- 3.5 - 7.0 Medium
- 7.0 - 10.0 High

These valuations are approximations concluded by observing the contemporary condition through different sources, which are indicated in reference list. All of three elements of decomposing value will be elaborated with the conclusion for each sub element.

Brand
Country's brand is regarded as strongly positive since it is a known tourist destination in the last decade. This makes it valid to be estimated like that. Observed region is the neighboring area of the capital Colombo. Comparing to the other regions this one is the most developed and represent the center of this island country. The capital Colombo is the biggest city in this state with the projections of 1,000,000 inhabitants for the year 2010. At the same time this is
the only metropolitan area. Because of its uniqueness it is graded as strongly positive estimated value. In additional to this conclusion is the fact that it is a constant tourist destination, with more and more foreign organizations and investors present at this market. Conclusions about architects, builders, landscape designers, and building components can be provided with the same arguments. Whole region is dominantly design, built by domestic contractors. The level of their work is satisfying. But the strongly positive evaluation remains just for world know brand is in this field.

Beauty
Improvements of infrastructure are satisfying so their estimated status is neutral. For the site, in this case a region around the capital is rich in natural features and landscapes. This makes it strongly positive estimated. The same is for view and vistas.

Utility
Urban design, urban functionality and structural quality are satisfying. They are estimated like a neutral. Accesses are strong. Like every island country, Sri Lanka has developed sea traffic, airport is present and because the island is relatively small the distance within the island are easily traveled. Also, access to resources which are not present in the island can be reach by neighboring India without big transportation expanses. Proximity and quality of resources are regarded as strongly positive. The main sources are tourism and fishery. Both of them can be easily reached. The connection of property to economic opportunity is also regarded as strongly positive. This was concluded by characteristics of national economy and by the foreign willingness for investment.

Environment risk
Environmental risk can be traced with more or less sophisticated methods. Here the latest one will be presented and explained.

Multiple Risk Integration
A way to calculate a risk concerning the all environment of some area can be done by Multiple Risk Integration, a tool presented in the global report: reducing Disaster Risk Challenge for Development done by United Nations Development Program. A multiple-hazard risk model was made by adding expected deaths from each hazard type for every country. A value of 'no data' states that countries without significant exposure were replaced by zero risk of deaths. The countries are regarded as not affected if a physical exposure is smaller than 2 percent of the national population and an affected population is smaller than 1,000 per year.

A Boolean process was run to allocate one of five statistically defined categories of multi-hazard risk to each country.
Multiple risk was computed using the succession of formulae as described in following equation.

\[
K_{\text{cyc}}(\text{PhExp}_{\text{cyclone}} \cdot \text{PHD}^{1.96} \cdot e^{-t_{55}}) + K_{\text{flood}}(\text{PhExp}_{\text{flood}} \cdot \text{GDP}_{\text{cap}}^{0.45} \cdot D^{0.75} \cdot e^{-5.22}) + \\
K_{\text{earthquakes}}(\text{PhExp}_{\text{earthquakes}} \cdot U_{g}^{12.27} \cdot e^{-16.27}) + K_{\text{drought}}(\text{PhExp}_{\text{drought}} \cdot W_{\text{TOT}}^{2.5} \cdot e^{-14.4})
\]

Where
- \( e \) is the Euler constant (\( e \approx 2.718 \))
- \( \text{PhExp} \) is the physical exposure of selected hazard
- \( \text{HDI} \) is the Human Development Index
- \( \text{GDP}_{\text{cap}} \) is the Gross Domestic Product per capita at purchasing power parity
- \( D \) is the local density (density of population in the flooded area)
- \( U_{g} \) is the Urban growth (computed over three-year period)
- \( W_{\text{TOT}} \) is the access to safe drinking water

Figure 11.6 – Computation of multiple risk
Source: UNDP 2004: Reducing disaster risk: a challenge for development

"In order to examine the fit between model multi-hazard risk and recorded deaths, data from both sources were categorized into five country risk classes. A cluster analysis minimizing the intra-class distance and maximizing the inter-classes (K-means clustering method) was performed. This meant that a purely statistical process had been..."
used to identify severities of risk from the model and deaths as recorded by EM-DAT. In order to take both risk indicators (killed and killed per inhabitant) into account, a Principal Component Analysis (PCA) was performed to combine the two. Then a distinction was made between countries smaller than 30,000 km squared and with population density higher than 100 inhabitants per km squared." (Global report: reducing Disaster Risk Challenge for Development done by United Nations Development Program)

"So far, the precision and quality of the data as well as the sensitivity of the Multiple Risk Integration model do not allow the ranking of countries for disaster risk". (Global report: Reducing Disaster Risk Challenge for Development done by United Nations Development Program)

Because of this statement by the authors of this program the only way to approximately value the risk is to use of Disaster Risk Index which is initial calculation of the Multiple Risk Integration.

Disaster Risk Index
The DRI (Disaster Risk Index) is a statistically robust tool with a high level of confidence. It provides the first, solid statistical base for understanding and comparing countries' disaster risk and human vulnerability. The risk maps provided in the Global Report research allow a comparison of relative risk between countries, but cannot be used to depict actual risk for any one country. Also, extraordinary events by their very nature do not follow the normal trend. This is due to the abnormal intensity of such events. Recent examples are: Hurricane Katrina 2005, Asian Tsunami 2004.

The DRI enables the calculation of the average risk of death per country in large- and medium-scale disasters associated with earthquakes, tropical cyclones and floods, based on data from 1980 to 2000. It also enables the identification of a number of socio-economic and environmental variables that are correlated with risk to death and which may point to causal processes of disaster risk.

In the DRI, countries are indexed for each hazard type according to their degree of physical exposure, their degree of relative vulnerability and their degree of risk.

The Disaster Risk Index (DRI) Analysis Tool measures the relative vulnerability of countries to three key natural hazards — earthquake, tropical cyclone and flood. Also, it identifies development factors that contribute to risk, and shows in quantitative terms, just how the effects of disasters can be either reduced or exacerbated by policy choices. This is done by using data from 1980 to 2000. The development of this program was in the best interest of making a tool that will both help generate renewed interest in this critical development issue and help bring together stakeholders around more careful and coherent planning to mitigate the impact of future disasters. More information is available at: http://www.undp.org/bcpr/disred/english/wedo/rrt/dri.htm

The following's are example for the Sri Lanka which is going to be elaborated as a case study to overall research of this thesis. The following Information can be reached at this internet site: http://gridca.grid.unep.ch/undp/cntry_profile.php
Sri Lanka

1. Disaster Risk Index
Casualties from four hazards (CRED) [killed/year] 27.9
Relative casualties from four hazards (CRED) [killed/mio. inh./year] 1.7
Population [inh.] 16786871

2. Vulnerability
Human Development Index 0.69
GDP PPP per capita [$/inh.] 2142.4
Improved access to water supply [% of population] 74.5
Urban population growth rate [% per year] 1.6
Arable land [% of land area] 29.2
Population density in flooded areas [inh./sqkm] 290.3

3. Descriptive Figures per Disaster Types

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Casualties</th>
<th>Physical exposure</th>
<th>Relative vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Droughts</td>
<td>0.29</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Earthquakes</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Floods</td>
<td>1.29</td>
<td>27.6</td>
<td>0.06</td>
</tr>
<tr>
<td>Tropical Cyclones</td>
<td>0.10</td>
<td>0.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>


Figure 1.8 – Sri Lanka disaster risk index and vulnerability
Source: UNDP 2007
After understanding the tools which can be used for assessment of the environmental risk the next step should provide information about how to evaluate these data. The biggest problem about this evaluation is non existence of country’s risk rang list. Or it is also possible to say that there is no comparison until now. Because of the necessity of valuation some approximations were made. In the DRI graph it is indicated that Sri Lanka is most vulnerable considering floods. The approximation of risk is made by comparing vulnerability of floods with the most vulnerable flood area in the world, which are listed on the right side of the graphic. Comparing to them the Sri Lanka stands relatively low but in the upper half comparing to all countries in the world. On the other hand, the rest of the environment threats are low. Because of these indications environmental risk for Sri Lanka is scored with 6, which means that it is slightly above average all around the world. In this statement it is also the fact of recent exposure to the tsunami impact in 2004. More precise valuating of the risk is possible just in the case when there is present world environment rang list. Until then the approximation is the only tool.

Stakeholder’s complexity

Stakeholder complexity is pretty much easy to elaborate on the concept level like it is going to be used in this thesis. Previously, in the Chapter 5, the all possible stakeholders are presented. The logic of making a valorization of the complexity is simple. The bigger the number of stakeholders the more complex problem is and it is harder to find the
overall satisfying solution. Unfortunately, on the other hand, only way to make a real progress is to involve as many as possible participants or stakeholders. This is the only proof that the project will be endurance and valid. The most positive or the easiest solution is when there are no participants. This is only possible if the problem does not exist. In order to measure the overall stakeholder complexity two main attributes were identified: Stake and Influence. Each of stakeholders has these two elements less or more present. But not each one of stakeholders has the same importance expressed through these two elements, especially when all of them are present at some developing region. By realizing the amount of the most important stakeholders, the complexity can be higher or lower. It is even better to said that by realizing that it is possible to get more realistic picture or map. To do that it is necessary to make proper stakeholder analysis for the specific region (Sri Lanka) and market (distressed properties by natural disaster) by using indication which is given in the Chapter 5 presented in the Influence – Interest matrix used for mapping. Considering this matrix, stakeholders can have a high or low stake, as well as influence.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Stake</th>
<th>Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Displaced and local population</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2. Community-based organizations (CBO)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>3. Host governments</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4. Police and military</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>5. Local non-government org. (LNGO)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>6. Coordinators</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>7. Specialists</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>8. Other sectors of response</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>9. Development workers</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>10. Suppliers / Contractors</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>11. Media</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>12. Donors</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>13. United nation bodies</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>14. International non-government org. (NGO)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>15. Peace keeping forces</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Explanations of the previous stakeholders attributes are going to be elaborated in the following text.

Displaced and local population present the part of the stakeholder's part which is dominating by number during the period of resettling. On the other hand their influence cannot be countable. They are in a poor condition and they cannot react directly just through the other stakeholders.

Community-based organizations (CBO) unfortunately do not have either high stake or high influence. The engaging displaced populations into these organizations bring a solution much more to the end. But this action requires highly organized state apparatus in two terms. To provoke people to be engage and that the realization could be derived. This is not a case at the Sri Lanka. The same reason stays for the influence of CBOs.

Host governments in the previous matrix are indicated that their level of stake is high as well as their influence. Their stake hold in organization is one of the key factors. The displaced population is mostly relying on the host
governments and expects some results which make them really important. The host government influence can be positive or negative. It depends on their different sources. In both case it is regarded as highly influential.

Police and military are executives concerning the whole state apparatus in every political system during the disaster period. This means that all decision during the natural but as well human-made disasters goes through this stakeholder. The level of the field and organizational skills are crucial in preventing tragic disaster impact. This makes it highly regarded concerning stake and influence.

Local non-government organizations (LNGO) are not dispersed in the Sri Lanka. This is the reason why its stake is regarded as low. There influence is low as well first because of their existence and secondly because they can not provide a crucial resources.

Coordinators, comparing to the other stakeholders do not have a high level of stake. On the other hand their influence is significant. The coordination between stakeholders is essential, especially when the big number of them is present.

Specialists like coordinators do not have a high level of stake comparing to the other stakeholders. But uniqueness of their specialization and the high product which they can provide makes them very valuable for finding the proper and quick solutions considering displaced population. It can be concluded that their influence is high.

Other sectors of response are not on the “map” of Sri Lanka. It considers some specific stakeholders which can influence the people during the period of natural disaster.

Development workers are mainly individuals working for the consultancy groups or some other type of organizations. Their stake is low comparing to the other stakeholders. Their work can be from different aspects: social, industrial, health, environmental, and regarding to this thesis real estate. In any of these cases but even more regarding all of them together, the concept of development is crucial for recovering region sustainability. Considering this fact the influence is high.

Suppliers / Contractors do not have a high level of stake. On the other hand, their importance and at the same time influence can be essential. They are providing necessary resources by supplying as well building in this particular case. The speed of supply and the speed of contractor’s production as well as their quality can have a considerable impact on how one problem is going to be solved. This make stakeholder highly influence.

Media, as well is not a high level stakeholder in this subject. Despite that it can be very influence in some cases but not in this particular example. Media can be used to start the propaganda to activate all other stakeholder but it do not have an influence on making decisions within good developed organizations since they have their own tools and sources of information.

Donors / There are not so many donors and comparing to the other stakeholders they are not in majority. But, their influence is crucial.
United nation bodies were deeply involved in redevelopment of Sri Lanka after the tsunami impact in 2004. They were involved from the concept through execution of several redevelopment programs. This makes them high level stakeholders. Also, their influence by their projects is essential to development as well.

International non-government organizations (NGO) were not so dominate specially comparing to UN bodies. On the other hand their influence is also significant which can be seen by the housing redevelopment programs of several of them.

Peace keeping forces fortunately not present at moment of natural disaster. But in recent history of Sri Lanka there were tension between two leading parties. Natural disaster can provoke even more tens atmosphere which can have necessity for the peace keeping forces involvement. Influence, as well is not essential.

After elaborating all stakeholders it is possible to make a map of their importance. Here it can be seen more sophisticated diversification and the relation amongst different stakeholder's importance. This map is presented in the following figure.

By looking to this map it is easy to conclude that the complexity of stakeholders is medium. The most of the stakeholders are in the 2nd and 3rd quadrant. These stakeholders have either low influence and high stake or reverse and they are the most numerous. Because of these facts the overall estimation of complexity is scored by 6. This provisional number is necessary in order to make the estimation of this factor adaptable and measurable with the other factors.
11.4 Conclusion

In conclusion of this chapter, the results from all factors will be gathered and put in unifying table. All segments of this table are previously explained. This stands for the score of each driver and its weight which leads to the level of factor's importance.

**GE Matrix - Modification for Distressed Real Estate Property by Natural Disasters**

Factors (external) that affect Market Attractiveness:

<table>
<thead>
<tr>
<th>Score</th>
<th>Weights</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard GE Factors</td>
<td>6</td>
<td>100%</td>
</tr>
</tbody>
</table>

Factors (internal) that affect Competitive Strength of a Strategic Business Unit:

<table>
<thead>
<tr>
<th>Score</th>
<th>Weights</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate Value</td>
<td>8</td>
<td>35%</td>
</tr>
<tr>
<td>Standard GE Factors</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>Environmental Risk</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>Stakeholder's Complexity</td>
<td>6</td>
<td>15%</td>
</tr>
</tbody>
</table>

Score Range:
- 0.0 - 3.5 Low
- 3.5 - 7.0 Medium
- 7.0 - 10.0 High

The following graph presents the final outlook of the GE Matrix where the previous factor's score are translated into the qualitative values. This matrix performs relatively positive incentives for investments. This is just an overlook and more detailed research should be done in future in order to reach final investment decision.
Chapter 12 - Redevelopment options

12.1 Introduction
After making a positive decision to invest in some distressed properties caused by natural disaster, the next step will be the choice of redevelopment. Redevelopment of some area concerns a vast range of different issues from social redevelopment, construction development and even to the branding of some specific area. All these parts of redevelopment are interrelated, but the most attention will be put on construction redevelopment. Without this part of redevelopment there is a small chance that some overall changes will occur. This is the reason why the structural redevelopment has the prior importance in this thesis.

This chapter is going to be elaborated just on the conceptual level and further research is needed to make a final decision about the choice of redevelopment options. This chapter will be based on the background information on the possible technologies for transitional settlements which are presented in Chapter 8 and Real Estate Value (Chapter 11). The concept is that the choice of redevelopment is going to be selected by comparing the existing Real Estate Value and the new value gained by implementing some of the possible technology solutions. The relationship between the technologies and land value is going to be elaborated by the tool "Decision Making Tree". For the full understanding of the relation between certain type of technology and equivalent gain land value, further research must be conducted. To do that all the technology market prices and professional appraisal estimation for certain area are needed. In addition to the complexity of this task, technologies among themselves are quite different and a model for their comparison is also required.

12.2 Decision tree analysis
Decision Trees are tools which are helping to choose between several courses of action. They provide a highly effective structure within which is possible to lay out options and investigate the possible outcomes of choosing those options. They also help to form a balanced picture of the risks and rewards associated with each possible course of action.

There are five steps in the process of making a decision tree. These are:

- Drawing a tree
- Evaluating decision tree
- Calculating tree values
- Calculating the Value of Uncertain Outcome Nodes
- Calculating the Value of Decision Nodes (http://www.mindtools.com/dectree.html)

The explanation about the whole analysis by these five steps can be seen in appendix. Not all of these steps are elaborated in this thesis because of insufficient information. In the following subchapter the tree drawing will be presented with some additional information regarding the missing data which can help to complete this analysis.
12.3 Decision tree analysis implication on redevelopment options after natural disasters

In the following figure, DTA will be used to picture the possible redevelopment options for the settlements after the natural disasters impact.

Figure 12.3 – DTA implication on redevelopment options after natural disaster
In order to understand the previous figure, the design of picture will be explained. The small square symbol is marking all decisions which are followed by another decision. The other symbol, a small circle, refers to the decision with uncertain outcome. At the end, lines which are connecting nodes are decisions which should be made. On every line it is possible to read one decision.

Once the design is explained, the construction of the figure will be explained. The initial node is a period in time when a decision on a settlement redevelopment has to be made. If it is previously estimated (see chapter 11) that it is valid to make a development project, there are two possible solutions after a disaster. The first one is to built a new settlement and the other option is to make a reconstruction. Both of these decisions are followed by questions what kind of plan is more appropriate, thorough or rapid redevelopment. In the next phase of decision making process all possible technologies will be introduced. Different kind of technology products has different attributes and the one which is marked in this analysis is their building speed (see chapter 8). This attribute dictates if the product could be classified in fast or thorough development process. Last phase of this analysis is their impact on the land value and existing property value. Every product will have at list slightly different impact with uncertain outcome. These decisions are marked as small circles.

**Evaluating Decision Tree**

After description of the decision tree drawing, next phase is to evaluate it. At this stage it is not possible to conduct analysis because of insufficient data. In the last phase, uncertainties about a new land or property value should be investigated. For that, professional appraisal estimation is needed because of two reasons. The first reason is the estimation of the value of land or property before intervention. Secondly the estimation in cash value for each type of product is needed as well. Only with these two data, it is possible to estimate in a cash value the real estate market reaction on some product.

Next thing is to look at each circle (representing an uncertainty point) and estimate the probability of each outcome. The total must come to 100% at each circle. If there are no data on past events it is not possible to make rigorous estimates of the probabilities and the only option is the best guess. The best guess estimation is probably going to be used since this kind of analysis for this topic is new. Anyway without previous estimation this assessment is also not doable.

**Steps 3, 4 and 5**

The next steps are not elaborated due to the lack of data. Explanation of all other steps is described in appendix. Briefly, the main point is to multiply the possible outcome with cash value starting from right to left. Each uncertainty node is going to have its own value. From this value the market price of product (data missing because of a big number of different products and even more different market prices) is going to be subtracted and this will give a value of certain decision. The decision with the highest value is going to be selected.
12.4 Summary

This chapter gives some insights in which way the redevelopment should be conducted. The used tool is the Decision Tree Analysis (DTA). There are two weak points in application of this method. The first - there is a lack of data. In further research these data can be found or created with additional time and effort. The second - the initial decision, the reason for a new or rebuilt settlement is regarded just through the efficiency of the various products. More proper estimation for the same decision should involved political, historical, cultural and environmental issues. For these attributes a different method then DTA might be more appropriate. Although, in this thesis I found more appropriate the orientation towards existing and new market products because without a built environment it is hardly possible that any of mentioned attributes can dictate a development of a certain place by itself. The part of DTA in this thesis is finished at conceptual level. But even this step of research gives a lot of information about the potential redevelopment of places hit by a natural disaster.
Step 5 • Results
Chapter 13 • Conclusion

13.1 Introduction
This chapter will provide insights about what are the possible implication and limitations of this thesis and what could be the areas of the further interest.

13.2 Implications
The accent of this thesis is on the real estate approach and the most significant implication of this work can be accomplished in the real estate development field. This stands primarily for the areas with high vulnerability towards the natural impact. All used methods (System Diagrams, GE Matrix and Decision Tree Analysis) and theoretical backgrounds (temporary occupancy, real estate value) are interpreted to fit into the research area of the natural disaster.

Another implication is in the field of disaster management preparedness. This phase of pre-disaster management secures that one area can deal with the natural disaster impact. The thesis provides information about how the overall process is conducted up to now. This is basically the principal way how host governments, United Nation bodies and humanitarian organizations are dealing nowadays with this problem. This was the initial point of the research in managing displaced population. The insight in this field shows some deficiency in already mentioned approach, while opening discussion about significance of the real estate approach.

In this thesis there is a large amount of information about the available products on the market which can be used in the purpose of settling displaced population. They are all elaborated and their basic attributes are shown. By understanding their attributes and having in mind the picture of the overall development problems, it is at the same time possible to see their positive and negative effects. This gained knowledge can be used in development of new units for displaced population.

13.3 Limitations
In further researches more methods and deeper insight than presented here should be applied in order to get more accurate information. Methods which are used in this study are mainly based on the business planning. These tools are used because they are easy to deal with and especially because they are providing results in a short notice. Still there is a lack of a more scientific approach. To upgrade this research it is possible to use a method like cladistic, represented in cladogram. This approach can provide a detailed overall picture and explains the connections and all other attributes of a potential product. There are already some insights about connection between this approach and real estate which makes it valid to use them.

In further researches more data should be collected and collaboration with professional appraisers and government officials would be necessary.
13.3 Areas of further interest

First of all, it is important to note that a temporary settlement could emerge under different circumstances and not only because of a natural disaster which is the topic of this thesis. Besides natural disasters, there are also circumstances like man-made disasters, military intervention bases, humanitarian rescue missions, scientific research missions, construction company building sites outside urbanized areas, commercial happenings - fairs. All of them have different grounds which influences the entire process of making a final product for each of them.

Considering the investments in real estate, the highest risks lay in areas vulnerable to natural disasters. The concept of this thesis is to pay attention on high risk profile settlements and then to implement the knowledge and to use the methods (System Diagrams, GE Matrix and Decision Tree Analysis) on low risk settlements, other than properties hit by disasters. If these tools are working in complex situations, they will work on easier ones as well. This is the reason why this thesis has studied the particular case of natural disasters in settlements. In a relation to other circumstances, further research is needed.

The characteristics of areas affected by natural disasters are easy to understand through pictures broadcasted in media on daily basis. While writing this research, hurricane "Dean" hit the coastlines of the Caribbean Sea. The scenes after natural disasters are terrifying. People start to leave in non-healthy environments, often in half-ruined buildings, infrastructures are usually devastated, the supply chains are interrupted, etc. But is this happening only in natural disasters? In 2005, there was one billion people who lived in slums and the projections for 2020 are augmenting to 1.5 billion people (UN Habitat 2005). Most of them spend their lives in precarious environments similar to those affected by a natural disaster. This means that similar techniques could be used for addressing this kind of problems as well.
Appendix

Description of natural disasters

Avalanche
An avalanche is a slippage of built-up snow down an incline, possibly mixed with ice, rock, soil or plant life in what is called a debris avalanche. Avalanches are categorized as either slab or powder avalanches. Avalanches are a major danger in mountainous areas during winter.

Cold
Extreme cold snaps are hazardous to humans and their livestock. A 2003 Mongolian cold snap, locally known as a dzud, killed almost 30,000 livestock.

Drought
A drought is a long-lasting weather pattern consisting of dry conditions with very little or no precipitation. During this period, food and water supplies can run low, and other conditions, such as famine, can result. Droughts can last for several years and are particularly damaging in areas in which the residents depend on agriculture for survival. The Dust Bowl of the 1930s is a famous example of a drought.

Earthquake
An earthquake is a sudden shift or movement in the tectonic plate in the Earth's crust. On the surface, this is manifested by shaking of the ground, and can be massively damaging to poorly built structures. Earthquakes occur along geologic fault lines, and are unpredictable. Single earthquakes have killed hundreds of thousands of people, such as in 1976 Tangshan earthquake, the 1906 San Francisco earthquake, the 1964 Good Friday Earthquake that hit Anchorage, Alaska, and the 2004 Indian Ocean earthquake.

Epidemics
A disease becomes a disaster when it spreads in a pandemic or epidemic as a massive outbreak of an infectious agent. Disease is historically the most lethal natural disaster with examples like the Spanish flu, Black Death, smallpox, and AIDS.

Famine
Famine, or food insecurity, is characterized by a widespread lack of food in a region, and can be characterized as a lack of agriculture foodstuffs, a lack of livestock, or a general lack of all foodstuffs required for basic nutrition. Famine is almost always caused by pre-existing conditions, such as drought, but its effects may be exacerbated by social factors, such as conflicts. Particularly devastating examples include the Ethiopian famine, which lasted for many years, and the Irish Potato Famine.

Fire
Bush fires, forest fires and mine fires are generally started by lightning, but also by human negligence or arson. They can burn thousands of square kilometers. If a fire intensifies enough to produce its own winds
and "weather", it will form into a firestorm. A good example of a mine fire is the one near Centralia, Pennsylvania: started in 1962, it ruined the town and continues to burn today. Some of the biggest city-related fires are The Great Chicago Fire and The Great Fire of London in 1666.

Flood
A flood is caused by excess water in a location, usually due to rain from a storm or thunderstorm, or the rapid melting of snow. Other causes can include flooding from water displacement, such as in a landslide, the failure of a dam, an earthquake-induced tsunami, a hurricane's storm surge, or melt water from volcanic activity. The 1991 Bangladesh cyclone caused massive floods that covered almost three quarters of the nation and left behind a situation of disease and famine. An example of a human-made flood is the one caused by the building of the Vajont Dam in northern Italy in the 1960s; a landslide into the reservoir sent a wave over the dam's crest and into the densely populated valley below.

Hail
A hailstorm occurs when a thunderstorm produces a large amount of hailstones. Hailstorms can be especially devastating to farm fields, ruining crops and damaging farming equipment. The largest recorded hailstones were the size of grapefruits.

Heat
A heat wave is a hazard characterized by extreme heat in an unexpected area. Heat waves are worsened by temperature inversions, katabatic winds, and other phenomena. The worst heat wave in recent history was the European Heat Wave of 2003, which struck Western and Southern Europe.

Landslide
A landslide is caused when soil, rocks, trees, structures and other items on slope comes into motion. Landslides can be initiated by earthquakes, volcanic eruptions, or by general instability in the surrounding land caused by deforestation or lack of porous soil. Mudslide, rockslide, and lahars are particular types of landslides. Mudslides, or mud flows is the result of heavy rainfall causing loose soil on steep terrain to collapse and slide. Rockslide is the result of loose rocks and boulders coming into motion. The deadliest recorded landslide occurred in 1985 in Armero, Colombia, when a volcanic eruption caused snow melt to pile up and destroy the town below, killing over 25,000 people.

Limnic eruption
A limnic eruption is a sudden release of asphyxiating or inflammable gas from a lake. Three lakes that are examples of limnic eruptions include Lake Nyos, Lake Monoun, and Lake Kivu. A 1986 limnic eruption of 1.6 million tones of CO₂ from Lake Nyos suffocated 1,800 people in a 20 mile radius.

Sinkhole
A sinkhole is a localized depression in the surface terrain, usually caused by the collapse of a subterranean structure, such as a cave. Although rare, large sinkholes that develop suddenly in populated areas can lead to the collapse of buildings and other structures. Florida experiences the majority of America's severe sinkholes.
Solar flare
A solar flare is a violent explosion in the Sun’s atmosphere. Solar flares take place in the solar corona and chromospheres. They produce electromagnetic radiation across the spectrum at all wavelengths. Solar flare emissions are a danger to orbiting satellites, manned space missions, communications systems, and power grid systems. It is expected that the next extreme solar storm may occur in the year 2011. [1]

Storm surge
A storm surge is an onshore rush of water associated with a low pressure weather system, typically a tropical cyclone. A storm surge is caused primarily by high winds pushing on the ocean’s surface. The wind causes the water to pile up higher than the ordinary sea level. Storm surges are particularly damaging when they occur at the time of a high tide, combining the effects of the surge and the tide. The highest storm surge ever recorded was produced by the 1899 Bathurst Bay Hurricane, which caused a 13 m (43 feet) storm surge to pummel the small Australian town. In the US, the greatest recorded storm surge was generated by Hurricane Katrina, which produced a storm surge of 9 m (30 feet) that slammed against the Gulf Coast.

Thunderstorm
A thunderstorm is a form of severe weather characterized by the presence of lightning and thunder, often accompanied by copious rainfall, hail and on occasion snowfall and tornadoes. Thunderstorms can happen anywhere.

Tornado
A tornado is a natural disaster resulting from a thunderstorm of severe conditions, and is a large funnel of extremely high pressure winds cycling and twisting at random. Tornadoes are measured in power according to the Fujita scale: an F1 being the least powerful and an F5 being the most powerful. Though normally within the American Midwest in a region known as "Tornado Alley", tornadoes can occur almost anywhere. Tornadoes can occur one at a time, or can occur in large tornado outbreaks along a squall line. The most powerful tornado ever recorded in terms of wind speed was the monster which swept through Moore, Oklahoma in 1999 and reached wind speeds of up to 318 mph, one mile below the maximum F5 speed ever considered. Tornadoes do not just stay within rural regions of the world: major cities have had small yet terrifying tornadoes touch down in their downtown sectors before, such as the 1997 waterspout in Miami, Florida, the small twister which touched down in Salt Lake City, Utah in 1999, and a 2001 tornado hitting Birmingham in the United Kingdom.

Tropical cyclones
A tropical cyclone is a low-pressure cyclonic storm system. It is caused by evaporated water which comes off of the ocean and becomes a storm. The Coriolis effect causes the storms to spin, and a cyclone is declared when this spinning mass of storms attains a wind speed greater
than 74 mph. Cyclones are known as hurricanes in the Americas and typhoons in eastern Asia. One of the most
damaging hurricanes in the United States was Hurricane Katrina, which hit the United States Gulf Coast in 2005 and
inundated a heavily populated New Orleans, Louisiana. Cyclones can lead to disasters when they make landfall.
Once above land they are reduced in intensity and die out.

Tsunami
A tsunami is a giant wave of water which rolls into the shore of an area with heights that can be anywhere from 15
feet to even 50 feet in height. It comes from Japanese language meaning "harbor wave". Tsunamis are caused by
undersea earthquakes or landslides, and are not noticed until reaching the shore, where the wave lifts from the
rising sea floor. In the 1950s an earthquake in Lituya Bay, Alaska caused a massive landslide to fall into the bay's
rear, forming the highest recorded wave in history when the wave passed through the bay's head: over 1720 feet in
height. Only two people were killed. The tsunami generated by the 2004 Indian Ocean Earthquake currently ranks
as the deadliest tsunami in recorded history. The tsunami was caused by a 9.2 Richter earthquake caused by a
massive shift in pressure between two plates near Sumatra. Currently, the Cascadia Fault along the Northwest
coast of the Americas is experiencing the same amount of extreme pressure and may have the same outcome in
the near future: a tsunami threatening coastal cities such as Vancouver and Seattle.

Volcanic eruption
A volcanic eruption is the point in which a volcano is active and releases its power, and the
eruptions come in many forms. They range from daily small eruptions which occur in places like
Kilauea in Hawaii, or extremely infrequent super volcano eruptions in places like Lake Toba in
Indonesia or Yellowstone in Wyoming. Some eruptions form pyroclastic flows, which are high-temperature clouds of
ash and steam that can trial down mountainsides at speed exceeding an airliner. The eruption of Mount Pelee of the
Caribbean in 1902 incinerated the entire town of Saint-Pierre in Martinique below. The more famous example is of
Mount Vesuvius, which buried the city of Pompeii, Italy in 79 A.D. and its resident in heaps of ash, and the remains
were later recovered preserved and intact. Recent large volcanic eruptions include that of Mount St. Helens in
Washington and Krakatoa in Indonesia, occurring in 1980 and 1883, respectively. The latter was one of the loudest eruptions in the world. Mount St. Helens spewed ash all across the Western states, and even caused the sun to
appear green in areas. Some volcanoes are dormant, or "sleeping", but may erupt soon, such as Mount Rainier in
Washington and Mount Fuji in Japan.

Waterspout
A waterspout is a tornadic weather phenomenon normally occurring over tropical waters in light
rain conditions. They form at the base of cumulus-type clouds and extend to the water surface
where winds pick up water spray. Waterspouts are dangerous to boats, planes and land
structures. Most of the time waterspouts are produced in semitropical regions of the world, but the majority of them
occur in the Bermuda Triangle and are suspected of being the cause of the many missing ships and planes in that
region. One unruly waterspout made its way into downtown Miami, Florida in 1997 and caused quite a scare with
the locals.
A snowstorm is a winter storm in which the primary form of precipitation is snow. When such a storm is accompanied by winds above 32 mph that severely reduce visibility, it becomes a blizzard. Hazards from snowstorms and blizzards include traffic-related accidents, hypothermia for those unable to find shelter, as well as major disruptions to transportation and fuel and power distribution systems. The Blizzard of 1888 that diminished the Northeast coast of the United States produced snow piles around 10-15 feet in height, sometimes even more. A later one struck Syracuse, New York and the Northeast again in 1975, and left drivers stuck inside their snow-covered vehicles along interstates. Another force of the cold is an ice storm which is basically rain that freezes instantly at contact with a surface. One devastating ice storm struck the city of Montreal, Canada in 1998 and destroyed communications and transportation systems.


Timeline of disaster response

1900s
1906 San Francisco Earthquake and Fires, USA

1910s
1911 Triangle Shirtwaist Company Fire, New York, USA
A blaze in a garment factory claims the lives of 146 workers, most of them women. Public outcry leads to the creation of fire safety codes.
1914-15 Maison Domeino, Le Corbusier, Paris, France
1914-18 World War I
1917 Demountable Wooden House, France
American Friends Service Committee. Built by volunteers to house World War I refugees, each "demountable" wooden house consisted of two rooms.
1919 League of Nations established, Versailles, France
Established after the end of World War I, the League of Nations' goal was to settle disputes between nations and foster peace. After World War II it would be replaced by the United N.

1920s
1923 Kanto Earthquake and Fire, Tokyo and Yokohama, Japan
200,000 people die; 370,000 buildings are destroyed. Frank Lloyd Wright's "earthquake-proof" Imperial Hotel (1916-22) is one of the few structures left standing.
1927 Mississippi River Flood, USA
The lower Mississippi River floods, inundating 27,000 square miles and shattering levee systems from Illinois to the Gulf of Mexico.
1927-32 "The Winona", Akron, Oh., USA
1929  |  Sears Modern Homes  
| Dymaxion House, Chicago, USA  
| R. Buckminster Fuller

1930s

1931  |  Prefabricate houses built for the Hirsch Copper and Brass Works,  
| Finow, Germany  
| Walter Gropius

1931  |  Slab apartment blocks on the Wannsee shore, Berlin, Germany  
| Walter Gropius

1931  |  Flood, China  
| The Yellow River, the second largest river in China, floods. Death toll estimates range from 850,000 to four million. The flooding is followed by famine and outbreaks of disease.

1934  |  Modern Housing  
| Catherine Bauer

1936  |  Airstream Clipper, Los Angeles, Calif., USA  
| Wally Byam

1938  |  Durham Portable House, USA  
| M. R. Doberman and John W. Davis

1939  |  Earthquake, Concepcion and Chillán, Chile  
| 50,000 are killed and 700,000 left homeless. 70 percent of Concepcion is destroyed and virtually all of Chillán.

1939-45  |  World War II  
| Millions are displaced. Emergency housing is still being constructed four years after D-Day

1939-45  |  Transportable Primitive Shelter, Helsinki, Finland  
| Alvar Aalto. Movable temporary shelters are designed to house war refugees.

1940s

1940  |  Dymaxion Deployment Unit
Various overseas US military bases, R. Buckminster Fuller. The units, produced by Butler Manufacturing, provide emergency accommodation for troops in various locations during World War II.

1943  Famine, Bangladesh and West Bengal, India (formerly Bengal)
      Crop failures and political complications caused by World War II prompt a sharp rise in the cost of rice and cause widespread famine, malnutrition, and related diseases, killing more than three million people.

1943-48  Packaged House System, Long Island, NY, USA
           Walter Gropius and Konrad Wachsmann

1944-47  Wichita Dwelling Machine, Wichita, Kan., USA
           R. Buckminster Fuller. The dwelling is based on Fuller's original concept for the Dymaxion house.

1945  Houses for Britain, USA
      The US Federal Public Housing Authority prepares to ship 30,000 prefabricated temporary emergency family dwelling to Great Britain under lend-lease. Plumbing and fixtures are to be shipped with the structures, but not sinks or closet doors.

1945  United Nations founded, San Francisco, Calif., USA

1945-51  Lustron Home, Columbus, Oh., USA
           Carl Strandlund. The Lustron Home retails for $7,000. Despite a government pledge of $40 million, only 2,498 homes are produced before the company forecloses in 1951.

1946  The Future of Housing
      Charles Abrams

1946-53  New Gourna Village, near Gourna, Egypt
           Hassan Fathy

1947-51  Levittown, Long Island, NY, USA
           William Levitt. Levitt pioneers on-site assembly-line construction. The 17,000-home development foreshadows today's "blitz builds".

1947-52  Marshall Plan
           The United States commits $12 billion to the reconstruction of Europe.

1948-49  Geodesic Dome, Asheville, NC, USA
           R. Buckminster Fuller. Fuller teaches at Black Mountain College and invents the geodesic dome. Over the course of the next several decades he will refine and expand on the basic design. At right, an early example of a geodesic dome is lifted into place.

1949  Tsunami, Hawaii, USA
       50-foot waves, some moving as fast as 490 mph, kill 96 people in the city of Hilo and destroy 46 homes. The Tsunami Warning System is created, with five seismic stations around the Pacific Rim.

1950s

1953  Storm Floods, North Sea, northern Europe
       100-mph winds cause a sea surge to crash into coastal Britain, Holland, and Belgium. In Holland the tidal waves cause dikes to break in 65 places; in Britain sea walls are breached.
Flooding causes 1,800 deaths. The disaster leads to the creation of the national Storm Tide Forecasting Service and the erection of the Thames Barrier, the world's largest movable barrier.

1955-63 Lafayette Park, Detroit, Mitt., USA
Ludwig Mies van der Rohe and Ludwig Hilbersheimer completed by other developers and architects). Part of a federally subsidized Urban renewal project, the development includes town houses and 21-story apartment blocks, grassy expanses, and a system of closed streets.

1958 Earthquake, Arequipa, Peru
10,000 houses destroyed. John F.C. Turner initiates a self-help rebuilding program.

1958 Low-income Housing, Chandigarh, India
Pierre Jeanneret

1960s
1964 Architecture Without Architects
Bernard Rudofsky. The exhibition and publication of the same name celebrate the beauty of vernacular architecture, leading to a renewed appreciation for traditional buildings arts.

1970s
1970 Subsidized low-cost housing in the Philippines (left) and Brazil (right).
1972 Freedom to Build
John F.C. Turner and Robert Fitcher

1972 Pruitt-Igoe Housing, St. Louis, Mo., USA
Minoru Yamasaki. St. Louis Housing Authority begins demolition of the 33-building public housing complex.

1972 Polyurethane Igloo, Masaya, Nicaragua
West German Red Cross and Bayer Company. Experimental dome structures provide emergency housing in Masaya, near Managua, Nicaragua, after three consecutive earthquakes strike the area, killing 20,000 people and rendering 250,000 of Managua's 400,000 residents homeless.

1973-76 Habitat for Humanity builds first project, Zaire
1975 Oxfam Emergency House-Making Unit, Lice, Turkey
1976 Earthquake, Hebei and Tangshan, China
Leaves 242,419 dead and 182,000 homeless. China refuses international aid.

1976 Earthquake, Guatemala
Fred Curv works with Oxfam and world Neighbors to design housing "pictographs" to educate Guatemalans in safer building technique after an earthquake there kills 23,000 people and injures another 76,000.

United Nations Conference on Human Settlements (Habitat), Vancouver, Canada
Leads to the formation of UN-HABITAT.

1980s
1984-85 Famine, Ethiopia
Drought and political instability lead to food shortages, killing more than one million people.
1985 Earthquake, Mexico City, Mexico

1985-94 Nemausus I & II, Nimes, France
Jean Nouvel. The architect adopts an industrial aesthetic for the construction of 114 units of subsidized low-cost housing.

1989 Aranya Community housing, Indore, India
Balkrishna Doshi, Vastu-Shilpa Foundation.

1989 Loma Prieta Earthquake, Watsonville, Calif., USA
One in five victims camps outside his or her home rather than use the officially designed communal shelters.

1990s

1990-91 improved Quincha Earthquake-Resistant Housing, Alto Mayo Region, Peru
ITDG. Developed in response to the earthquake that struck in 1990, the design improves upon traditional Quincha building methods (in which walls are constructed from wooden poles in filled with smaller wooden poles) by adding roof trusses and making them more flexible and therefore more earthquake resistant. In 1991 another earthquake destroys 17,000 homes, but the 70 locally built improved structures withstand the tremor, demonstrating the effectiveness of the design and prompting the group to build another 4,000 homes.

1993 Mississippi River Flood, Midwestern USA
American Red Cross spends $44 million to help families recover. FEMA creates initiative to buy or relocate properties to prevent future flood losses.

1993 Rural Studio, Newburn, Ala., USA
Samuel Mockbee founds the Rural Studio at Auburn University.

1994 Rwandan Genocide, Burundi, Rwanda, Tanzania
Interahamwe Hutu extremists kill an estimated 500,000 to 800,000 Rwandans in 100 days. Two million refugees flee the country. The outbreak of disease in refugee camps claims an additional 80,000 lives.

1995 Hanshin earthquake, Osaka Bay, Japan

2000s

2001 Earthquake Reconstruction, Ludiya, Gujarat, India
Vastu-Shilpa foundation

2004 Tsunami, Indian Ocean
175,000 people are killed and more than one million people in 13 countries are displaced.

2005 Operation Restore Order, Zimbabwe
Pres. Robert Mugabe orders a crackdown on "illegal structures", forcing slum dwellers to tear down their own dwellings throughout the country. Nearly 600,000 people left homeless. UN-HABITAT condemns the slum-clearance program as indiscriminate, unjustified, and conducted with indifference to human suffering.

2005 Green mobile Home, Mississippi State University, USA
Developed by architect at the Carl Small Town Center, part of the College of Architecture,
Art, and Design at Mississippi State University, this self-sufficient, solar powered unit was designed as an alternative to the traditional mobile home.

2005 Hurricane Katrina, Louisiana, Mississippi, Alabama, USA
145-mph winds tear a path of destruction through the Gulf Coast. The storm and subsequent flooding of New Orleans kill an estimated 1,325 people, more than one million people are displaced from the Gulf Coast region. Emergency officials respond by bringing more than 50,000 travel trailers and mobile homes to the area, but 100 days after the disaster, demand continues to outstrip supply. At right, FEMA tag on the door of a home in New Orleans indicates it has been searched for survivors.

2005 Earthquake, Pakistan-administered Kashmir
A month after the disaster the death toll estimate stands at 87,000; more than two million people are displaced. The United Nations exhausts its stockpile of tents. At right, desperate families in Muzaffarabad, Pakistan, set up a camp using recycled advertising billboards in an attempt to shelter themselves as winter approaches.

Decision Tree Analysis (DTA)

Drawing a tree
You start a Decision Tree with a decision that you need to make. Draw a small square to represent this towards the left of a large piece of paper. From this box draw out lines towards the right for each possible solution, and write that solution along the line. Keep the lines apart as far as possible so that you can expand your thoughts.

At the end of each line, consider the results. If the result of taking that decision is uncertain, draw a small circle. If the result is another decision that you need to make, draw another square. Squares represent decisions, and circles represent uncertain outcomes. Write the decision or factor above the square or circle. If you have completed the solution at the end of the line, just leave it blank.

Starting from the new decision squares on your diagram, draw out lines representing the options that you could select. From the circles draw lines representing possible outcomes. Again make a brief note on the line saying what it means. Keep on doing this until you have drawn out as many of the possible outcomes and decisions as you can see leading on from the original decisions.

Once you have done this, review your tree diagram. Challenge each square and circle to see if there are any solutions or outcomes you have not considered. If there are, draw them in. If necessary, redraft your tree if parts of it are too congested or untidy. You should now have a good understanding of the range of possible outcomes of your decisions.

2. Evaluating Your Decision Tree
Now you are ready to evaluate the decision tree. This is where you can work out which option has the greatest worth to you. Start by assigning a cash value or score to each possible outcome. Estimate how much you think it would be worth to you if that outcome came about.
Next look at each circle (representing an uncertainty point) and estimate the probability of each outcome. If you use percentages, the total must come to 100% at each circle. If you use fractions, these must add up to 1. If you have data on past events you may be able to make rigorous estimates of the probabilities. Otherwise write down your best guess.

3. Calculating Tree Values
Once you have worked out the value of the outcomes, and have assessed the probability of the outcomes of uncertainty, it is time to start calculating the values that will help you make your decision.

Start on the right hand side of the decision tree, and work back towards the left. As you complete a set of calculations on a node (decision square or uncertainty circle), all you need to do is to record the result. You can ignore all the calculations that lead to that result from then on.

4. Calculating the Value of Uncertain Outcome Nodes
Where you are calculating the value of uncertain outcomes (circles on the diagram), do this by multiplying the value of the outcomes by their probability. The total for that node of the tree is the total of these values.

5. Calculating the Value of Decision Nodes
When you are evaluating a decision node, write down the cost of each option along each decision line. Then subtract the cost from the outcome value that you have already calculated. This will give you a value that represents the benefit of that decision.

Note that amounts already spent do not count for this analysis - these are 'sunk costs' and (despite emotional counter-arguments) should not be factored into the decision.

When you have calculated these decision benefits, choose the option that has the largest benefit, and take that as the decision made. This is the value of that decision node.

Key points
Decision trees provide an effective method of Decision Making because they:

- Clearly lay out the problem so that all options can be challenged
- Allow us to analyze fully the possible consequences of a decision
- Provide a framework to quantify the values of outcomes and the probabilities of achieving them
- Help us to make the best decisions on the basis of existing information and best guesses.

Source: http://www.mindtools.com/dectree.html
References

Books
• Alan W. Evans, Economics, Real Estate & the Supply of Land, Blackwell Publishing Ltd, 2004
• Architecture for Humanity, Design Like You Give a Damn. Architectural Responses to Humanitarian Crises, Thames & Hudson, 2006
• Stephen Roulac, Place and Property Strategy, Property Press 2001
• Tom Corsellis and Antonella Vitale, Transitional settlement displaced population, University of Cambridge, 2005
• United Nations Development Programme Bureau for Crisis Prevention and Recovery, Reducing Disaster risk a challenge for development, John S. Swift Co., 2004

Articles
• Inter-Agency Technical Committee of the Forum of Ministers of the Environment of Latin America and the Caribbean, Panorama of the environmental impact of recent natural disasters in Latin America and the Caribbean, UNEP/LAC-IGWG.XII/TD.2, 23 February, 2000
• Francois Ascher, Multi-Mobility, Multispeed Cities: a challenge for architects, town planners and politicians, Rotterdam Architecture Biennial, Lecture, 09/05/2003
• John Corbett, Torsten Hagerstrand: Time Geography, Regents of University of California, Santa Barbara, 2001-2007
• Sultan Barakat, Housing reconstruction after conflict and disaster, Humanitarian Practice Network Number 43, December 2003
• Various authors, Humanitarian exchange, Humanitarian Practice Network Number 33, March 2003
• Jennifer Duyne Barenstein & Daniel Pittel, Post-disaster housing reconstruction, current trends and sustainable alternatives for tsunami-affected communities in coastal Tamil Nadu, University of Applied Sciences of Southern Switzerland SUPSI, March 2007
• Angelo de Bernardo & Gilles Isard, Temporary &semi-permanent buildings for health structures in refugees camps, Medecins sans Frontieres
• M. Gordon Brown, Is the category imperative? Toward a spatial taxonomy for real estate research, Paper presented at the 13th Annual European Real Estate Society Conference, Weimar, Germany, 7-10 June, 2006
• W Don Barnabas, Development of a sustainable low-income housing finance programme in Sri Lanka, UN-Habitat Slum Upgrading Facility, January 2006
• Unites Nation High Commissioner for Refugees (UNHCR), National transitional shelter update – RD – 14Nov05.DOC, 14 November 2005
• Unites Nation High Commissioner for Refugees (UNHCR), National transitional shelter update – RD – 14Nov05.DOC, 14 November 2005
• Unites Nation Human Settlement Programme, Urban indicator guidelines - Monitoring the Habitat Agenda and the Millennium Development Goals, August 2004
• Unites Nation Centre for Human Settlements (Habitat), Tools to support participatory urban decision making, July 2001

Internet sites
• http://www.oxfordreference.com
• http://www.earthinstitute.columbia.edu/crosscutting/climate.html
• http://gridca.grid.unep.ch/undp/cntry_profile.php
• http://www.glenumber.net/glide/public/search/search.jsp
• http://www.builsrilanka.com/Advice/BOQ/BOQ.html
• http://www.mindtools.com/
• http://www.earthinstitute.columbia.edu/

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