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# **A Study of Finding out the Effective Scheme of the Economic Development for Developing Countries**

Oyuntsatsral Tseyenbaljir

A dissertation submitted to  
Kochi University of Technology  
in partial fulfillment of the requirements  
for the degree of

Doctor of Philosophy

Special Course for International Students  
Department of Engineering  
Graduate School of Engineering  
Kochi University of Technology  
Kochi, Japan

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**A Study of Finding out the Effective Scheme of the  
Economic Development for Developing Countries:  
SEZ development project as an effective scheme of a country development**

by

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## **Abstract**

During the United Nations Millennium Summit held in September 2000, the 189 member countries of the UN have decided to select the most changeable theme that was to rid the world of poverty. The countries attended the summit announced 8 goals as “The Millennium Development Goals” and said that the number one goal is to reduce by half, between 1990 and 2015, the proportion of people living on less than a dollar a day. It has already passed over 10 years period of time since they made this propaganda, however, it can be observed that there are still the severe poverty, unemployment, poor living condition and lack of basic infrastructure exist in many countries in the world.

According to the World Bank, there are 144 countries out of total 210 countries are counted as low income and middle income countries in the world. However, it can be observed that those developing countries have not yet found appropriate development ways and that’s why they are still in the low economic and living conditions. There is a strong need of self-development for those developing countries.

Although the developing countries have been trying some self-development schemes, some of the countries failed to step forward.

Among the well-known self-development schemes, SEZ scheme was chosen by many developing countries. However the some attempts for developing SEZs were not same as successful in China, Philippines etc. The author’s investigation of SEZ projects in landlocked countries showed that there were almost no successful SEZ projects in those countries. For solving this bottleneck, the author carefully did study about possible ways to aware failure and she found out that the complete systematic scheme which includes feasibility study, execution and construction for SEZ was essential. Not only the current situation of the feasibility study was not able to cover the necessary set of feasibility studies for SEZ project but also the execution scheme was needed some improvement.

The author did this study for solving the problems of the developing countries that are under the very difficult natural and geopolitical condition including

landlocked countries. As a representative of those developing countries, Mongolia was chosen. The author hopes to find out the effective scheme of self-development for solving the problems of Mongolia and encouraging her economic development.

### **Chapter 1. Introduction**

The research philosophy and assumptions made to identify the problems facing to the developing countries that caused low economic development in the developing countries such as Mongolia. The research flowchart was made to reach the goal on the basis of what-why-how to reasoning.

### **Chapter 2. Study about developing countries**

The chapter provides the history of movements of some Asian leader countries and situation of current developing countries in Asia. Movements of Asian countries were studied in this chapter starting with the earliest shipment of Japan from developing country to developed country followed by Singapore, Hong Kong and Korea. Moreover, the developing countries those belong to different groups of income like Malaysia, Philippines, Thailand, Indonesia, Vietnam, Sri Lanka, Bangladesh, Nepal, Laos and Cambodia were studied.

### **Chapter 3. Economic development scheme for developing countries**

In this chapter, 3 main possible schemes that can be used to move up a country to the upper middle income level from lower middle income were analyzed. Those schemes are 1) to get help from a specific country(s); 2) the scheme using ODA; 3) the scheme using Public-Private-Partnership (PPP). Advantages and disadvantages of those 3 schemes were analyzed briefly in this chapter. And also current ODA scheme its problems and how to deal with these problems were analyzed. Moreover PPP scheme effectiveness compared to traditional ODA scheme was analyzed and suggested this scheme for development of the developing countries.

#### **Chapter 4. Effective scheme of a country development**

This chapter provides studies related to the SEZ, its development and execution method.

#### **Chapter 5. Effective scheme for development of the country Mongolia as an example of landlocked countries**

Current socio-economic condition of the country Mongolia was focused in this chapter. Moreover, the failed stories for establishing SEZs in Mongolia and their reasons to be failed and recommendations to establish feasible SEZ development in Mongolia were discussed in this chapter. Based on the country unique specialties, considerable industries developed by resources kept by Mongolia are studied and suggested.

As mentioned Chapter 3, the most effective scheme for developing SEZ is PPP scheme. But using the PPP scheme, it is necessary to change current scheme of feasibility study for stakeholders' needs. So the author developed a new scheme for a feasibility study system for SEZ development projects to be executed by PPP scheme. The new feasibility study system covers a broader range of studies including market demand feasibility, technical feasibility, economical feasibility, financial feasibility, environmental feasibility and concurrence of stakeholders.

#### **Chapter 6. New concept of project execution and effectiveness analysis applying for SEZ projects**

An important matter is to check the effectiveness of the SEZ project to the country economy. The author made SEZ project effectiveness analysis in country wide effectiveness by using the Static and Dynamic Computable General Equilibrium model. In the dynamic Computable General Equilibrium model, 2 kinds of execution method of ODA and PPP were analyzed and compared for the same SEZ project case.

## **Chapter 7. Conclusions and Recommendations**

Finally in Chapter 7 the conclusions of this research work are highlighted, leading to several recommendations for developing countries and useful application of SEZ as a developing leverage.

## **Acknowledgement**

I would like to express my sincere gratitude to my advisor Prof. Shunji Kusayanagi for his kind encouragement, valuable advice during my study at KUT. I would like to especially thank to his generosity for giving me the opportunity not only to finish my study but also to visit the many different countries and to experience the different cultures which opened my eyes and helped my research a lot.

I am extremely grateful to Dr. Rikuo Katsumata for sharing his academic and practical experiences on SEZ and CGE model. I am sincerely grateful to all the members of the examination committee – Prof. Nasu, Prof. Nagano, Prof. Shima, Dr. Goso and Dr. Katsumata for their valuable suggestions and constructive comments.

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## **Chapter I. Introduction**

### **1.1 Purpose of the Study**

People in developing countries are suffering because of the poverty, unemployment, poor infrastructure condition all around the world. Not only the governments of those developing countries but also a multiple number of international, regional and national organizations have been working for fighting against to the poverty, unemployment and poor infrastructure condition. Throughout the Official Development Assistance (ODA) etc, huge amount of money had been spent for those activities. Moreover, a number of summits, conferences, meetings and seminars had been held under the title of fighting against to the poverty. But what have changed?

The most recent and the most famous example is “Millennium Development Goal”. When the new century began, the 189 member countries of the UN have decided to select the most changeable theme that was to rid the world of poverty during the United Nations Millennium Summit held in September 2000. The countries attended the summit announced 8 goals as “The Millennium Development Goals” and said that the number one goal is to reduce by half, between 1990 and 2015, the proportion of people living on less than a dollar a day. It has already passed over 10 years period of time since they made this propaganda, however, it can be observed that there are still the severe poverty, unemployment, poor living condition and lack of basic infrastructure exist in many countries in the world.

Also there is a strong need to carefully consider the effectiveness of ODA from developed countries as donors to developing countries as recipients. The donors already spent approximately US\$ 1 trillion for the ODA within last 20 years. But outcome of the money which was spent for ODA activities in the developing countries is difficult to measure. Somehow the situation of ODA

recipient is warning the donors and the recipients to change the thinking way and method about ODA.

According to the World Bank data, there are 144 countries out of total 210 countries are counted as low income and middle income countries in the world. Every single 144 countries have most of or all of these reasons including civil wars and regional conflict, inadequate governance and legislation, geographic location, unequal distribution of natural resources, ineffective use of resources, number of population, lack of human resources, inefficient economic structure and lack of fund to be low income countries. However, it can be observed that those developing countries have not yet found appropriate development ways and that's why they are still in the low economic and living conditions. There is a strong need of self-development for those developing countries struggling with those problems.

Looking through the development speed of the countries, the countries that have already equipped the self-development capacity had a high speed when they jumped from low or lower middle income level to upper middle income level. But the countries had almost no speed are at same time have not found the self-development capacity. Judging from this fact, it can be seen that there are generally two different groups of countries in the world, one group of the countries that have already equipped the self-development capacity and other group of the countries that have not yet.

The author is from Mongolia which is also one of the developing countries have not yet found appropriate development way. But Mongolia has a much difficult condition compared to the other countries due to its low population and landlocked geographical condition located between two giant neighbors, Russia and China, and under their strongly influencing political and economic policies. Moreover the country itself has a harsh climatic condition as long cold winter and short summer.

During the author's research of economic development schemes, the author found out that developing Special Economic Zone (SEZ) was one of the effective schemes for the economic development of developing countries. But it can be seen that there is no systematic scheme for developing SEZ.

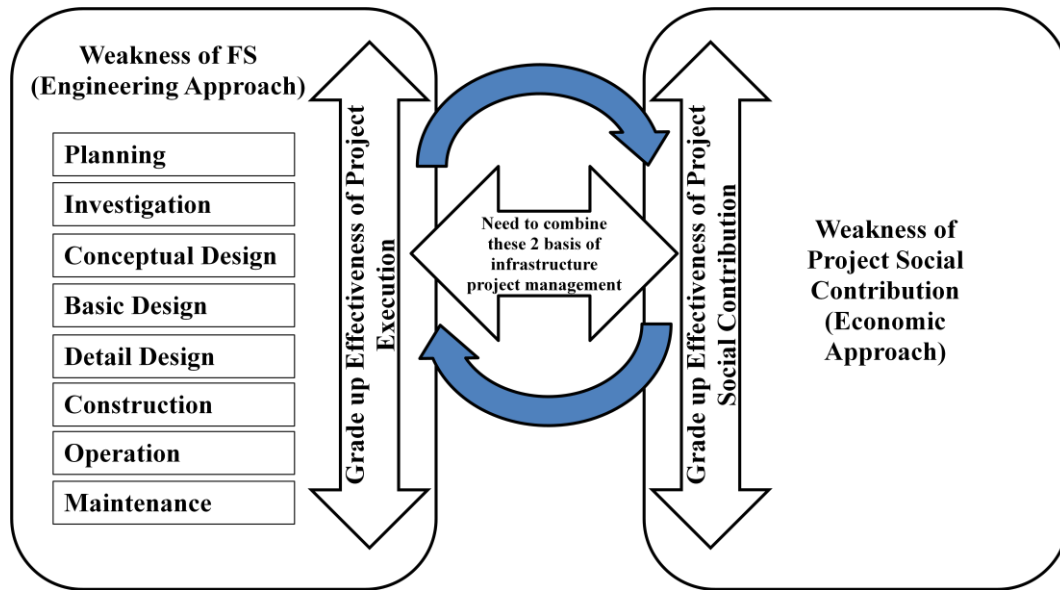
There are 2 basic approaches for infrastructure project development and management. One is engineering approach or basically concentrated on how to grade up the effectiveness of project and its execution. This kind of approach usually is made by the people in the area of Construction Management and Project Management. The normal approach that the people in the area take is to concentrate their attention on finding out ways for grading up the effectiveness of the project execution. However, they do not concentrate their attention on the effectiveness of the project itself something like the social contribution and economic impact.

Why do they not concentrate their attention on the effectiveness of the project itself? It is probably that the people in the engineering are weak in the economy and they do not have much knowledge. This situation creates problems for the infrastructure development.

Another one is economic approach which must be concentrated on how to grade up the social contribution and economic impact made by infrastructure development projects. However, the people in this area do not concentrate on the project itself and its execution. Why do they not concentrate their attention on the project itself? It is probably that the people in the economic are weak in the Construction Management and Project Management and they do not have that knowledge. This situation also creates problems for the infrastructure development.

Unfortunately, both engineers and economists are acting solely from their own single approach. But these two approaches need to be combined since both of them very important basis of infrastructure project management (Figure 1.1).

In this study, the author tried to combine the engineering and economic approaches and solve the problems facing to the project execution and project social contribution for the development of SEZ projects effectively.



**Figure 1. 1 2 Basis of Infrastructure Project Management**

The author did this study for solving the problems of the developing countries that are under the very difficult natural and geopolitical condition including landlocked countries. As a representative of those developing countries, Mongolia was chosen. The author hopes to find out the effective scheme of self-development for solving the problems of Mongolia and encouraging her economic development. And the effective scheme will be applicable to make happy the people in those developing countries especially with low population and landlocked such as Mongolia.

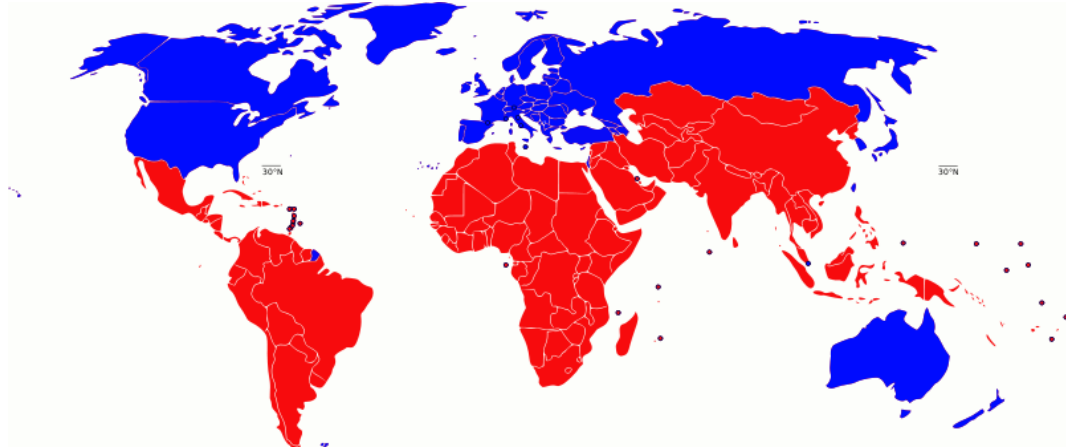
## **1.2 Background of the Study**

### **1.2.1 The North and South Problem**

Before making a study for finding out the effective scheme of the economic development for developing countries, it is required to analyze the contemporary situation of developing countries in Asia and the World. The North and South Problem is quite basic matter that is needed to know.

The North and South Divide is a socio-economic division between developed countries, known as the North and developing countries known as the South. Also

the most of developed countries except Australia and New Zealand including all members of Group of 8 are in fact located in the northern hemisphere (Figure 1.2).



**Figure 1.2 North and South Divide**

Source: [http://en.wikipedia.org/wiki/File:North\\_South\\_divide.svg](http://en.wikipedia.org/wiki/File:North_South_divide.svg)

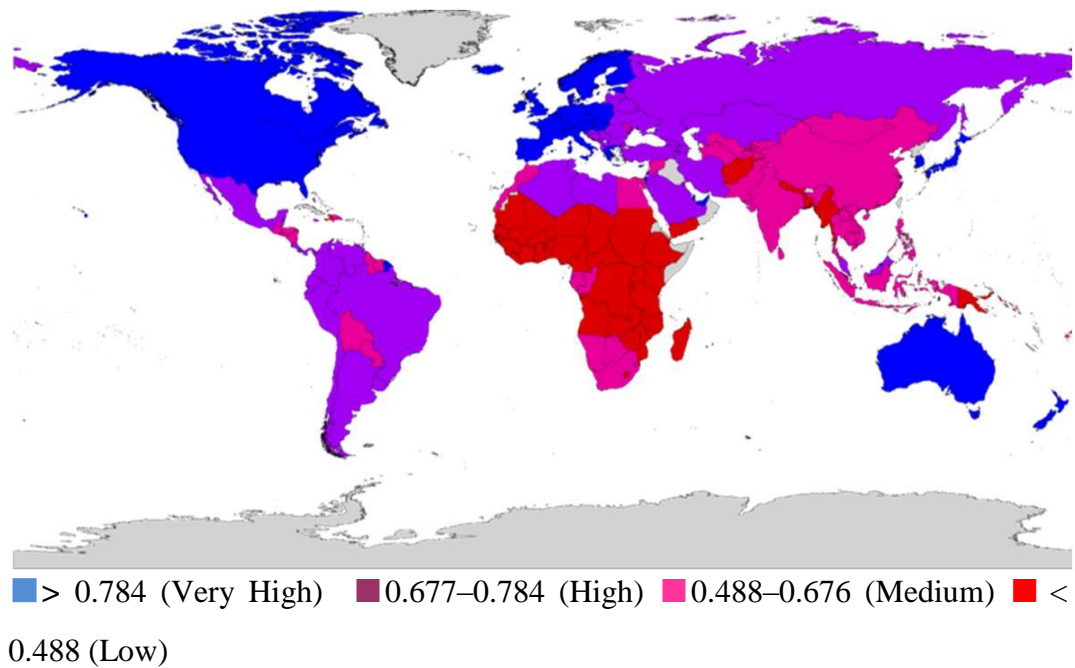
According to the World Bank data published in year 2010, there are 144 countries including 40 low income, 56 lower middle income and 48 upper middle income countries referred as developing countries. Those 144 developing countries are divided into geographical location as follows:

- East Asia and Pacific – 24
- Europe and Central Asia – 22
- Latin America and Caribbean – 30
- Middle East and North Africa – 13
- South Asia – 8
- Sub-Saharan Africa – 47

It can be seen that, most of those developing countries located in the southern hemisphere.

Figure 1.3 shows World map indicating the countries' HDI; Human Development Index in 2010.





**Figure 1.3 World map indicating the countries' Human Development Index in 2010**

Source: 2010 Human Development Report

The existence of North and South Problem is not only in economic development level but also in human development level can be observed from this figure. The figure is saying that people live in the countries located in the South are not well developed especially countries in Africa have this problem.

### **1.2.2 The New Movement of the United Nations Millennium Development Goals**

During the United Nations Millennium Summit held in September 2000, the 189 member countries of the UN have decided to select the most changeable theme that was to rid the world of poverty. The countries attended the summit announced 8 goals as “The Millennium Development Goals”. The Millennium Development Goals include following main 8 goals:

Goal 1: Eradicate extreme poverty and hunger

Goal 2: Achieve universal primary education

Goal 3: Promote gender equality and empower women

Goal 4: Reduce child mortality

Goal 5: Improve maternal health

Goal 6: Combat HIV/AIDS, malaria, and other diseases

Goal 7: Ensure environmental sustainability

Goal 8: Develop a global partnership for development

The very first goal of the eight Millennium Development Goals is defined to fight with extreme poverty and hunger. This first goal consists of two targets.

- 1) Reduce the extreme poverty level to half of the 1990 level by 2015
- 2) Reduce the number of people in extreme hunger to half the between 1990 to 2015

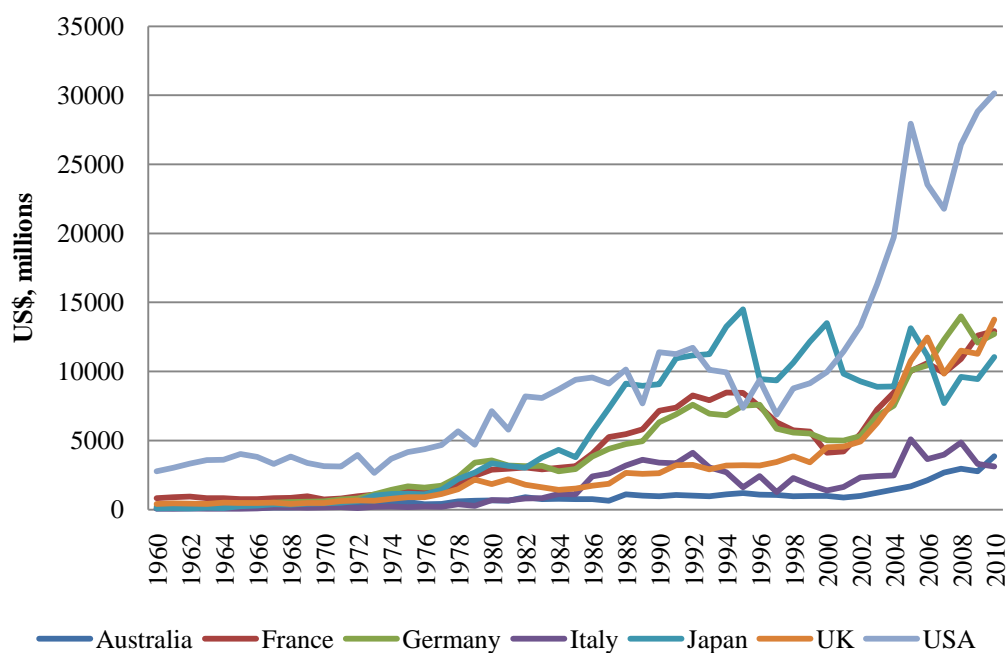
It is clear that developing countries cannot reach the goal by their own attempts without any external help. That's why developing a global partnership for development is included in Millennium Development Goal as the Goal 8.

It has already passed over 10 years period of time since they made this propaganda, however, it can be observed that there are still the severe poverty, unemployment, poor living condition and lack of basic infrastructure exist in many countries in the world.

The situation reminds us to change the way which was used until now. And developing countries need to find their own self-development scheme.

### **1.2.3 The Official Development Assistance (ODA) Scheme to Developing Countries**

The Official Development Assistance (ODA) is a quite important activity based on the concept of developed countries and developing countries helping each other. The developed countries referred as donors and the developing countries referred as aid-receiving countries in ODA scheme. The biggest contributing donor countries are USA, UK, Germany, France, Japan, Italy and Australia. Donor countries those are the members of the OECD's Development Assistance Committee (DAC) have spent US\$ 2.5 trillion for Official Development Assistance since 1960. Figure 1.4 shows the total amount of ODA spent for the developing countries by main donors since 1960.

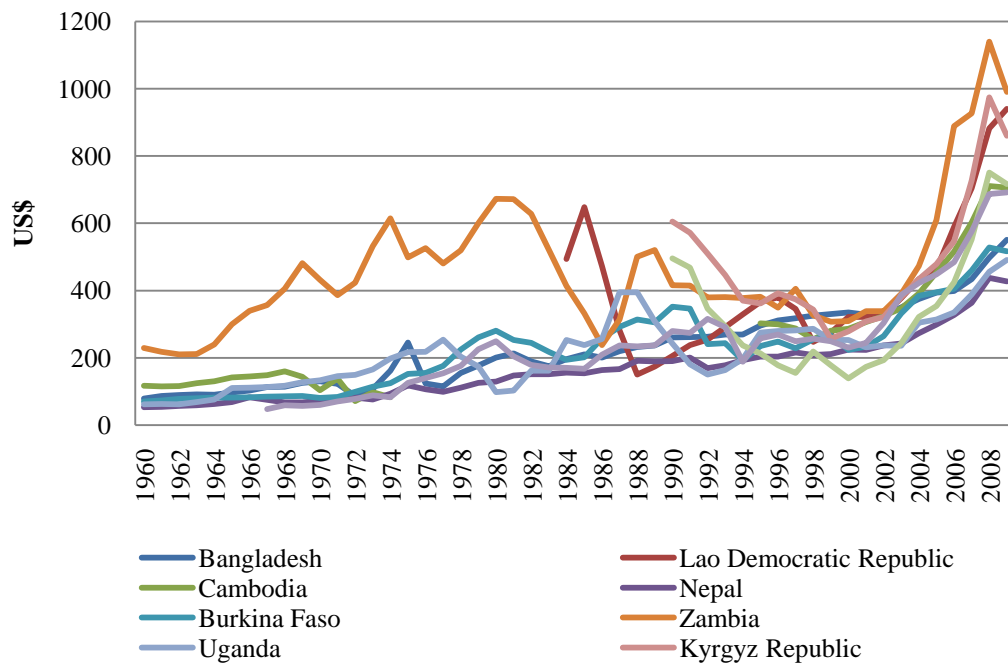


**Figure 1.4 ODA Net Disbursements, 1960-2010 (current prices)**

Source: OECD, 2011

But despite this huge amount of money spent for ODA, an interesting issue comes out. How was the effectiveness of the ODA for aid-receiving developing countries? Did the economic development of those aid-receiving developing countries make significant development? Is the ODA scheme appropriate to develop those aid-receiving countries?

Figure 1.5 shows the GDP per capita of low income developing countries since 1960.

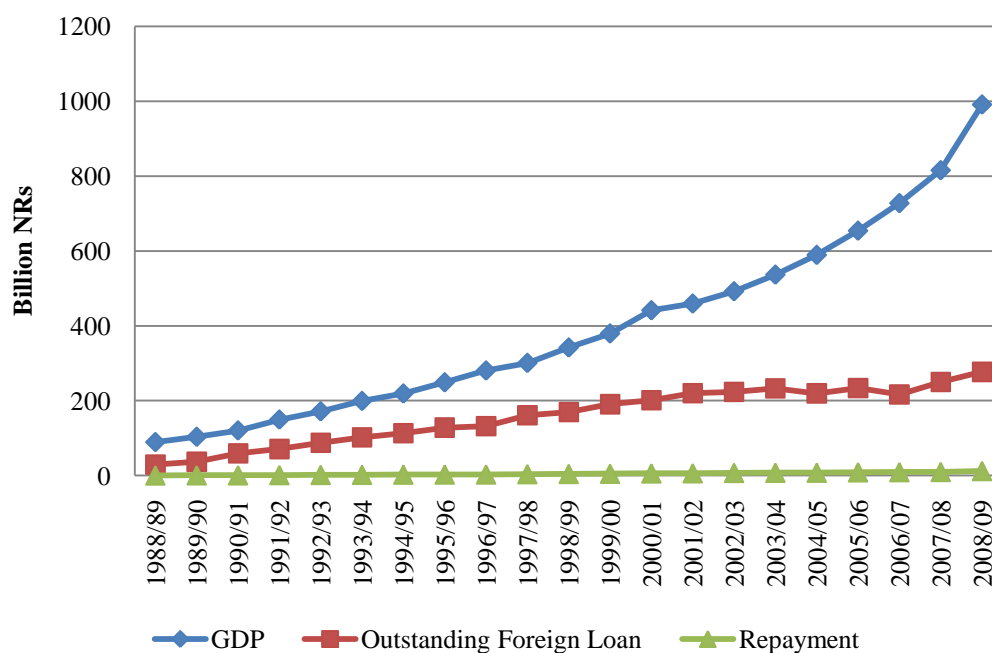


**Figure 1.5 GDP per capita in the low income countries, 1960-2009 (current US\$)**

Source: World Bank, 2011

According to the statistic, it looks like that those developing countries economic situation have been improved because most of countries had got 2 or 3 times increase their GDP per capita. However the situation is not so simple. Firstly, they are still remained in low income developing countries category. Secondly, those countries increased their GDP per capita but they had not got self-development capacity.

Figure 1.6 shows the correlations among the 3 elements of GDP, Foreign Loan and Repayment of Loan in Nepal as an example. Figure 1.6 shows that the country Nepal has not yet developed the self-development capacity even though the amount of GDP increased because this country does not have the repayment capability for foreign loan. The same situations can be observed in other countries listed in Figure 1.5.



**Figure1.6 GDP, Foreign Loan and Repayment of Loan in Nepal**

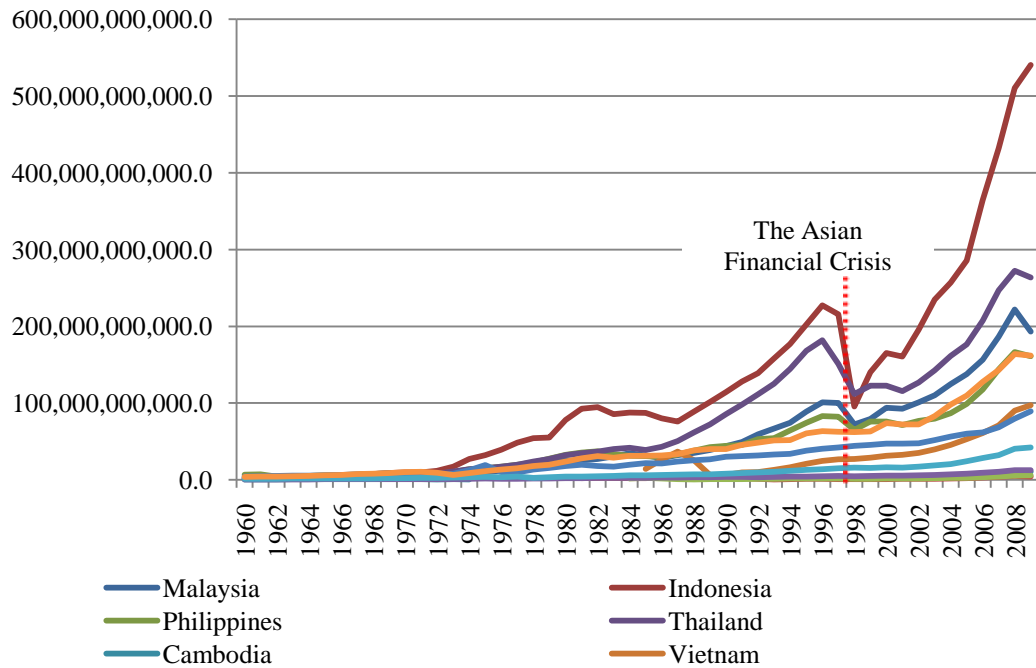
Source: Economic Survey of Nepal, 2009/10 and other years

What was the problem with the ODA scheme? Why are those developing countries in same income group and do not develop self-development capacity for years? It can be said that the existing ODA scheme has marginal capacity and it has already reached the limits of its function. For realizing Millennium Development Goals, it is necessary to find out the new ODA scheme.

### 1.3Hypothesis

What is the essential matter to set up a proper self-development capacity scheme of developing countries? The last decade of the last century, countries in Asian region, like Singapore, Malaysia, Thailand, Indonesia, Vietnam, India and China, these countries have been expediting their developing speed drastically. During the study the author found that one of the common schemes used in above mentioned developing countries was SEZ; Special Economic Zone scheme.

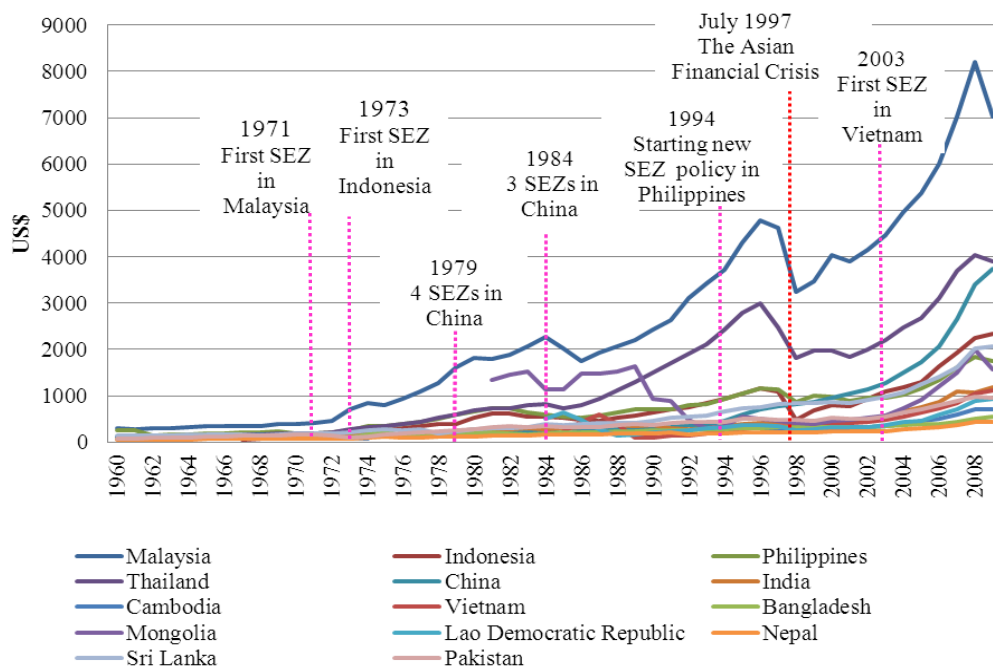
Figure 1.7 is showing the history of GDP of Asian countries after 1960 to now.



**Figure 1.7 GDP (current US\$) of Asian Countries, 1960-2009**

Source: World Bank, 2011

Figure 1.8 is showing the history of the SEZ development time and GDP per Capita of Asian countries after 1960 to now. It is interesting thing that countries have been taken off from Low income country level like Malaysia, Indonesia, etc., have quite big number of SEZ; Special Economic Zones and they have been taken off from Low income country level several years after set up SEZs. Judging from these figures, it can be assumed that the development of SEZs would be effective scheme to move up GDP.



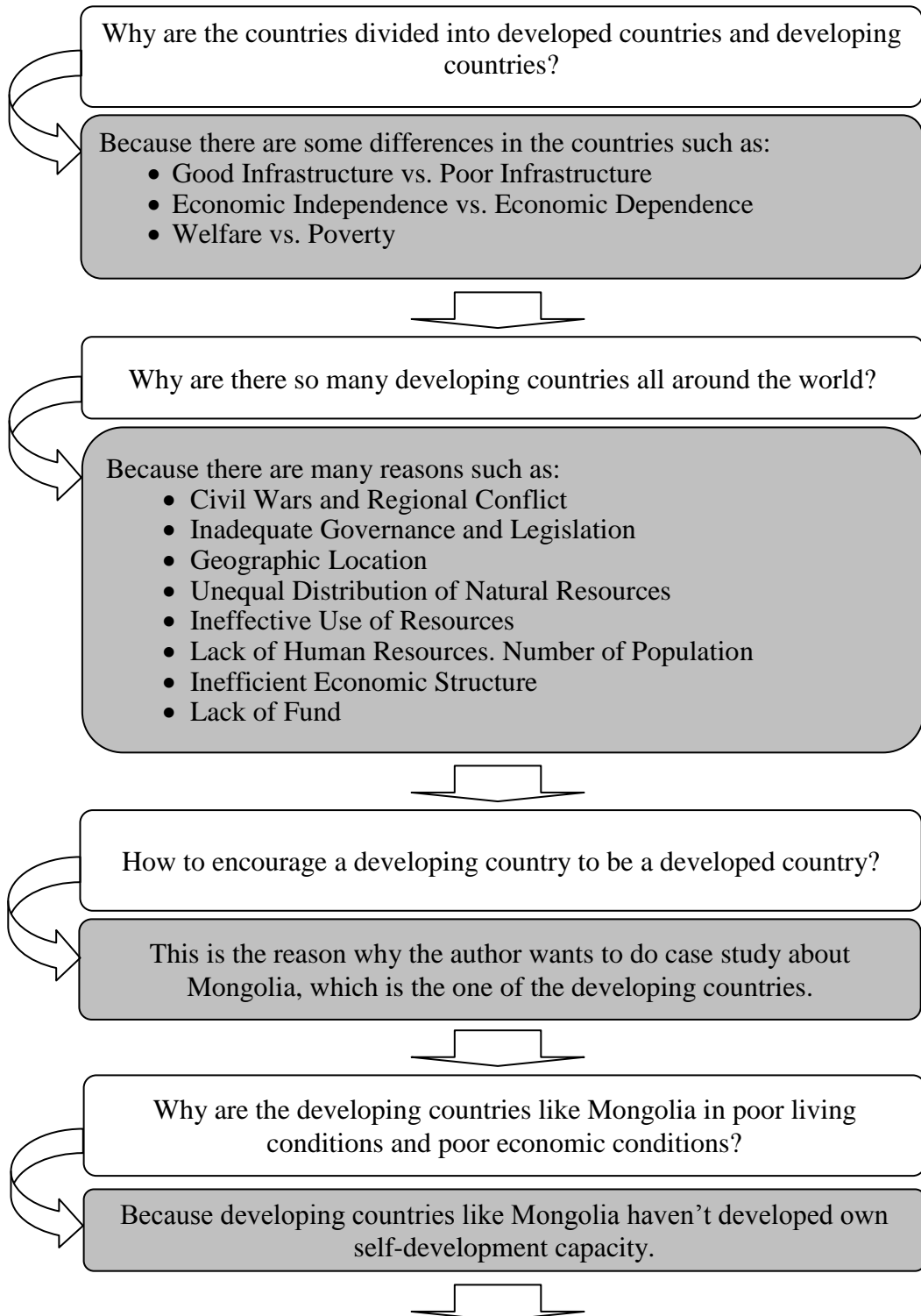
**Figure 1.8 GDP per Capita (current US\$) of Asian Countries, 1960-2009**

Source: World Bank, 2011 and various resources collected by the author

Based on this hypothesis, this study is made to find out the appropriate economic development scheme combined with PPP (Public Private Partnership) for developing countries especially landlocked and small population countries like Mongolia.

## 1.4 The Study Flow and Structure

For clarifying the research philosophy and setting up the study flow, firstly following steps of Questions and Answers were made.





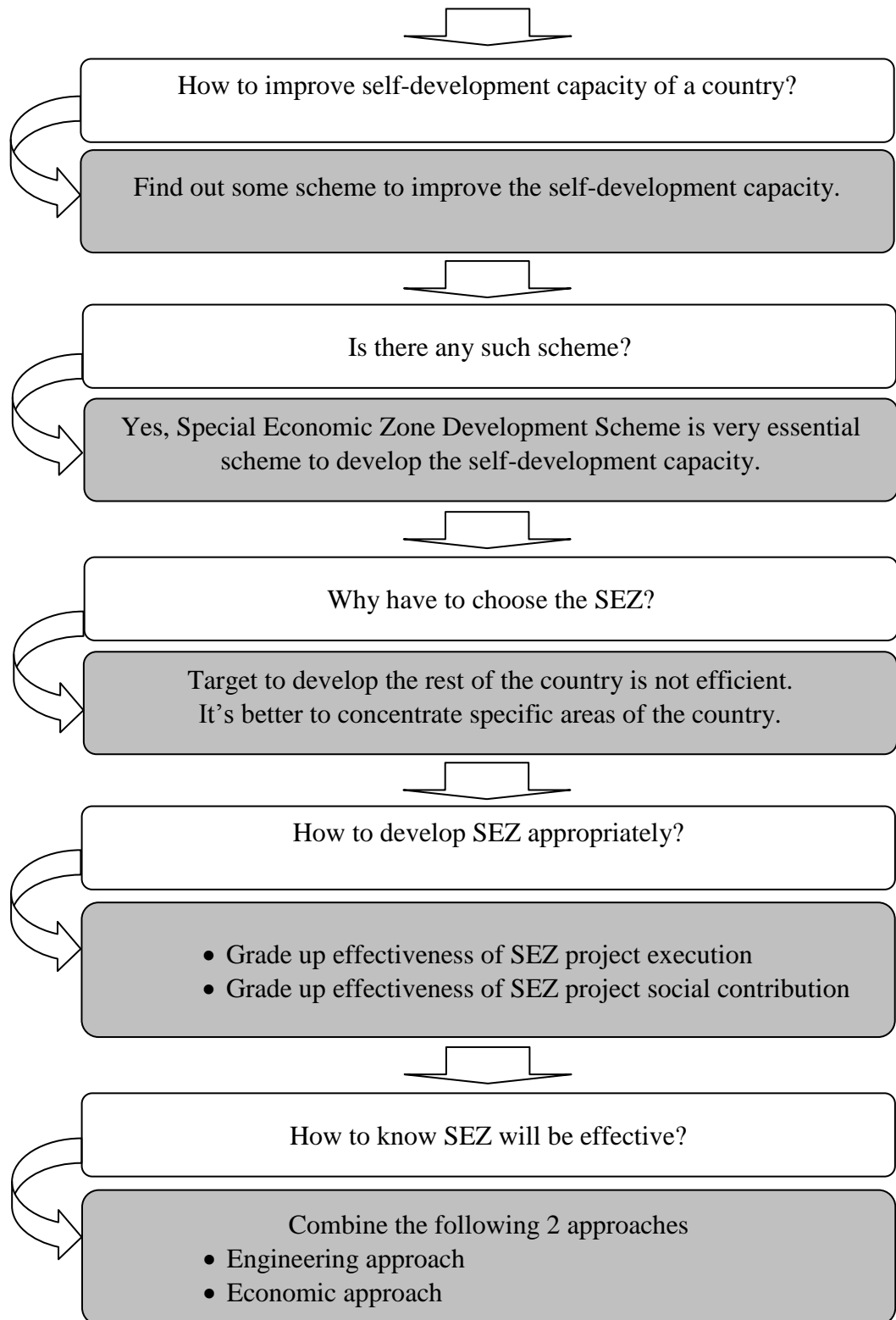
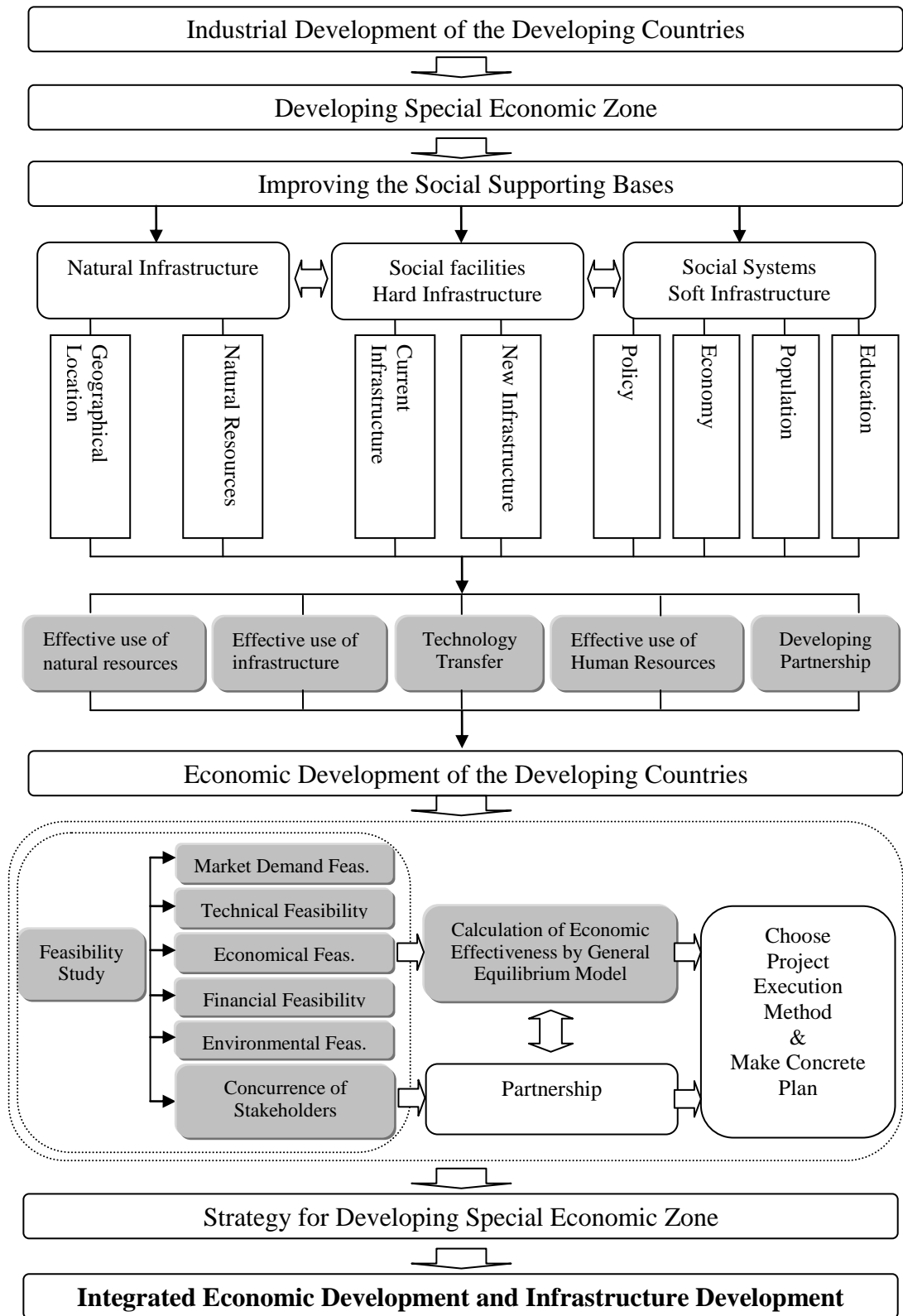


Figure 1.9 is showing Research Methodology and Flow.



**Figure 1.9 Research Methodology and Flow**

## **1.5 Expected Result**

This study will be a helpful way to develop the current socio-economic conditions of developing countries by using SEZ concept based on own capacity and PPP concept.

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URL: <http://data.worldbank.org/country>

## **Chapter II. Study about Developing Countries**

### **2.1 What are Developing Countries?**

#### **2.1.1 The Definition of Developing Countries**

Before starting the study first of all it is needed to know that what a developing country is. Basically there is no internationally defined single definition of the term of developing country in the world. Thus, there are a number of different definitions of the term of developing country. But the term usually comes from country income level.

World Bank classifies countries based on its GNI; Gross National Income per capita as follows.

- 1) Low income, per capita GNI \$995 or less;
- 2) Lower middle income, per capita GNI \$996 - \$3,945;
- 3) Upper middle income, per capita GNI \$3,946 - \$12,195;
- 4) High income, per capita GNI \$12,196 or more

Low income and middle income countries are referred to as developing countries. As 1 July 2010, there are 40 low income, 56 lower middle income and 48 upper middle income countries in the world. According to this data, it can be said that there are total 144 developing countries out of total 210 countries in the world.

As of July 2010, those are:

#### **Low Income Countries (40):**

Afghanistan, Guinea, Nepal, Bangladesh, Guinea-Bissau, Niger, Benin, Haiti, Rwanda, Burkina Faso, Kenya, Sierra Leone, Burundi, Korea Dem Rep., Solomon Islands, Cambodia, Kyrgyz Republic, Somalia, Central African Republic, Lao PDR, Tajikistan, Chad, Liberia, Tanzania, Comoros, Madagascar, Togo, Congo Dem. Rep, Malawi, Uganda, Eritrea, Mali, Zambia, Ethiopia, Mauritania, Zimbabwe, The Gambia, Mozambique, Ghana, Myanmar

**Lower middle income (56):**

Angola, India, São Tomé and Príncipe, Armenia, Iraq, Senegal, Belize, Jordan, Sri Lanka, Bhutan, Kiribati, Sudan, Bolivia, Kosovo, Swaziland, Cameroon, Lesotho, Syrian Arab Republic, Cape Verde, Maldives, Thailand, China, Marshall Islands, Timor-Leste, Congo Rep., Micronesia Fed. Sts., Tonga, Côte d'Ivoire, Moldova, Tunisia, Djibouti, Mongolia, Turkmenistan, Ecuador, Morocco, Tuvalu, Egypt Arab Rep., Nicaragua, Ukraine, El Salvador, Nigeria, Uzbekistan, Georgia, Pakistan, Vanuatu, Guatemala, Papua New Guinea, Vietnam, Guyana, Paraguay, West Bank and Gaza, Honduras, Philippines, Yemen Rep., Indonesia, Samoa

**Upper middle income (48):**

Albania, Dominican Republic, Namibia, Algeria, Fiji, Palau, American Samoa, Gabon, Panama, Antigua and Barbuda, Grenada, Peru, Argentina, Iran Islamic Rep., Romania, Azerbaijan, Jamaica, Russian Federation, Belarus, Kazakhstan, Serbia, Bosnia and Herzegovina, Lebanon, Seychelles, Botswana, Libya, South Africa, Brazil, Lithuania, St. Kitts and Nevis, Bulgaria, Macedonia FYR, St. Lucia, Chile, Malaysia, St. Vincent and the Grenadines, Colombia, Mauritius, Suriname, Costa Rica, Mayotte, Turkey, Cuba, Mexico, Uruguay, Dominica, Montenegro, Venezuela RB

**2.1.2 Developing Countries in the World**

Based on the data from World Bank and International Monetary Fund, there are approximately total 150 countries are referred to as developing countries.

According to the World Bank data, there are 144 countries referred to as developing countries. As of July 2010, those are:

**Table 2.1 Developing Countries by Region**

<b>Region</b>	<b>Country name</b>
<b>East Asia and Pacific (24)</b>	American Samoa, Cambodia, China, Fiji, Indonesia, Kiribati, Korea Dem. Rep., Lao PDR, Malaysia, Marshall Islands, Micronesia Fed. Sts, Mongolia, Myanmar, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tuvalu, Tonga, Vanuatu, Vietnam
<b>Europe and Central Asia (22)</b>	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, Kosovo, Kyrgyz Republic, Lithuania, Macedonia FYR, Moldova, Montenegro, Romania, Russian Federation, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan
<b>Latin America and the Caribbean (30)</b>	Antigua and Barbuda, Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haití, Honduras, Jamaica, Mexico, Nicaragua, Panamá, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Uruguay, Venezuela RB
<b>Middle East and North Africa (13)</b>	Algeria, Djibouti, Egypt Arab Rep., Iran Islamic Rep., Iraq, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, West Bank and Gaza, Yemen Rep.
<b>South Asia(8)</b>	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
<b>Sub-Saharan Africa(47)</b>	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Dem. Rep., Congo Rep, Cote d'Ivoire, Eritrea, Ethiopia, Gabon, Gambia The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Source: World Bank, 2011

Also according to the International Monetary Fund's World Economic Outlook Report, the world is divided into two main groups: advanced economies, and emerging and developing economies. 34 countries are listed as advanced economies and 150 countries are listed as the emerging and developing economies by IMF as of April 2011 (IMF, 2011).

**Table 2.2 Emerging and Developing Economies by Region**

<b>Region</b>	<b>Country name</b>
<b>Central and Eastern Europe (14)</b>	Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, Latvia, Lithuania, Former Yugoslav Republic of Macedonia, Montenegro, Poland, Romania, Serbia, Turkey
<b>Commonwealth of Independent States (13)</b>	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
<b>Developing Asia (27)</b>	Islamic Republic of Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao People's Democratic Republic, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam
<b>Latin America and the Caribbean (32)</b>	Antigua and Barbuda, Argentina, The Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela
<b>Middle East and North Africa (20)</b>	Algeria, Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Republic of Yemen
<b>Sub-Saharan Africa (44)</b>	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Source: IMF, 2011

### 2.1.3 Developing Countries in Asia

According to IMF data, there are 33 countries referred to as developing countries in Asian region. Those countries are:

**Developing Asia (27):** Islamic Republic of Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao People's Democratic Republic, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam

**Commonwealth of Independent States (6):** Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan

According to the World Bank data, there are total 37 countries referred to as developing in East Asia and Pacific, South Asia and Central Asia. Those countries are:

**East Asia and Pacific (24):** American Samoa, Malaysia, Samoa, Cambodia, Marshall Islands, Solomon Islands, China, Micronesia Fed. Sts, Thailand, Fiji, Mongolia, Timor-Leste, Indonesia, Myanmar, Tuvalu, Tonga, Kiribati, Palau, Vanuatu, Korea Dem. Rep., Papua New Guinea, Vietnam, Lao PDR, Philippines

**South Asia (8):** Afghanistan, India, Pakistan, Bangladesh, Maldives, Sri Lanka, Bhutan, Nepal

**Central Asia (5):** Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan

### 2.1.4 Landlocked Developing Countries in Asia

According to UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS), there are total 31 landlocked developing countries: 15 in Africa, 10 in Asia, 4 in Europe and 2 in Latin America. Figure 2.1 shows the landlocked developing countries in Asia.





**Figure 2.1 Landlocked developing countries in Asia**

Source: UN-OHRLLS, 2011

5 countries including Afghanistan, Kyrgyzstan, Laos, Nepal, and Tajikistan out of total 10 landlocked developing countries in Asia fall under category of low income countries. 4 countries including Bhutan, Mongolia, Turkmenistan and Uzbekistan fall under category of lower middle income countries. Only Kazakhstan falls under category of upper middle income countries according to the World Bank classification.

Table 2.3 shows the Human Development Index of those landlocked developing countries in Asia.

**Table 2.3 Human Development Index of Landlocked Developing countries in Asia**

	Low income				Lower middle income			Upper middle income
Indicator	Nepal	Laos	Kyrgyzstan	Tajikistan	Mongolia	Uzbekistan	Turkmenistan	Kazakhstan
Population without access to improved water source (%), 2008	12	43	10	30	24	13	..	5
Population without access to improved sanitation(%), 2008	69	47	7	6	50	0	2	3
Road density, road per sq.km of land area (in kilometer), 2002-2007	12	13	..	..	..	..	..	3
Population without electricity(%), 2008	55,9	43,5	..	..	34,1	..	..	..
Mobile and fixed-line subscription (per 100 people), 2008	17	35	74	58	74	53	32	117
Internet users (per 100 people), 2008	1,7	8,5	16,1	8,8	12,5	9	1,5	10,9

.. – Not available

Source: Human Development Report, 2010

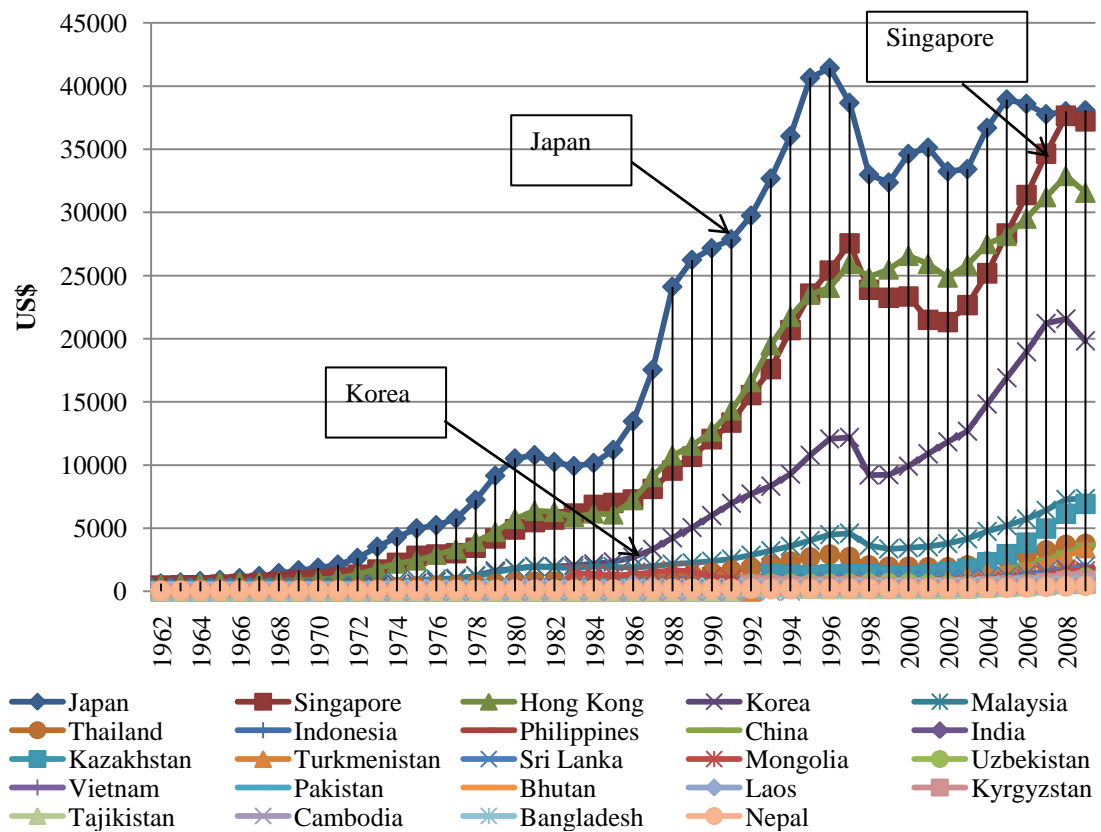
It can be seen that most of those landlocked developing countries are in the poor living condition and lack of basic infrastructure.

## 2.2 Movement of Developing Countries in Asia

For sure, one of the largest factors to reduce poverty is to increase national income per capita level. Various studies prove this fact. Ravallion (2001) shows the proportionate changes in the poverty rate against the growth rate in average income based on the data from 47 developing countries.

While looking through the statistical data history of GNI per capita of Asian countries, it is clear to see their movement of economic development.

Figure 2.1 shows the history of GNI per capita of 24 countries in Asian region from 1962 to 2009. You can see from this figure which country made progress on her development and which country did not.



**Figure 2.2 GNI per Capita of Asian countries, 1962-2009**

Source: World Bank, 2011

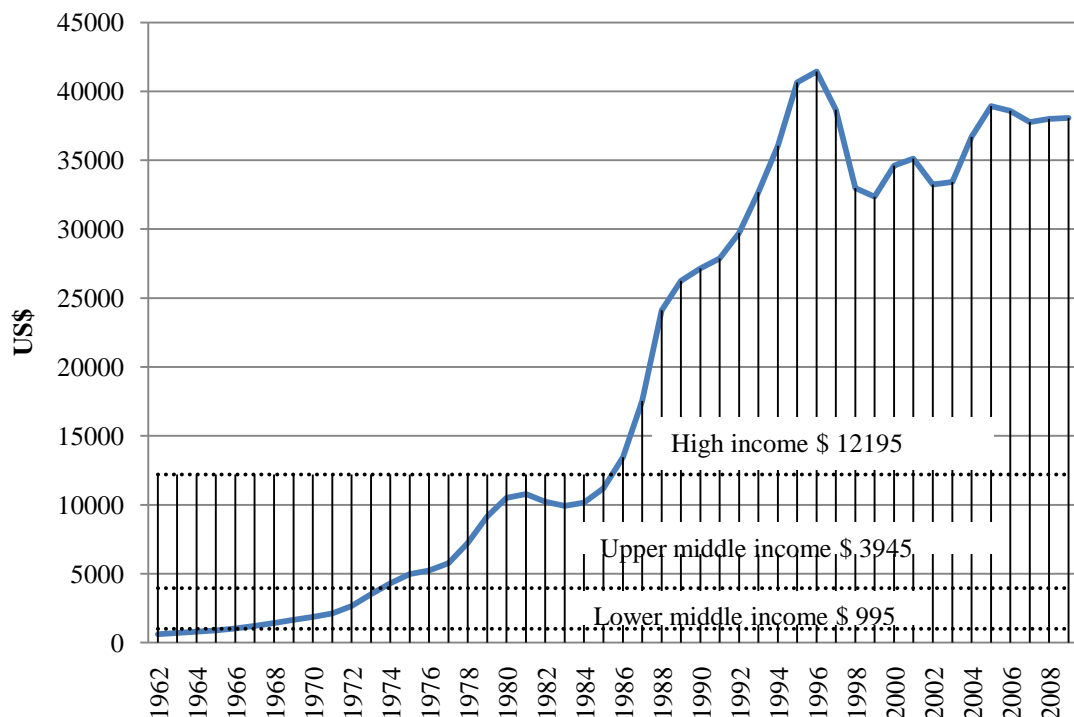
Based on the GNI per capita and characteristic of economic development scheme of those 24 countries, the author did analysis by dividing them into 6 groups.

- Group 1. Japan
- Group 2. Singapore, Hong Kong, Korea
- Group 3. Malaysia, Thailand, Indonesia, Philippines
- Group 4. China, India
- Group 5. Kazakhstan, Turkmenistan, Sri Lanka, Mongolia, Uzbekistan, Vietnam, Pakistan and Bhutan
- Group 6. Laos, Kyrgyzstan, Tajikistan, Cambodia, Bangladesh and Nepal

### Group 1

The country sorted in Group 1 is only Japan. Japan is the most developed country and she is giving big influence to other countries in Asia regarding the economic development.

Figure 2.3 shows the history of GNI per capita of Japan from 1962 to 2009.



**Figure 2.3 GNI per Capita of Japan, 1962-2009**

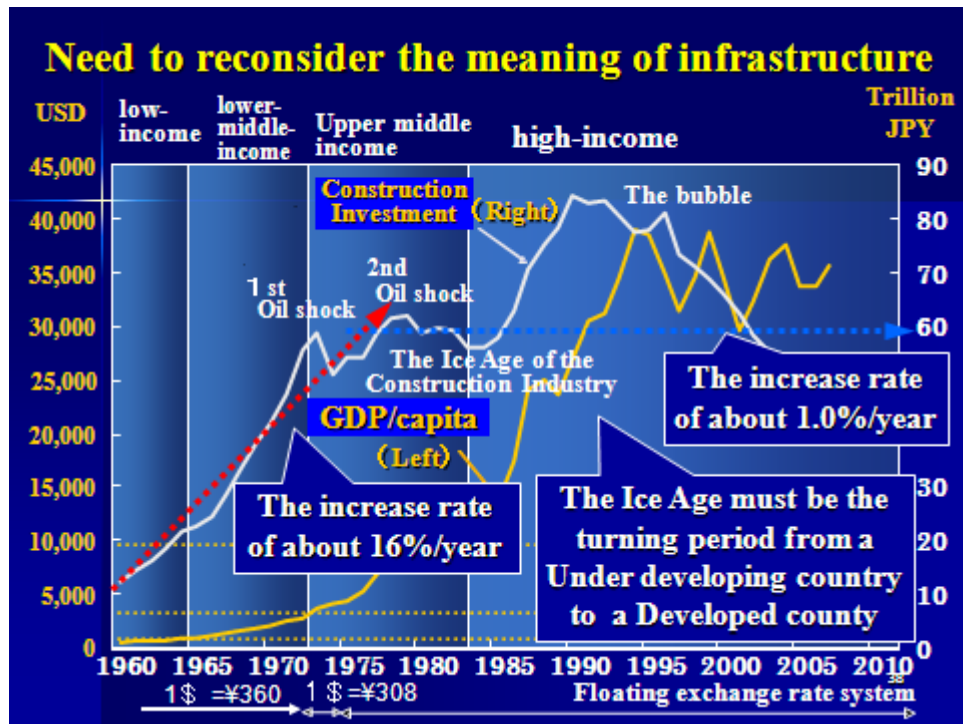
Source: World Bank, 2011

The author made a study related to the history of Japanese GDP per capita. In 1940 before starting World War II, Japanese GDP per capita was about US\$ 2,800. In the same year in 1940, the USA's GDP per capita was about 7,100 dollars. UK had 6,500 dollars and Germany had about 5,600 dollars. Italy had about 5,500 dollars and France had about 4,000 dollars. Although Japanese GDP per capita was the lowest, she had already been categorized one of developed countries in the world at that time.

The war was finished in August 1945, however almost all of infrastructures in Japan were destroyed by continuing bombing operated by the Allied Forces. After the war, Japan needed to spend her effort to restore infrastructures and it took almost 10 year period. The war restoration works almost completed in the middle of 1950s but Japan continued making her effort to develop infrastructure required for economic development until the end of 1970s. In the early 1970s, Japan had moved out from Lower middle income level into the Upper middle income level.

After World War II Japan has developed rapidly from the 1960s to the 1980s, and this case has been called Japanese miracle. Actually Japan is an extraordinary case of highly developed country. It is telling us how infrastructure development is important and it is essential matter for economic development. However, it shall be understood that Japan had already equipped certain level of the technologies for industrialization before the war started. It tells us that the self-development capacity shall be created with appropriate infrastructure plus technologies for industrialization.

Figure 2.4 shows the history of infrastructure investment and GDP per capita of Japan from 1962 to 2009.



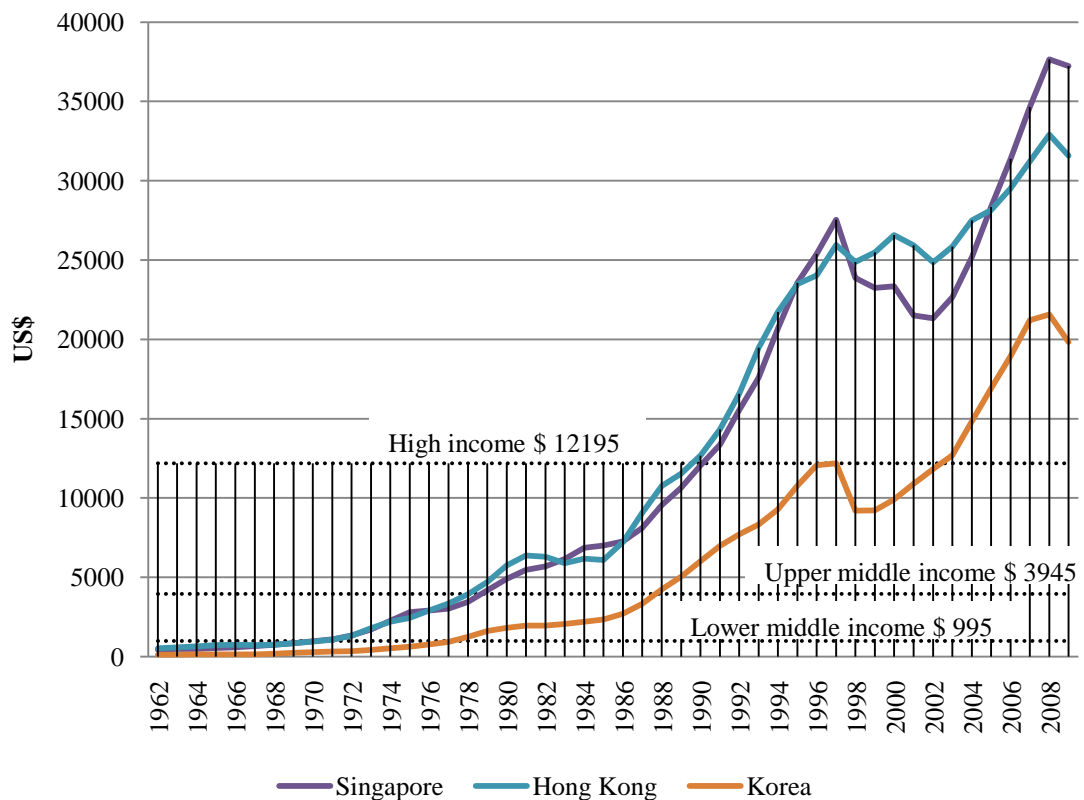
**Figure 2.4 The History of Infrastructure Investment and GDP per Capita**

Source: Kusayanagi, 2010

## Group 2

Group 2 includes the Singapore, Hong Kong and Korea. Those 3 countries were called Asian Tigers because of their rapid development. In the 1980s, Singapore, Hong Kong and Korea had moved out from Lower middle income level into the Upper middle income level. By early 2000, all of those 3 countries entered the high income country level.

Figure 2.5 shows the history of GNI per capita of Singapore, Hong Kong and Korea from 1962 to 2009.



**Figure 2.5 GNI per Capita of Group 2, 1962-2009**

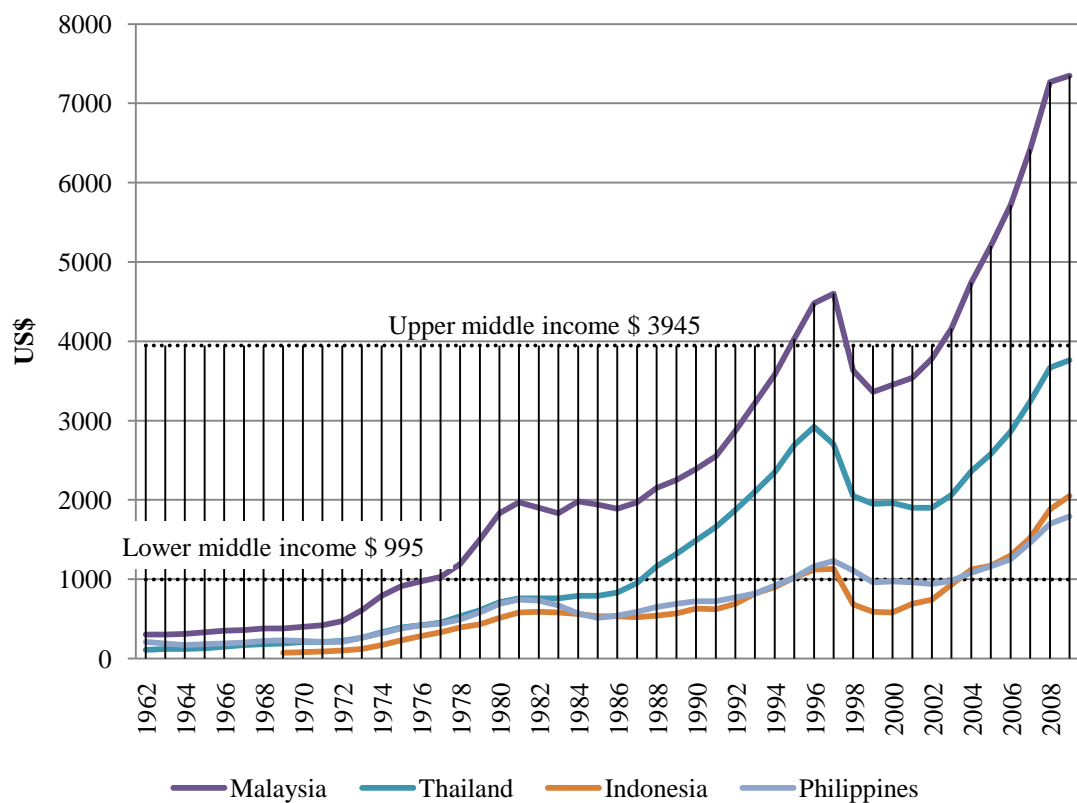
Source: World Bank, 2011

Among those countries, Korea, the most recent entrant to high income level country, provides the good example of the economic development and human development at the same time. Human Development Index of Korea rose at an average annual growth rate of 1.18 % over the period of 1980-2010.

### Group 3

Group 3 includes the East Asian 4 countries; Thailand, Malaysia, Indonesia, Philippines. Rapidly developing those 4 countries are been led by Malaysia. Malaysia already has passed the upper middle income level and now running aggressively to the high income level.

Figure 2.6 shows the history of GNI per capita of Malaysia, Thailand, Indonesia and Philippines from 1962 to 2009.



**Figure 2.6 GNI per Capita of Group 3, 1962-2009**

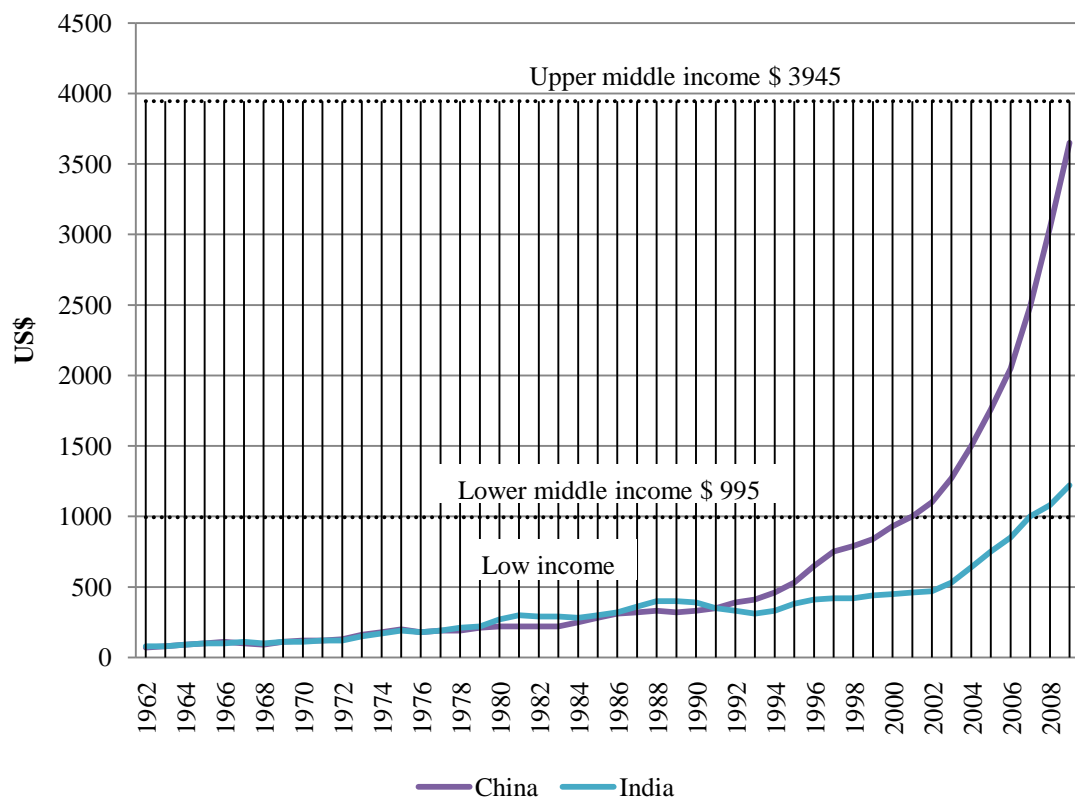
Source: World Bank, 2011



#### Group 4

Group 4 includes China and India. Those 2 countries are not only the most populous nations but also their economic development is growing rapidly. China already took the place of the second biggest economy after USA in the world.

Figure 2.7 shows the history of GNI per capita of China and India from 1962 to 2009.



**Figure 2.7 GNI per Capita of Group 4, 1962-2009**

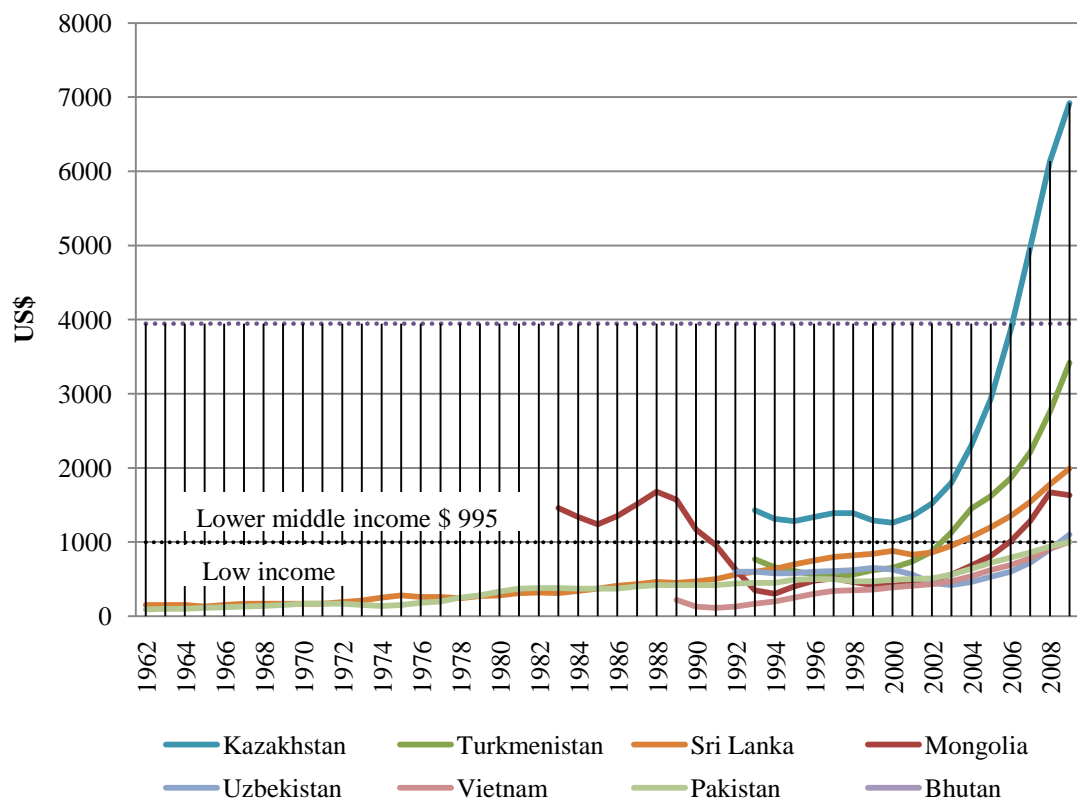
Source: World Bank, 2011

GNI per capita of China is almost there to reach upper middle income level. India just moved up to the lower middle income level.

## Group 5

Group 5 includes Kazakhstan, Turkmenistan, Sri Lanka, Mongolia, Uzbekistan, Vietnam, Pakistan and Bhutan. These countries except Kazakhstan had moved out from Low income level to Lower middle income level in the 2000s.

Figure 2.8 shows the history of GNI per capita of Kazakhstan, Turkmenistan, Sri Lanka, Mongolia, Uzbekistan, Vietnam, Pakistan and Bhutan from 1962 to 2009.



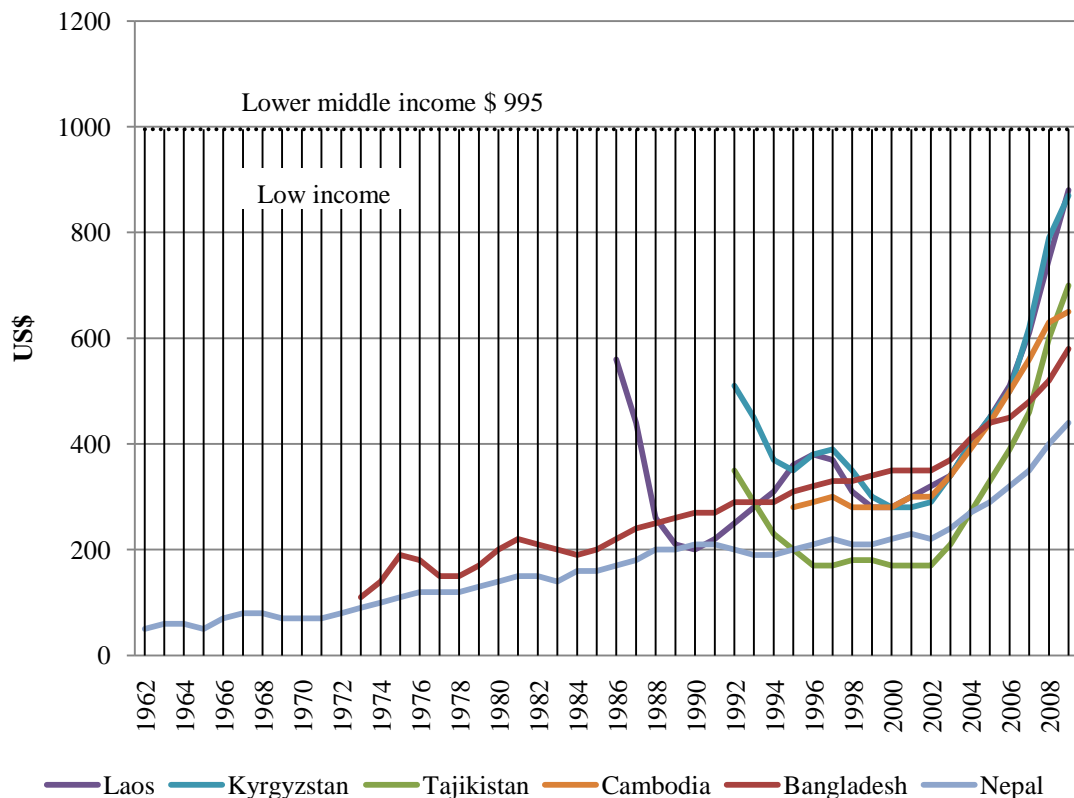
**Figure 2.8 GNI per Capita of Group 5, 1962-2009**

Source: World Bank, 2011

## Group 6

Group 6 includes Laos, Kyrgyzstan, Tajikistan, Cambodia, Bangladesh and Nepal. Although GNI per capita of these countries are growing slowly, they are still remained in Low income level during the 1962-2009.

Figure 2.9 shows the history of GNI per capita of Laos, Kyrgyzstan, Tajikistan, Cambodia, Bangladesh and Nepal from 1962 to 2009.



**Figure 2.9 GNI per Capita of Group 6, 1962-2009**

Source: World Bank, 2011

It is really necessary to know the reasons behind the different stories of development in Asian countries. Why some countries made great development and why some of them still in same income group for about 50 years? What is the main factor to jump from low and lower middle income country to upper middle income country?

### **2.3 Key Problems for Development of a Country**

Although every single country has its own difficulties to grow up, there are several important key problems exist in developing countries.

- Civil wars and regional conflict
- Inadequate governance and legislation
- Geographic location
- Unequal distribution of natural resources
- Ineffective use of resources
- Number of population
- Lack of human resources
- Inefficient economic structure
- Lack of fund

### **2.4 Key Elements for Moving up to the Upper Middle Income Level**

Although there is no simple recipe (scenario) for economic development, there are some key elements to bring the economic development.

#### **1. Structure changes of economic composition**

Making structure changes to economic composition by moving resources from low value-added and low productivity activities such as agriculture to high productivity and high value-added activities such as industry and services brings economic growth. This concept can be seen at the economic composition of different income group countries (Table 2.4).

**Table 2.4 Percentage Contribution to GDP**

	<b>Agriculture</b> (value-added, % of GDP)	<b>Industry</b> (value-added, % of GDP)	<b>Services</b> (value-added, % of GDP)
<b>Low &amp; Middle income countries</b>			
2009	10%	35%	55%
<b>Low income countries</b>			
2009	26%	24%	50%
<b>Lower middle income countries</b>			
2009	13%	39%	48%
<b>Upper middle income countries</b>			
2009	6%	31%	62%
<b>High income countries</b>			
2008	1%	25%	74%

Source: World Bank, 2011

## **2. Use the demographic window effect as leverage**

Working age population proportion in a country has its own cycle. While the working age population proportion was increasing, those developed countries such as Japan and Korea took the advantage of the demographic window effect as leverage to develop. For example, in Japan the demographic window opened in early 1960s, reached peak in 1970s and gradually decreased until 1990s. Japan took this advantage and jumped from low income level country to high income level country from 1960s to 1990s.

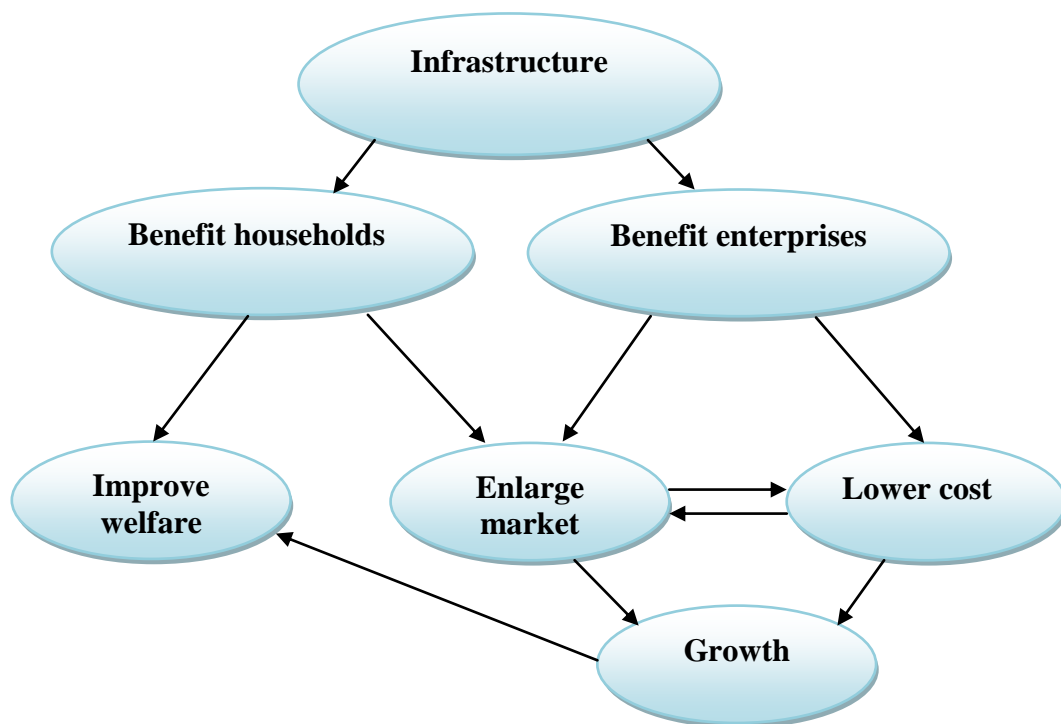
## **3. Human development**

There are numerous studies prove that increases in earnings are directly associated with additional years of education. Also improving man-power skills by educating human resource is important factor for structure changes of the economic composition from low productivity activities to high productivity activities. Recent evidence from India suggests that its growth since 1993 has been associated with an increased demand for skills and a rising skills by increasing wages for skilled workers.

#### 4. Improve infrastructure

Proper infrastructure development is the most essential element of economical development of the any country. Infrastructure development has many direct and indirect effects to the country development. For example improving transportation system in developing countries offers more opportunities to the developing countries to participate in global production processes and international trade.

How does infrastructure contribute to development was clearly explained by Prud'homme R. (2004) in simple scheme (Figure 2.10).



**Figure 2.10 How Infrastructure Contribute to Development**

Source: Prud'homme R. (2004)

Prudhomme R. (2004) explained that,

*“Infrastructure impacts “development” via both households and enterprises, the consumers of infrastructure-related services, and does so through three main mechanisms.*

*For households, infrastructure-related services improve welfare, and often do it in a dramatic fashion; water supply and sanitation, power supply, transportation change the lives of beneficiaries. These welfare improvements do not contribute much to GDP, although one can argue that they improve the quality of the labor force and hence its productivity.*

*The other mechanisms, which are interrelated, have a direct impact on GDP. First, infrastructure supply lowers the cost of some of the inputs used by enterprises. In power or transportation or communication, it can do so by impressive amounts. In so doing, infrastructure acts exactly like technological progress. Lower input costs mean lower total costs, which mean larger markets, and further cost reductions.*

*The most interesting, and perhaps the most important, mechanism of the infrastructure development relationship is market enlargement. It applies to goods markets and to labor markets and even (via telecommunication infrastructure) to capital markets. As noted by Adam Smith more than two centuries ago, transport infrastructure enlarges goods markets, by lowering transport costs, and also by speeding access for perishable merchandises. The progress of telecommunication infrastructure has intensified this enlargement process. With it comes to intensified competition, greater specialization, and economies of scale.*

*Improved infrastructure functions exactly like lower tariffs. It facilitates economic exchanges, and brings the same type of economic benefits. All the analyses that assess the economic benefits due to increased trade can be used to show the contribution of improved infrastructure to economic growth.”*

## **2.5 Conclusion**

While looking through the economic development history of developing countries in Asia from 1962 to 2009, there are very different stories in those developing countries. Among the stories, the country could rapidly developed was only Japan. The author had analyzed that Japan made strong self-development capacity. The development story of Japan proves the scheme about infrastructure contribution to development, mentioned in section 2.4, was true for Japanese case. So the developing countries still in lower middle and low income categories

should consider the infrastructure development carefully. But it is really need to mention that bare infrastructure cannot encourage to the developing countries effectively. The infrastructure which can bring industrial capability is the key for the self-development capacity. Next chapters will discuss about how to develop the infrastructure which brings industrial capability in more details.

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## **Chapter III. Economic Development Schemes for Developing Countries**

### **3.1 Key Facts about 3 Main Schemes (Brief explanations)**

Japan had rapidly developed through own efforts after World War II. However Japan had received support from international organizations and some countries especially from USA in 1950s. From 1946 to 1951 Japan received relief and rehabilitation aid by GARIOA; Government Appropriation for Relief in Occupied Area Fund and EROA; Economic Rehabilitation in Occupied Area Fund with amount of US\$ 2 billion and repaid in full in 1973. In addition to that, Japan developed capital mobilization through World Bank loans with amount of US\$ 863 million from 1953 to 1966 and repaid in full in 1990. Total 31 infrastructure projects including Tanagawa Thermal Power Station, Kurobe No.4 Dam, Tokaido Shinkansen and Tomei Expressway were built by World Bank loans (Kusakabe, 2009).

After World War II with appropriate funding support from international organizations and other countries Japan succeeded to move up from the Lower income level to the Upper income level. Many developing countries have been watching at and trying to follow the development way shown by Japan. However, it must be understood that Japan had already developed the self-development capacity to build infrastructures and manage industries before World War II. Japan started her industrialization since Meiji Era that was started in 1868.

The most concerned matter should be how to develop “the self-development capacity” for a country development. There are 3 main possible schemes a country could use to move up from lower income level to the upper income level from. Those are;

1. To develop Self-development capacity by getting helps from a specific country(s)
2. To develop Self-development capacity by using the ODA scheme

3. To develop Self-development capacity by using the PPP; Public Private Partnership scheme

**1) To get helps from a specific country(s)**

The first possible scheme to develop developing countries is to get helps from a specific country or countries. Although this scheme has own advantages, strongly depending on a specific country or countries is not a favorable position for the country itself and her independence. Especially the countries which has small population should aware this situation. Mongolia is one of the countries needed to follow this way. Starting from 1920s until 1990s, Mongolia had received enormous amount of aid from Soviet Union. The development brought together with the aid had impressive impact on Mongolian development. But the country Mongolia also lost many historical and cultural treasures during the 70 years. Even Mongolia ignored her traditional script which was used since Great Chingis Khaan period and adopted Cyrillic script from Russia.

Moreover, the Stalinist Repressions in Mongolia started in 1922, peaked in 1937 and continued till 1985 in Mongolia. Starting the fall of 1937, approximately 22,000 (Kaplonski, 2002) to 35,000 people which were 3-4% of total population of Mongolia on that time especially highly educated Mongolian elite group people were killed in the purges. The purges affected the whole country, although the main focus was on upper party and government ranks, the army, and especially the Buddhist clergy. One very common accusation during World War II was collaboration with supposed Japanese spy rings. The total number of people killed in the purges is still not clear. Some sources say that up to 100,000 victims.

Although Mongolia had received many kinds of support from Soviet Union, country itself could not receive the capacity of self-development during 70 years of socialist system. After Soviet Union collapsed and all subsidies stopped, Mongolia faced the big recession in the early 1990s. For developing countries like Mongolia, it is really need to help them to develop their own self-development capacity.

## **2) The scheme using ODA**

One of the efficient schemes which have been implemented in the most of developing countries around the world is ODA scheme. This scheme was started after World War II and it was originally made as the war reconstruction and development scheme for both developed and developing countries. Many countries have developed self-development capacity by ODA scheme but some countries have not. In Section 3.2 it will be discussed about the ODA scheme and its problems in more details.

## **3) The scheme using PPP; Public Private Partnership**

Since the late 1980s, public-private partnerships (PPP) have become popular not only in many developing countries but also in developed countries around the world. This scheme is applied for developing infrastructure which the public sectors have difficulties and/or disadvantages to implement. The public sectors choose the PPP scheme as effective scheme for improving public infrastructure without dependent on the only scarce public fund and achieving to the goal by private sector involvement. In Section 3.4 it will be explained about this scheme in more details.

## **3.2 The Current Situation of ODA**

### **3.2.1 What is ODA?**

Generally, ODA; Official Development Assistance is the aid given from member countries of Development Assistant Committee (DAC) of Organization for Economic Co-Operation and Development (OECD) to the developing countries.

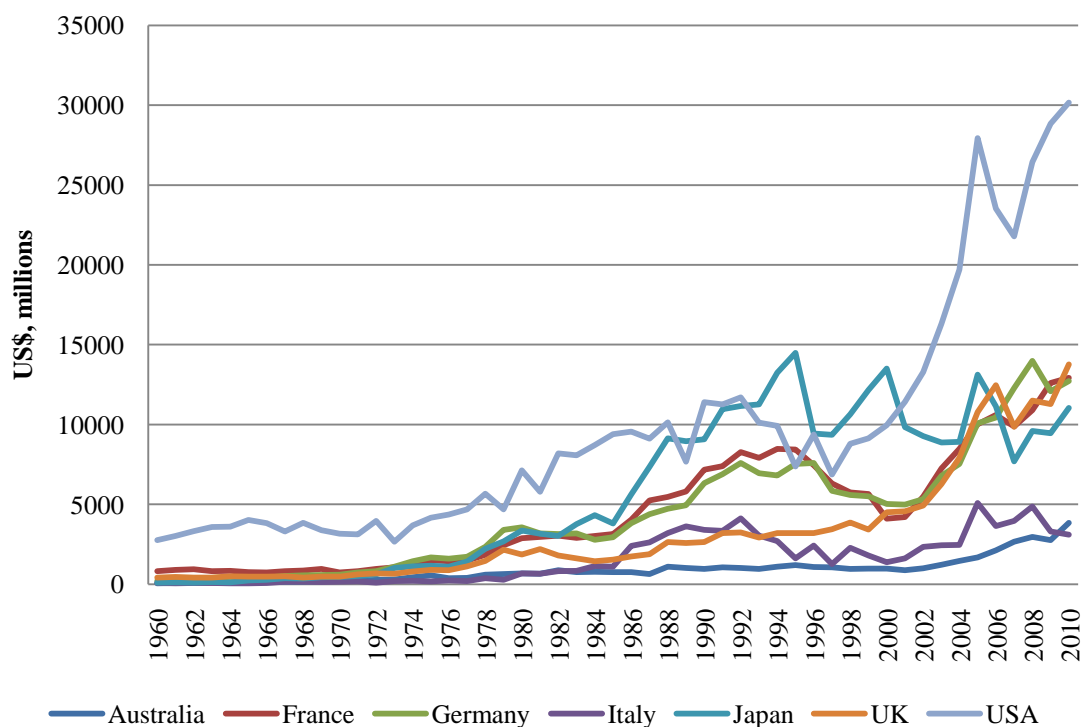
OECD was established in 1961. But history of OECD was dated back to 1947 when The Organization for European Economic Cooperation (OEEC) was established to run the US-financed Marshall Plan for reconstruction of a continent ravaged by war. In December 1960, Canada and USA signed to join the OEEC and the global organization as OECD was born that time. In 1964, Japan joined to the OECD members followed by many other countries.

As of in January 2011 there are 34 countries as the members of the OECD around the world. These are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States (OECD, 2011).

ODA consists of flows to developing countries and multilateral institutions provided by official agencies, including state and local governments, or by their executive agencies, each transaction of which meets the following test (Fuhrer, H. 1996);

1. It is administered with the promotion of the economic development and welfare of developing countries as its main objective, and
2. It is concessional in character and contains a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent).

Figure 3.1 is showing ODA net disbursements from Major DAC Donor Countries from 1960 to 2010. During 50 years period of time, major DAC donor countries disbursed total US\$ 2.5 trillion and the major DAC donor countries increased disbursements after the September 11 attacks.



**Figure 3.1 ODA Net Disbursements: Trend in Major DAC Donor Countries, 1960-2010**

Source: OECD, 2011

### 3.2.2 Types of ODA

There are following 2 types of ODA;

1. Multilateral ODA
2. Bilateral ODA

#### Multilateral ODA

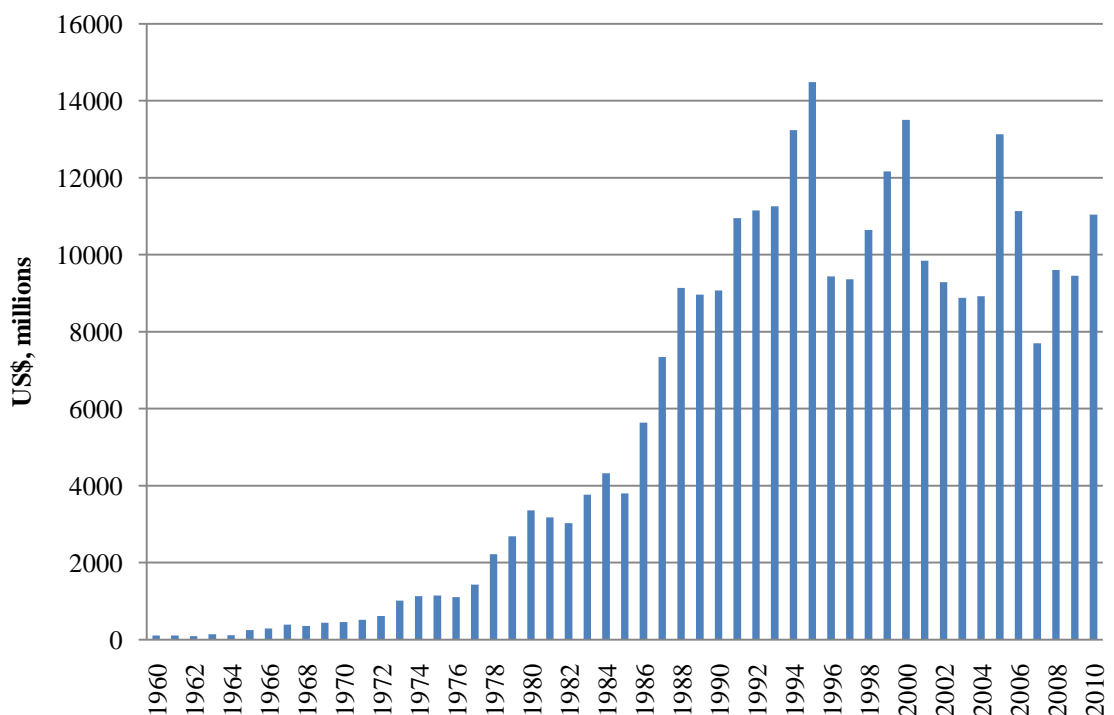
Multilateral institutions involve in development assistance can be broadly divided into two categories. The first group consists of international financial institutions that primarily provide funds needed for development, while the second group consists of various United Nations agencies which engage in economic, social and humanitarian activities (Niraula R, 2006).

## Bilateral ODA

Bilateral ODA is a kind of development assistance directly provided by a country to another country based on their relationships. Although the bilateral ODA is usually provided by a developed country to a developing country, also a developing country can provide bilateral ODA to another developing country (Niraula R., 2006).

### 3.2.3 Japan's ODA

Japan started the reconstruction in Asian Countries after World War II by making reparation agreement with Burma in 1955, the Philippines in 1956, Indonesia in 1958 and South Vietnam in 1960. Since joined to OECD in 1964, Japan has been one of the biggest contributors of ODA in DAC, OECD (Figure 3.2).



**Figure 3.2 ODA Net Disbursements: Japan, 1960-2010**

Source: OECD, 2011

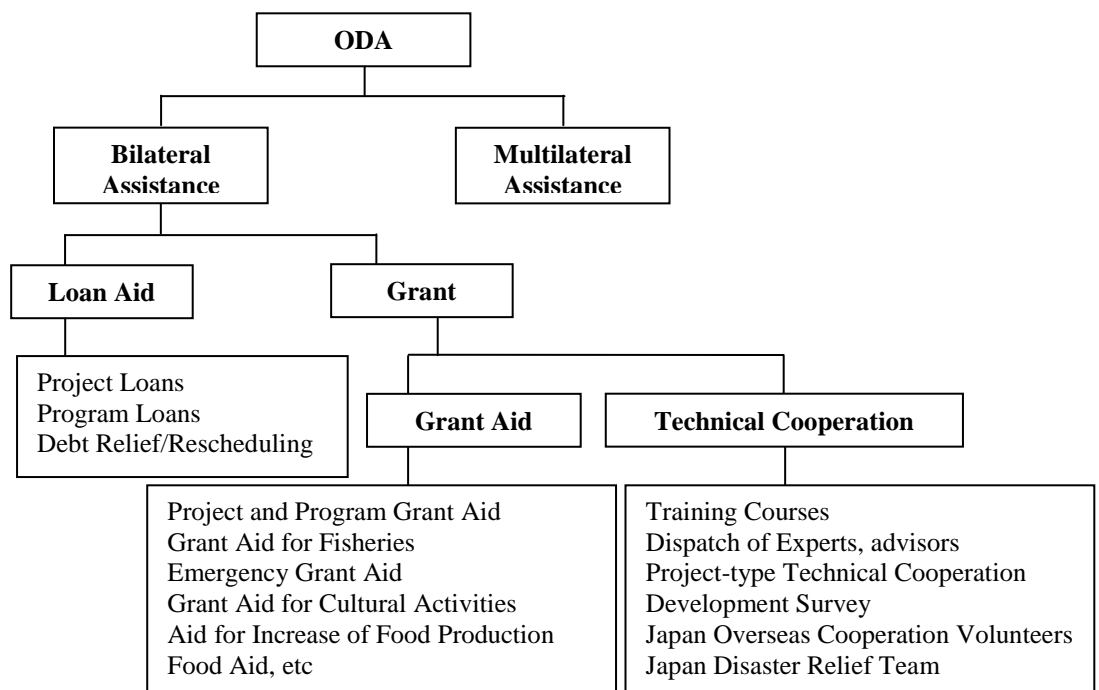
In Japan, assistance to the developing countries for their economic development is referred as economic cooperation. In terms the flow of financial

resources, economic cooperation is divided into 4 categories;

1. Official Development Assistance (ODA)
2. Other Official Flows (OOF)
3. Private flows (PF)
4. Grants by private non-profit agencies

ODA is referred as the flow of funding meets several requirements.

- Provided by official agencies or by their executive agencies
- Administered with the promotion of economic development and welfare of developing countries as its main objective; and
- Concessional in character to avoid severe burdens on developing countries and conveys a grant element of at least 25%. Grant element means an indicator to show softness of lending condition. Figure 3.3 shows the Japan's ODA structure and types.

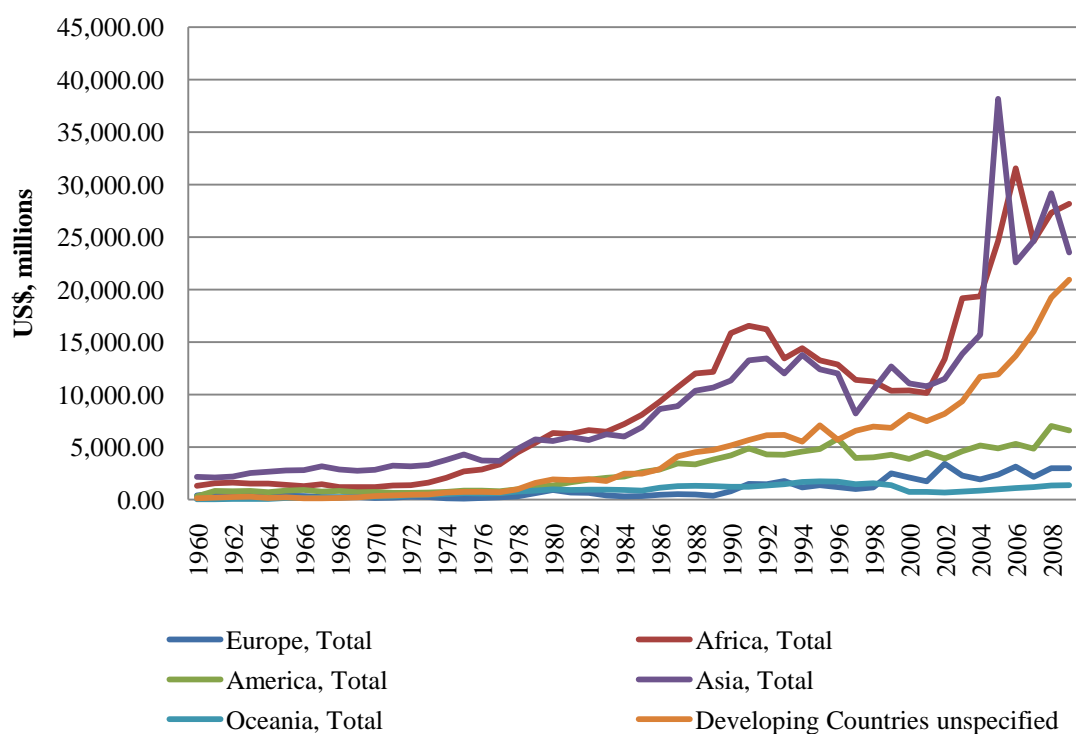


**Figure 3.3 Japan's Official Development Assistance**



### 3.2.4 ODA Activities and its Effectiveness

The most of the developing countries receive ODA from OECD. Since the OECD was established in 1961 DAC have spent almost US\$ 2.5 trillion (Lessmann and Markwardt, 2011) and within last 20 years approximately US\$ 1 trillion already spent for the ODA. Figure 3.4 shows the total ODA recipients by region 1960-2009. From the Figure 3.4, it can be seen that 2 regions; Africa and Asia have been the top ODA recipients since 1960 till today.

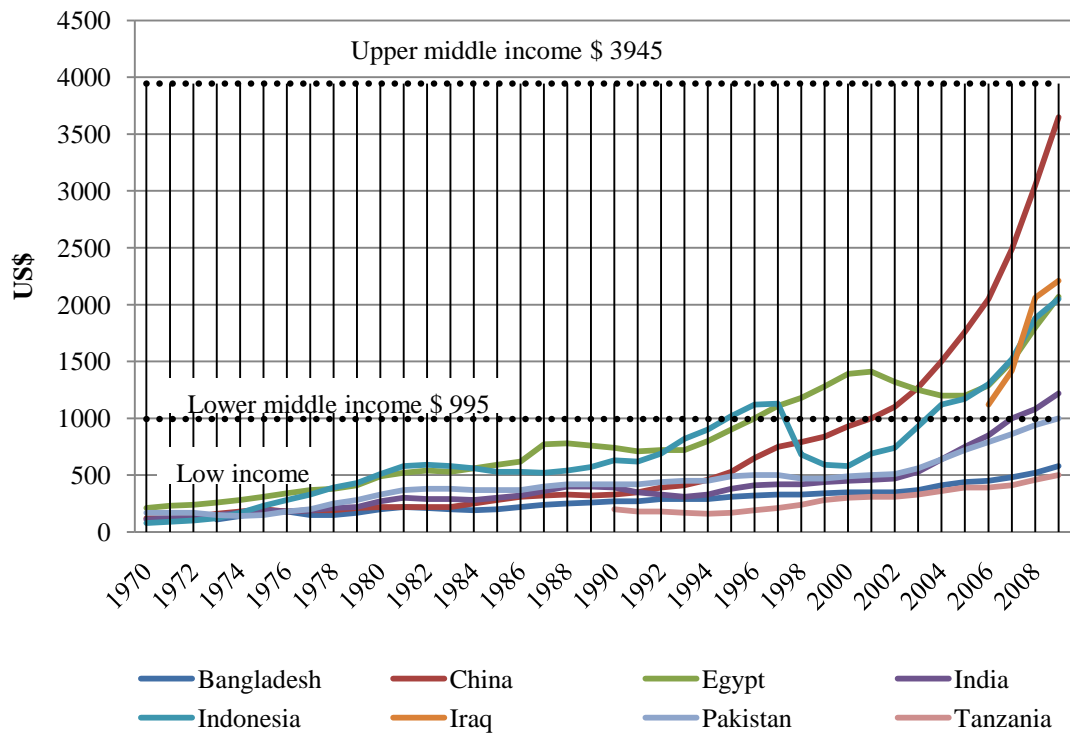


**Figure 3.4 ODA Net Disbursements by Region, 1960-2009**

Source: OECD, 2011

But the effectiveness of ODA is still not clear. There are many studies about ODA and its effectiveness to the development of the developing countries. Firstly, Papanek (1973) determined that a foreign aid and growth have positive relationship. Dowling and Hiemenz (1982) and Levy (1988) found same result with Papanek. But at the same time Voivodas (1973) and Mosley et al.(1987) could not found the same result as Papanek.

According to the data from the Development Aid at a Glance 2011, 8 countries including Bangladesh, China, Egypt, India, Indonesia, Iraq, Pakistan, and Tanzania have been the largest ODA recipients since 1970 (OECD, 2011). However, as shown in Figure 3.5, none of these countries are able to reach the Upper middle income level in last 40 years. Moreover, half or 4 of these countries still fall under category of the Low income country since 1970. The data says that the ODA has some matters that shall be reconsidered in its scheme. It is necessary to recheck the way of infrastructure development in recipient countries and whether they have the scheme related to the self-development capacities or not.

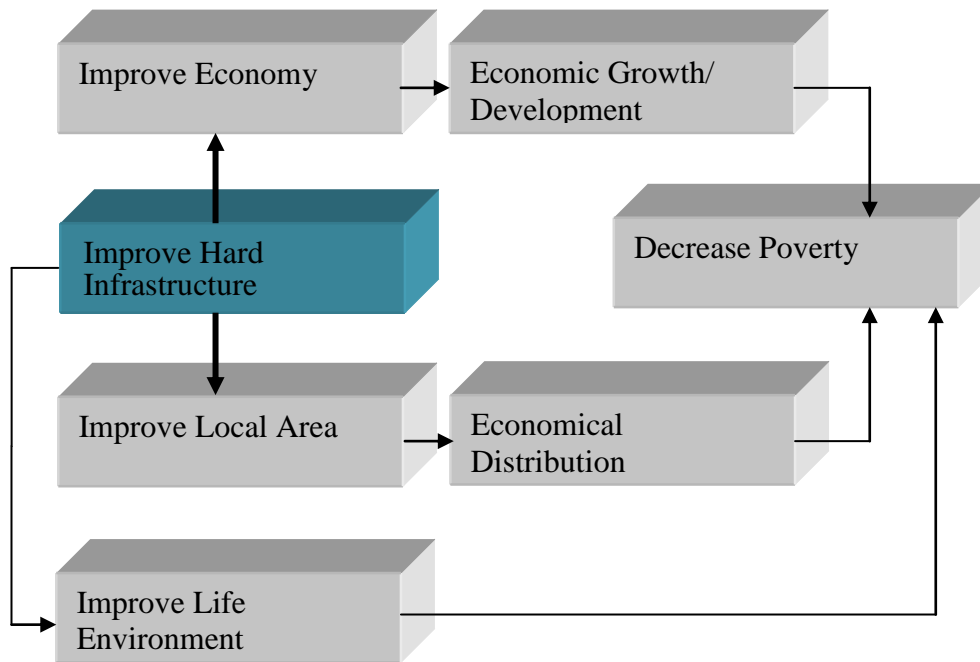


**Figure 3.5 GNI per Capita of the Largest ODA Recipients, 1970-2009**

Source: The author's compilation from OECD (2011) and World Bank (2011)

### 3.2.5 Problems Inherent in Current ODA System

Figure 3.6 shows the basic execution scheme and the philosophy of ODA. As described on this figure the traditional ODA scheme has the philosophy starting from the “Improve Hard Infrastructure”. It says that the Improve Hard Infrastructure creates 3 different movements those are “Improve Economy”, “Improve Local Area” and “Improve Life Environment”. Those 3 movements finally effect decreasing the poverty.



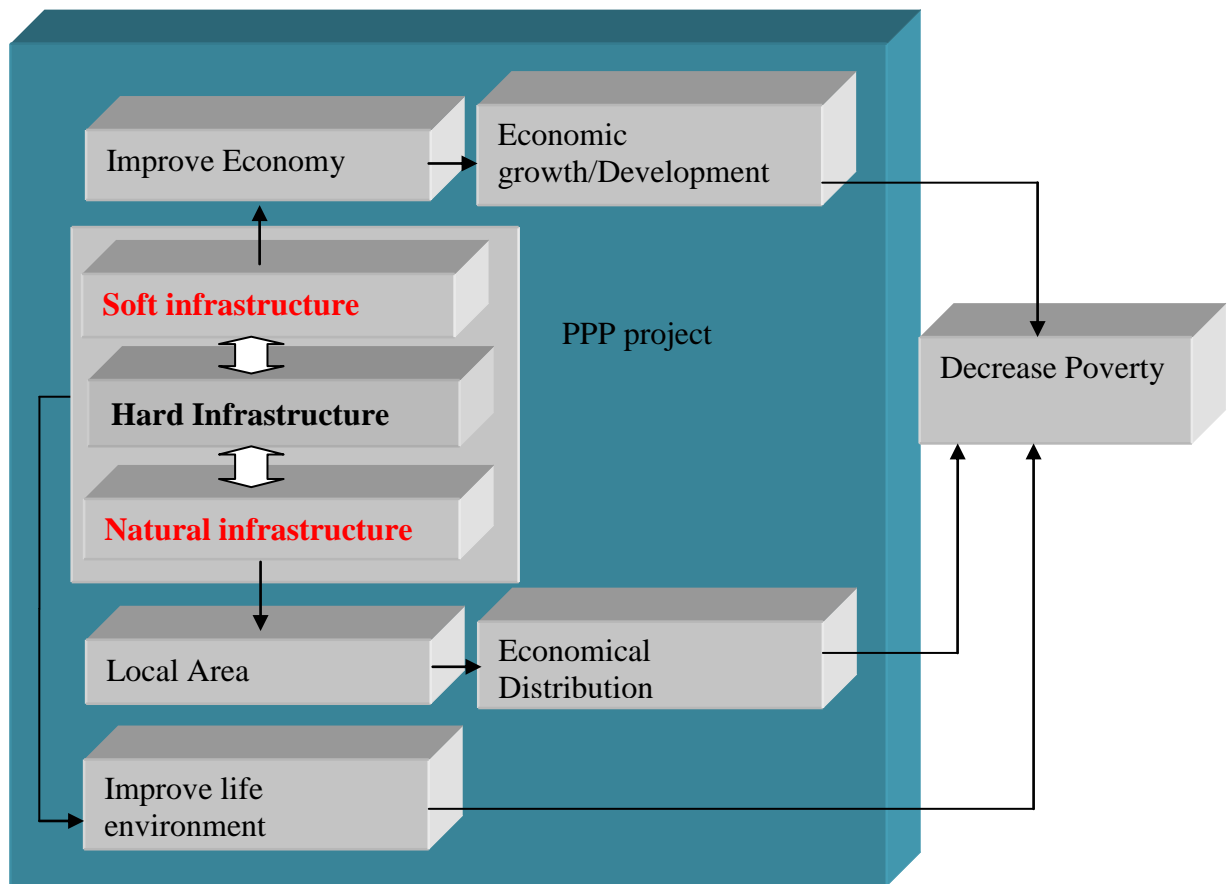
**Figure 3.6 Traditional ODA Scheme**

It can be understood that the main concern of the traditional ODA scheme to develop the hard infrastructure. It says that the traditional ODA scheme does not have the concerns for the natural infrastructure and soft infrastructure. Consequently the infrastructure development way in the recipient countries contains difficulties and it does not keep the proper functions for creating the self-development capacities. The traditional ODA system needs to be improved by including the natural infrastructure and soft infrastructure.

### 3.2.6 The Changes Required for ODA Scheme

For improving current situation of ODA scheme, it is needed to give support to

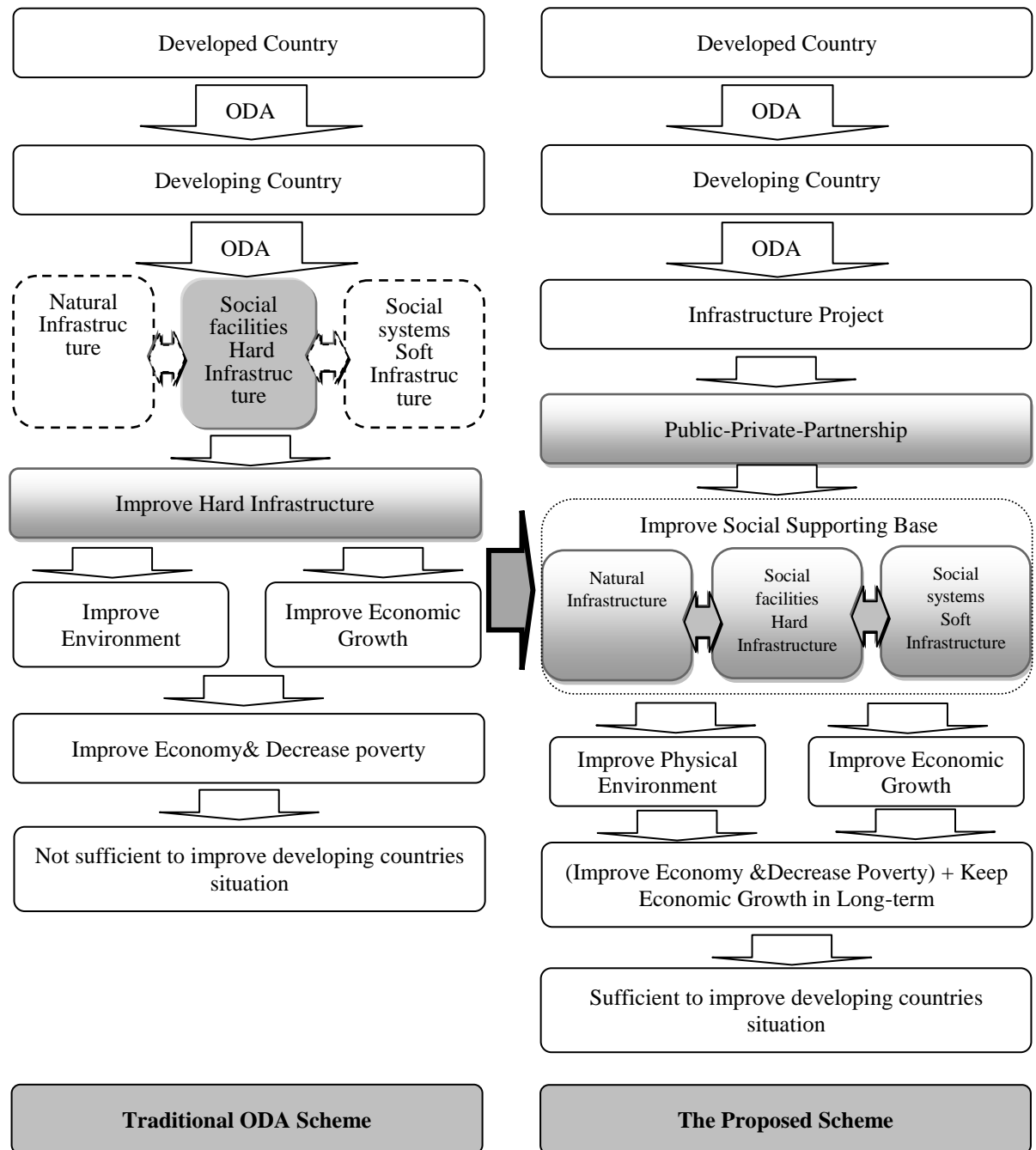
develop not only hard infrastructures but also other areas. The purpose of providing ODA should be made support for the recipient countries to build up their own self-development capacity. The proposed scheme for ODA project is shown in Figure 3.7. The basic idea of the proposed scheme is to develop hard infrastructure together with considering Soft infrastructure and Natural infrastructure. This concept will bring the long-term economic development to the developing countries.



**Figure 3.7 Proposed ODA Scheme**

And also the proposed scheme is shown together with the existing scheme in Figure 3.8. The main difference of these two schemes is the ability to continue the economic development of developing countries after completion of the project. Only bare hard infrastructure is not sufficient enough to improve the economy without proper development of other factors such as policy, education etc... So

the developing countries are not able to use sufficiently the hard infrastructure for their economic development.



**Figure 3.8 The Traditional ODA Scheme versus the Proposed Scheme**

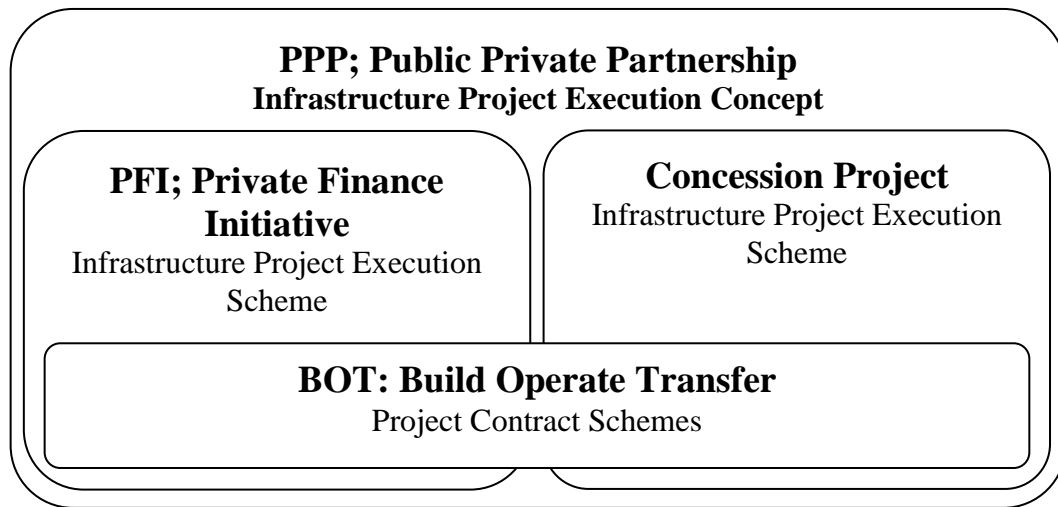
For building up the self-development capacity of developing countries, there is a need of strong support for developing the infrastructure and human resources at the same time. This idea can be completed by enhancing the capacity for developing value added economic activities. As mentioned in the hypothesis, the Special Economic Zone scheme is crucial for the developing countries. If ODA supports to develop SEZs in the developing countries effectively, it will be a huge impact to the current situation of the developing countries by enhancing infrastructure and human resources at the same time.

### **3.3The Current Situation of PPP**

#### **3.3.1 What is PPP?**

Kusayanagi S. together with his research group made several studies regarding PPP scheme. He found that the understanding and definition on PPP scheme were not the same, every country has own understanding and definition of the PPP scheme. PFI; Private Finance Initiative scheme was originally from United Kingdom. Harris (2004) mentioned that due to successful cases in UK, PFI scheme became popular in other countries. On other hand Concession Project Execution scheme was originally fund in France and became popular in other countries. Now days many countries have started to say the PPP. The similar concept of the PPP; Public Private Partnership was also started in Japan in 1980s. It was called “Dai-san Sector (third sector) project Execution”.

Kusayanagi S. defined the PPP as the infrastructure project execution concept combined the function of public organizations and the functions of private organizations. He defined that both PFI; Private Finance Initiative and Concession Project Execution were the project execution scheme and BOT: Build Operate Transfer and its modifications like BOO, BTO etc., were the project contract schemes. Figure 3.9 shows his definition.



**Figure 3.9 The Understanding and Definition on PPP Scheme**

Source: Kusayanagi S.

There are several advantages of PPP scheme such as;

- ① Speed up infrastructure development
- ② Speed up project implementation time
- ③ Reduce total cost of project
- ④ Risk allocation
- ⑤ Improve performance
- ⑥ Improve service quality

### 3.3.2 PPP types

PPP comes in many different arrangements depending on the phases of project development, finance, implementation, operation, and maintenance. Types of PPP and their comparison are shown in Table 3.1.

**Table 3.1 Comparison of PPP Types**

Type	Form	Funding	Private risk	Risk transfer	Duration
<b>Traditional</b>	Contract with private to design and build public facilities	Government	• In design and construction	• Design • Construction	During design and construction period
<b>Turnkey</b>	Contract with	From	• In design and	• Design	During design

	private design public facility	to and	government and given to private after project finished	construction	• Construction	and construction period
<b>LDO(Lease-Developed-Operate)/BDO (Build-Developed-Operate)</b>	Agreement long term leasing or buying the existing facility by private operate and developed	Government in construction stage and private in operation and development stages	In Operational and development	Operational development	10-20 years	
<b>O (Operation) and M (Management)</b>	Cooperation in which government give operation and maintenance right to private	Government in construction stage and private in operation and development stages	• Operational	Operational	2-10 years	
<b>Concession</b>	Agreement to have service provision right	Private	In <ul style="list-style-type: none"><li>• Design</li><li>• Construction</li><li>• Operational</li><li>• Financial</li></ul>	<ul style="list-style-type: none"><li>• Design</li><li>• Construction</li><li>• Financial</li><li>• Asset management and maintenance</li><li>• Revenue</li></ul>	25-30 years	
<b>Divestation</b>	Agreement to sell fully or partly infrastructure asset to private	Private	In <ul style="list-style-type: none"><li>• Design</li><li>• Construction</li><li>• Operational</li><li>• Financial</li></ul>	<ul style="list-style-type: none"><li>• Design</li><li>• Construction</li><li>• Financial</li><li>• Asset management and maintenance</li><li>• Revenue</li></ul>	25-30 years	



<b>BOT(Build-Operate-Transfer)</b>	Agreement with private to build and operate the infrastructure facility	Mostly private	on	In	<ul style="list-style-type: none"> <li>• Design and Construction</li> <li>• Operational</li> <li>• Financial</li> </ul>	<ul style="list-style-type: none"> <li>• Design, Construction and Financial</li> <li>• Asset management and maintenance</li> <li>• Revenue</li> </ul>	25-30 years
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Source: Karsaman R. H. and Naimah S. (2009)

### BOT types

- ① BTO: Build-Transfer-Operate
- ② BOO: Build-Own-Operate
- ③ BLT: Build-Lease-Transfer
- ④ ROT: Rehabilitate-Operate-Transfer
- ⑤ RLT: Rehabilitate- Lease-Transfer
- ⑥ DBFO: Design-Build-Finance-Operate

**Table 3.2 Advantages and Disadvantages of PPP types**

Type	Advantages	Disadvantages
<b>Traditional</b>	<ul style="list-style-type: none"> <li>• Risk avoidance is available</li> <li>• Can accelerate duration. Lowering cost and support construction innovation</li> </ul>	<ul style="list-style-type: none"> <li>• There is operational risk</li> <li>• Life cycle analysis is not counted</li> <li>• Not interested private</li> </ul>
<b>Turnkey</b>	<ul style="list-style-type: none"> <li>• Risk transfer is available</li> <li>• Can accelerate construction</li> <li>• Can increase construction quality</li> <li>• Efficiency in construction stage</li> </ul>	<ul style="list-style-type: none"> <li>• More complicated procedure to determine the winner of tender</li> <li>• There is additional cost if operational facility is changed after the contract agreed</li> <li>• There is financial risk from government side</li> </ul>
<b>LDO/BDO</b>	<ul style="list-style-type: none"> <li>• Government could earn money from leasing or buying the facility</li> <li>• Government no need to spend</li> </ul>	<ul style="list-style-type: none"> <li>• Government can lost control over existing facility</li> <li>• Difficult to determine asset value when leasing or buying</li> </ul>

	<ul style="list-style-type: none"> <li>capital to develop or upgrade the facility</li> <li>Financial risk is transferred to private party</li> <li>Both parties can take revenue from this agreement</li> <li>Service quality increase in line with facility increment</li> <li>Quality increasing, cost and time efficiency during facility development</li> </ul>	
<b>O and M</b>	<ul style="list-style-type: none"> <li>Potentially increasing service quality and efficiency that can decrease cost</li> <li>Wide contract structure</li> </ul>	<ul style="list-style-type: none"> <li>There is additional cost if private performance is not very good</li> <li>Government control and ability is less in response to public need</li> </ul>
<b>Divestation</b>	<ul style="list-style-type: none"> <li>Government only act as regulator</li> <li>In partial divestation, government still have control to the asset</li> <li>Attract private sector to financial sector</li> <li>Increasing asset management efficiency and keep public interest</li> </ul>	<ul style="list-style-type: none"> <li>Tariff monopoly could happen</li> </ul>
<b>BOT</b>	<ul style="list-style-type: none"> <li>Partial risk transfer is available</li> <li>Can accelerate construction</li> <li>Can increase operational and maintenance quality</li> <li>Efficiency lead to saving</li> <li>Government control still exists</li> <li>Asset still belong to government</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to replace incompetent private party</li> <li>Contract complication</li> <li>Need contract management system</li> </ul>

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Source: Karsaman R. H. and Naimah S. (2009)

### 3.4 Conclusion

Among those 3 schemes, experiences in many countries show that PPP scheme is very effective scheme for development of the developing countries. Even PPP scheme have been used for the development of SEZs in developing countries. But there is a need to change the current feasibility study scheme used for developing SEZs due to implementing SEZs by PPP scheme. The author made the new scheme of feasibility study useful for SEZ projects to be implemented by PPP scheme. The new scheme of the feasibility study will be discussed in Chapter 4.

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## **Chapter IV. SEZ Scheme as an Effective Scheme of a Country Development**

The economic development of a country is strictly tied to a wealth creation. A wealth is created only through production chain. Production chain is basically the steps that need to be taken in order to transform raw materials into goods. Recent development scheme showed that a country could be in any part of the production chain and still be creating significant income. In the globalized world, all the production activities in the world are connected to each other in some way directly and indirectly. So the country herself needs to pay attention to involve in the any part of the production chain.

The country also needs to search the possibility to be the existing part of the production chain additionally or make a new part of the production chain. And the country needs to improve the social supporting base which consists of Social systems (Soft infrastructure), Social facilities (Hard infrastructure) and Natural environment (Natural infrastructure), to make a friendly environment for creating income.

As mentioned in the end of Chapter 1, to develop SEZ has been the one of the main schemes to encourage developing countries for the last five decades. Considering these matters, the most practical and effective scheme for being a part of production chain and for industrial development in a country is direct industrial development by establishing SEZ. That is why SEZ scheme has been selected as an effective self-development scheme by many developed countries while they were moving up from the lower income level to the upper income level.

In this chapter the author will discuss the history of SEZ and the countries' movements and backgrounds toward setting up SEZs in the world.

## 4.1 Special Economic Zone

Firstly the reason to develop SEZ should be clarified. Many developing countries try to attract foreign investment because they are lack of resources for development of productive capacity. However, potential investors coming from outside the country will not have strong interest to invest due to unfavorable business environment such as unendurable bureaucracy, not well organized laws and regulation restriction etc. A country who wants to develop productive capacity needs to set up a government policy offering incentives and preparing more favorable business environment for attracting foreign investors. This is the key point of establishing SEZ. Generally SEZ is framework of policy for making a specific area more attractive for investment. Thus the definition of Special Economic Zone (SEZ) is like that;

*“Special Economic Zone (SEZ) is geographically delimited area which is treated as being outside domestic customs territory. SEZ has special policy in the zone and offers certain incentives for businesses which locate in the zone especially tax breaks.”*

However every country, which has developed SEZ, has used different terms depending on their specialties. Therefore, there are many different terms for SEZs or similar zones in different countries. As following Table 4.1 is telling, Kusago and Tzannatos (1998) specified around 19 different terms are used to describe SEZ.

**Table 4.1 Terms used to describe SEZ**

Term	Main users and date of first use
<b>Free trade zone</b>	Traditional term since 19 <sup>th</sup> century; ILO; International Labour Office (1982)
<b>Foreign trade zone</b>	Individual authors: R.S.Toman, 1956; W.Dymsza, 1964), India (1983)
<b>Industrial free zone</b>	Ireland (pre-1970), UNIDO; United Nations Industrial Development Organization (1971), Liberia (1975)

<b>Free zone</b>	UNCTAD; United Nations Conference on Trade and Development (1973), USAID; United States Agency for International Development (1982), United Arab Emirates (1983)
<b>Maquiladoras</b>	Mexico (early 1970s)
<b>Export free zone</b>	Ireland (1975), UNIDO (1976)
<b>Duty free export processing zone</b>	Republic of Korea (1975)
<b>Export processing free zone</b>	UNIDO (1976), UNICTAD (1983)
<b>Free production zone</b>	Starnberg Institute (1977)
<b>Export processing zone</b>	Philippines (1977), Harvard University (1977), APO; Asian Productivity Organization(1977), WEPZA; World Export Processing Zone Association (1978), UNIDO (1979), Malaysia (1980), Pakistan (1980), Singapore (1982), UNCTC; The United Nations Centre on Transnational Corporations (1982), ILO ; International Labour Organization (1983), The economist (1979)
<b>Special economic zone</b>	China (1979)
<b>Tax free zone</b>	Individual authors (W.H. and D.B. Diamond, 1980)
<b>Tax free trade zone</b>	Individual author (D.B. Diamond, 1980)
<b>Investment promotion zone</b>	Sri Lanka (1981)
<b>Free economic zone</b>	Individual author (H. Grubel, 1982)
<b>Free export zone</b>	Republic of Korea (1983)
<b>Free export processing zone</b>	OECD ; Organization for Economic Co-operation and Development (1984)
<b>Privileged export zone</b>	Individual author (N. N. Sachitanand, 1984)
<b>Industrial export processing zone</b>	Individual author (P. Ryan, 1985)

Source: Kusago and Tzannatos (1998)

As the time goes, special economic zone concept has varied to different types of zones by objectives, activities and markets. The most common used types of zones are shown on Table 4.2.

**Table 4.2 Types of Zones**

<b>Type of Zone</b>	<b>Development Objective</b>	<b>Physical Configuration</b>	<b>Typical Location</b>	<b>Eligible Activities</b>	<b>Markets</b>
Free Trade Zone	Support Trade	Size < 50 ha	Ports of Entry	Trade Related activities	Domestic, Re-export
Traditional Export Processing Zone	Export Manufacturing	Size < 100 ha, total area is EPZ	None	Manufacturing, processing	Mostly export
Hybrid Export Processing Zone	Export manufacturing	Size < 100 ha, only part of the area is EPZ	None	Manufacturing, processing	Export, Domestic market
Freeport	Integrated development	Size > 100 km <sup>2</sup>	None	Multi-use	Domestic, Internal and Export markets
Enterprise Zone, Urban Free Zones	Urban revitalization	Size < 50 ha	Distressed urban or rural areas	Multi-use	Domestic
Single Factory EPZ	Export manufacturing	Designation for individual enterprises	Countrywide	Manufacturing, other processing	Export market

Source: FIAS; The Multi-Donor Investment Climate Advisory Service of World Bank Group (2008)

It is difficult to say exact number of SEZs due to the different terms used interchangeably in different countries, but there are approximately 3,500 SEZs in the world now days.



## 4.2 History of SEZ

SEZ concept has long history. For activating international trade, SEZs were established along the international trade routes centuries ago. Those citywide SEZs were established as follows (FIAS, 2008);

- 1704 in Gibraltar,
- 1819 in Singapore,
- 1848 in Hong Kong,
- 1888 in Hamburg, and
- 1891 in Copenhagen

However the new page of history of SEZ started together with establishment of Shannon SEZ in Ireland in 1959. The number of zones has grown dramatically since that time. In Western Europe, most industrialized countries established zones before 1970s. According to the data published by World Bank in 1992, SEZs were started to establish in Asian developing countries as follows;

- 1965 - Kandla in India
- 1965 - Kaohsiung in Taiwan
- 1970 - Masan in the Republic of Korea
- 1971 - Sungei Way in Malaysia
- 1971- Thailand
- 1972 - Bataan in the Philippines
- 1973 - Tanjung Priok in Indonesia
- 1978 - Katunayake in Sri Lanka
- 1983 - Bangladesh

The same trend can be seen in developing countries in Latin America and the Caribbean.

- 1964 - Barranquilla in the Republic of Colombia
- 1965 - La Romana in Dominican Republic
- 1972 - Zolic/Santo Tomas de Castilla in Guatemala
- 1972 - Puerto Cortes in Honduras
- 1973 - San Bartolo in El Salvador
- 1976 - Kingston in Jamaica.

In African countries like Senegal, Liberia and Ghana started to move to development of SEZs in 1970s. And since 1990, many new ASEAN member countries started to develop SEZs.

1991- Vietnam (CSF, 2007)

2005 - Phnom Penh in Cambodia

The International Labour Organization's report said that as of 1975 there were 79 zones and about 800,000 people were working in 25 countries around the world. However, about 30 years passed, the situation has been drastically changed. ILO report 2007 says that by 2006, approximately 3,500 special economic zones have been established in 130 different countries around the world and some 66 million peoples are working in those zones.

### **4.3 Advantages of SEZ Development**

Why do many countries move up to development of SEZ? The main reason is that they need to set up a core scheme of development of own country and they expect SEZ will be. It can be analyzed that the countries which are established SEZ in own territory will get following advantages.

- 1) Foreign Direct Investment
- 2) Employment Creation
- 3) Export Development, both in size and type
- 4) Skills and Technology Transfer

#### **1) Foreign Direct Investment (FDI)**

Developing countries are always lack of funds to develop their countries. For getting helps from others, the developing countries need to attract foreign investors' interest to their countries. It is clear that one of the main reasons to develop SEZ is to attract foreign direct investment to host country. Many examples say that the foreign direct investment flow to the host country increases dramatically by starting SEZ projects. For example, China's national level zones attracted US\$9.2 billion in foreign direct investment in 2004(CSF, 2007).

## **2) Employment Creation**

Due to the foreign investment flow to the SEZs, those SEZs create additional workplaces in the host country. Sometimes SEZs are located in the regions with high unemployment ratio on purpose of creating workplaces. As number of SEZs increases, the number of direct employment increases as well. For example, 91,860 people were employed in the Philippines' economic zones in 1994. In 2007, 593,108 people were employed in the Philippines' economic zones (PEZA, 2008).

Although it is harder to measure, SEZ also creates indirect employment. According to WEPZA, every job in a SEZ creates two additional jobs through multiplier in the region (WEPZA, 1998).

## **3) Export Development**

SEZ projects have played leading roles for export development of the host country. Approximately 86% of Philippines total manufactured export has produced in the SEZs since 2003 (PEZA, 2008). And 87% of China's exports are produced in SEZs (CSF, 2007).

## **4) Skills and Technology Transfer**

SEZ is one of the ways to bring advanced technologies to developing countries. Without any skills to use advanced technologies, the industrial sector will not able to follow world trend. The industrial sector that does not able to follow the world trend never brings high income to the developing country.

## **4.4 Schemes for Establishing SEZs**

There are several considerable schemes for establishing SEZ. In recent years, among them private sector participation is seen as main trend.

- 1) Public sector
- 2) The scheme using ODA
- 3) Public Private Partnership
- 4) Pure Private sector execution

Recently private sector participation in SEZ development has become a highly visible tendency around the world. According to FIAS (2008), “62 percent of 2301 zones in developing and transition countries are private sector developed and operated (Table 4.3). This contrasts greatly with the 1980s, when less than 25 percent of zones worldwide were in private hands.”

**Table 4.3 Public and Private Sector Zones in Developing and Transition Economies**

Region	Public Zones	Private Zones	Total
Americas	146	394	540
Asia and the Pacific	435	556	991
Sub-Saharan Africa	49	65	114
Middle East and North Africa	173	40	213
Central and Eastern Europe and Central Asia	69	374	443
Total	872	1,429	2,301

Source: FIAS, 2008

According to the Table 4.3, except Middle East and North Africa, numbers of SEZs developed by private sectors are bigger than developed by the public sectors. It is the tendency that the numbers of SEZs developed by public sector are decreasing.

It seems to be private sector SEZ projects are considered more successful than public sector SEZ projects. There are several reasons for the failure of public sector initiated SEZ projects, as follows:

- Government monopoly on SEZ development

Basically governmental project execution bodies will implement projects based on political preconditions. SEZ projects shall be executed based on commercial preconditions.

- Selecting rural areas for the SEZ site

Government oriented SEZ projects are usually executed on the rural development policy. Therefore most of government oriented SEZ projects select rural areas for SEZ sites, which require a huge amount of infrastructure expenditure.

- Lack of operation capability

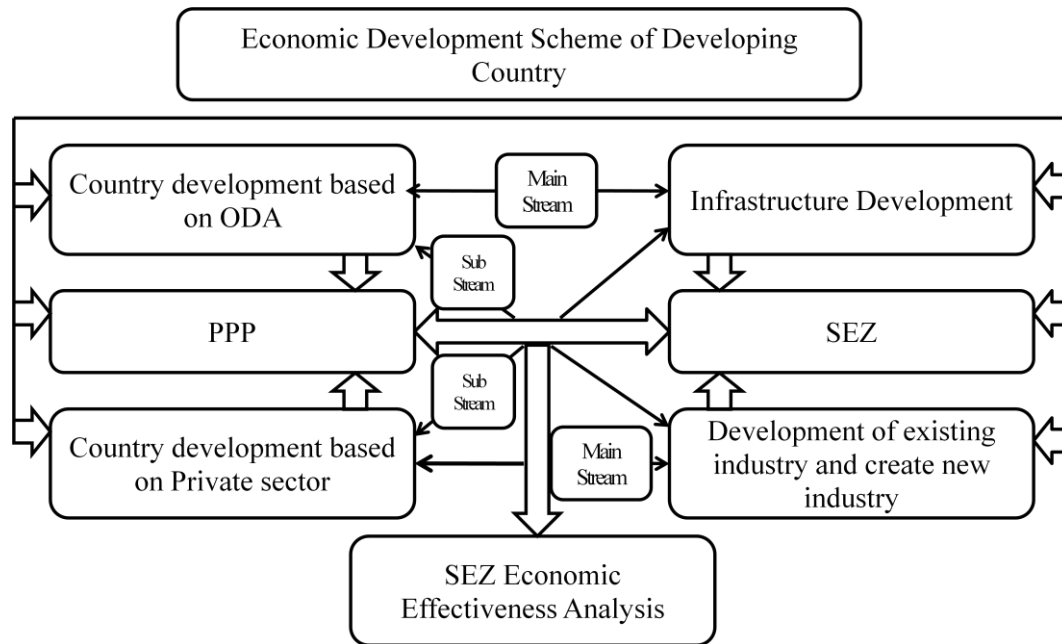
SEZ project needs to provide continual management and maintenance services so that the companies in the zone are able to maintain proper operation. Basically governmental project execution bodies have limited capability regarding management of commercial facilities.

- Lack of financial resources

The governments of developing countries always lack financial resources, and usually big development projects such as SEZ projects place pressure on the government budget. The lack of financial resources is the main reason for prolonged projects.

Figure 4.1 shows the effectiveness of PPP scheme for developing SEZ project. It is shown on this figure that main stream of country development based on ODA scheme usually concentrated on infrastructure development. Sub stream is concentrated on development of existing industry and create new industry. But main stream of country development based on private sector investment concentrated on development of existing industry or create new industry. Sub stream is concentrated on development of infrastructure.

But PPP scheme has a big opportunity to combine ODA scheme and pure private scheme. If we can use PPP scheme for developing SEZ which is very effective way to develop the infrastructure and industry sector at the same time, it will show big impact on both economic and infrastructure development of developing country.



**Figure 4.1 Economic Development Scheme and SEZ project in Developing Country**

#### **4.5 The Analysis of Present States and Development Impact made by Special Economic Zones in Developing Countries**

For the developing countries that are trying to develop SEZs, really need to learn the good examples around the world for adopting the successful experiences and not repeating same mistakes made earlier. Analysis of SEZs based on the 6 groups of Asian countries as mentioned in the Chapter 2. One or two countries from the each group were considered in the analysis in more details.

##### **Group 1. Japan**

Japan is exempted from this study because she did not use SEZ scheme as her development leverage. Although Japan did not use SEZ as development leverage, Japanese investors have made great support to develop successful SEZs in many developing countries especially in Asia.

## Group 2. Singapore, Hong Kong, Taiwan, Korea

Group 2 countries successfully developed the SEZs in their earlier stage of the development.

1819 in Singapore

1848 in Hong Kong

1965 - Kaohsiung in Taiwan

1970 - Masan in the Republic of Korea

**Table 4.4 SEZs in Group 2**

	<b>Singapore</b>	<b>Hong Kong</b>	<b>Taiwan</b>	<b>Korea</b>
<b>Number of SEZs</b>	42	NA	5	3
<b>Total employment (2005-2006)</b>		336000	67646	39000
<b>Investment (USD million)</b>	6400	29.6 billion	24628508	11.56bn
<b>Main investing countries</b>	Japan, US, Mexico, Canada, Chile, Australia, Korea, New Zealand	EU, US, Canada, China, Japan, Malaysia, Russian Federation, Singapore, Korea, Taiwan, Mexico, Switzerland, Thailand, Saudi Arabia	NA	NA
<b>Number of firms</b>	7000	3845	354	NA
<b>Main sectors</b>	Energy, food processing, textiles, chemicals, timbers, metals, mechanics, auto industries, electronics components	Investment holdings, banks and deposit-taking companies, financial institutions, insurance, manufacturing, communications, tourism, wholesale	NA	NA

<b>Zone exports (USD million)</b>	165.9	101.5 bn	343	30.61 bn
<b>Main markets</b>	US, ASEAN, EU, Gulf States, others	British Virgin Islands, Netherlands, Bermuda, Japan, Singapore, Cayman Islands, Thailand, UK, US, other	NA	NA
<b>Zone export as percent of total export</b>	NA	NA	NA	NA

Source: ILO, 2007



## 1) Korea

The most recent case of successful SEZ development in the Group 2 is the case of Korea.

### Masan Free Trade Zone

Masan FTZ, the first SEZ in Korea was established in 1970. Masan FTZ was operated as a Free Export Zone based on the manufacturing and processing industry from 1970 to 2000. World Economic Processing Zones Association selected Masan FTZ as the success model of promoting the foreign policy. 52



companies out of total 94 companies in Masan FTZ were established by FDI. Masan FTZ produces 13-15% of overall Korean economy surplus, although the size of the SEZ is just 0.2% of total area of Korea (Jeong, 2011).

**Figure 4.2 Masan Free Trade Zone** Masan FTZ is the rare case of successfully establishing close linkage between the SEZ and domestic economy especially for electronics industry. In 1988, 56 companies out of total 73 companies had engaged 525 domestic companies for outsourcing process (Jeong, 2011). In 2005, 75 companies in FTZ hired 8,665 workers, which are 41% of total 22,000 workers in Masan city. 57 support companies hired 486 workers, and 314 companies near the SEZ hired 5,330 workers. 3000 to 4000 people received specialized training in the zone and around, half of which eventually left the SEZ to work in local electronic firms.

### Group 3. Malaysia, Thailand, Indonesia, Philippines

The countries in Group 3 have developed their first SEZs in the early 1970s.

1971 - Sungei Way in Malaysia

1971- Thailand

1972 - Bataan in the Philippines

1973 - Tanjung Priok in Indonesia

**Table 4.5 SEZs in Group 3**

	Malaysia	Thailand	Indonesia	Philippines
<b>Number of SEZs</b>	13	10	NA	45
<b>Total employment (2005-2006)</b>	369,488	451,599	6,000,000	1,128,197
<b>Investment (USD million)</b>	5.512bn	1.442bn	11,31	1.270bn
<b>Main investing countries</b>	Japan, US, UK, Germany, Switzerland, Taiwan, Korea, Italy, Netherlands, Finland, others	EU, US, Taiwan, Japan, Singapore, Hong Kong		Philippines, US, Japan, UK, Malaysia, Singapore, others
<b>Number of firms</b>	3,000	1,357	1,149	1,179
<b>Main sectors</b>	High-tech, food processing, services, IT industry, pharmaceuticals	Agricultural products, minerals and ceramics, light industry, metal processing, electronics and electrical, chemical, plastic, paper,	Transports, warehouse, communications, chemical and pharmaceutical, construction, food, mining, textiles, leathers, electronics components,	Electronics and semiconductors, electrical machinery and apparatus, transport and car parts, chemical and chemical products, information

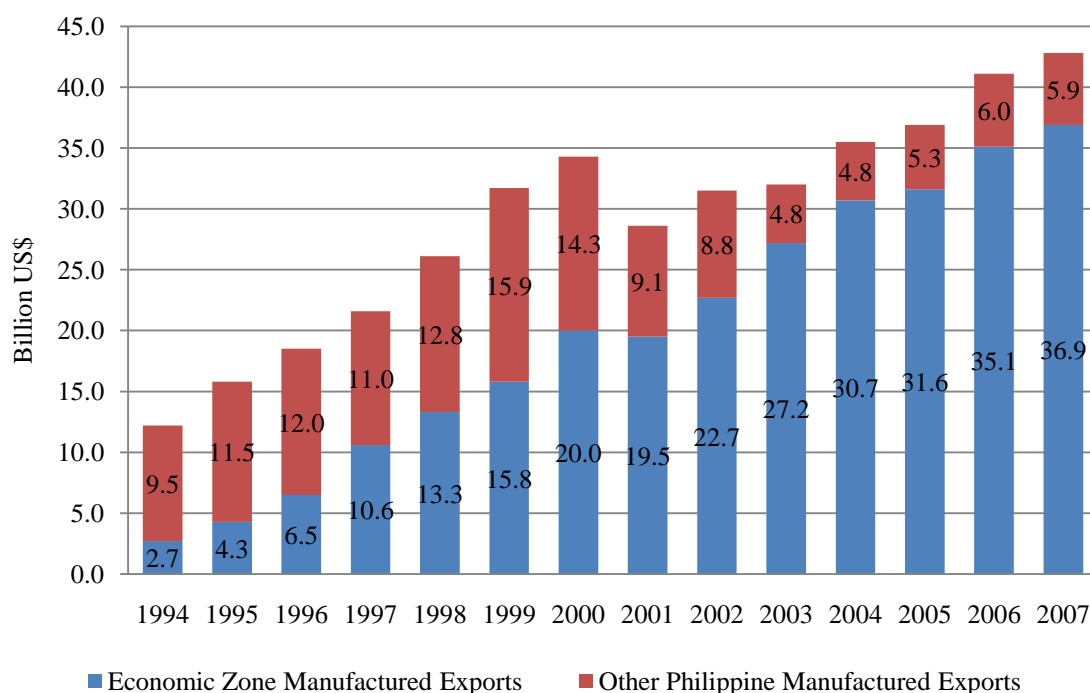
		service and infrastructure	others	technology, medical precision and optical products, rubber, plastic, garments and textiles, others
<b>Zone exports (USD million)</b>	12,6 bn	8242	18,4bn	30.61 bn
<b>Main markets</b>	Japan, US, UK, Germany, Switzerland, Taiwan, Korea	Korea, Netherlands, UK, Belgium, Austria, US, Germany, Japan, India, Malaysia, Taiwan, China, Hong Kong, Singapore	NA	NA
<b>Zone export as percent of total export</b>	83%	NA	NA	NA

Source: ILO, 2007

### 1) The Philippines

The Philippines started its development of SEZ in 1969. Total 16 SEZs were developed during 1969-1994. Development of private zones was stimulated since new legislation passed in 1995. As November 2008, there are 179 operating SEZs including 62 manufacturing and industrial estates, 110 IT parks and centers, 5 tourism eco zones, 1 medical tourism park and 1 medical tourism center within the total area of 6,661.63 hectares.

As of 2007, direct employment from SEZs was 593,108. Figure 4.3 shows the historical changes of export development 1994-2007. 86% of the Philippines Manufactured Export was produced in the SEZs in 2007 (PEZA, 2008).



**Figure 4.3 Philippine Manufactured Export, 1994-2007**

Source: PEZA, 2008

### Clark Freeport Zone

Clark Freeport Zone was developed on base of the former United States Clark Air Base, which was serving until 1992. It covers a total area of approximately 4,400 ha for main zone, 27,600 ha for sub zone.

Clark Freeport Zone has very strategic location. It is located away from major Asian destinations within 1.5-4 hours flight time. More than 700 local and foreign business projects have chosen to locate inside the Clark Freeport Zone since 1993. Most of them are from America, Japan, Taiwan and Korea. And also there are other foreign firms including United Parcel Service, Sumidenso, Rolls-Royce, Yokohama, L & T Intl Group Philippines, Inc., Cyber City Teleservices.



**Figure 4.4 Clark Free port Zone**

Source: Clark Freeport zone home page <http://www.clark.com.ph/>

## 2) Indonesia

### MM2100 Industrial town

The author visited this industrial town in November 2009. MM2100 Industrial town was established in 1990 by two well-regarded corporations; Marubeni Corporation of Japan and Manunggal Group of Indonesia. MM2100 Industrial town is located in Bekasi, West Java with the planned area of 805 ha.

MM2100 Industrial Town is located in the very suitable location to access and



it is located 30 km from Jakarta Central Business District, 35 km from Tanjung Priok Sea Port and 55 km from Soekarno-Hatta International Airport. The project development area is divided into 3 phases; Phase I is 240 ha, Phase II is 120 and Phase III is 445 ha. With more than 170 manufacturing and supporting companies, MM2100 Industrial Town is one of the best value industrial estates in Indonesia.



**Figure 4.5 MM2100 Industrial Town**

Source: Taken by the author during her visits in MM2100 Industrial Town in November, 2009

## Group 4. China, India

### 1) China

China started to establish its SEZs in 1980 after the announcement of “Open Door Policy” in 1978. The Central Government of China has so far only authorized seven SEZs. The first 4 SEZs in Shenzhen, Zhuhai, Shantou and Xiamen were established in 1980. Pudong district in Shanghai and Hainan province were both authorized as SEZs in 1990. And Newly Developed Area of Tianjin Binhai was authorized as SEZ in 2006.

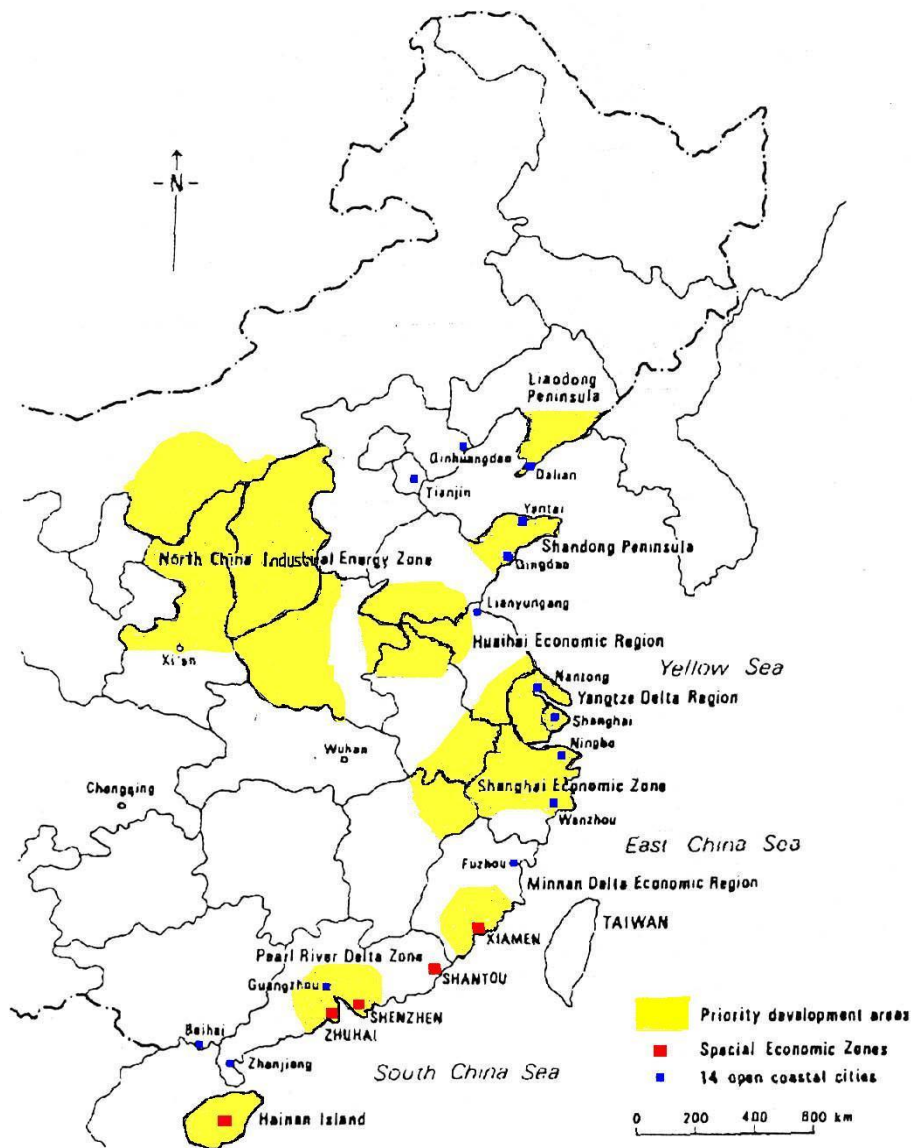


Figure 4.6 SEZs in China

SEZs in China tend to cover large geographic areas. Shenzhen, for instance, spans nearly 2,000 sq. km; Shanghai's Pudong district is 522 sq. km; and Hainan, 34,000 sq. km.

Moreover, Economic and Technological Development Zones (ETDZs) were set up in 14 coastal cities in 1984.

### **Shenzhen SEZ**

Shenzhen SEZ is the most successful and well-known one among the SEZs in China. Shenzhen has rapidly transformed from a small fishing village into a major



**Figure 4.7 Shenzhen SEZ**

industrial and financial center with population of 12 million by developing SEZ. From 1980 to 2005, the average annual growth rate of the gross domestic product (GDP) of Shenzhen was 27%. In 2006, Shenzhen's total GDP was \$71.3 billion, ranking it the fourth

among rapidly growing cities in China (Guo and Feng, 2007). In 2005, export of Shenzhen was \$115 billion, ranks the first among all mainland China cities for 13 consecutive years (Pan, 2006).

### **Group 5. Mongolia, Vietnam, Sri Lanka, Pakistan, Turkmenistan, Uzbekistan, Kazakhstan**

Except Mongolia the country the author from, there is almost no available complete data about situation of SEZs in the landlocked developing countries in Group 5. Table 4.6 shows only the study of SEZs in Vietnam, Sri Lanka, and Pakistan.



**Table 4.6 SEZs in Group 5**

	<b>Vietnam</b>	<b>Sri Lanka</b>	<b>Pakistan</b>
<b>Number of SEZs</b>	10	12	26
<b>Total employment (2005-2006)</b>	950,000	410,851	888,312
<b>Investment (USD million)</b>	1067	287	3872.50
<b>Main investing countries</b>	Japan, Taiwan, Hong Kong, Netherlands, Singapore, US, Korea, UK, France, Philippines	Korea, Japan, Hong Kong, Singapore, UK, US, Europe	US, UK, UAE, Germany, France, Hong Kong, Italy, Japan, Saudi Arabia, Canada, Netherlands, Korea
<b>Number of firms</b>	234	223	300
<b>Main sectors</b>	Wood, leather, metals, food processing, packaging, textiles	Clothing, textiles, rubber products, high-tech, others	Electronics, chemicals, stuffed toys, precision mechanics, yarn processing, garments, leather, food processing, plastics
<b>Zone exports (USD million)</b>		4263	8073.1
<b>Main markets</b>		US, Europe, South-East Asia	US, Europe, South-East Asia
<b>Zone export as percent of total export</b>		38%	

Source: ILO, 2007

As mentioned above there is not available complete data about situation of SEZs in the landlocked developing countries Kazakhstan, Uzbekistan and Turkmenistan. However the author found out the following information.

### 1) **Kazakhstan**

9 free economic zones were established in Kazakhstan between 1991 and 1996. However, currently only 6 special economic zones are remained in Kazakhstan.

Two of them are working actively, two are under development and another two are still in the initial stage. (Mikhalchenko I., 2010).

### **Ontustyk Special Economic Zone**

Ontustyk SEZ to be established is located near Shymkent city in South Kazakhstan region with a planned area of 200 hectares. The President decree on creation of Ontustyk SEZ had been effective on 06 July, 2005. The SEZ is specially planned to be a cotton-textile cluster but its construction works has not completed yet till now. This project can be observed as typical cases of SEZ project execution by the public sector.



**Figure 4.8 Ontustyk Special Economic Zone**

Source: <http://eng.textilezone.kz/>

## **2) Uzbekistan**

### **Navoi Free Industrial-Economic Zone**

The author found information regarding Navoi Free Industrial-Economic Zone to be established is located next to Navoi city International Airport of Navoi province, Uzbekistan. Total planned area of Navoi Free Industrial-Economic Zone

is around 1,500 hectares divided into 3 sections; innovation-industrial, transport-logistical, and social and recreational complex. This zone is located just 4km from freight terminal of Navoi Airport, 4.5 km from railway and 2km from “E-40” highway. The zone is now under construction ([www.navoi.uz](http://www.navoi.uz)).



**Figure 4.9 Navoi Free Industrial-Economic Zone**

### 3) Mongolia

SEZ project had implemented by the government in Mongolia however none of them are creating actual progress well. Current situation and problems of SEZs in Mongolia will be discussed in Chapter 5 in details.



project can be categorized in PPP. The author had a chance to stay at this project site for studying PPP type of SEZ project execution.

Phnom Penh SEZ is located in the capital city Phnom Penh with the planned area of 350 ha. PPSEZ has very suitable location for transportation. It is located 8 km from Phnom Penh International Airport, 18 km from the city center and 207 km from the deep seaport Sihanoukville. Phnom Penh SEZ project started December 2005 and now the on-site infrastructure has been completed and investors started their activities (Figure 4.11). Currently there are 14 international companies such as Yamaha Motor, Ajinomoto etc. have moved in this SEZ and some of them have started their production activities.

Now the Phase 2 is under construction.



**Figure 4.11 Phnom Penh SEZ project: Phase 1 operation started since 2008**

Source: Phnom Penh SEZ

## **2. Stung Hao SEZ**

Another SEZ to be established in Cambodia is Stung Hao SEZ, located in Sihanoukville province. This is a project carried by private sector. Attwood Investment Group Co., Ltd (Cambodian developer) is developing the Stung Hao SEZ. Total area of the SEZ is 192 Ha. This SEZ project is still under construction.



**Figure 4.12 Stung Hao SEZ**

Source: Taken by the author during her visit on 29 May, 2011

### **3. Sihanoukville Port SEZ**

The Sihanoukville Port SEZ is under construction in Sihanoukville province, Cambodia. The author visited this project in May 2011. The Sihanoukville Port SEZ is located adjacent to the Sihanoukville Port with the total area of the SEZ is 70 Ha. This SEZ is developed by Sihanoukville Autonomous Port and funded by ODA Loan from Japan. Therefore this project is carried out by the public sector (Sihanoukville Port authority).

The project is carrying out by Japanese consultant and same as Japanese contractor. However, the infrastructure development is still in a low progress compared to the Phnom Penh SEZ. According to the plan of Sihanoukville Port SEZ, the project should be completed by January 2011. However as of May, 2011, there was almost no infrastructure were completed in the zone. The current situation of the SEZ can be seen from the Figure 4.12.

According to the first schedule the project should have started in April 2008 and complete within 34 months by January 2011. But the construction was started in November 2009 due to delay of site position. Sihanoukville Port SEZ will not have problems related to the on-site infrastructure because the design and qualities of it based on international standards.





**Figure 4.13 Shihanoukville Port SEZ**

Source: Taken by the author during her visit on 29 May, 2011

#### **4. Sihanoukville SEZ**

Another SEZ also located in Sihanoukville province is Sihanoukville SEZ with the planned total area of 1,688 hectares. The author also visited this project in May 2011.

The Sihanoukville SEZ is developed by Cambodia - China Joint Venture. This project was started in February 2008 and planned to complete by 2015. Developers were planning that 150 companies can be situated there and 40,000 job opportunities provided in 2011. Main infrastructure of the Sihanoukville SEZ was almost completed and many factories are under construction and some of them have already started the production activities but not many. It is far from planned 150 companies. The infrastructure provided by the developer is not good enough.



**Figure 4.14 Sihanoukville SEZ**

Source: Taken by the author during her visit on May 29, 2011

The author made her studies of the 4 different SEZs in Cambodia and she found out that three out of four SEZs are not successful and rapid as Phnom Penh SEZ. And not only Phnom Penh SEZ has special factors to be successful such as location, management and development scheme but also the Phnom Penh SEZ was the only SEZ which were developed under PPP scheme in Cambodia. Based on the success of SEZ developed under PPP scheme, the author inspired to do some quantitative analysis by comparing the SEZ effect to the national economy in two cases of execution schemes; PPP and ODA. Chapter 6 will show the quantitative analysis in details.

#### **4.6 Special Economic Zones in Landlocked Developing Countries in Asia**

Stories of SEZ development in landlocked developing countries in Asia especially former socialist countries are very different with compared to those



previously mentioned SEZs in Asian countries. Most of the former socialist countries faced recession after collapse of Soviet Union. And those countries are still suffering from transition to market economy. Although those countries are trying to follow development steps of South East Asia, they have been facing a number of difficulties. It is still difficult to answer whether those SEZs, which were started to develop in the former socialist countries, will be successful or not.

**Table 4.7 SEZs in landlocked developing countries in Asia**

<b>No.</b>	<b>Country Name</b>	<b>SEZs</b>	<b>Current condition</b>
1	Mongolia	1. Altanbulag FTZ, 2. Zamyn-Uud FEZ, 3. Tsagaannuur FTZ 4. Choir FEZ	All delayed under construction stage
2	Kazakhstan	1. IT Park SEZ 2. Astana-New City SEZ 3. Ontustyk SEZ	Under construction  Delayed under construction stage
3	Uzbekistan	1. Navoi Free Industrial-Economic Zone	Under construction
4	Turkmenistan	There are ten free economic zones in Turkmenistan: 1. Mary-Bayramaly (1992) 2. Okarem-Cheleken(1992) 3. Turkmenabad-Seidi(1992) 4. Bakharden-Kizylarvat(1992) 5. Dashkhowuz Airport(1992) 6. Ashgabat-Annau(1992) 7. Ashgabat-Bezmein(1992) 8. Ashgabat International Airport(1997)	In practice, the free economic zones are not fully operational because of lack of government financial support, the under-developed infrastructure and the consequent slow pace of business activities.  The only exception is Ashgabat International Airport, with its modern

		9. Serakhs(1996) 10. Guneshli-Turkmenistan(1997)	infrastructure allowing development of transit cargo deliveries, trade and services.
5	Kyrgyzstan	1. Bishkek Free Economic Zone 2. Karakol FEZ 3. Maimak FEZ (1997) 4. Naryn FEZ (1991)	Except for Bishkek, all the others will be dissolved (UNESCAP).
6	Tajikistan	1. Sughd Free Economic Zone, 2. Panj Free Economic Zone	Sughd FEZ is started its operation in August, 2009. Panj Free Economic Zone is under construction
7	Laos	1. Savan-Seno Economic zone	Low development progress
8	Nepal	1. Bhairahawa SEZ	Low development progress
9	Bhutan	NA	NA
10	Afghanistan	NA	NA

Source: Various sources collected by author

#### 4.7 Successful Factors of SEZs

To see the common features of success in previously mentioned SEZs in different countries in Asia, following comparisons were made by the author.

Table 4.8 shows the successful features of SEZs.

- Masan Free trade Zone –MFTZ
- Clark Free Port – CFP
- MM2100 Industrial Town – MM2100
- Shenzhen Special Economic Zone – SSEZ
- Phnom Penh Special Economic Zone – PPSEZ

**Table 4.8 Successful Features of SEZs**

Features	Successful	MFTZ	SSEZ	MM 2100	CFP	PPSEZ
		Korea 1970	China 1980	Indonesia 1990	Philippines 1993	Cambodia 2005
Climate	2 seasons Tropic, subtropics		X	X	X	X
Geography	Geopolitical advantageous location	X	X	X	X	X
	Next to potential cities, regions	X	X	X	X	X
Logistic	Transportation node; easily accessible to port	X	X	X	X	X
	airport	X	X	X	X	X
	railway					X
	highway	X		X		X
Population in the region	High	X	X	X	X	X
Infrastructure	Existing infrastructure: former Air force base etc.				X	
	Advanced infrastructure	X	X	X	X	X
Government support	Strong	X	X			X
	One stop service	X		X		X
Private sector participation	Strong			X		X
Workforce	English speaking	X	X	X	X	X

Source: The author

There were some common features in those successful SEZs such as;

- **Geographic location of the site where the SEZ established**

SEZs; Masan FTZ in Korea, Clark FPZ in Philippines and Shenzhen SEZ in China out 5 SEZs are located in the port city. 2SEZs; MM2100 IT in Indonesia and Phnom Penh SEZ in Cambodia are located in the capital city.

- **Regional effect**

Shenzhen SEZ in China was built when the Hong Kong investors were seeking new market to invest. And Masan FTZ in Korea was built while the Japanese companies were moving to overseas with high boom.

- **Well-known companies' effect**

Once the SEZ attracts the well-known international companies as investors (companies build own factories and continuing product activities) to the SEZ, many other companies will follow them. There will be so call “snow ball effect” by them.

- **Infrastructure availability**

For example Clark Freeport Zone in Philippine was a former US air base. So it was easy to use the infrastructure facilities after the US air base removed.

#### **4.8 Common Problems for SEZs**

There is no country exactly similar to one other in the world. The successful SEZ stories of East and South East Asia are completely different for the other countries. Although every project in different countries has its own problems, there are several groups of problems.

##### **1. Lack of market demand study**

SEZ projects without proper market demand feasibility study became the one of the main reason of the failure. For example, SEZs in Mongolia are lack of market demand feasibility. And now the Altanbulag FTZ is almost completed its basic infrastructure, the assigned investment companies have refused to start their activities.

##### **2. Technical issues in SEZs**

The next important study is to check technical feasibility such as site evaluation, infrastructure condition of surrounding area etc. Due to carefully not consider technical features of specific area, some zones were resulted extremely high development cost.

For example, The Cartagena Free Zone in Colombia was located on a swamp resulting in extremely high capital development costs (FIAS, 2008).

### 3. Lack of Economical study

Economical feasibility or cost-benefit analysis of the project is most crucial to determine what will be the benefit to the host country and what will be the loss from the perspective of the country or government. The Bataan Export Processing Zone in the Philippines was spent high development cost due to its location in the remote area. And the Bataan EPZ became the repeatedly mentioned example of the failure of cost-benefit analysis (Singh R., 2004).

### 4. Financial Issues in SEZs

Developing countries are always lack of funding. So the financial feasibility is one of the important studies for SEZ projects. Unfortunately, the government projects or fully public projects are subsidized too much without proper financial feasibility studies. For attracting private funding to SEZ development projects it is important to consider other feasibilities such as market demand. For example, SEZs in Mongolia started to implement without proper financial feasibility study. And the development of SEZ projects is slow progress due to small amount of funding given by government of Mongolia every year.

### 5. Environmental Issues in SEZs

Environmental degradation due to SEZ development became a crucial issue in some countries such as Mexico. Maquiladoras in Mexico became hardly



**Figure 4.15 Water contaminations in Mexico.** (Source: CorpWatch, 1999)

contaminated places because of the polluting industries.

For example, Metales y sus Derivados, a United states-owned maquiladora, which was used to be battery recycling plant and lead smelter, was shut down by the Mexican government in 1994 due to its repeated

environmental violations over 22 years. This factory is now abandoned and more than 5,400 tons of toxic waste including lead, sulphuric acid and arsenic are exposed to the sun, wind and rain. The owner, a United States citizen has refused



**Figure 4.16 Sight outside the “Metales y sus Derivados” Maquiladora on the US-Mexico border** (Source: Global Exchange, 2004)

to clean up the toxic waste spread throughout the location.

The toxic wastes are seeping into the ground and are carried downhill into the local water supply of Colonia Chilpancingo, a community of about 1,000 people. The people of Chilpancingo, who are lack of knowledge about

the dangers of toxic wastes, use a dirt walkway that runs alongside of Metales to get to and from work at the other local maquiladoras. In 1995, a containment wall was built around Metales to prevent children from playing within the site and also to prevent local residents from using the scrap metal in the construction of their homes. Many people from Chilpancingo are suffering from high rates of health problems such as dizziness, nausea, asthma, gastrointestinal problems, chronic skin and eye irritations, and birth defects (Global Exchange, 2004).

This maquiladora was not the first maquiladora of its kind to be closed by the Mexican Government. Alco Pacifico, was also a U.S.-owned battery recycling plant and lead smelter. It too, was located in Tijuana and was shut down in 1991. The 30,000 tons of abandoned waste from Alco Pacifico was simply moved to CYTRAR, yet another toxic waste site located in Hermosillo (Global Exchange, 2004).

## **6. Lack of partnership**

As mentioned previously in the section 4.4, the private sector participation in SEZ development is increasing and Public-Private Partnership has become a highly visible tendency to develop SEZ development projects around the world.

So discovering the roles of all stakeholders is crucial to result of project success. For example, SEZs in Mongolia started to implement without any private sector involvement. If private sector participation was indicated in those SEZ project, the development of SEZ projects would be rapid than current situation. So these examples can be divided into 6 steps of feasibility study which must be done before the SEZ starts. Following graphic shows causes and effects of the most common problems for SEZ projects based on the classification of the feasibility study steps (Table 4.9).

**Table 4.9 Causes and effects of the most common problems and need studies for SEZ**

<b>Causes of Common Problems</b>	<b>Effect to SEZ Future</b>	<b>Need for Preventing Causes</b>	<b>Public Project Situation</b>	<b>Private Project Situation</b>
Market Demand: •Optimistic evaluation for “Growth Pole” •Concern to supplier side	•Noncompetitive zone •Noncompetitive industry	Check Market Demand Feasibility	Weak	Strong
Technical: Selecting rural areas lacking basic infrastructure for zone site	• Burden the funding for infrastructure in rural area • Nice infrastructure but no industry in the zone	Check Technical Feasibility of Zone Site	Weak	Strong
Economical •Optimistic expectation •High Infrastructure Cost	•Public projects are subsidized too much	Check Economical Feasibility or do Cost/Benefit analysis	Weak	Weak
Financial: •Lack of Funding •Reliance on the	• Prolonged or delayed projects without funding	Check Financial Feasibility	Weak	Strong

public sector funding				
Environmental • Lack of environmental studies Inviting highly polluting industries	<ul style="list-style-type: none"> <li>• Air pollution/ CO2 emission</li> <li>• Water contamination</li> <li>• Solid waste</li> </ul>	Check Environmental Feasibility/ Invite environment friendly industries	Weak	Weak
Partnership: • Government monopoly Lack of partnership	<ul style="list-style-type: none"> <li>• Prolonged projects due to government bureaucracy</li> </ul>	Concurrence of Stakeholders	Weak	Strong

Source: The author

Those most common causes of problems can be prevented if a realistic feasibility study is done for SEZ projects based on the need studies shown on the above table. An appropriate scheme of feasibility study should be implemented to reduce the number of problems.

#### 4.9 Solving the Problems facing to the SEZs

As analyzed in Section 4.8, most failures of SEZ development projects in developing countries are due to lack of feasibility studies. If the feasibility study for the SEZ development projects can be made by very realistic way, the number of failed and prolonged projects will be decreased and successful projects will be increased. For making a realistic feasibility study, it should cover a broader range of studies including market demand feasibility, technical feasibility, economical feasibility, financial feasibility, environmental feasibility and concurrence of stakeholders. Generally some of those studies are currently done; there is demand of some additional studies based on the lessons learned from SEZ development projects and a highly visible tendency of private sector participation in SEZ development in recent years.



#### **4.9.1 What is Feasibility Study?**

A feasibility study is a study to examine a project proposal. It is an important analytical tool which is generally used for answering the questions: is the project feasible or not?

A feasibility study helps to make the right decision by showing a realistic picture at both the positive and negative aspects of the project proposal. A Feasibility study takes place during a project initiation phase. The result of the feasibility study will decide whether implement or not implement the project. Usually Feasibility Study comprises of a range of interrelated and often independent sub studies. For depending on the project type, the Feasibility Study can be different from each other. Lock D. (1996) mentioned about importance of the Feasibility Study:

*“A feasibility study for a large capital project can be quite an undertaking in itself, perhaps taking years to prepare and costing millions of pounds. But a good feasibility study report can do much to point a project in the right direction and define its risks and achievable objectives.”*

So the Feasibility Study has to be prepared to decide to implement or terminate the infrastructure projects especially the SEZ development projects. The FS is important tool to host country's deliberation about SEZ project.

#### **SEZ projects started without Feasibility Study**

According to the author's investigation, all SEZ projects in Mongolia started without any feasibility study and they have not done feasibility study yet (Table 4.10).

**Table 4.10 SEZs without Feasibility Study**

<b>Name of SEZ</b>	<b>Country</b>	<b>Feasibility Study</b>
Altanbulag FTZ	<b>Mongolia</b>	<b>No</b>
Zamyn-Uud FEZ	<b>Mongolia</b>	<b>No</b>
Tsagaannuur FTZ	<b>Mongolia</b>	<b>No</b>
Choir FEZ	<b>Mongolia</b>	<b>No</b>

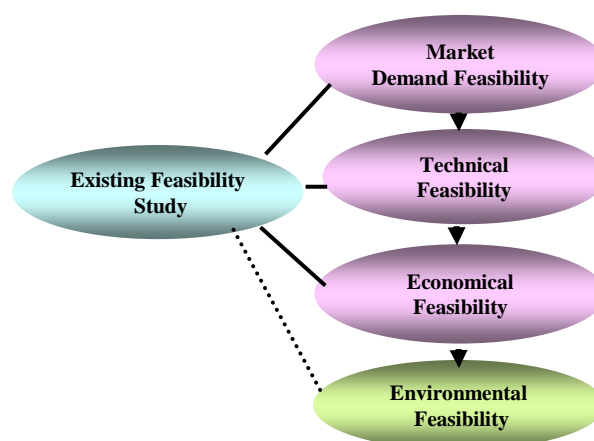
Source: Author

Also the other former socialist countries developing SEZs are almost same as Mongolia. Those countries that just have been shifting to market economy have no experience how to do the feasibility study for the SEZ projects.

#### **4.9.2 Existing Feasibility Study**

Usually following studies are included in feasibility study of SEZ development projects.

1. Market Demand Study
2. Technical Feasibility
3. Economical Feasibility
4. Environmental Feasibility (This is not well be considered and be implemented)



**Figure 4.17 Existing Feasibility Study**

### 4.9.3 The New Concept of the Feasibility Study

As mentioned in previous section, those steps of existing feasibility study cannot be sufficient enough to fulfill current requirements. So demand of new scheme of feasibility study is sought and it is also necessary for attracting private sector participation to SEZ development projects.

Recently private sector participation in SEZ development has become a highly visible tendency around the world (FIAS, 2008). So there is a need to define the purpose of the SEZs clearly from the viewpoint of participating parties to analyze the problems and to improve existing feasibility study. Generally the purpose of a country or public sector to set up a SEZ is to generate economic growth based on foreign direct investment and technology on the other hand the purpose of the private sector is to make profit. The future of a SEZ project directly depends on the combination of these two interests. Therefore, it is crucial to use some concept such as Public-Private-Partnership (PPP) which aligns public and private interests properly (Figure 4.18).

Public Sector	Public-Private-Partnership	Private Sector
Public sector's principal roles are to regulate and facilitate economic development in the national interests such as: <ul style="list-style-type: none"> <li>• Effective use of resource</li> <li>• Economic Development</li> <li>• Public Welfare</li> </ul>	Win-Win or Public-Private-Welfare  Developing SEZ project	Private sector's principal roles are to invest capital and implement economic activities in its own interests such as: <ul style="list-style-type: none"> <li>• Effective use of capital</li> <li>• Make profit</li> <li>• Enterprise welfare</li> </ul>

**Figure 4.18 Aligning Public and Private Sector Interests for developing SEZ Projects**

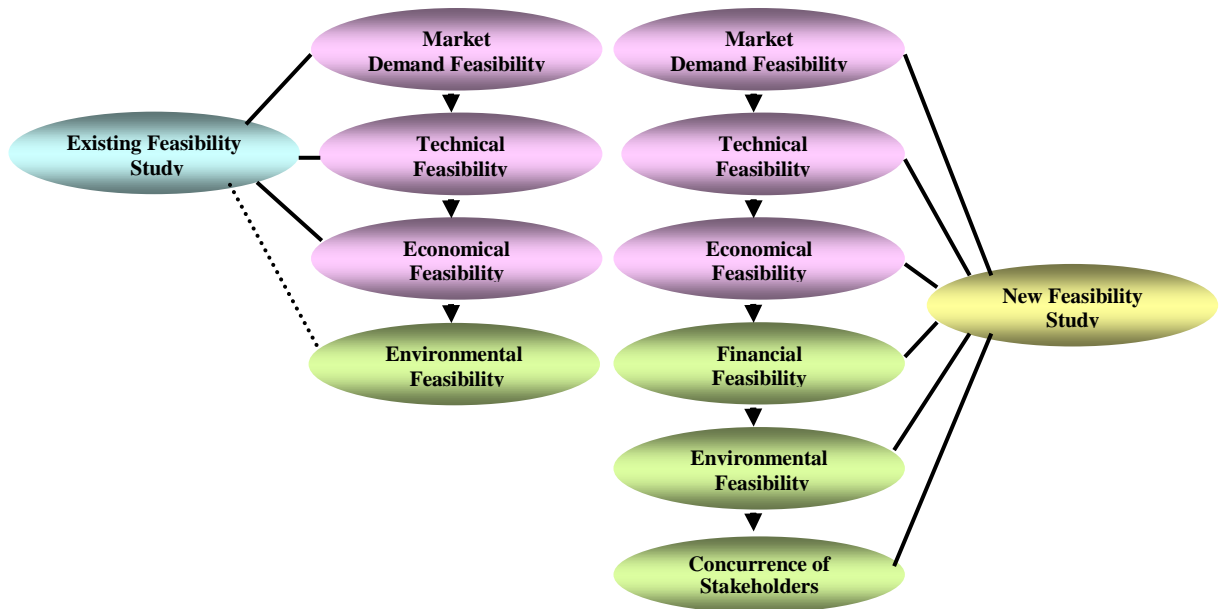
So this proposed scheme of feasibility study is more suitable for SEZ projects which are to be executed by the public-private-partnership concept.

Using concept of PPP for developing SEZ projects has several advantages.

- Solve the financial problems of public sector
- Bring the private sector management
- Competence of SEZ will increase

In Chapter 6, The PPP concept and its application for SEZ projects will be explained in more details.

Implementation of SEZ development projects would be more successful if a feasibility study system for SEZ development projects could cover a broader range of studies with comparison to current feasibility study as follows (Figure 4.19).



**Figure 4.19 Comparisons of Current Feasibility Study Steps and a New Scheme of Feasibility Study Steps**

### 1) Market Demand Feasibility

The market demand feasibility should be checked in the first step of feasibility study. But developing countries do not pay much attention to this study. Especially public projects just optimistically expect growth of some sector and establish that kind of SEZ just concerning supplier side. But due to lack of market demand study, the project becomes a “mission uncompleted” for years.

Actually market demand study should evaluate the potential markets on a local, regional and global basis and decide potential sectors which will be attracted to the SEZ.

Market demand feasibility study should answer the following questions:

- What is the potential target market?
- Who are the users of the SEZ?

## **2) Technical Feasibility**

The next important study is to check technical feasibility such as site evaluation, infrastructure condition of surrounding area etc.

Technical feasibility should answer following questions:

- What technical risks are there?
- How to overcome those technical risks?

## **3) Economical Feasibility**

Economical feasibility or cost-benefit analysis of the project is the most crucial to determine what will be the benefit to the host country and what will be the loss from the perspective of the country or government. Although SEZ is a kind of business activity on the other hand it is tool to improve people's welfare in developing country.

Economical feasibility study should answer the following questions:

- What are the benefits from SEZ project to the host country?
- What are the costs of SEZ project from the host country?
- Are the benefits worth the costs?

## **4) Financial Feasibility**

Financial feasibility study should answer the following questions:

- What are the financial sources?
- What are the financial risks?

### **5) Environmental feasibility**

Environmental feasibility study should be carefully done for SEZ development projects especially for selecting industries within the zone. Industries with clean and advanced technology should be accepted to enter to the SEZs for the long-term sustainable development of the country. Most developing countries gratefully receive the foreign direct investment without considering the side-effect. But some highly polluting industries with low technology move to the developing countries and endanger the environment and people. It was not the expectation of developing countries.

Environmental feasibility study should answer the following questions:

- What are the environmental effects?
- How much would be the environmental loss of the host country?
- How to be kept the environmental loss as much as low?

### **6) Concurrence of stakeholders**

The private sector participation in SEZ development is increasing and Public-Private Partnership has become a highly visible tendency to develop SEZ development projects around the world. So discovering the roles of all stakeholders is crucial to result of project success. Concurrence of stakeholders should answer the following questions:

- Who are the stakeholders?
- What are the duties of the stakeholders?
- What are the responsibilities of the stakeholders?

The important thing is that these 6 different kinds of feasibility studies should not be done individually. They must be handled with the idea of correlativity. A realistic feasibility study should be based on balance of 6 steps of feasibility studies.

Based on the new scheme of feasibility study, the author developed an evaluation check list for checking feasibility of SEZ projects. And the check list

was applied to evaluate the feasibilities of existing SEZ projects in Mongolia (See Chapter 5).

#### **4.10 Conclusion**

The world tendency of private sector participation in SEZ development projects shows concession type project scheme (PFI and/or PPP) is much effective way for developing SEZ development projects than pure public projects in developing countries.

Current steps of the feasibility study are not sufficient enough to fulfill requirements for PPP type SEZ development projects. So based on the new trend of PPP type projects, this new scheme of feasibility study is proposed. The new scheme tries to consider the satisfactions of all the participating parties in the feasibility study. Not only the investors' satisfaction but also the host country's satisfaction is crucial for implementation of projects.

The new scheme of feasibility study encourages implementation of not only existing SEZ development projects but also new projects in developing countries.

This new scheme can be used all kinds of infrastructure projects though the author tries to explain on the examples of SEZ development projects.

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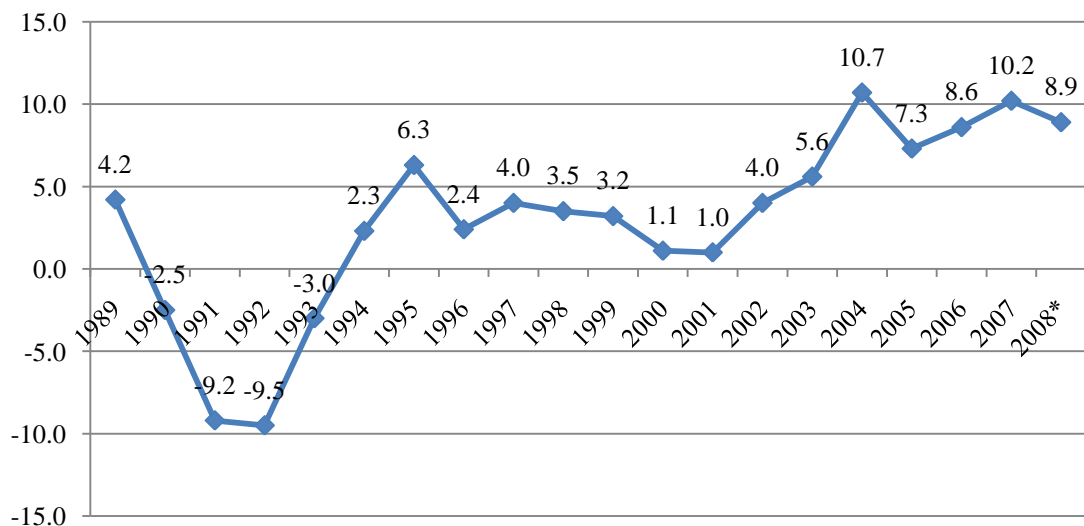
## Chapter V. Effective Scheme for Development the Country

### Mongolia as an example of landlocked countries

As mentioned in the hypothesis in Chapter I, this study is made to find out the appropriate economic development scheme combined with PPP (Public Private Partnership) to developing countries especially landlocked and small population countries like Mongolia. In this Chapter, the author will discuss finding out the effective development scheme for the country Mongolia where the author comes from. There are 44 landlocked countries in the world and most of them are categorized in the developing county. Mongolia is one of the typical landlocked countries who have many limiting conditions against the economic developments. Therefore the development scheme for Mongolia will be the prototype for other landlocked countries.

#### 5.1 Current Situation of Mongolia

Mongolia has reached economic success since the country embarked on its transition to market economy. Even Mongolia faced recession between 1990 to 1993, during the beginning years of the transition period, GDP began to recover to positive rates of growth from 1994. In recent years, Mongolian GDP growth rate has been steadily growing, reaching 8.9% in 2008 (Figure 5.1).

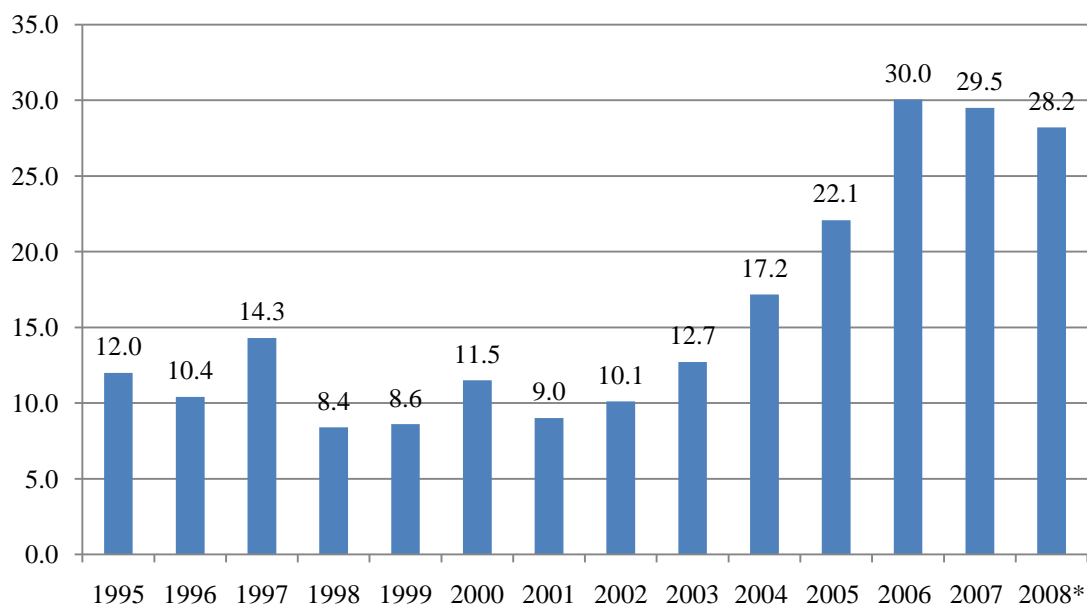


**Figure 5.1 Real economic growth, 1989-2008**

\* Preliminary estimates

Source: NSO 2004 a, b, 2005, 2006, 2007, 2008, 2009

Recently mining sector has become the main source of economic growth. The mining sector share of GDP has started to grow due to increase of global prices of copper and gold, Mongolia's two main mineral exports. Mining sector accounted for nearly 30 % of GDP since 2006 (Figure 5.2).



**Figure 5.2 Mining sector share in GDP, 1995-2008**

\* Preliminary estimates

Source: NSO, 2004a, b, 2005, 2006, 2007, 2008, 2009

Even the economic growth is high in recent years, there are still many socio-economic problems facing to Mongolia (Table 5.1). Those socio-economic problems can be divided into 3 groups as shown in Table 5.1.

**Table 5.1 Problems facing to Mongolia**

<b>Limiting Conditions</b>	<b>Internal</b>	<b>External</b>
<ul style="list-style-type: none"><li>• Location: Landlocked, no seaports</li><li>• Powerful Neighbors: Russia&amp; China</li><li>• Climate: long, cold winter and short summer</li><li>• Population: small</li></ul>	<ul style="list-style-type: none"><li>• Dependent on less number of export commodities</li><li>• Weak manufacturing</li><li>• Insufficient infrastructure</li><li>• Regional disparity</li><li>• Poverty</li><li>• Migration</li><li>• Unemployment</li></ul>	<ul style="list-style-type: none"><li>• Lack of partnership: Political and Economical Domination from 2 giant neighbors</li></ul>

Source: The Author

### **(1) Limiting conditions**

#### ***a) Geographical Location***

Mongolian territory is 1,564,100 square kilometers and Mongolia is the seventeenth largest country in the world by territory. It stretches 2,392 km from west to eastern frontier and 1,259 km from north to southern frontier. But Mongolia is one of the 44 landlocked countries in the world. According the size of the territory, Mongolia is the second largest landlocked country after Kazakhstan. Due to the physical barriers of the location, transportation cost is higher among the region. The nearest access to the sea is Tianjin port through China.

#### ***b) Neighbors***

Mongolia is neighboring with Russian Federation along 3,485 km in the north and with People's Republic of China along 4,676.9 km in the south. Russia is the largest country with the territory of 17,075,400 square kilometers in the world and it is also the ninth most populous nation in the world with 142 million people. On the other hand, China's the third largest country in the world with territory of 9.6 million square kilometers and it is also the most populous nation in the world with over 1.3 billion people.

**c) *Climate***

Mongolia has an extreme continental climate with long, cold winters and short summers, during which most of its annual precipitation falls. The capital city Ulan Bator has the lowest average temperature among the national capitals in the world. The country averages 257 cloudless days a year, and it is usually at the center of a region of high atmospheric pressure. The annual precipitation in the north area is 200 to 350 millimeters and in the south area is 100 to 200 millimeters. The extreme south is the Gobi, some regions of which receive no precipitation at all in most years. It also experiences extreme climatic conditions including long snowstorms, low precipitation, short growing seasons, dust storms and droughts. Nomadic herders, which are 13% of total population, often have toll of livestock caused by occasional extremely harsh winter known as *zud* (a Mongolian term).

**d) *Population***

Although the population growth was declined after 1990s, the number of population is increasing in recent years. At the end of 2008, total population has reached 2 million 683.5 thousand. Population density is 1.7/km<sup>2</sup>. 48.8 % of the total population is men and 51.2 % is women, giving a sex ratio at of 95.4 males per 100 females. The population of Mongolia was 4.0 persons per household in 2008 (NSO 2009).

**(2) Internal Problems**

**a) *Dependent on less number of export commodities***

If look inside to the recent economic growth deeper, it will be known as Mongolian economy is highly vulnerable to a few commodities. Mongolian main export commodities are copper concentrate, gold and cashmere, accounted for about 60 % of Mongolia's export since 2004. On the other hand all export commodities except minerals decreased in recent years (Table 5.2).

**Table 5.2 Composition of Mongolian Export Commodities, percent of total**

	Commodities	2000	2001	2002	2003	2004	2005	2006
Mineral products	Copper concentrate	29.9	28.4	26.8	26.6	32.7	30.6	41.5
	Gold	13.0	14.5	22.8	22.7	28.0	31.1	17.7
	Fluorspar concentrate	3.6	3.8	3.2	3.3	2.4	2.4	2.3
	Petroleum oil	0.3	0.3	0.6	0.7	0.9	0.9	1.1
Raw and semi-processed livestock products	De-haired cashmere	10.2	10.5	5.8	5.5	5.3	5.7	5.2
	Hides and skin	7.1	11.1	8.7	8.6	2.6	2.7	2.7
	Meat	2.3	3.3	3.8	2.1	0.9	0.7	1.0
	Sheep and camel wool	0.9	1.2	0.9	1.2	0.6	0.6	0.4
Manufactured goods	Sewn goods	13.9	14.1	1.3	10.0	7.2	4.9	2.6
	Knitted goods	5.9	5.6	8.1	8.9	8.9	4.7	2.4

Source: MIT 2008

Mongolia's GDP growth is highly vulnerable to global mineral prices. With regard to the future development of Mongolia, interesting issues are rose. Whether Mongolia can continue to keep the pace of rapid economic growth in the future by only enjoying mineral products export or the country should find some ways else to develop.

#### **b) *Weak manufacturing industry***

Manufacturing share in composition of gross industrial output has continuously decreased since 1989. Manufacturing share in 2005 was at 21.0% having roughly decreased 3 times since 1989 when it was 72.7% (Table 5.3).

**Table 5.3 Composition of gross industrial output**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Mining and quarrying	51.4	51.7	47.2	47.3	49.6	60.0	66.3	69.9	63.3	59.7
Manufacturing										
Electricity, thermal	30.6	32.4	34.9	34.0	32.5	27.6	21.0	21.5	28.7	31.4
energy and water	18.0	15.9	17.9	18.7	17.9	12.4	12.7	8.6	8.0	8.9
supply										

\* Preliminary estimates

Source: NSO, 2004a, b, 2005, 2006, 2007, 2008, 2009

Due to lack of funding during the transition period most manufacturing industries closed their doors. And also Chinese merchants have bought raw materials such as cashmere, hides and skins which are main manufacturing materials of Mongolia and transfer them to China for processing. Mongolian manufacturing industries cannot compete for raw materials with Chinese merchants. Chinese offer high price for cashmeres, hides and skins to the herders compared to Mongolian industries.

***c) Insufficient infrastructure***

Mongolia's unique nomadic tradition has influenced the infrastructure development of the country. Infrastructure was not the main priority for a country where a high percentage of the population were herders moving through the vast landscapes of Mongolia in search of the best pastures for their animals. Only 40 years ago, Mongolians started developing a modern infrastructure. However, Mongolia still has unmet requirements in infrastructure, especially in rural areas where basic works in road, water supply, energy and telecommunications needed to be developed. According to the Global Competiveness Index, quality of overall infrastructure in Mongolia is in the last place out of 133 countries (WEF 2009).

- ***Electricity***

A high percentage of population still does not have access to modern sources of electricity and heat: some 33 % of the population currently lacks access to electricity and 43 % lack access to central heating. This is the case in most of the households that live in gers (moveable houses), which rely on coal or wood for their stoves. According to the Global Competiveness Index, quality of electric supply in Mongolia is 112<sup>th</sup> place out of 133 countries (WEF 2009). Due to lack of electricity, Mongolia imports approximately 200 million kilowatt hour electricity from Russia per year.

- *Transportation*

Road surfaces in Mongolia will require improvement to handle the increase of transit in the region. At present, only 13 % of the freight movement in Mongolia is done by road, since the relatively poor road network limits road transport within Mongolia. According to the Global Competitiveness Index, quality of road in Mongolia is the last place out of 133 countries (WEF 2009). As of January 1 in 2009, 86.7% of the total length of roads is earth road, improved earth road length is 3.6%, gravel road length is 4.2%, and paved road length is only 5.5% (RAM 2009).

**d) Migration**

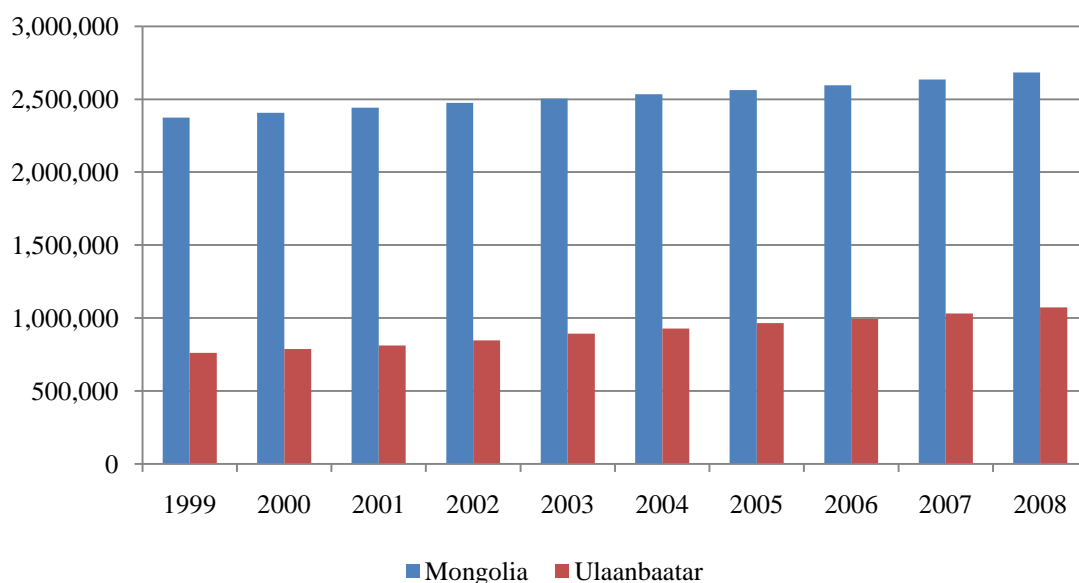
In recent years, Mongolia has experienced as continued rural to urban migration flows, particular to Ulaanbaatar, in search of better life. The migration flows can be explained by following reasons.

First, during the 70 years of socialist economy, migration movements were controlled and associated with work opportunities in rural areas. All this changed at the beginning of the transition: with the withdrawal of the subsidies and the market associated with the Soviet Union, part of the industrial sector and the agriculture collectives collapsed.

Second, the rural economy, mainly based on herding was able to absorb this labor force, but it was not necessarily able to provide it financial security and adequate livelihood because of the social service in rural areas also collapsed.

Third, the migration to urban areas is existing because of inequalities exist among the region and between the urban and rural areas. It also demonstrated that reasons for migrating are related to lack of opportunities, be they for markets, for jobs and income, for education, and for a better living environment (Solongo A., 2007).





**Figure 5.3 Population in Mongolia and Ulaanbaatar 1998-2008**

Source: NSO, 2004a, b, 2005, 2006, 2007, 2008, 2009

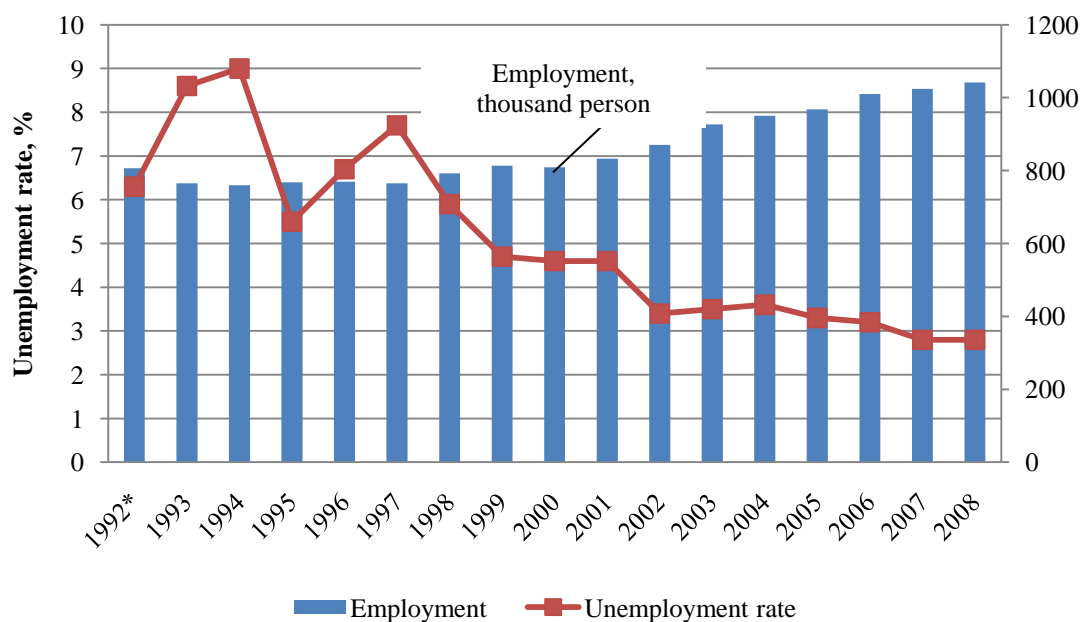
Total area of Ulaanbaatar city is only 4704.4 km square. But migration stream to Ulaanbaatar city has not slowed down. The population was increasing year by year in Ulaanbaatar and it was reached 1 million 71.7 thousand in 2008. In 2008, population density was 228.1 persons per square kilometer in Ulaanbaatar. It is extremely crowded compared to the country population density 1.7 person per square kilometer.

Because of this huge amount of inhabitants, urban services are overstretching in recent years. In winter time, inhabitants of Ulaanbaatar city have been suffering from air pollution.

#### ***e) Unemployment***

Unemployment is the most serious issue in Mongolia. Although the unemployment rate has been steadily decreasing since 1997, employment numbers are increasing smoothly (Figure 5.4). That is explained by labor force participation rates which have fallen steadily throughout the period (Figure 5.5). Consistent with such a view, that “hidden” unemployment is on the rise, the employment and labor force data also show an increase in the number of persons

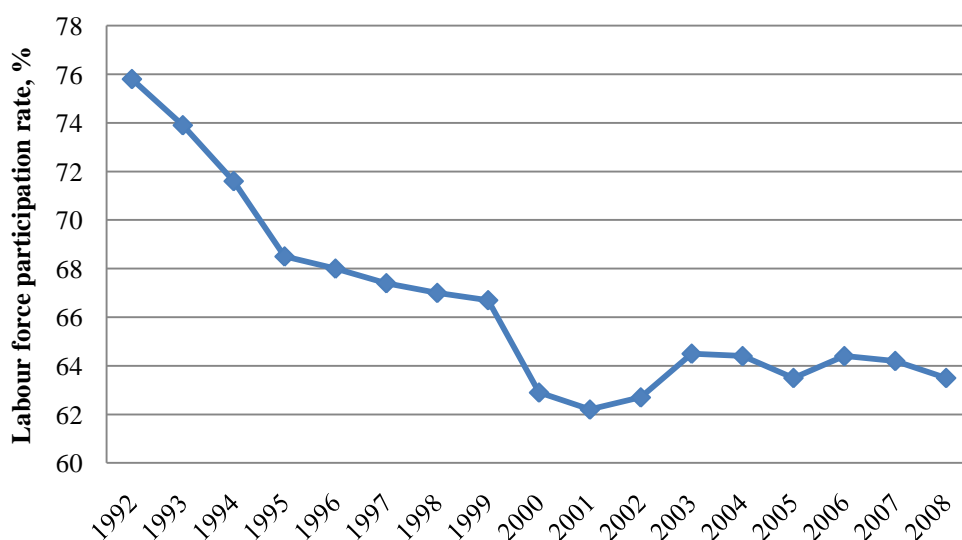
of working age who are neither employed nor registered as unemployed (World Bank 2007).



**Figure 5.4 Unemployment rate and employment, 1992-2008**

\* The economically active resolution has been estimated by taken those people who were registered with employment service since 1992.

Source: NSO, 2004a, b, 2005, 2006, 2007, 2008, 2009



**Figure 5.5 Labour force participation rate, 1992-2008**

Source: NSO, 2004a, b, 2005, 2006, 2007, 2008, 2009

### (3) External Problems neighboring countries' influence in Mongolian economy

Mongolia is a landlocked country and she is located between two giant neighboring countries; Russian Federation and People's Republic of China. After the World War II, Mongolia had been compelled to accept strong political and economical influences from these two countries and those influences are becoming bigger and bigger. When it is considered the development of Mongolia, it will be quite essential matter to find out the way of keeping industrial and economical independences from these two countries. It can be said that the purpose of this study is actually to find out the way of the development scheme based on keeping industrial and economical independences from Russia and China. Contemporary situation of these countries especially China, which is the second largest GDP country in the world by its economic growth, should be considered in Mongolian case. Comparison of GDP of those 3 countries can show how big those 2 neighboring countries of Mongolia (Figure 5.6).

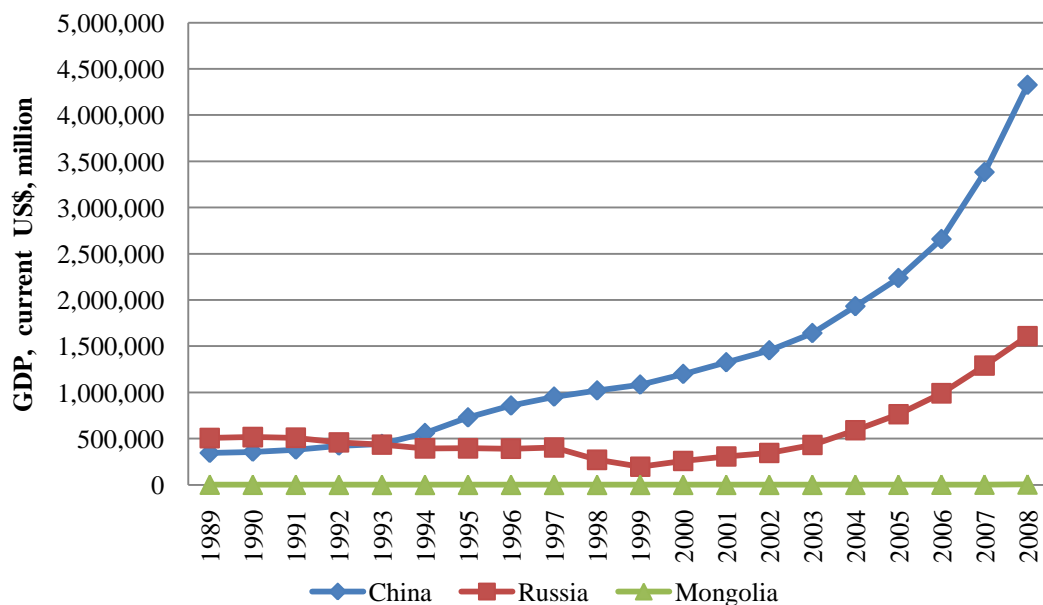
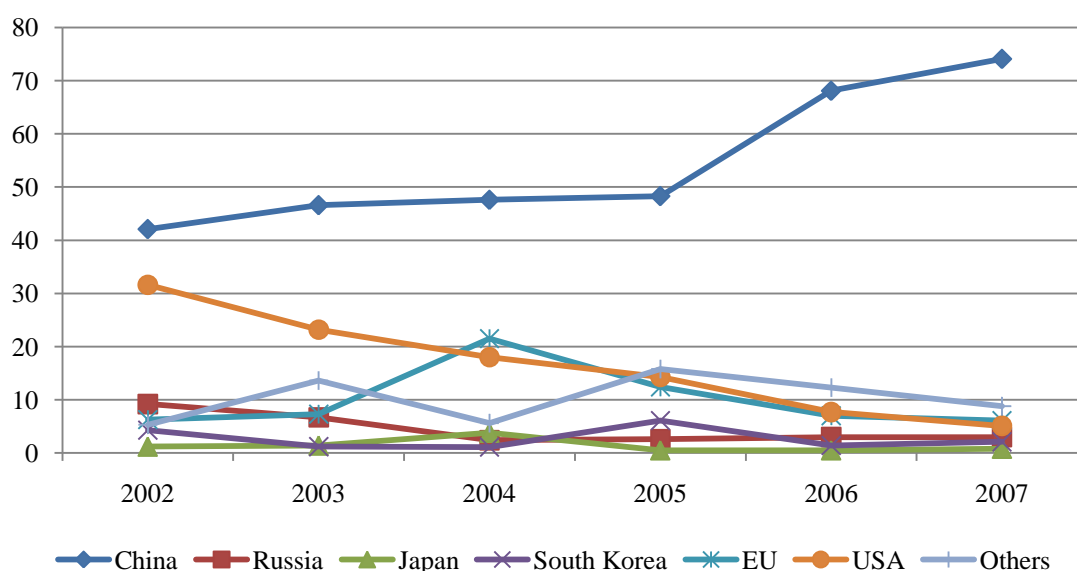


Figure 5.6 Comparison of GDP, 1989-2008, current US\$, million

### a) *Foreign Trade*

Mongolia trades with 103 countries throughout the world (MIT 2008). Certainly, Mongolian two neighboring countries Russian Federation and People's Republic of China are the largest presences in foreign trade activities. In 2008, Mongolian trade turnover with PRC accounted for 44% of total trade, whereas trade with Russia accounted for 23%. PRC accounted for 64.5% of total exports and 27.7% of total imports. Russia accounted for 3.4% of total exports and 38.3% of total imports (NSO, 2009).

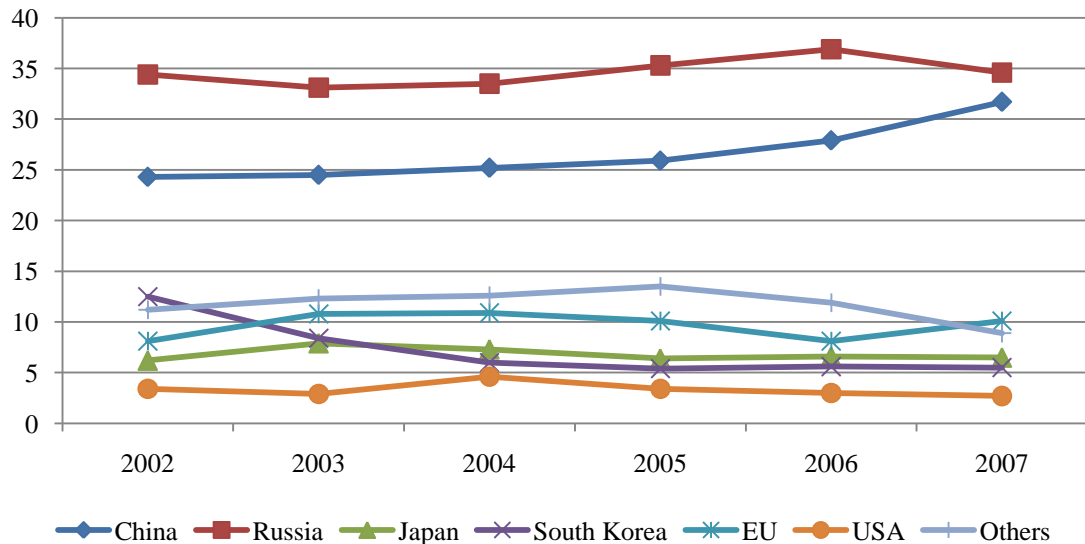


**Figure 5.7 Export composition, by trade partners**

- *Chinese domination in Mongolian raw material export*

Chinese rapid development has started since 1978, now reaching the second biggest economy in the world by 2009. Now China became the monster of raw materials and natural resources in the world due to its rapidly increasing economy. Steadily increasing China's economic growth could threaten her neighboring countries' economic development. Based on the statistics of foreign trade and other, it is clear that influence of China is getting stronger in recent years. As Mongolian main export partner, most of mineral resources are going to China without processing. Mongolia is necessary to find the way of self-development

based on its advantages. If Mongolia just prepares raw materials to China, she will never develop.



**Figure 5.8 Import composition, by trade partners**

- *Domination of Russia in Mongolian petrol import*

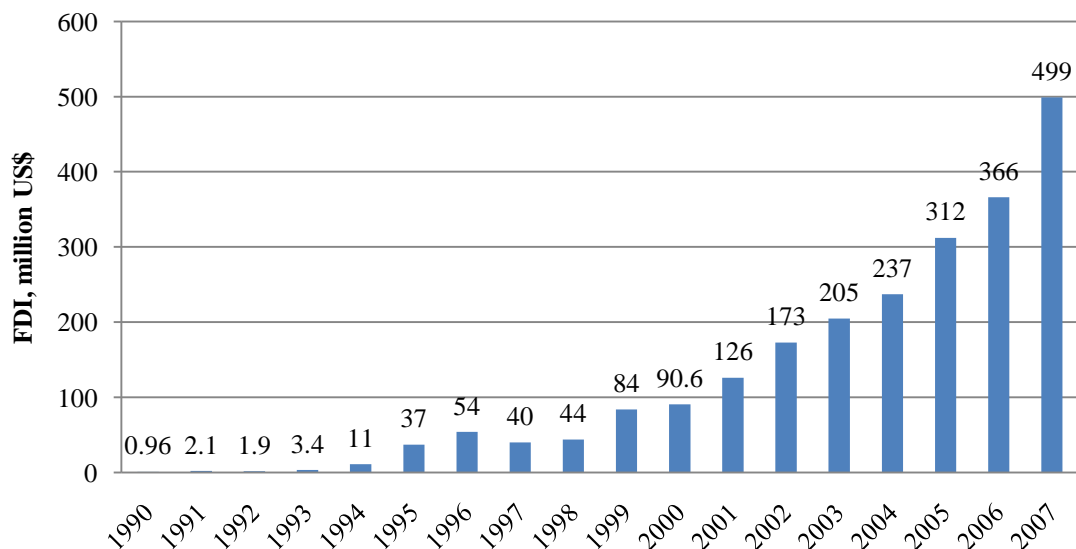
Mongolia imports about 90-100% of petrol from Russia. For example, in 2007 Mongolia imported 96.4% of total petrol from Russia. So fluctuation of the petrol price imported from Russia highly affects to the price of consumer goods in Mongolia. The price rise of petrol is the main reason of inflation in Mongolia. The government of Mongolia always makes some agreement with Russian government and its petrol exporting companies to keep the price constantly for a while. Mongolia imports most of its petroleum directly from Rosneft Co. Ltd, Russian oil supplier. In 2008, Rosneft once claimed to Mongolian government for entering petrol market of Mongolia by building own 100 petrol stations and in this case Rosneft can keep their petrol price constantly (Ulstur.mn 2008). Only one foreign company is controlling Mongolia petrol market with its interest is dangerous for Mongolian independence.

- *Threats of the imported products from China*

Chinese cheap and low quality products have been imported to Mongolia since 1990s. There are uncountable number of cases occurred with related to Chinese low quality products especially food in Mongolia. Mongolian media repeatedly highlights the danger of Chinese food and other products. General Mongolian population believes that China uses food weapon against Mongolia.

**b) Foreign Direct Investment**

Foreign Direct Investment in Mongolia has been increasing steadily since Mongolia opened the door for outside world in 1990s (Figure 5.9). As the end of 2008, since 1990, over 9,300 foreign invested companies (including the oil sector) have been registered in Mongolia from 98 countries with the total investment of over 3 billion USD. People's Republic of China, South Korea, Canada, Russian Federation, Virgin Islands of United Kingdom, USA and Japan are in leading position by the amount of investment and the number of registered companies. Investment volume is increasing and only in 2008, FDI volume reached 708 million USD of 1,551 foreign invested companies (Ganzorig, 2009). FDI is concentrated mainly in mining (47.7%), trade (15.4%), light industry (6%), and processing of animal-originated raw materials (3.8%).



**Figure 5.9 Foreign direct investment in Mongolia, 1990-2007**

Source: FIFTA

- *Issues related with Chinese investors*

China is one of the major investors in Mongolia, and at the end of 2009, there were 4,927 entities with Chinese investment registered in Mongolia, with an overall volume of 203 billion USD in investments. Unfortunately, there are so many issues with related to Chinese invested companies in Mongolia especially activities against Mongolian laws and regulations. Chinese invested companies do not respect laws and regulations with related to human rights, labor protection, minimum wage standard, and environmental protection.

## **5.2 SEZs in Mongolia**

Influenced by successful cases in other countries, Mongolian parliament has already approved “The Concept of Establishing Free Economic Zone in Mongolia” in 1995 and law on Free Zones in 2002. The Law on Free Zones consists of 3 chapters and 18 articles. In the Law on Free Zones, the SEZ is defined as follows:

*“Free zone” shall mean part of the territory of Mongolia under special conditions for business and investment and which should be considered to be separate in terms of custom and taxation.*

And also the law announces that the SEZ in Mongolia will be pure public as follows:

*The State Ih Hural (Parliament) shall decide on the creation, forms, location and the size of territory, borders, change and dissolution of free zone in Mongolia upon submittal of respective proposal by the Government.*

There are 4 zones under implementation; in the northern, southern, western border areas and along the railway - Altanbulag FTZ, Zamyn-Uud FEZ, Tsagaannuur FTZ and Choir FEZ (Figure 5.10).



**Figure 5.10 Potential SEZs in Mongolia**

# 1) The present states of 4 SEZ projects

## a) Altanbulag Free Trade Zone

The Law on the Legal Status of the Altanbulag Free Trade Zone, the first free trade zone of Mongolia, was approved by parliament in 2002. The Altanbulag FTZ is located in the northern part of Mongolia with a planned area of 500 hectares; 123 hectares as common spaces and 377 hectares as industries. It is adjacent to Khiagt border port of Russia, 335 km away from the capital city of Ulaanbaatar.



**Figure 5.11 Altanbulag FTZ**



The Altanbulag FTZ offers 2 kinds of investment incentives; Taxation and Land use fee

- **Tax allowance and exemption**

	Tax type	Duration	Tax Abatement
Companies that invest into construction of storage facilities, cargo terminals and hotels in the Altanbulag FTZ	Income tax	First 5 years	100%
		Next 3 years	50%
Companies engaged in storage and protection of goods and products, improvement of packaging and which signed a respective contract with the Governor to operate for more than 10 years	Income tax	First 1 year	100%
		Next 3 years	50%
The amount of companies' investment into main infrastructure of the Altanbulag FTZ shall be deducted from the revenue subject to income tax.			
Foreign companies, organizations and individuals registered at the Governor's Office and residing permanently in the Altanbulag FTZ	Real Estate Tax Exemption		

Source: Law on the Legal Status of Altanbulag FTZ, 2002

- **Land Use Fee**

The abatement (reducing taxes and duties) for land use fee shall be granted in the following cases:

- Companies engaged in trading and services shall be exempted from paying land use fee for three years since the date of beginning operations, and granted 50 percent abatement for three consequent years;
- Companies engaged in construction of main infrastructure of the Altanbulag FTZ, shall be exempted from land use fee for five years since the date of beginning operations and granted 30 percent abatement for three consequent years.

The construction of on-site infrastructure of the zone development is in progress but it is getting big delay on the schedule depending on the government funding. In October 2008, the author visited the site of Altanbulag FTZ and on that time the zone development has been limited by a main gate, iron fence and guard places since the zone development started in 2004.



**Figure 5.12 Altanbulag FTZ**

Source: The photos were taken during author's survey in Altanbulag FTZ in October, 2008

The Government of Mongolia (GoM) suggested to the governor's office of Altanbulag FTZ to invite domestic and foreign investors, who shall implement investment projects in the zone area. According to the suggestion of the GoM, over 140 investors from 6 countries have signed segmental investment agreement and started to lease total area of 400 hectares since September 2006. But the investors are still waiting for the on-site infrastructure complete.

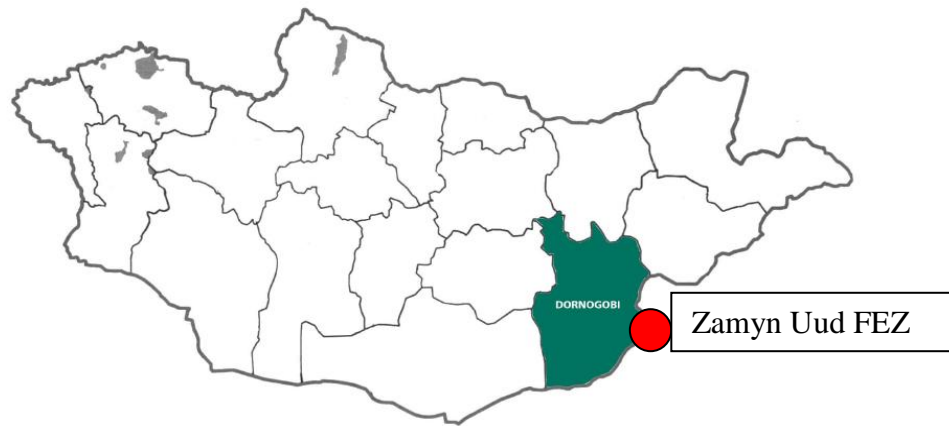
The future of the Altanbulag FTZ is still not predictable. Based on the world experiences of developing SEZs, the Altanbulag FTZ has high possibility not to be successful.

#### **b) Zamyn-Uud Free Economic Zone**

The development of Mongolia's first free economic zone is in its initial stage and governed by the law of the Zamyn-Uud Free Economic Zone issued in 2003. The zone is located next to the biggest border port town of Zamyn-Uud,

Dornogobi province. It is situated 780 km from Ulaanbaatar and 8 km from Erlian town of China. A planned area of Zamyn-Uud FEZ is 900 hectares.

The Law on the Legal Status of the Zamyn-Uud FEZ envisages developing the zone with three major sections: industrial, commercial, and tourism-entertainment.



**Figure 5.13 Zamyn-Uud FEZ**

Based on the experience of Altanbulag FTZ, GoM has sought a strategic investor for Zamyn-Uud FEZ. Therefore GoM had announced international open tenders for selection of the strategic investor of Zamyn-Uud FEZ project in 2004 and 2007 twice. The first tender winner, “West Paradise” Co. Ltd from British Virgin Islands held the ground breaking ceremony in April, 2005, however, did not organize any activities to develop the Zamyn-Uud FEZ for 2 years since the ground breaking ceremony. For this reason, GoM revoked the contract in the evidence of the strategic investor had not completed its responsibilities.

For the second time, the international open tender for selection of the strategic investor of Zamyn-Uud FEZ was held in 2007 and “Winwheel Bullion” corporation from US were selected as the tender winner. Although GoM signed the management contract with the “Winwheel Bullion” corporation in April, 2006, the investor did not deposit US\$ 10 million as mentioned in the contract and GoM has left no choice except to revoke the contract in June, 2006. After the two cases of failures to choose the strategic investor, The GoM had decided to use its own capacity to complete the project by government funding and included the expenditure of the project into the government budget from 2007 to 2009.

In October 2008, the author visited the site of Zamyn-Uud FEZ and interviewed the personnel in charge of the infrastructure development. When the author visited the site, there has been built only a fence and guard places around the zone. The construction of the fence and guard places was started in 2007.



**Figure 5.14 Current Situation of Zamyn-Uud FEZ**

Source: The photos were taken during author's survey in Altanbulag FTZ in October, 2008

Geographically the Zamyn-Uud FEZ is located in sandy desert area where also lack of fresh water resource. It requires high cost for developing green line to stop sand movement. Due to climate and lack of social environment, young labour force will not interest in this zone.

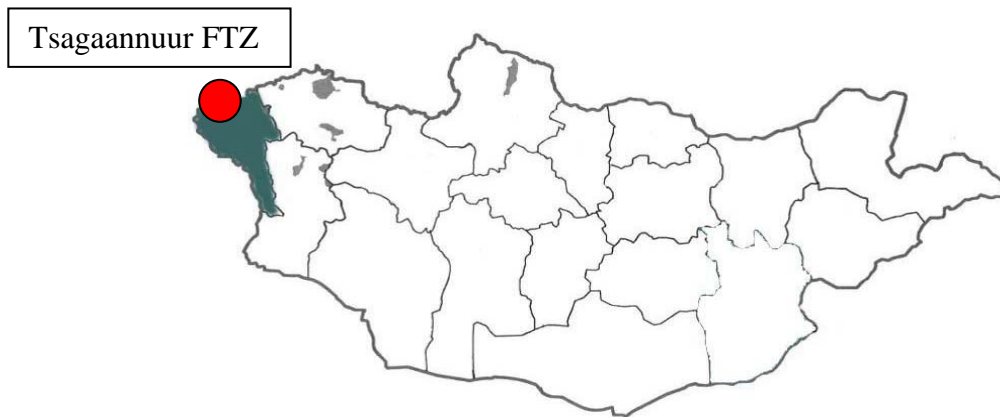
After many years passed since its announcement for developing FEZ, 20-year Master plan of Zamyn-Uud FEZ was just approved in 2009. According to the master plan, development of zone will be divided into 2 stages; 2009-2019 and 2019-2029.

The future of the Zamyn-Uud FEZ is still not predictable. Based on the world experiences of developing SEZs, the Zamyn-Uud FEZ has high possibility not to be successful. It's better to dissolve the Zamyn-Uud FEZ status for not wasting the government fund any more.

### **c) Tsagaannuur Free Trade Zone**

Tsagaannuur Free Trade Zone is situated on the western border of Mongolia in Tsagaannuur village, Bayan- Ulgii province with a planned area of 708.4 hectares. Parliament has approved the law of Tsagaannuur Free Trade Zone in 2003, and

the governor's office of Tsagaannuur FTZ was established in 2005. After many years passed since its announcement for developing FTZ, Master plan of Tsagaannuur FTZ was just approved in 2009. The master plan is designed to be implemented between 2009 and 2021 with three stages; 2009-2012, 2013-2016 and 2017- 2021.



**Figure 5.16 Tsagaannuur FTZ**

Tsagaannuur FTZ is the furthest SEZ which located 1,720 km from Ulaanbaatar city. Tsagaannuur FTZ is located between the borders of three countries; Russia, China, and Kazakhstan as 28 km away from Russian border, 250 km from Chinese border and 190 km from Kazakhstan border through Russia. More over the shortest road from Russia to China can be built through this zone. 60% of the total population of the surrounding area of Tsagaannuur FTZ in Russia, China and Kazakhstan living this area speaks Kazakh language. Northern part of China is developing rapidly in recent years. So its demand to import natural resources from Russia through Mongolia is increasing. The zone is located next to the deposits of chrome and some cement materials. The area is famous for its natural view. So there is a possibility to develop tourism business. The area is located next to lakes which are rich in fish.

Tsagaannuur FTZ is situated at 2,100m above sea level, cold and less plant cover. Also the zone is located in permafrost ground. So cost of infrastructure will be expensive. Difficult to attract labour force due to lack of social and cultural activities. Due to climate and lack of social environment, young labour force will not interest in this zone. Migration to UB and Kazakhstan is one barrier to

develop this zone. Highly depends on the political, economical and cultural relationship between Russia and China.

The future of the Tsagaannuur FTZ is still not predictable. Based on the world experiences of developing SEZs, the Tsagaannuur FTZ has high possibility not to be successful. It's better to dissolve the status of Tsagaannuur FTZ for not wasting the government fund any more.

#### **d) Choir Free Economic Zone**

The fourth zone will be established in Govi-Sumber province. But the legal status of Choir FEZ has not been approved by parliament yet. It is not wise idea to establish another SEZ while the other 3 SEZs have not been completed since 2002 and not seen any future to be successful. It's better to dissolve the status of Choir FEZ.

### **2) Problems related to SEZ project execution**

Even Mongolia's SEZs projects were started several years ago, number of problems facing these projects such as legal and regulatory framework, lack of funding and lack of experience. These main problems facing to SEZ development in Mongolia can be discussed hereunder.

#### ***a) Political problems***

Frequent changes of governments are observed in the least developed country like Mongolia. Mongolia uses unicameral parliamentary system and the parliament selects its members every four years by general election. According to the election results, changes of the organizational structure of ministries, agencies and human resource will happen after the every parliamentary election. Key projects also suffer from a change of project personnel along with the change of government which ultimately make difficult to attain the targeted schedule and cost.

### ***b) Financial problems***

Government oriented programs are facing lack of financial source dependent on government budget. Due to insufficient amount of budget, given to SEZ projects every year, progress of project is prolonged. Table 5.4 shows the total investment was given by the Government of Mongolia since the SEZs were announced to develop.

**Table 5.4 Total investment for SEZ development in Mongolia, million tugrug**

	2003-2004	2005	2006	2007	2008	Total
<b>Altanbulag FTZ</b>	224.9	615.9	48.0	109.2	629.0	<b>1627.0</b>
<b>Zamyn-Uud FEZ</b>				1300.0	1892.0	<b>3192.0</b>
<b>Tsagaannuur FTZ</b>			60.0	37.3	1111.5	<b>1208.8</b>
<b>Choir FEZ</b>				35.0	135.0	<b>170.0</b>
<b>Total</b>	<b>224.9</b>	<b>615.9</b>	<b>108.0</b>	<b>1481.5</b>	<b>3767.5</b>	<b>6027.8</b>

Source: Free Zone Committee, 2010

### ***c) Organizational problems***

Preparatory work of SEZ project development had not well been done. None of the 4 projects have feasibility study and cost-benefit analysis. Moreover, preparing the necessary studies to implement SEZ projects are suffering from lack of experienced specialists in SEZ projects.

### ***d) Laws and Regulations***

The law on Free Zones, approved in 2002, does not have a full set of implementation regulations. The revised law on Free Zones has been discussed since 2005. Approving the laws and regulations related to the zone activities takes time and effort.

## **5.3 Evaluation of SEZs in Mongolia by using the New Feasibility Study Scheme**

As mentioned above, SEZ concept has started in Mongolia and 4 big projects started over 9 years ago, none of them have been completed yet. Each project has its own reason to be prolonged as shown in the previous section. Judging from the

examples of other countries, traditional way of establishing SEZs will not be as successful as them in landlocked and low population country such as Mongolia. Based on the investigation of successful stories, there was not any landlocked country which could develop SEZs effectively.

The author evaluated feasibility studies of 4 different SEZ projects in Mongolia by using the feasibility study evaluation check list that the author developed based on the New Scheme of Feasibility Study explained in Chapter 4 (Appendix 1). The following Table 5.5 shows the results of qualitative evaluation.

**Table 5.5 The feasibility study level of SEZs in Mongolia**

Investigation Items	Description of conditions	Altanbulag FTZ	Zamyn-Uud FEZ	Tsagaannuur FTZ	Choir FEZ
Market Demand Feasibility	Competitive advantages of the zone site location	Border port	Border port	Border port	Along the railway
	Competitive advantages of the zone offering for investors	No	No	No	No
	Potential markets in which the zone promotes itself	Russia	China	Russia, China, Kazakhstan	NA
	Potential investors study	No	No	No	No
	Potential industries study	Weak	Weak	Weak	No
Technical Feasibility	Total Area (hectares)	500	900	708.4	Not announced
	Distance from capital city	335km	780km	1720km	NA
	Location	Rural area	Rural area	Rural area	NA
	Access to the site from Capital	Vehicle	Train+ Vehicle	Plane+ Vehicle	Train+ Vehicle
	Distance from the nearest border port	1 km	3 km	28 km	NA
	Distance from province	25km	230km	70km	NA



	center				
	Population within 15 km	4,000	9,800	1,626	NA
	Close to Airport	No	No	No	No
	Close to Seaport	No	No (The nearest to use seaport in Tianjin, China)	No	No
	Close to Railway station	Yes ( 30 km)	Yes ( 3 km)	No	Yes
	Close to Highway	Yes	Yes	Yes	Yes
	Close to international school	No	No	No	No
	Close to hospital with international standards	No	No	No	No
	Close to stores and supermarkets with international standards	No	No	No	No
	High speed internet service	Yes	Yes	Yes	Yes
	Mobile Telephone	Yes	Yes	Yes	Yes
	Fresh Water Source	Ground water	Ground water	Ground Water	Ground water
	Fresh Water Resource	Normal	Scarce	Normal	Normal
	Electric supply	National grid	National grid	National grid	National grid
	Altitude	1080-1116m		2100m	
	Soil condition	Normal	Sandy	Permafrost	Sandy
Economical Feasibility	Calculation of number of new employment	Weak	Weak	Weak	Weak
	Calculation of export amount	Weak	Weak	Weak	Weak
	Calculation of domestic linkages	Weak	Weak	Weak	Weak
	Cost of infrastructure development	High	High	High	High
	Calculation of tax losses	No	No	No	No

<b>Financial Feasibility</b>	Financial resource	Government budget	Government budget	Government budget	Government budget
	Enough fund to develop	No	No	No	No
	Implementation of new financial resource expect government fund	No	No (Tried to find the strategic investor twice but failed twice)	No	No
<b>Environmental Feasibility</b>	Make environmental study	Weak	Weak	Weak	Weak
	Invite environmental friendly investors	No	No	No	No
<b>Concurrence of Stakeholders</b>	Public participation	Yes (100% government project)	Yes (100% government project)	Yes (100% government project)	Yes (100% government project)
	Private participation	No	No	No	No

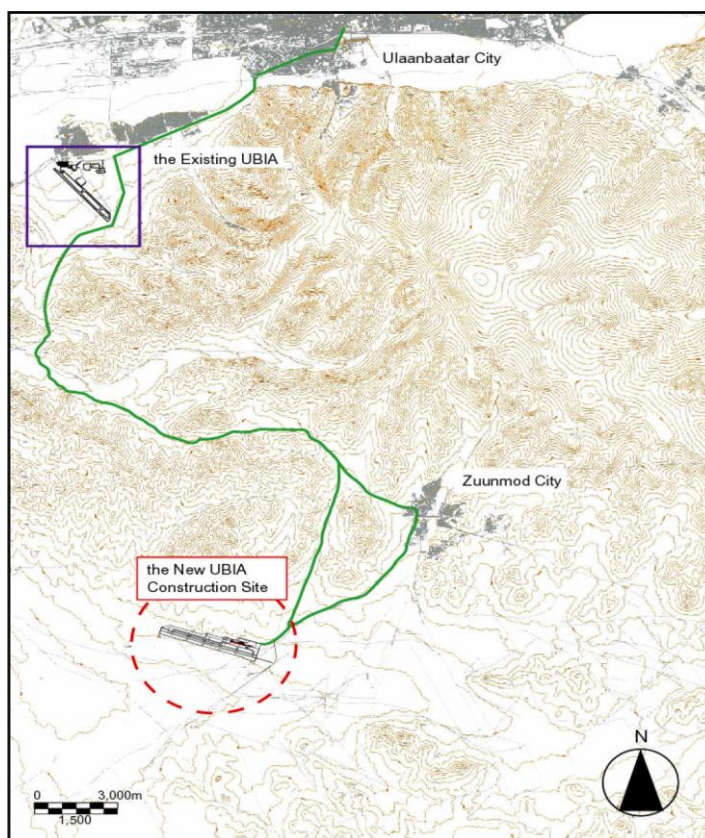
Source: The author's compilation

According to the evaluation of SEZs projects in Mongolia by using the New Feasibility Study Scheme, the feasibility levels of all 4 projects were very weak for all of the 6 steps of F/S. As mentioned in previously, in the author's opinion, these SEZs have low possibility to be developed successfully and it's better to dissolve the status of these zones for not wasting the time and funding.

## 5.4 Recommendation of Feasible SEZ Development Plans in Mongolia

### 5.4.1 New SEZ development plan

While all existing on-going SEZs in Mongolia are located in very rural areas and their construction is pro-longed, it is crucial to develop a new SEZ with successful features for the development of Mongolia. The author was searching a possibility of developing a new SEZ in the area with more advantages compared to the existing failed SEZs. And she found out that Ulaanbaatar, capital city of Mongolia will have a new international airport as replacement of existing Chingis Khaan International Airport by 2015. The airport will be built with Japanese assistance in Tov province. Japanese Government will be giving a 40-year loan of US\$270 million. The project has already initiated. However the future development plan of existing Chingis Khaan International Airport has not yet decided by the government.



**Figure 5.16 Location of Existing and New Ulaanbaatar International Airports**

And the author noticed that there is high possibility for developing a new SEZ based on the lessons learned from the world successful SEZ cases in the existing international airport. It is possible to use the building facilities and infrastructures such as electricity, water, drainage and sewage systems of existing international airport as SEZ infrastructure basics. The project can reduce its

development cost drastically. Ulaanbaatar City is located just 15 km from the existing airport. Therefore it will not difficult to get work resources.

The author made the preliminary feasibility study of this plan and named this plan as “Ulaanbaatar Airport SEZ” construction project. The author also evaluated the feasibility study level of the new SEZ to-be-built by using the evaluation check list based on the New Scheme of Feasibility Study. Table 5.6 shows the results of author’s evaluation. It shall be understood that while there is no concrete plan to establish Ulaanbaatar Airport SEZ, evaluation is basically based on the technical features of the location. However this plan has much higher feasibility level than 4 on-going SEZ projects.

**Table 5.6 The feasibility study level of a new SEZ in existing airport**

	Description of conditions	New SEZ
Market Demand Feasibility	Competitive advantages of the zone site location	Airport is the world sky gateway and it has more possibility to connect other countries except only the neighboring countries; Russia and China.
	Competitive advantages of the zone offering for investors	NA
Technical feasibility	Distance from capital city	15 km
	Close to international school	Yes
	Close to hospital with international standards	Yes
	Close to stores and supermarkets with international standards	Yes
	Population within 15 km	1,071,700
	Easy to find labour force	Yes (easy to employ from the capital city, Ulaanbaatar where the half of total population lives)
Economical feasibility	Cost of infrastructure development	Less cost to access SEZ site
Financial feasibility	Financing resource	NA

Environmental feasibility	Environment friendly industries should be invited
Concurrence of stakeholders	PPP type scheme should be used

Source: The author's compilation

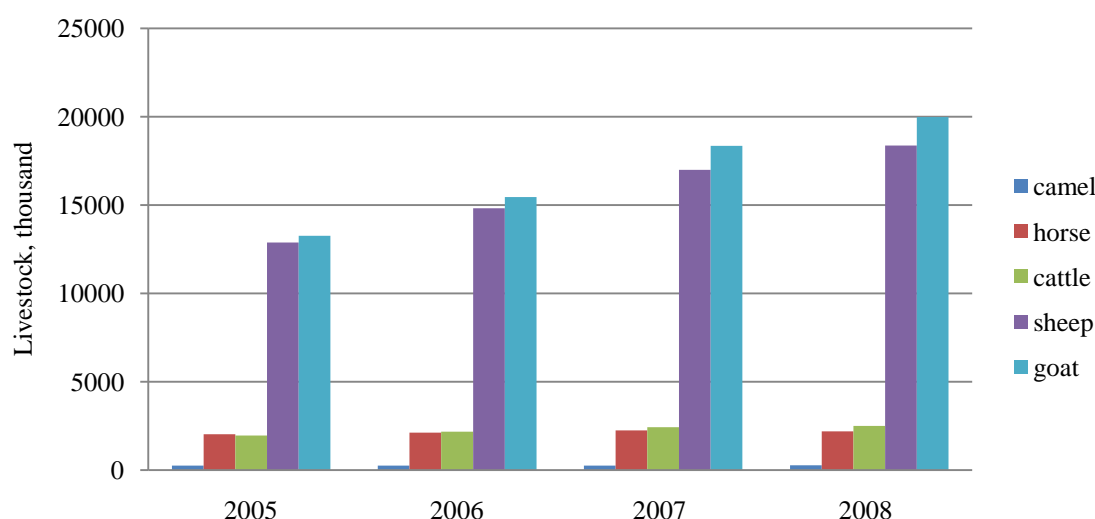
#### **5.4.2 Considerable industries which can be developed by resources kept in Mongolia**

Before establishing SEZ, what kinds of industries should be invited to the SEZ is one of the crucial issues to decide. Most countries make decision based on their own advantages. Somehow it is possible to make decision by supplier side view. But the emerging globalization issue reminds to consider not only own interests but also international and regional trends. As mentioned in the first section of Chapter 5, Mongolia is a low-population, landlocked country located between two giant neighbors. In Mongolian case, it is better to consider 3 variants for choosing potential industries to be located in SEZ. Also the author considered that in case developing SEZ on the basis of the airport, the products to be produced should be light weighted.

- Traditional industry based on the agriculture sector of Mongolia
- High tech industry based on the natural resources of Mongolia
- High-tech service industry based on the geographical location of Mongolia

##### **1. Traditional industry based on the agriculture sector of Mongolia**

Mongolia's main source of livelihood has been its animal husbandry sector for many years. There are 5 kinds of animal which dominate in Mongolia's animal husbandry sector; horse, camel, cattle, sheep and goat. Number of those 5 animals has been increasing gradually in recent years (Figure 5.17).



**Figure 5.17 Number of livestock, 2005-2008**

Source: NSO 2009

In 2008, there were total 43 million animals including 0.3 million camel, 2.1 million horse, 2.5 million cattle, 18.4 million sheep and 20 million goat (NSO 2009). Several main products are produced by animal husbandry sector. Those are meat, hides, skins, wool and cashmere. Among those main products, the cashmere is the most valuable product in the world market.

### **Potential Industry - Cashmere Industry**

Cashmere is a kind of products which can be a valuable resource for export. Cashmere garments are luxury products which highly demands in luxury segments of Europe, America and Japan. Mongolia has advantage for cashmere sector. Number of livestock was reached 42 million and 20 million of them were goats in 2008. Around 17,000 ton raw cashmere is collected every year in the world. Mongolia collects approximately 7,000 ton raw cashmere per year or it equals to 40% of total world cashmere. China collects 9,000 ton raw cashmere per year. 1000 ton raw cashmere is from Iran, Afghanistan, Russia, and Turkey. It means Mongolia and China are the main players in the world cashmere production market.

Although 6,700 ton raw cashmere was collected in 2009, 5000 ton of them were directly exported to China. Only 1500 ton raw cashmere left for Mongolian

cashmere manufacturers. Just 7-8% of total collected cashmere is used for end products, however Mongolia collects 6700 ton raw cashmere per year. The Mongolian cashmere fiber is darker in shades. So its market value is lower than Chinese Cashmere which is whiter (USAID, 2007).

a) is 10-15% longer than Chinese cashmere (a result of longer harsh winters), and

b) has a softer handle that consumers can recognize. This translates for spinners into an easier-to-spin fiber which pills less in the yarn.

For these reasons, Mongolian cashmere is commonly blended with Chinese cashmere for making whiter mixture spins. If Mongolia could develop cashmere industries in the new SEZ, the raw cashmere flow to China would be stopped and export income would be increased by high-value added end products of cashmere.

## **2. High tech industry based on the natural resources of Mongolia**

Mongolia is rich in its natural resources. Especially several kinds of minerals are spread widely; gold, coal, copper, molybdenum, and etc (Table 5.7).

**Table 5.7 Natural Resources of Mongolia**

Natural Resources	Number of deposits
<b>Gold</b>	511
<b>Copper</b>	6
<b>Molybdenum</b>	3
<b>Lead</b>	4
<b>Zinc</b>	4
<b>Tin</b>	12
<b>Tungsten</b>	17
<b>Iron</b>	29
<b>Coal</b>	85
<b>Fluorite</b>	83
<b>Limestone</b>	48
<b>Clay</b>	81
<b>Sand and gravel</b>	84
<b>Sand for construction materials</b>	53

Source: MRA 2010

And each year Mongolia produces following types of minerals such fluorite, fluorite concentrate, copper concentrate etc. Table 5.8 shows the types and amounts of main minerals produced in Mongolia 2004-2009.

**Table 5.8 Mining products by Commodity, 2004-2009 (thousand tons)**

	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Fluorite</b>	206.7	233.4	239.4	245	219.1	344.2
<b>Fluorite concentrate</b>	102.7	93.7	108.3	109.9	115.7	115.3
<b>Copper in concentrate</b>	130	126.3	129.7	130.2	126.8	129.8
<b>Molybdenum in concentrate</b>	1.14	1.15	1.41	1.98	1.78	2.41
<b>Tin concentrate/50%/</b>	0.022	0.047		0.03	0.09	0.015
<b>Tungsten concentrate/68%/</b>	0.077	0.078	0.182	0.244	0.142	0.039
<b>Coal</b>	6665	7517.1	8074.1	9237.6	9291.6	13164
<b>Gold</b>	0.019	0.022	0.021	0.018	0.015	0.001
<b>Cathode copper</b>	2.38	2.48	2.62	3.01	2.59	2.47
<b>Iron ore</b>	33.5	167.7	180	265.1	1387.4	1379.0
<b>Zinc concentrate /wet/</b>		22.8	109.0	154.7	143.6	156.5
<b>Cast copper</b>		0.20	0.22			
<b>Molybdenum oxide</b>			0.16	2.66	2.11	0.157

Source: MRA 2010

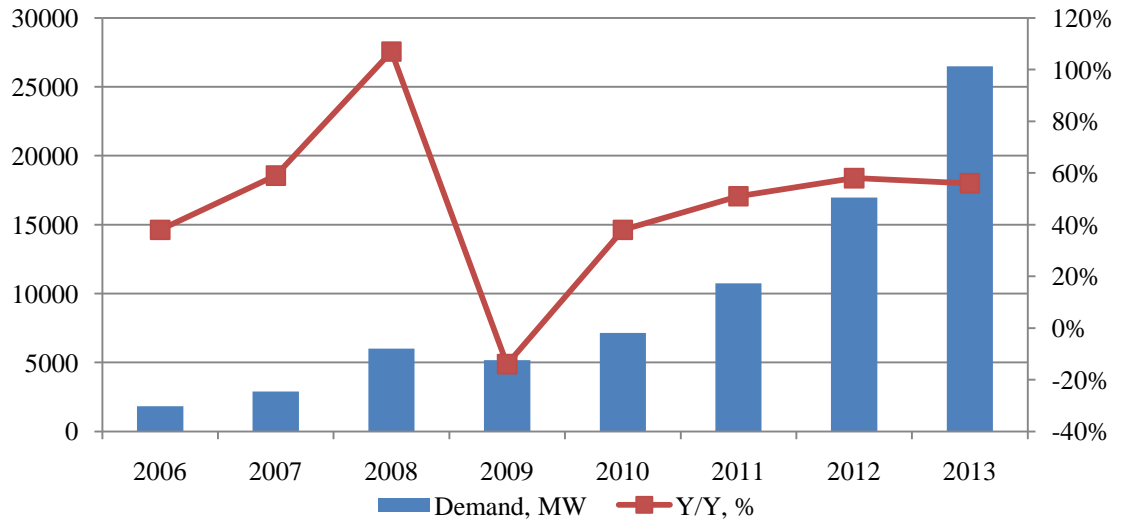
Most of mineral products are being exported without any processing. If Mongolia can produce end products and export them, it will be more helpful for Mongolia's wealth. So it is important to consider what kind of products should be produced by using what kinds of minerals and how to export them to which market.

### **Potential Industry - Solar Panel Industry**

Hydrocarbon energy recourse is limited in the world. It will be more limited as time goes by. So this emerging energy issue reminds us to think about future energy resources especially renewable energy resources such as solar, wind, water, and etc. One of the possible main resources among the renewable energy resources is solar resource. Market trend of the solar panel is increasing



continuously in recent years. Projection of global solar cell demand also tells demand of solar cell will increase by 2015 by double with compared to 2007.



**Figure 5. 18 Solar cell end market demand**

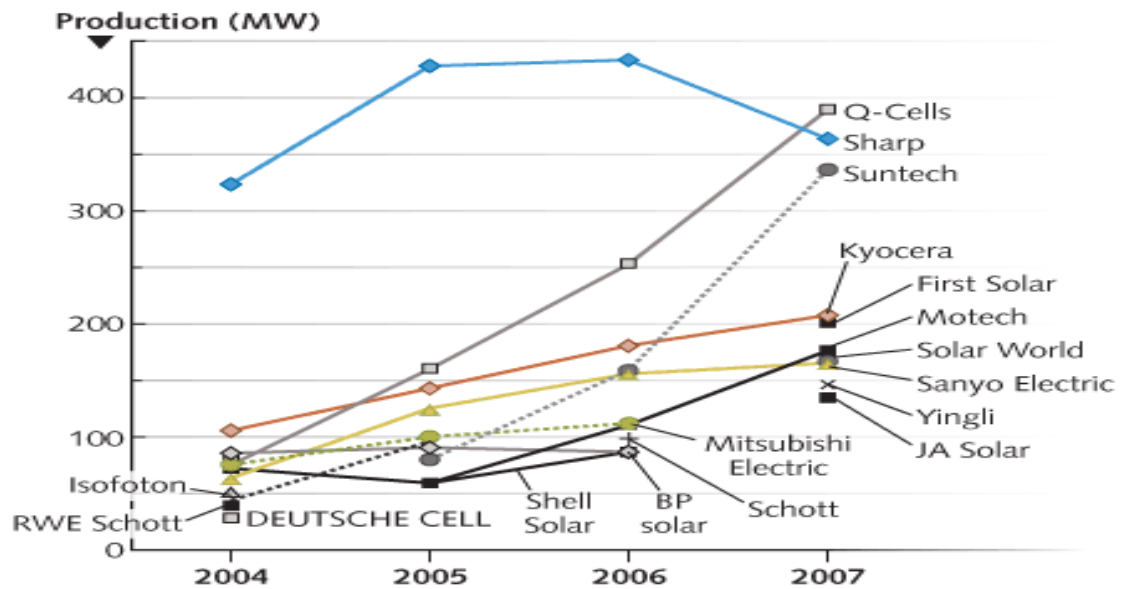
Source: DisplaySearch, 2009

Mongolia has a chance to develop solar panel industry by using its mineral resources. According to the author's study the thin film solar cell demand is increasing rapidly. And there are 5 main kinds of the thin film solar cell.

- a) Amorphous silicon or microcrystalline silicon solar cell
- b) Cadmium telluride solar cell
- c) Copper indium gallium selenide solar cell
- d) Polymer/organic solar cells
- e) Luminescent solar concentrator

Among the 5 kinds of solar cell, copper indium gallium selenide solar cell has the highest efficiency (~20%) among thin film materials. Moreover, Mongolia is rich in copper resources. So developing the copper indium gallium selenide solar cell industry in the new SEZ has possibility. But it requires high technology and chemical industry development.

Figure 5.19 shows the top 10 photovoltaic manufacturers that lead by production amount.



**Figure 5.19 Top 10 Photovoltaic manufacturers, 2004-2007**

In 2009, following 10 companies were included top 10 manufacturers.

1. 1100.0 MW First Solar (US) – uses a thin film semiconductor process based on CdTe, to produce photovoltaic modules
2. 704.0 MW Suntech (China) - the world's largest producer of crystalline silicon photovoltaic modules.
3. 595.0 MW Sharp (Japan)- thin film modules and mono and poly-crystalline silicon solar cells
4. 586.0 MW Q-Cells (Germany)
5. 525.3 MW Yingli (China)
6. 520.0 MW JA Solar (China)
7. 400.0 MW Kyocera (Japan)
8. 399.0 MW Trina Solar (China)
9. 397.0 MW SunPower (US)
10. 368.0 MW Gintech (Taiwan)

Mongolia needs to put effort to develop solar cell industries in the new SEZ by discussing the world leading companies such as Sharp etc.

### 3) High-tech service industry

#### Potential Industry - Aircraft maintenance center

Since the case is about the airport based SEZ, one of the possible industries can be service related to the aircrafts. Aircraft maintenance center will be one of the realistic industries in the Ulaanbaatar Airport SEZ. For finding out the possibility of calling Aircraft maintenance center, the author made the detail study of the aircraft maintenance center business.

#### a) Global Market Demand

World Air travel is growing 5.3% per year since 1977. Within 20 years Asia Pacific region will overtake the US and Europe as the world's largest air transport market. Asia-Pacific airlines will carry over 30% of the global passenger traffic and around 40% of all air freight.

Based on the growth prediction of air transport market, the world leading aircraft makers; Boeing and Airbus also introduced their prediction about new airplane deliveries from 2009 to 2028. Table 5.8 shows the prediction of new airplane deliveries by region.

**Table 5.8 Prediction about new airplane deliveries by region, 2009-2028**

Area	Boeing	Airbus
<b>North America</b>	7,690	5,451
<b>Europe</b>	7,330	6,068
<b>CIS</b>	1,050	901
<b>Middle East</b>	1,770	1,419
<b>Latin America</b>	1,640	1,658
<b>Africa</b>	620	929
<b>Asia Pacific</b>	8,960	7,672
<b>Total</b>	<b>29,060</b>	<b>24,098</b>

Source: Boeing 2009, Airbus 2009

## b) Opportunity for Mongolia

### ① Geographical Advantage of Mongolia

Over 2.25 billion people reside within 5 hours flying time of Mongolia. Figure 5.19 shows the distances between Ulaanbaatar and the biggest cities in the region. Also 4 countries comprising 60% of the world's GDP and 7 of the world's fastest growing economies are within 7 days by rail or sea freight.

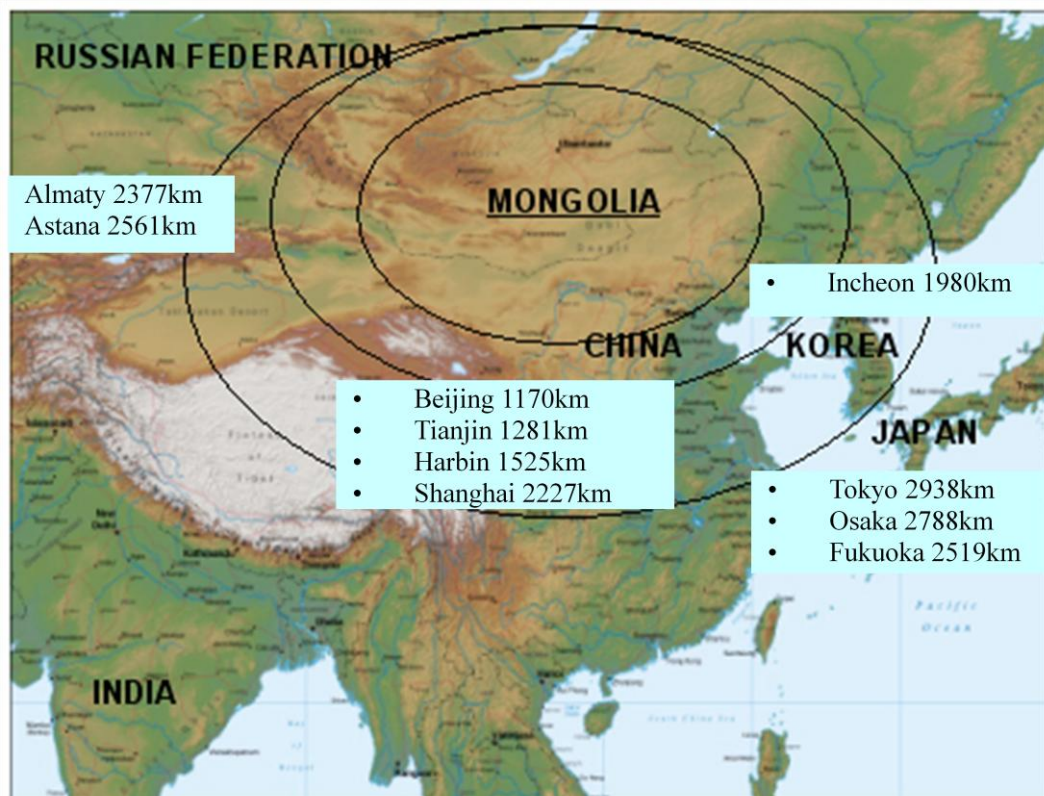


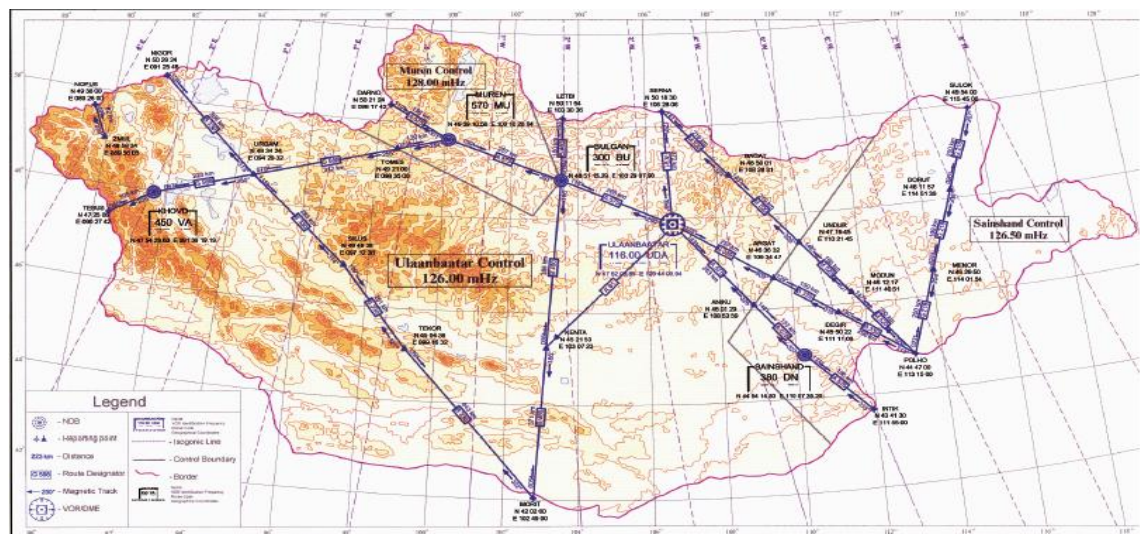
Figure 5.19 The distance between Ulaanbaatar and the nearest biggest cities

There are also several air routes passing over Mongolia. Figure 5.20 and 5.21 show the air routes over Mongolia.



**Figure 5.20 Airways over Mongolia**

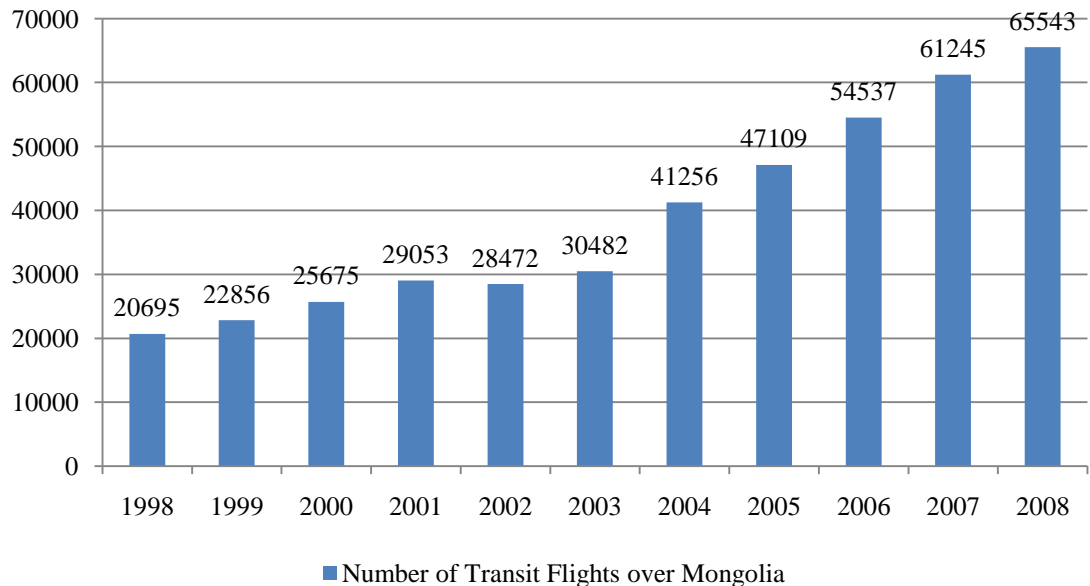
Source: Nobuyuki Kato, 2006



**Figure 5.21 Airways over Mongolia**

Source: CAAM, 2009

Number of transit flights over Mongolia is increasing rapidly within last 10 years (Figure 5.21).



**Figure 5.21 Number of Transit Flights over Mongolia, 1998-2008**

Source: CAAM, 2009

## **② Foreign airlines from 6 countries landing in Mongolian airport**

There are total 6 foreign airlines, which carry passengers to destinations. Those are Aeroflot (Russia), Air china (China), Korean Air (South Korea), Japan Airlines (Japan) and SCAT (Kazakhstan). These airlines have high possibility to be the customer of aircraft maintenance center in the new SEZ. That's why the author collected data of the number of the aircrafts and their types owned by these airlines.

**Table 5.9 Number of Aircrafts by Airlines**

Aircraft type	Airlines				
	MIAT	Aeroflot	Air China	Korean Air	Japan Airlines
A300-600					22
A300-600R				8	
A310-300	1				
A319-100		15	33		
A320			10		
A320-200		32			
A321			19		
A330			20		
A330-200/300		8			
A330-200				2	
A330-300				16	
A321-200		16			
A340-300			6		
B737-3/6/7/8			114		
B737-800	2			15	25
B737-900				16	
B747-400					27
B747-400BCF					4
B747-400D					8
B747-400F					2
B747-400/M			10	25	
B757-200			13		
B767-200					2
B767-300					19
B767-300ER					23
B767-300ERF					3
B767-300E		11			
B767-2/300			6		
B777-200					15
B777-200ER			10	18	11
B777-300					7
B777-300/-30				7	
B777-300ER					13
B747-400F/ER				17	
Tu154		3			
IL96		6			
DC10-3/40F/		3			
MD-81					7
MD-90					16
<b>Total</b>	<b>3</b>	<b>94</b>	<b>241</b>	<b>124</b>	<b>204</b>

Source: JADC, 2010

### ③ Infrastructure – Current Airport

Ulaanbaatar, Mongolia will have a new international airport by 2015. There is no concrete plan to utilize the current airport after completion of new airport. Therefore, it is possible to use current airport as SEZ, which will be especially concerned in aircraft maintenance. It's better to mention why the existing airport was needed to change. Existing Chingis Khaan International Airport has following problems and that's why the new international airport was needed to be developed.

- According to ICAO, the airport should have more than 95% of usage
- Due to the north western wind blowing to runway during April to July the airport usage drops to 84%-92%
- Due to air pollution in December and January, the airport usage drops to 80%-83%

### ④ Human resources - Potential engineers

There is a program for undergraduate students in Aeronautic Mechanic Engineer at School of Mechanical Engineering, Mongolian University of Science and Technology since 2001. There 76 students have graduated with degree BE in Aeronautic Mechanic Engineer since 2006 (aerohydromes.com).

### ⑤ Threats to be developed the aircraft maintenance center

By using Porter's 5 Force model, the threats can be face to the aircraft maintenance center is checked.

#### 1) Threat of New Entrants

- Aircraft Maintenance business is highly related to the geopolitical policy of the country.
- There are only 2 well-known aircraft makers; Boeing and Airbus.
- Getting permission of different aviation authorities takes time and effort.
- Lack of human resources majored in aircraft engineering and other related engineering fields in Mongolia.

#### 2) Bargaining Power of Suppliers

- Mongolia imports its 100% of petroleum products from outside.



- So it can be sometimes difficult to provide aircraft fuel continuously.

### **3) Bargaining Power of Customers**

- There is a newly established Boeing Shanghai Aircraft Aviation Services Co., Ltd in Pudong International Airport, Shanghai. So customers can choose the Boeing Shanghai Maintenance Center.

### **4) Threat of Substitute Products**

- There is a newly established Boeing Shanghai Aircraft Aviation Services Co., Ltd in Pudong International Airport, Shanghai
- 8 civil aviation authorities from different countries including European Aviation Safety Agency, Korea, Russia, Thailand made agreement to get service in Boeing Shanghai Aircraft Aviation Services Co., Ltd

Since the one of the two main aircraft makers; Boeing already developed the maintenance in Shanghai, Mongolia needs to put effort to discuss with Airbus about developing maintenance center in the new SEZ.

## **5.5 Conclusion**

Based on the world trend there is a demand for adjusted new type of SEZ in landlocked, low population countries such as Mongolia. New type of SEZ in landlocked country such as Mongolia should consider following matters.

1. Near to the international gateway  
In case of landlocked country, the location should be next to an airport.
2. Save infrastructure expenditures  
Using existing infrastructure for establishing SEZ will be a cost effective way for developing country such as Mongolia.
3. Industries in SEZ should be based on advantages of host country  
In Mongolian case, the industries can be based on rich mineral resources and strategic geopolitical location of Mongolia.

The government of Mongolia decided to make a brand-new airport in the area of Ulaanbaatar. After completion of the new airport by 2015, there is no appropriate plan for using existing airport. So this existing airport can be used as SEZ. New

SEZ can include some industries with related to the mineral processing hi-tech industry and aircraft maintenance industry based on the geopolitical location of Mongolia.

For preventing same unsuccessful stories as exist in Mongolia, Mongolian SEZ projects should follow the world trend of private sector participation in SEZ project development so as to avoid reliance on government funding. Attracting private sector participation in SEZ development needs preparation work related to laws, regulations and planning. Especially for the planning, complex feasibility study is crucial to develop SEZs in landlocked developing countries. An appropriate scheme of feasibility study should be prepared for encouraging SEZ development in developing countries.

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## Chapter VI. The Concept of Project Execution and Effectiveness Analysis Applying for SEZ Projects

### 6.1 Concept of Analysis

It is crucial that to evaluate effectiveness of large infrastructure development projects such as SEZs on economic point of view. For evaluating economic effectiveness of the SEZ project, some simulation should be done on the basis of current economic data of the country.

The author was seeking an appropriate way of analysis for checking the effectiveness of SEZ projects. And she found out that General Equilibrium Model can be applied on this purpose.

		The Way of Analysis	
		Wassily Leontief Theory	CGE ( Computable General Equilibrium)
Applying Data	Inter-industry table (Input-Output Model)	<ul style="list-style-type: none"> <li>■ The model can be applied for industry activity analysis only.</li> <li>■ The analysis gives linear outcome with respect to change in demand side only.</li> </ul>	
	SAM: Social Accounting Matrix	<ul style="list-style-type: none"> <li>■ The model can be applied for a country accounting analysis.</li> <li>■ The analysis gives linear outcome with respect to change in demand side only.</li> </ul>	<ul style="list-style-type: none"> <li>■ The effectiveness of infrastructure development project like SEZ project shall be analyzed with non-linear .</li> <li>■ CGE considers price change.</li> </ul>

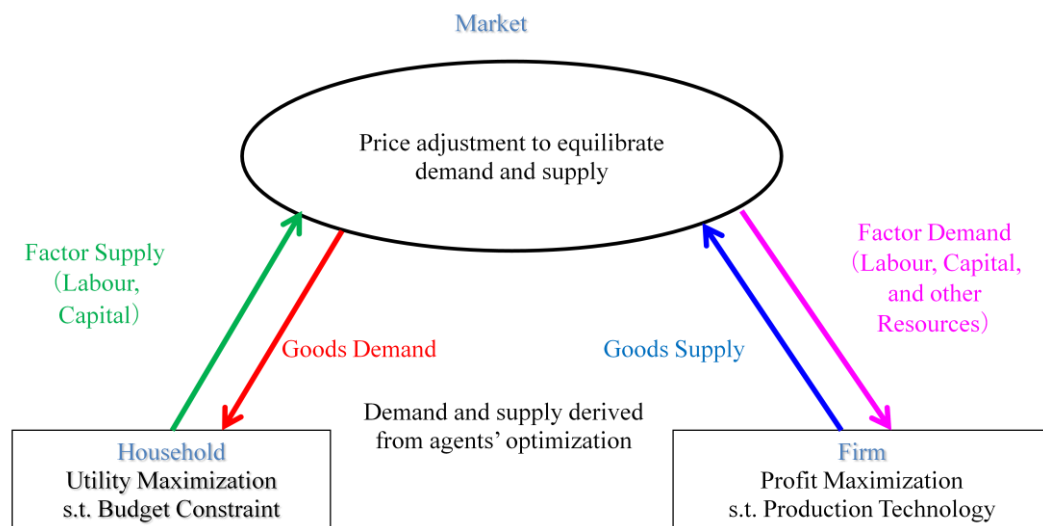
Figure 6.1 Study Background

### 6.2 Computable General Equilibrium Model

Computable general equilibrium (CGE) models are a class of economic models that use actual economic data to estimate how an economy might react to changes in policy, technology or other external factors. In other words, CGE models are designed to establish a numerical framework for empirical analysis and evaluation

of economical policies. That's why they are called Computable General Equilibrium Models.

- Computable → numerical solution (empirical data)
- General → description of the whole economy
  - full economic cycle
  - all markets
- Equilibrium → demand equals supply
  - prices are adjusted to achieve market equilibrium
  - general: on all markets simultaneously
- Model → solvable set of equations



**Figure 6.2 Concept of Computable General Equilibrium Model**

Source: Hosoe et al (2010)

CGE models are commonly used in following research topics (Hosoe et al, 2010).

- General macroeconomic issues: public expenditure cuts, impact of trade and tax reforms on income distribution
- Fiscal policy issues: introduction of value-added taxes, commodity tax reforms
- International trade policy: impact of WTO negotiations, ASEAN free trade area formation

- Regional and transport policy: impact of high-speed rail and highway investment
- Environmental policy; introduction of eco-taxes, implementing a tradable CO2 emissions permit system
- Industrial and labour policy: deregulation of electric power industry, impact of foreign workforce inflow

### 6.2.1 Computable General Equilibrium Model of Mongolia

CGC model of Mongolia was needed to do the analysis. But there was not any CGC model was developed in Mongolia before and it was needed to collect sufficient data for developing General Equilibrium Model of Mongolia. The country Mongolia was lack of statistical and other data as the all the developing countries. For doing the analysis following steps were taken by the author to collect necessary data step by step and developing the not applicable one by herself.

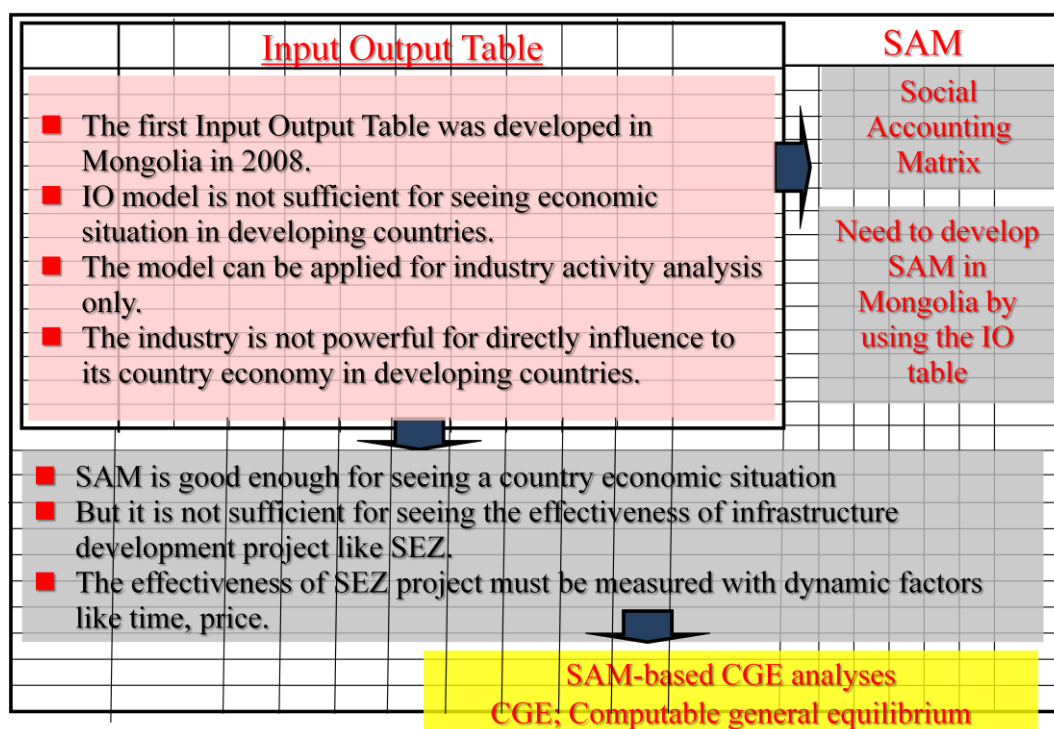


Figure 6.3 The Step of Analysis



1. Collect Input Output Table of Mongolia
2. Develop Social Accounting Matrix of Mongolia by using the data from Input Output Table of Mongolia and various sources
3. Develop General Equilibrium Model of Mongolia by using the data from Social Accounting Matrix of Mongolia
4. Input the data from General Equilibrium Model into GAMS; General Algebraic Modeling System programming
5. Ready GAMS file for the analysis of SEZ

### **1. Input Output Table of Mongolia**

One of the most important data sets is the Input Output Table for implementation of quantitative analysis. This table is a data matrix which shows annual transactions among economic sectors of a country. This data set can be used not only for basic quantitative analysis but also calibration of advanced economic simulation models. Though it is a very important data set, an Input Output Table for the Mongolian economy had not yet been produced until 2008.

Fortunately, The Input Output Table of Mongolia was officially prepared for the first time based on the data of 2005 and published on the Statistical Year Book – 2007 in 2008 (Appendix 2).

## 2. Social Accounting Matrix of Mongolia

The author developed the Social Accounting Matrix of Mongolia based on the Input-Output Table 2005 of Mongolia by following the guideline of “Textbook of Computable General Equilibrium Modelling” due to lack of the data the proper Social Accounting Matrix of Mongolia was not prepared and published anywhere. Social Accounting Matrix of Mongolia developed by the author is attached in the Appendix 3.

		Activity					Factor		Indirect tax		Final Demand			External	Total
		AGR	FIS	MIN	...	OTH	CAP	LAB	IDT	TRF	HOH	GOV	INV	EXT	
Activity	AGR														
	FIS														
	MIN														
	...														
	OTH														
Factor	CAP														
	LAB														
Indirect Tax	IDT														
	TRF														
Final Demand	HOH														
	GOV														
	INV														
External	EXT														
Total															

	directly taken from IOT
	calculated from IOT
	2005 tax revenue from NSO, 2006

**Figure 6.4 Simple Structure of Social Accounting Matrix of Mongolia**

## 3. GAMS programming

After completed SAM Mongolia, the SAM was input to the GAMS programming (Today most CGE models are formulated and solved using one of the [GEMPACK](#) or [GAMS](#) software systems. In this analysis, the GAMS was used.) for applying the economic effectiveness analysis. All the data in SAM was converted to

GAMS programming input style. And the file was prepared as the basic for the analysis (Appendix 4).

## **6.3 Analysis**

After developed the CGE model of Mongolia, the analysis was started. The author did 2 kinds of analysis.

1. Static analysis
2. Dynamic analysis

### **6.3.1 Static Analysis**

The author made static CGE model to evaluate economic impact of SEZ project on Mongolian economy under different scenarios.

#### **a. Static Analysis – 1**

**Objective:** To evaluate which kind of industry has effective impact to Mongolian economy. Labour intensive industry or Capital intensive industry?

**Case 1.** Only Labour increase 20%

**Case 2.** Only Capital increase 20%

**Case 3.** Both Labour & Capital increase 20%

**Case 4.** Only Labour increase 10%

**Case 5.** Only Capital increase 10%

**Case 6.** Both Labour & Capital increase 10%

**Case 7.** Labour 10%, Capital 20%

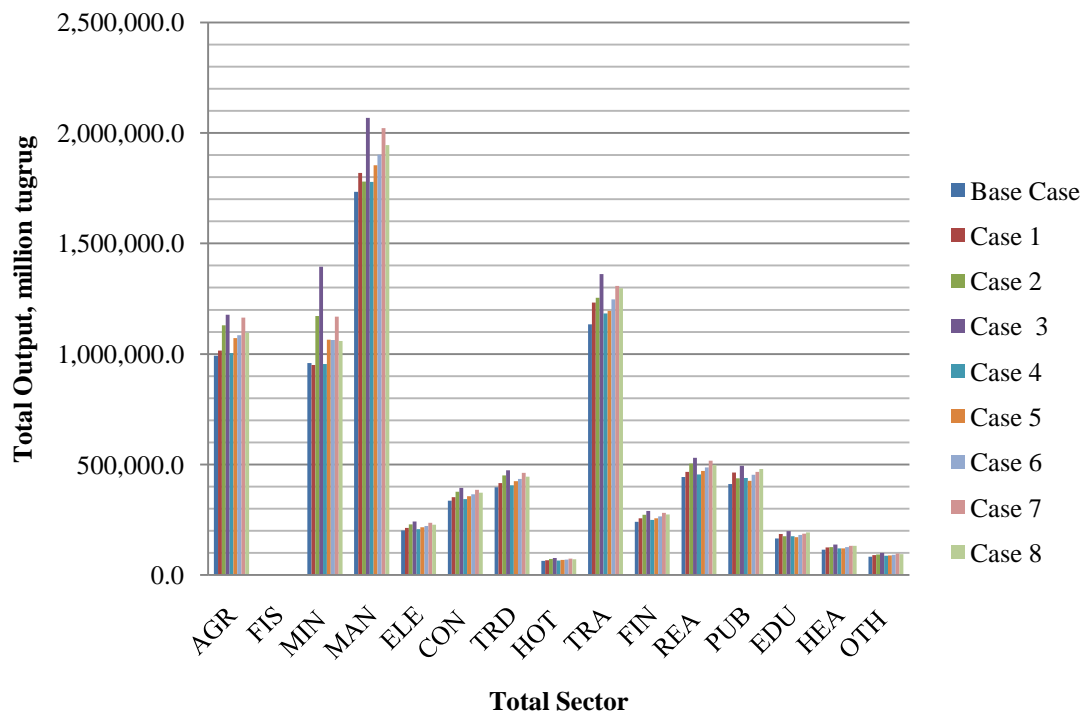
**Case 8.** Labour 20%, Capital 10%

#### **Process:**

1. Change coefficients of labor and capital for the base case of Mongolian CGE model
2. Calculate new equilibrium level by using GAMS program for each case
3. Collect results from GAMS result file after the new equilibrium level was found.

**Table 6.1 Total Output, By Cases**

Sector	Total Output (million tugrug)								
	Base Case	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
		Only LAB 20%	Only CAP 20%	Both LAB& CAP 20%	Only LAB 10%	Only CAP 10%	Both LAB & CAP 10%	LAB 10%, CAP 20%	LAB 20%, CAP 10%
AGR	991 707,0	1 015 101,8	1 129 401,4	1 177 512,6	1 003 766,1	1 071 688,7	1 084 617,4	1 164 549,4	1 096 778,0
FIS	412,0	439,3	464,6	495,5	426,0	438,8	453,7	480,5	467,9
MIN	958 622,0	950 890,7	1 171 635,2	1 395 482,7	955 138,3	1 065 345,5	1 062 534,8	1 169 617,3	1 058 817,0
MAN	1 734 088,0	1 819 266,6	1 779 940,4	2 068 463,1	1 777 984,9	1 854 453,9	1 901 290,6	2 021 738,1	1 945 361,9
ELE	202 019,0	213 783,8	229 430,5	242 788,1	208 088,4	215 917,3	222 403,3	236 319,8	228 491,5
CON	336 214,0	351 787,3	376 363,0	393 991,5	344 254,8	356 528,9	365 102,2	385 472,8	373 140,3
TRD	396 582,0	415 981,5	451 375,3	473 457,0	406 598,0	424 307,6	435 019,3	462 765,8	445 066,3
HOT	63 935,0	67 501,4	72 636,9	76 667,5	65 772,1	68 342,8	70 301,3	74 713,2	72 144,9
TRA	1 133 702,0	1 232 654,8	1 254 322,6	1 360 981,2	1 184 024,8	1 194 999,6	1 247 345,8	1 308 566,3	1 297 948,5
FIN	241 334,0	256 888,8	272 419,1	289 690,1	249 311,6	257 085,9	265 512,8	281 276,2	273 517,8
REA	443 635,0	466 737,7	504 265,8	530 371,2	455 530,3	470 487,2	487 007,5	517 717,1	498 936,1
PUB	412 298,0	463 589,0	438 278,7	494 756,3	438 572,8	425 891,4	453 528,2	467 187,1	479 862,2
EDU	165 466,0	186 116,2	176 267,7	198 519,9	175 986,1	171 052,1	181 996,4	187 602,8	192 526,5
HEA	114 899,0	125 173,0	126 300,8	137 763,6	120 179,6	120 739,5	126 331,0	132 187,6	131 623,1
OTH	83 539,0	89 630,9	93 332,8	100 189,5	86 675,7	88 527,3	91 864,1	96 862,2	95 008,8
	<b>7 278 452,0</b>	<b>7 655 542,8</b>	<b>8 076 434,8</b>	<b>8 941 129,8</b>	<b>7 472 309,5</b>	<b>7 785 806,4</b>	<b>7 995 308,4</b>	<b>8 507 056,1</b>	<b>8 189 690,6</b>



**Figure 6. 5 Total Output, by Sector**

## Result:

Based on the results, the author chose the 3 cases which showed the highest total output increase compared to the base case. Following 3 cases showed the highest total output.

1<sup>st</sup> – Case 3 (Both Labour & Capital increase 20%) – 8 941 129.8million

2<sup>nd</sup> – Case 7 (Labour 10%, Capital 20%) – 8 507 056.1 million

3<sup>rd</sup> – Case 8 (Labour 20%, Capital 10%) – 8 189 691.6 million

**Table 6.2 Export, By Cases**

Sector	Export (million tugrug)								
	Base Case	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
		Only LAB 20%	Only CAP 20%	Both LAB& CAP 20%	Only LAB 10%	Only CAP 10%	Both LAB & CAP 10%	LAB 10%, CAP 20%	LAB 20%, CAP 10%
AGR	66132,0	64524,0	80785,1	78881,9	65289,3	73429,3	72509,4	79785,2	71676,3
FIS	192,0	207,4	214,3	231,8	199,9	203,4	211,9	223,3	219,9
MIN	816678,0	804930,0	1007600,0	997700,0	811100,0	912260,0	907160,0	1003100,0	901340,0
MAN	217964,0	234030,0	243540,0	262120,0	226290,0	231070,0	240050,0	253140,0	248430,0
ELE	119,0	134,7	126,7	144,1	127,1	123,1	131,5	135,6	139,7
CON	1166,0	1256,7	1269,5	1370,9	1212,8	1218,9	1268,5	1321,8	1315,2
TRD	64702,0	68937,8	72713,4	77538,7	66888,6	68780,9	71121,8	75200,8	73319,1
HOT	330,0	358,5	365,1	397,3	344,7	348,0	363,6	381,6	378,4
TRA	402608,0	460700,0	425190,0	486180,0	431940,0	414300,0	444400,0	455970,0	473940,0
FIN	8793,0	9592,9	9715,7	10598,5	9202,4	9264,7	9695,9	10167,2	10107,5
REA	1036,0	1115,7	1153,4	1243,1	1077,0	1095,9	1139,6	1199,5	1180,7
PUB	6396,0	8345,7	5819,5	7704,1	7363,8	6099,4	7050,1	6751,0	8019,0
EDU	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
HEA	19,0	24,1	17,9	22,9	21,5	18,4	20,9	20,4	23,5
OTH	264,0	316,1	264,2	318,0	290,3	264,3	291,0	291,3	317,3
	1586399,0	1654473,6	1848774,8	1924451,2	1621347,4	1718476,4	1755414,2	1887687,6	1790406,5

Based on the results, the author chose the 3 cases which showed the highest export increase compared to the base case. Following 3 cases showed the highest export.

1<sup>st</sup> – Case 3 (Both Labour & Capital increase 20%) – 1 924 451.2million

2<sup>nd</sup> – Case 7 (Labour 10%, Capital 20%) – 1 887 688.6 million

3<sup>rd</sup> – Case 2 (Only Capital 20%) – 1 848 775.8 million

According to the results of those 3 cases and judging from the total output and export amount, it is seen that capital intensive industry is more effective than labour intensive industry in Mongolia.

#### **b. Static Analysis – 2**

**Propose:** According to the structure of the Mongolian economy, there are 3 main sectors; Agriculture, Mining and Manufacturing. Since the current economic situation of Mongolia was discussed in Chapter 5, there is need to change the economy highly depending on the mining sector. That's why the author did analysis to evaluate which sector has effective impact to Mongolian economy; Agriculture or Manufacturing.

Total 5 cases developed in this analysis.

**Case 1.** Only Investment in Agriculture Increase 10%

**Case 2.** Investment in Agriculture Increase 10% and Investment in Manufacturing Increase 10%

**Case 3.** Investment in Agriculture Increase 20% and Investment in Manufacturing Increase 20%

**Case 4.** Investment in Agriculture Increase 10% and Investment in Manufacturing Increase 20%

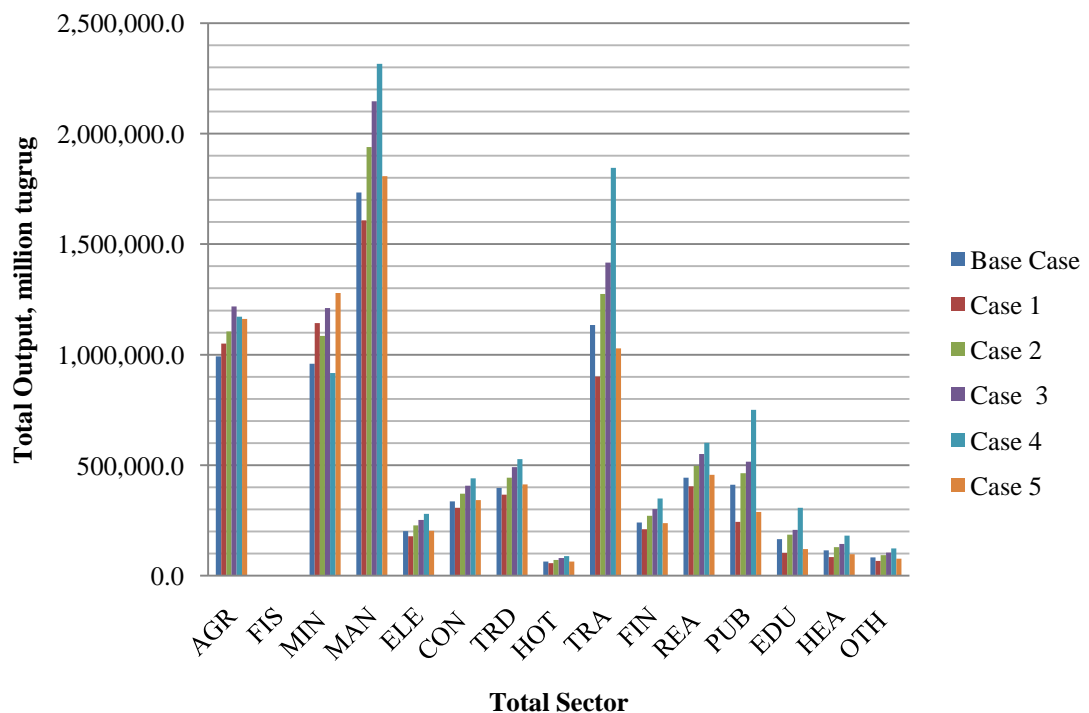
**Case 5.** Investment in Agriculture Increase 20% and Investment in Manufacturing Increase 10%

#### **Process:**

1. Change coefficients of investment in agriculture and manufacturing for the base case of Mongolian CGE model
2. Calculate new equilibrium level by using GAMS program for each case
3. Collect results from GAMS result file after the new equilibrium level was found.

**Table 6. 3 Total Output, By Cases**

Sector	Total Output					
	Base Case	Case 1	Case 2	Case 3	Case 4	Case 5
		Only investment in AGR 10%	Both investment in AGR and MAN 10%	Both investment in AGR and MAN 20%	Investment in AGR 10% and MAN 20%	Investment in AGR 20% and MAN 10%
<b>AGR</b>	991 707,0	1 049 642,2	1 105 258,7	1 218 818,5	1 172 287,3	1 162 212,2
<b>FIS</b>	412,0	350,8	463,6	515,1	591,6	399,5
<b>MIN</b>	958 622,0	1 142 197,2	1 084 551,6	1 210 509,7	916 482,5	1 278 336,2
<b>MAN</b>	1 734 088,0	1 607 421,4	1 939 855,6	2 145 601,7	2 316 179,5	1 807 367,0
<b>ELE</b>	202 019,0	178 522,7	227 151,9	252 284,3	280 566,5	202 797,5
<b>CON</b>	336 214,0	307 637,5	371 801,1	407 368,9	440 725,5	342 716,4
<b>TRD</b>	396 582,0	366 654,8	443 886,1	491 177,1	527 209,5	412 739,1
<b>HOT</b>	63 935,0	57 358,8	71 780,5	79 625,6	88 197,9	64 946,8
<b>TRA</b>	1 133 702,0	900 806,4	1 274 848,3	1 415 971,6	1 845 419,0	1 028 375,8
<b>FIN</b>	241 334,0	210 132,7	271 192,5	301 048,0	348 928,9	238 494,5
<b>REA</b>	443 635,0	405 069,7	497 041,6	550 436,8	601 590,3	456 946,2
<b>PUB</b>	412 298,0	243 748,8	464 016,0	515 721,6	750 236,4	288 364,7
<b>EDU</b>	165 466,0	103 019,7	186 195,2	206 914,7	307 611,6	120 768,5
<b>HEA</b>	114 899,0	85 106,3	129 113,1	143 325,0	182 178,5	98 150,5
<b>OTH</b>	83 539,0	67 836,1	93 845,2	104 150,6	123 792,6	77 579,2
	<b>7 278 452,0</b>	<b>6 725 505,3</b>	<b>8 161 001,2</b>	<b>9 043 469,1</b>	<b>9 901 997,7</b>	<b>7 580 194,1</b>



**Figure 6. 6 Total Output, by Sector**

**Result:**

Based on the results, the author chose the 3 cases which showed the highest total output increase compared to the base case. Following 3 cases showed the highest total output.

1<sup>st</sup>– Case 4 (Investment in Agriculture Increase 10% and Investment in Manufacturing Increase 20%) – 9 901 997.7 million

2<sup>nd</sup>– Case 3 (Investment in Agriculture Increase 20% and Investment in Manufacturing Increase 20%) – 9 043 469.1 million

3<sup>rd</sup>– Case 2 (Investment in Agriculture Increase 10% and Investment in Manufacturing Increase 10%) – 8 161 001.2 million

According to the result of those 3 cases, manufacturing sector is more effective than agriculture sector in Mongolia.

The results of these two types of the statistic analysis tell that total output of Mongolia will be increased in case of capital intensive manufacturing industry will be developed. So the result proves that SEZ based on the capital intensive manufacturing industries will bring economic growth if this kind of SEZs will be developed in Mongolia. As the result shows SEZ can be effective in Mongolian economy, it is needed to go in more detail analysis like which kind of execution scheme will be more effective to develop SEZ etc. So the following dynamic analysis was made.

**6.3.2 Dynamic Analysis****Objective:**

While studying through different cases of SEZ development projects and visiting sites of SEZs in Mongolia, Indonesia, and Cambodia, the author noticed there were huge differences in between the projects. Especially after visited the 4 different SEZs in Cambodia, she was curious about to evaluate the effectiveness of execution schemes of SEZs in quantitative way. The author impressed the rapid progress of Phnom Penh SEZ which is developed under PPP scheme and also wondered the late progress of Sihanoukville Port SEZ which is developed under



ODA scheme in same country Cambodia. She noticed that the time factor is the most important factor for developing SEZs.

So the author decided to evaluate the effectiveness of her proposed project Ulaanbaatar Airport SEZ under 2 different execution schemes of ODA and PPP to the rest of the country by using CGE model based on statistical data of Mongolia.

### Assumption of Dynamic Analysis

- Ulaanbaatar Airport SEZ project



**Figure 6.7 Location of proposed Ulaanbaatar Airport SEZ**

- Execution scheme
  - Case 1. PPP scheme
  - Case 2. ODA scheme
- Investment amount: 100 million USD (suppose to use the current infrastructures as basic for the new SEZ)
- Type: 40 year loan
- Loan Interest rate: 0.2% per year
- Repayment: Starting from 11<sup>th</sup> year
- Capital Depreciation rate: 4% per year
- Increase in Capital amount by developing SEZ: After started the operation of the new SEZ, supposed to be filled by investors within 8 years and due

to the new investors the capital amount will be increased by 40% at the end of the 8<sup>th</sup> year since the operation started. In the next 20 years, the capital amount will keep growing in slow speed within 20 years and supposed to be increased by 60% at the end of the 28<sup>th</sup> year since the operation started.

- Increase in Labour amount by developing SEZ: After started the operation of the new SEZ, supposed to be filled by investors within 8 years and due to the new investors the Labour amount will be increased by 20% end of the 8<sup>th</sup> year since the operation.
- Project schedule

**Table 6.4 Project Schedule**

	<b>Basic Conceptual Design</b>	<b>Detail Design</b>	<b>Build</b>	<b>Preparation for Operation</b>	<b>Operation</b>
PPP	2009-2010	2011	2012	2013	2014-2056
ODA	2009-2013	2014-2015	2016-2017	2018-2019	2020-2056

- Loan condition

**Table 6.5 Case 1 - PPP Loan condition**

Loan	<b>Loan 1</b>	<b>Loan 2</b>	<b>Loan 3</b>	<b>Loan 4</b>	<b>Total</b>
Year	2009	2010	2011	2012	
Loan Amount (million USD)	12 ,5	12, 5	25,0	50,0	100,0
Loan Amount ( million MNT)	16 250,0	16 250,0	32 500,0	65 000,0	130 000,0

- MNT- tugrug (currency of Mongolia)
- Exchange rate: 1USD= 1300MNT

PPP Loan repayment will finish in 2051.

**Table 6.6 Case 2 - ODA Loan condition**

	Loan 1	Loan 2	Loan 3	Loan 4	Loan 5	Loan 6	Loan 7	Total
Year	2009	2011	2013	2014	2015	2016	2017	
Loan Amount (million USD)	8,33	8,33	8.33	12, 5	12, 5	25,0	25,0	100,0
Loan Amount ( million MNT)	10 833,3	10 833,3	10 833,3	16 250,0	16 250,0	32 500,0	32 500,0	130000,0

- Exchange rate: 1USD= 1300MNT

ODA Loan repayment will finish in 2056.

### **Working Age Population Effect**

For calculating the Labour amount, the author compiled the data from “Population Projection 2008-2030”. Following steps were taken to compile the proportion of Labour amount increasing.

1. Calculate total working age population by picking the number of population with 15-64 year-old in male, 15-59 year-old in woman (according to Labour Law of Mongolia) from the “Population Projection 2008-2030”

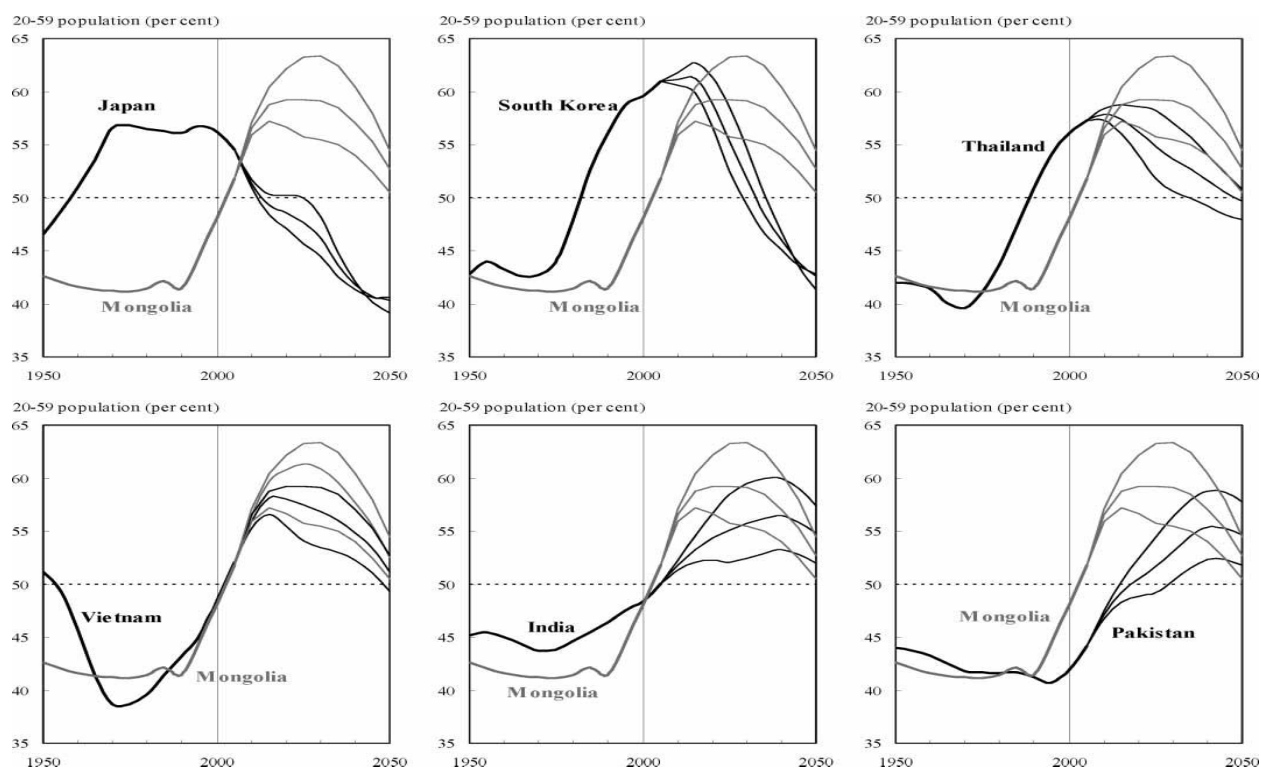
2. Suppose employment population rate will be constant as 62% as 2008.

$$\text{Employment population rate} = \text{Working population} / \text{Working Age Population}$$

or

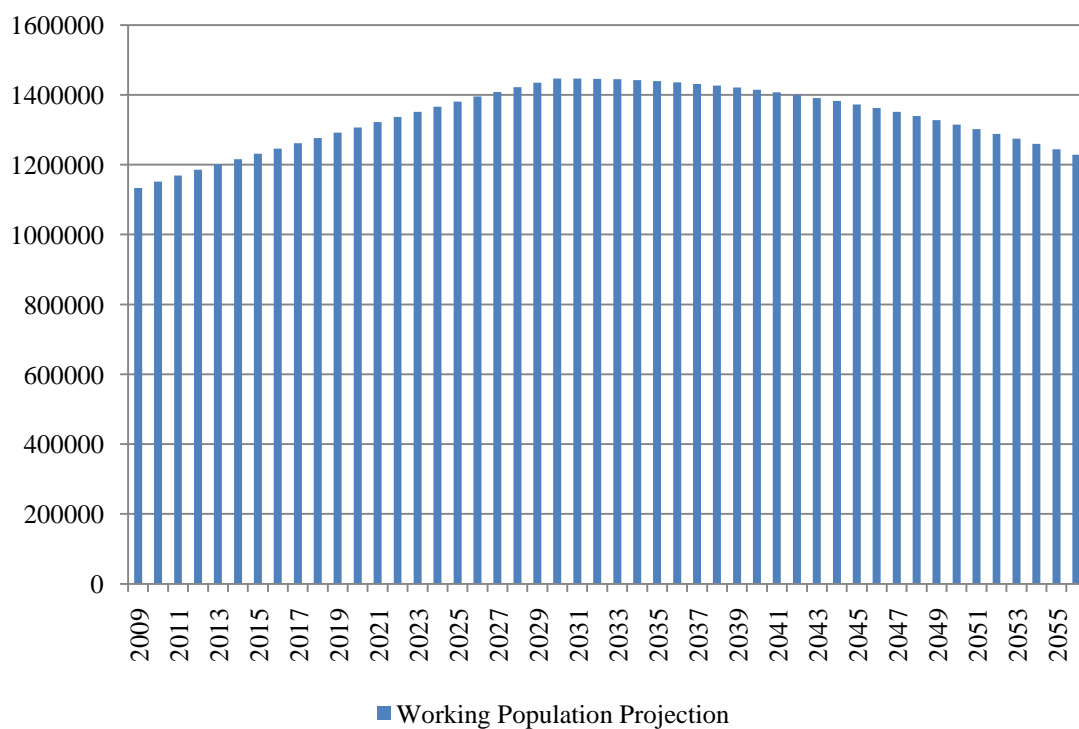
$$\text{Working population} = \text{Working Age Population} * 0,62$$

3. Since there was no applicable data after 2030 in Mongolia, the author projected the total working age population based on the ratio of growth from 2008 to 2030 and tendency of working age population proportion projection based on the study of Spoorenberg (2008). According to Spoorenberg (2008), working age population proportion in Mongolia will be the peak in 2020-2030 and gradually decreasing.



**Figure 6. 8 Working Age population ratio in Mongolia**

Source: Spoorenberg (2008)



**Figure 6. 9 Working Population Projection, 2009-2056**

Source: The author's compilation

**Process:**

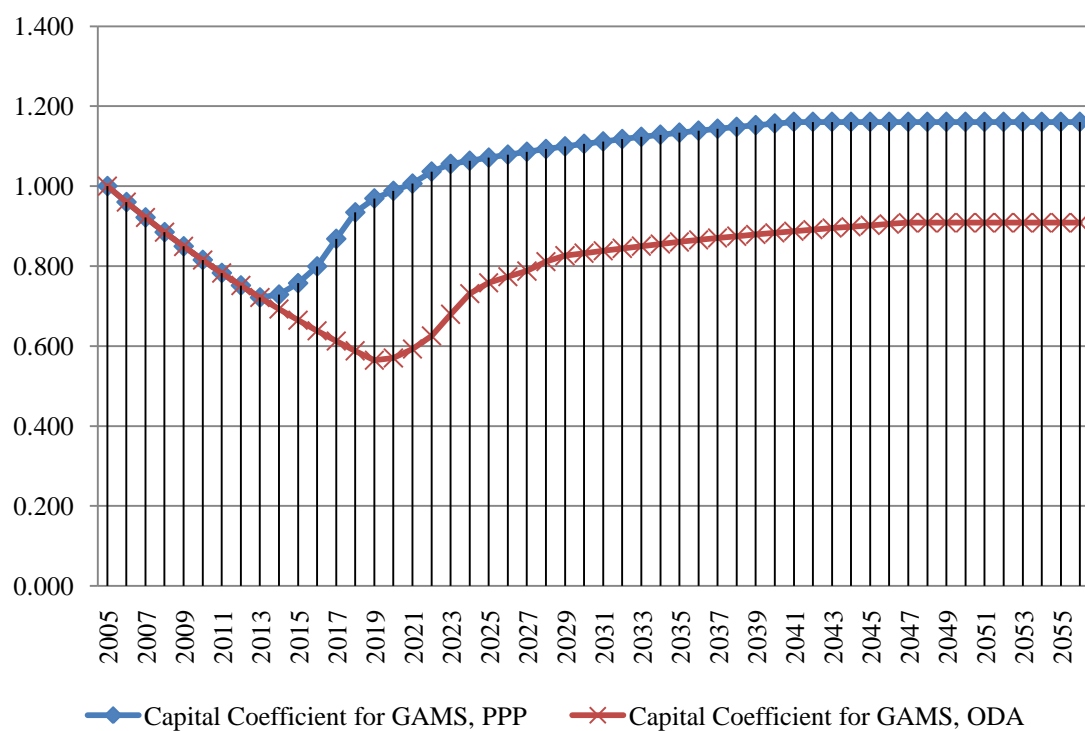
1. Calculate coefficient of Labor, Capital and Foreign Saving for each case and each year until complete the repayment of loan (Please note that the analysis is different from real situation. Due to the limitation of model neglected other changes except Labor, Capital and Foreign Saving.)
2. Change coefficients of Labor, Capital and Foreign Saving for the base case of Mongolian CGE model
3. Calculate new equilibrium level by using GAMS program for each case
4. Collect results from GAMS result file after the new equilibrium level was found.

**Table 6.7 Calculation of Coefficients of Labor, Capital and Foreign Saving  
for each case**

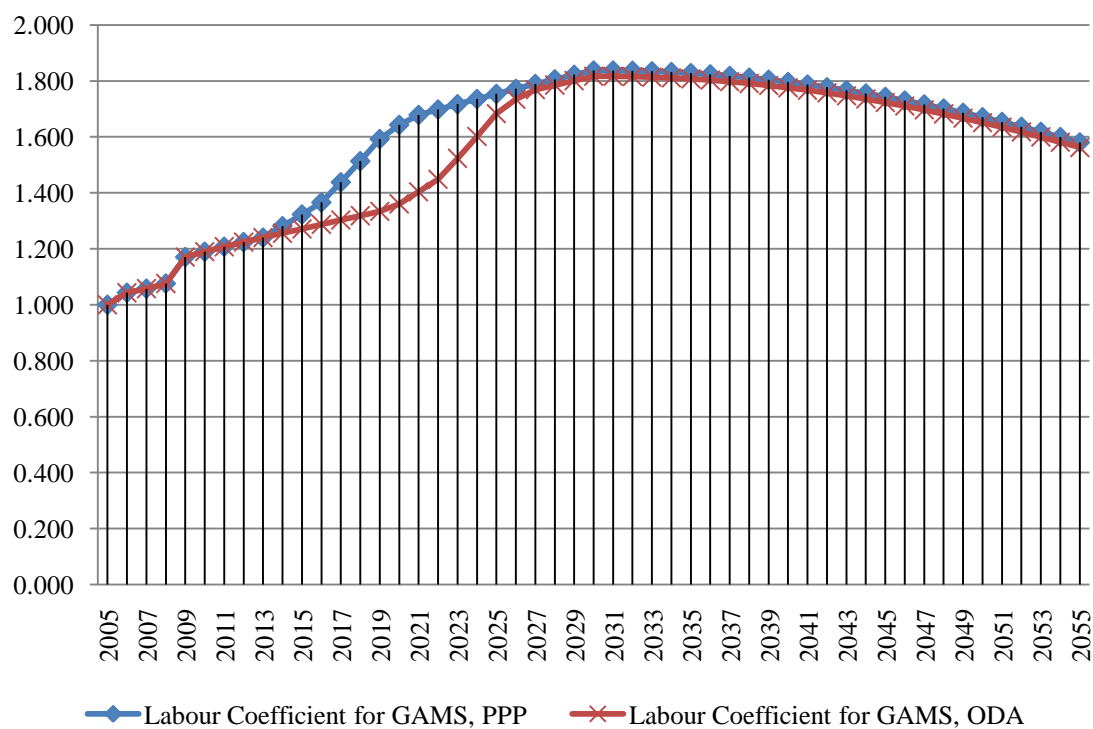
	Capital Coefficient for GAMS, PPP	Capital Coefficient for GAMS, ODA	Labour Coefficient for GAMS, PPP	Labour Coefficient for GAMS, ODA	Foreign Saving Coefficient for GAMS,PPP	Foreign Saving Coefficient for GAMS, ODA
2005	1,000	1,000	1,000	1,000	1,000	1,000
2006	0,960	0,960	1,043	1,043	1,000	1,000
2007	0,922	0,922	1,058	1,058	1,000	1,000
2008	0,885	0,885	1,076	1,076	1,000	1,000
2009	0,849	0,849	1,170	1,170	1,082	1,055
2010	0,815	0,815	1,190	1,190	1,164	1,055
2011	0,783	0,783	1,207	1,207	1,328	1,109
2012	0,751	0,751	1,224	1,224	1,656	1,109
2013	0,721	0,721	1,240	1,240	1,652	1,163
2014	0,729	0,693	1,281	1,256	1,647	1,244
2015	0,757	0,665	1,323	1,271	1,641	1,324
2016	0,799	0,638	1,366	1,287	1,633	1,486
2017	0,868	0,613	1,438	1,303	1,624	1,647
2018	0,934	0,588	1,513	1,318	1,613	1,641
2019	0,969	0,565	1,592	1,334	1,599	1,632
2020	0,988	0,570	1,643	1,361	1,580	1,622
2021	1,006	0,593	1,679	1,404	1,555	1,609
2022	1,036	0,625	1,698	1,448	1,519	1,594
2023	1,055	0,679	1,717	1,523	1,481	1,577
2024	1,063	0,731	1,735	1,601	1,443	1,555
2025	1,071	0,759	1,754	1,683	1,404	1,530
2026	1,079	0,773	1,772	1,734	1,365	1,499
2027	1,086	0,788	1,789	1,769	1,326	1,461
2028	1,093	0,811	1,806	1,785	1,286	1,423
2029	1,099	0,826	1,822	1,801	1,246	1,384

	Capital Coefficient for GAMS, PPP	Capital Coefficient for GAMS, ODA	Labour Coefficient for GAMS, PPP	Labour Coefficient for GAMS, ODA	Foreign Saving Coefficient for GAMS,PPP	Foreign Saving Coefficient for GAMS, ODA
2030	1,106	0,832	1,837	1,816	1,206	1,345
2031	1,112	0,838	1,837	1,816	1,166	1,306
2032	1,118	0,844	1,836	1,815	1,127	1,266
2033	1,123	0,850	1,834	1,814	1,087	1,226
2034	1,129	0,855	1,832	1,811	1,048	1,187
2035	1,134	0,860	1,828	1,807	1,009	1,147
2036	1,139	0,865	1,823	1,803	0,970	1,108
2037	1,143	0,870	1,818	1,797	0,932	1,068
2038	1,148	0,875	1,812	1,791	0,895	1,029
2039	1,152	0,879	1,804	1,784	0,859	0,991
2040	1,157	0,883	1,796	1,776	0,823	0,953
2041	1,161	0,887	1,787	1,767	0,788	0,916
2042	1,161	0,891	1,777	1,757	0,754	0,879
2043	1,161	0,895	1,767	1,747	0,722	0,843
2044	1,161	0,899	1,755	1,735	0,690	0,808
2045	1,161	0,902	1,743	1,723	0,660	0,774
2046	1,161	0,905	1,730	1,710	0,632	0,741
2047	1,161	0,909	1,716	1,697	0,604	0,709
2048	1,161	0,909	1,701	1,682	0,579	0,679
2049	1,161	0,909	1,686	1,667	0,557	0,651
2050	1,161	0,909	1,670	1,651	0,540	0,628
2051	1,161	0,909	1,653	1,635	0,529	0,604
2052	1,161	0,909	1,636	1,617	0,529	0,582
2053	1,161	0,909	1,618	1,600	0,529	0,565
2054	1,161	0,909	1,599	1,581	0,529	0,550
2055	1,161	0,909	1,580	1,562	0,529	0,538
2056	1,161	0,909	1,561	1,543	0,529	0,533

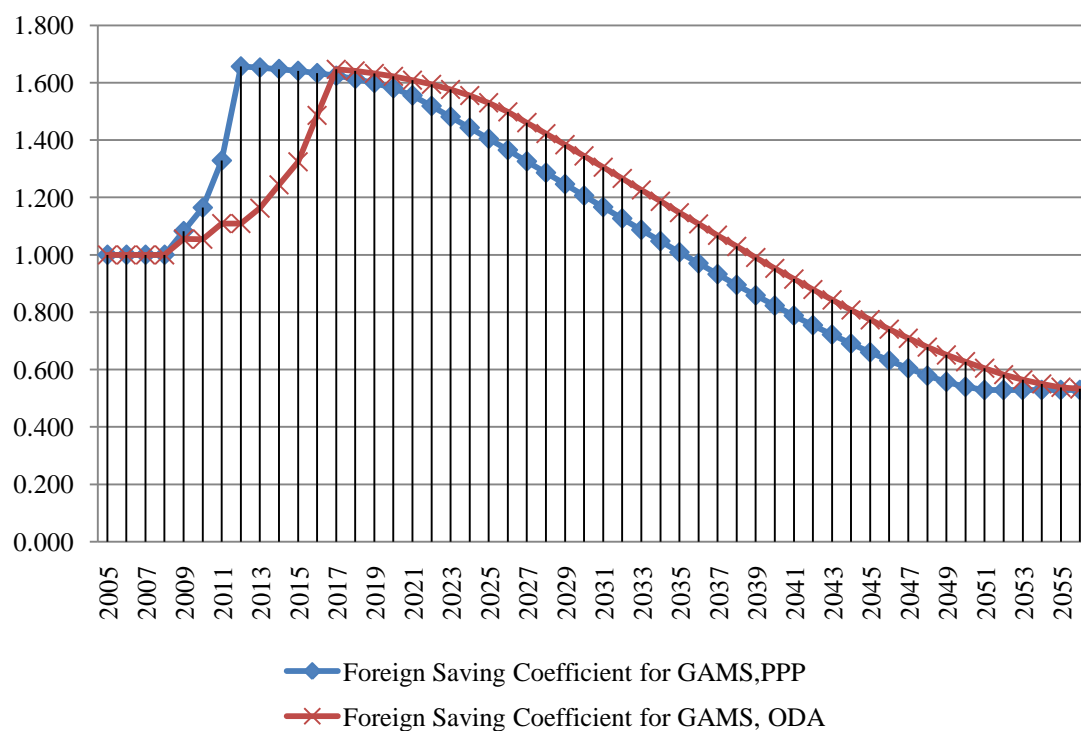
Source: The author's compilation



**Figure 6.10 Capital coefficients for CGE model**



**Figure 6.11 Labour coefficients for CGE model**



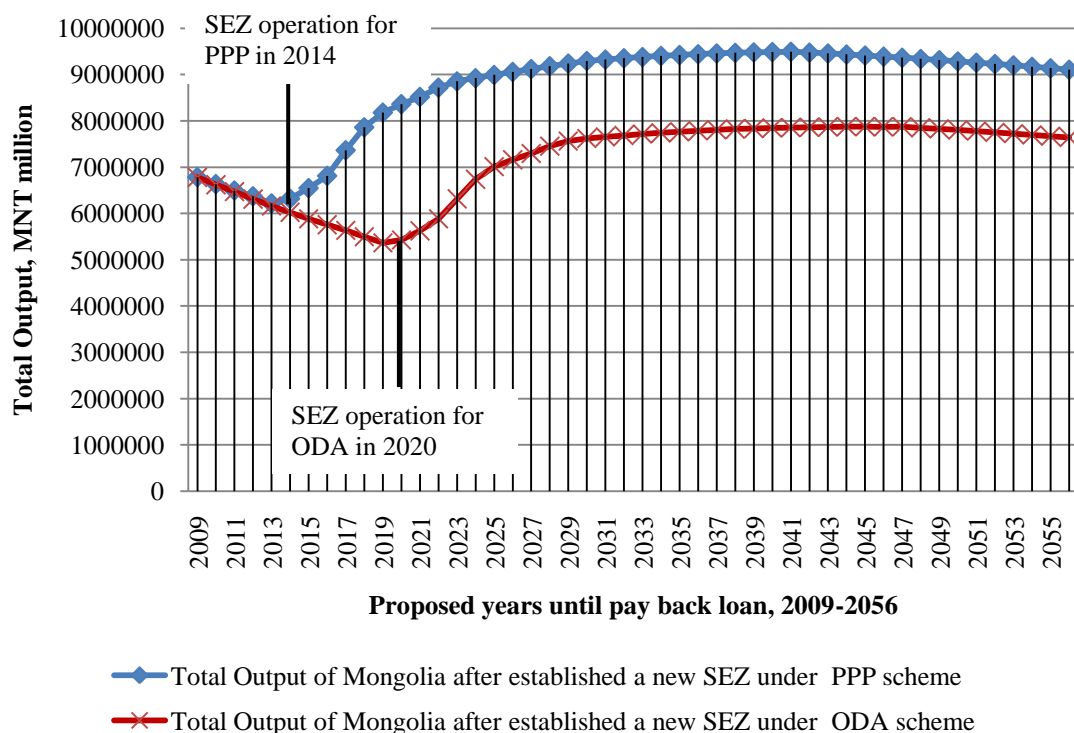
**Figure 6.12 Foreign savings coefficients for CGE Model**

### Results:

After running the GAMS program for 2 schemes and 48 cases until finish the repayment of 40-year-loan, all the total 48 outputs for each ODA and PPP schemes, Figure 6.13 was developed.

Judging from the Figure 6.13, the result of the evaluation proved that PPP scheme has more effectiveness compared to ODA scheme for the time effectiveness.





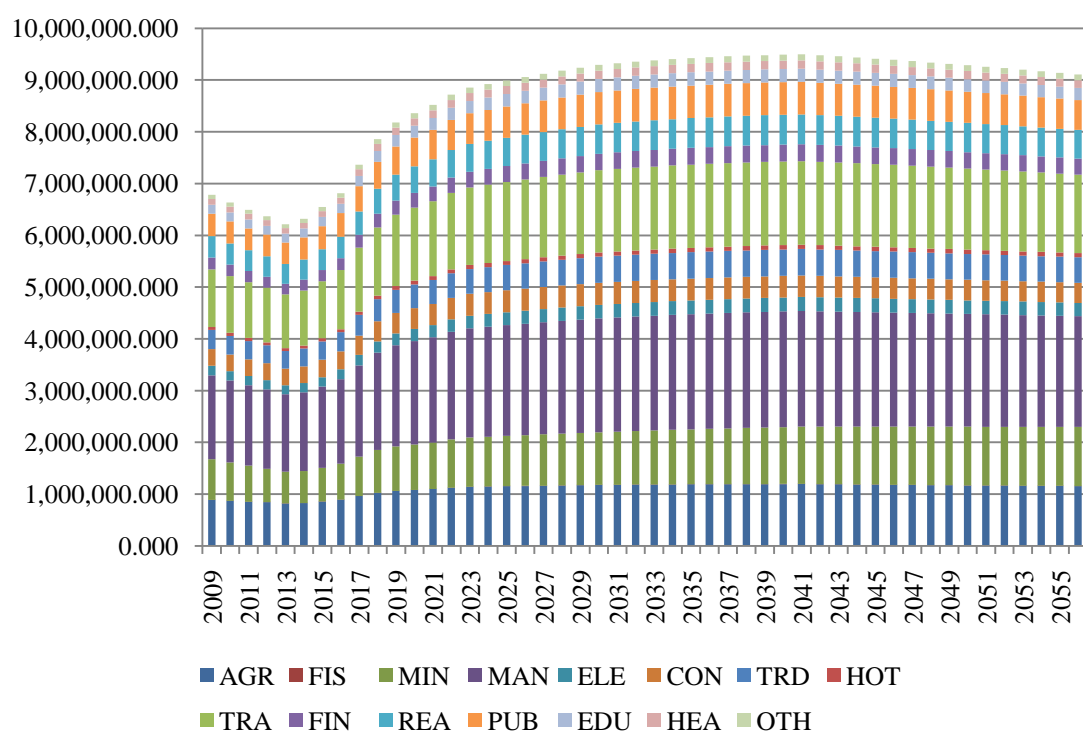
**Figure 6.13 Comparison of total outputs in PPP and ODA scheme**

And also in this case, timing of PPP project is matching the working age population growth of Mongolia very well. According to Figure 6.5, working population is growing until 2030. The SEZ developed under PPP scheme will start operation in 2014. It means the SEZ developed under PPP scheme will enjoy the demographic leveraged effect 16 years.

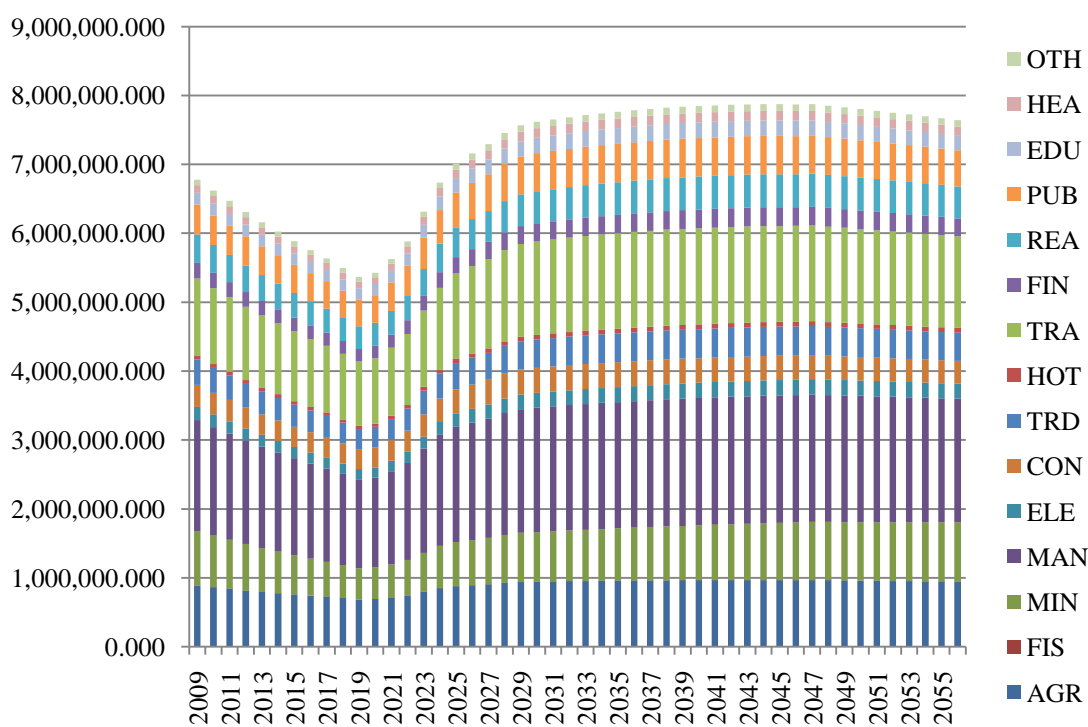
On another hand, if the SEZ project developed under ODA scheme, the operation will start 2020 or years later than PPP scheme case.

It is better to mention, successful SEZs in the developing countries used the advantage of working population growth effect when they started development of SEZs.

Total output of SEZ project developed under PPP scheme is 21.5% higher than the total output of SEZ project developed under ODA scheme.



**Figure 6. 14 Total Output in PPP scheme, 2009-2056, by sector**



**Figure 6. 15 Total Output in ODA scheme, 2009-2056, by sector**

## 6.4 Conclusion

Before starting SEZ projects, the evaluation of the effectiveness of the SEZ project is crucial to be done. But unfortunately, the developing countries are lack of all kind of statistical data and projection and this situation makes difficult to do evaluation. The author faces also the lack of data while doing this evaluation.

One of the successful features of the SEZ project has been the right timing. So PPP scheme has much advantage for developing SEZs in short period on right timing.

The result of the evaluation proved that PPP scheme has more effectiveness compared to ODA scheme for the time effectiveness. This kind of evaluation is highly recommended to use for SEZ projects in the developing countries.

## 6.5 References

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## **Chapter VII. Conclusions and Recommendations**

### **Chapter 1**

The author did this study for solving the problems of the developing countries that are under the very difficult natural and geopolitical condition including landlocked countries. As a representative of those developing countries, Mongolia was chosen.

Started the study with how many countries and where are located are in poor living condition and lack of basic infrastructure. Unfortunately the most of developing countries are located the southern hemisphere of the world are in such condition. Almost 1/3 of the world total countries are belonging to the low income and lower middle income category. Although the international organizations announce different kinds of programs and goals, and moreover assistances like ODA etc, poured to the developing world there is not significant result to be shown in the real condition of the developing countries. So the developing countries need to develop their self-development capacity. And the SEZ scheme can be the effective scheme to develop self-development capacity was author's hypothesis.

### **Chapter 2**

While looking through the economic development history of 24 developing countries in Asia from 1962 to 2009, there are very different stories in those developing countries. Among the stories, the country could rapidly developed was only Japan. The author had analyzed that Japan made strong self-development capacity. The development story of Japan proves the scheme about infrastructure contribution to the development was true. So the developing countries still in lower middle and low income categories should consider the infrastructure development carefully. But it is really need to mention that bare infrastructure cannot encourage to the developing countries effectively. The infrastructure which can bring industrial capability is the key for the self-development capacity.

### **Chapter 3**

Next step was to check possible schemes of a country development. Among 3 main possible schemes, experiences in many countries show that PPP scheme is very effective scheme for development of the developing countries.

### **Chapter 4**

According to the hypothesis, the author checked the history of SEZ development in 24 developing countries in Asia. There were very successful and very unsuccessful cases of SEZs development were found.

The hypothesis of the study, mentioned earlier in the Chapter 1 was SEZ scheme would be effective scheme for development in the developing countries. The study result proved that SEZ is definitely the effective scheme to enhance the developing countries to get the self-development capacity. All those successful SEZs in China, Korea, Malaysia, Philippines, Indonesia and Cambodia had already shown their effectiveness to the rest of the country by increasing FDI, creating employment, increasing export amount and type and bringing skills and technology in the SEZ.

Unfortunately, there are also failed unsuccessful cases of developing SEZs especially in the landlocked developing countries.

Judging and comparing those different cases, the author found some successful features of SEZ development at the same time some unsuccessful features.

And the author found out that it is crucial to check the feasibility first for preventing from failure of SEZ development. Although PPP scheme have been used for the development of SEZs in developing countries, but there is a need to change the current feasibility study scheme used for developing SEZs due to implementing SEZs by PPP scheme. The author developed the new scheme of feasibility study useful for SEZ projects to be implemented by PPP scheme. The new scheme tries to consider the satisfactions of all the participating parties in the feasibility study. Not only the investors' satisfaction but also the host country's satisfaction is crucial for implementation of projects. And also she developed the evaluation check list based on the new scheme of feasibility study. The new

scheme of feasibility study and the evaluation check list encourage implementation of not only existing SEZ development projects but also new projects in developing countries. This new scheme can be used all kinds of infrastructure projects though the author tries to explain on the examples of SEZ development projects.

## **Chapter 5**

The next step was to study the current socio-economic situations of Mongolia as a representative of developing countries. And also the current situation of the Mongolian SEZ projects which are pro-longed for years were studied and evaluated by feasibility study checklist developed by the author. And it is found that those SEZ projects have very low feasibility to be developed successfully. Moreover, the SEZs in landlocked developing countries are in same situation as SEZs in Mongolia. Future SEZ projects in those countries should follow the world trend of private sector participation in SEZ project development so as to avoid reliance on government funding for preventing same unsuccessful stories as exist in Mongolia.

The author proposed a new SEZ project named Ulaanbaatar Airport SEZ as an example SEZ which is suitable for the landlocked developing countries. This proposed SEZ will be located in the existing Ulaanbaatar International Airport and using the current facility as SEZ that's why development cost will be lower. And this SEZ has several advantages as located in the airport, easy to access international markets and also easy to employ workers from Ulaanbaatar city etc.

And also possible industries can be developed in the proposed SEZ were studied and found out the solar panel production and aircraft maintenance center have high possibility from the point of natural minerals resources and geographical location of Mongolia.

## **Chapter 6**

The author made the evaluation for the effectiveness of the proposed SEZ project under execution schemes of ODA and PPP to the rest of the country by using CGE model based on statistical data of Mongolia. The result of the

evaluation proved that PPP scheme has more effectiveness compared to ODA scheme for the time effectiveness. It is better to mention, one of the successful features of the SEZ project has been the right timing before and now on. So PPP scheme has much advantage for developing SEZs in short period on right timing. This kind of evaluation is highly recommended to use for SEZ projects in the developing countries.

## **Conclusions**

As mentioned earlier in Chapter 1, this study is concentrated on how to combine engineering and economic approach for improving project execution and project social contribution on the case of SEZ development project.

For engineering approach, this study was concentrated on how to improve project feasibility study level, by including more detailed studies.

For economic approach, this study includes the analysis to check the SEZ project execution scheme effectiveness in the country context.

Following conclusions came out from this study.

- It crucial to develop self-development capacity for the developing countries to change their socio-economic situation.
- SEZ is one of the effective scheme to develop self-development capacity
- But it is crucial to check the effectiveness of the scheme before starting to implement
- Feasibility study must be done before start SEZ projects.
- Checking the future effectiveness of SEZs in the country context is also important for preventing failures.
- Computable General Equilibrium Model is suitable for evaluating the effectiveness in the country context.

The findings of this study, while generated specially in Mongolian context, are also meant to be used to develop the current socio-economic situation of developing countries by using SEZ concept based on own capacity and PPP

concept.

### **Recommendations for Further Study**

Since the study was finding out the effective scheme for economic development of the developing countries, it is required to check the effectiveness of the SEZ scheme by quantitative and qualitative analysis. It is recommended that to use SEZ Project Evaluation Check List as a prototype tool to check feasibility level of projected SEZs in the developing countries and to develop and to apply Computable General Equilibrium Model in more detailed ways. And also it is recommended to change the current system of ODA scheme improving its effectiveness especially in time factor.



## Appendix 1. Check List for Evaluation of Feasibility Level of SEZ Projects

Investigation Items	Description of conditions	Condition of SEZ
Market Demand Feasibility	Competitive advantages of the zone site location	
	Competitive advantages of the zone offering for investors	
	Potential markets in which the zone promotes itself	
	Potential investors study	
	Potential industries study	
Technical Feasibility	Total Area (hectares)	
	Distance from capital city	
	Location	
	Access to the site from Capital	
	Distance from the nearest border port	
	Distance from province center	
	Population within 15 km	
	Close to Airport	
	Close to Seaport	
	Close to Railway station	
	Close to Highway	
	Close to international school	
	Close to hospital with international standards	
	Close to stores and supermarkets with international standards	
	High speed internet service	
	Mobile Telephone	
	Fresh Water Source	
	Fresh Water Resource	
	Electric supply	
	Altitude	
	Soil condition	
Economical Feasibility	Calculation of number of new employment	
	Calculation of export amount	
	Calculation of domestic linkages	
	Cost of infrastructure development	
	Calculation of tax losses	
Financial Feasibility	Financial resource	
	Enough fund to develop	
	Implementation of new financial resource expect government fund	
Environmental Feasibility	Make environmental study	
	Invite environmental friendly investors	
Concurrence of Stakeholders	Public participation	
	Private participation	

Industries	Intermediate consumption, by industries										Yõñëi õõõãäëýýý Final uses										Total final consumption	Imports	Total Consumption, at basic price					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15													
	Agriculture, hunting & forestry	Fishery	Mining & quarrying	Manufacturing	Electricity, gas & water supply	Construction	Wholesale and retail trade	Hotels & restaurants	Transport, storage & communication	Financial intermediation	Real estate, renting & other business activities	Public administration & defense; compulsory social security	Education	Health & social work	Other community, social & personal services	Total intermediate consumption	Private consumption	Government consumption	Consumption of Non-profit Institutions Serving Households	Fixed Capital Formation				Changes in inventories	Net Changes in Circulating Capital	Domestic final demand	Total exports, fob	
1	Agriculture, hunting & forestry	80 816,0	18,0	22 559,0	146 186,0	3 281,0	19 103,0	5 600,0	13 425,0	32 662,0	427,0	8 876,0	4 536,0	1 809,0	2 249,0	795,0	342 342,0	285 524,0	227,0	0,0	161 049,0	1,0	136 432,0	583 233,0	66 132,0	649 365,0	231 308,0	760 399,0
2	Fishery	0,0	0,0	0,0	0,0	0,0	0,0	0,0	179,0	0,0	0,0	0,0	0,0	0,0	0,0	179,0	35,0	0,0	0,0	0,0	0,0	6,0	41,0	192,0	233,0	9,0	403,0	
3	Mining & quarrying	724,0	0,0	4 739,0	7 510,0	33 456,0	7 319,0	1 112,0	337,0	2 448,0	75,0	688,0	842,0	191,0	312,0	255,0	60 008,0	12 820,0	37,0	0,0	3 690,0	700,0	64 689,0	81 936,0	816 678,0	898 614,0	4 157,0	954 465,0
4	Manufacturing	42 038,0	45,0	157 046,0	149 410,0	24 056,0	125 545,0	27 278,0	10 392,0	196 673,0	3 256,0	57 379,0	17 981,0	4 778,0	13 377,0	5 523,0	834 777,0	373 161,0	1 733,0	0,0	255 153,0	0,0	51 300,0	681 347,0	217 964,0	899 311,0	1 133 652,0	600 436,0
5	Electricity, gas & water supply	2 092,0	0,0	27 804,0	26 341,0	16 679,0	3 315,0	8 983,0	8 698,0	18 931,0	2 979,0	21 739,0	3 650,0	2 590,0	1 512,0	5 563,0	150 876,0	49 160,0	1 417,0	214,0	210,0	0,0	23,0	51 024,0	119,0	51 143,0	6 618,0	195 401,0
6	Construction	36,0	0,0	13 711,0	1 968,0	2 250,0	4 362,0	885,0	87,0	21 083,0	1 544,0	9 830,0	5 482,0	1 107,0	68,0	550,0	62 963,0	941,0	2 643,0	0,0	268 451,0	0,0	50,0	272 085,0	1 166,0	273 251,0	4 621,0	331 593,0
7	Wholesale and retail trade	10 368,0	7,0	21 873,0	35 797,0	6 723,0	17 440,0	16 375,0	2 249,0	22 143,0	361,0	8 245,0	2 538,0	752,0	2 078,0	762,0	147 711,0	125 022,0	421,0	35,0	44 365,0	1,0	14 325,0	184 169,0	64 702,0	248 871,0	3 905,0	392 677,0
8	Hotels & restaurants	67,0	0,0	1 803,0	1 441,0	297,0	870,0	9 428,0	301,0	6 432,0	3 299,0	1 630,0	691,0	956,0	64,0	1 027,0	28 306,0	34 198,0	197,0	360,0	467,0	0,0	77,0	35 299,0	330,0	35 629,0	1 765,0	62 170,0
9	Transport, storage & communication	12 778,0	20,0	44 528,0	37 253,0	16 614,0	30 679,0	34 351,0	4 177,0	74 300,0	8 796,0	36 812,0	28 446,0	4 389,0	3 277,0	8 453,0	344 873,0	320 412,0	4 657,0	995,0	49 793,0	85,0	10 279,0	386 221,0	402 608,0	788 829,0	310 339,0	823 363,0
10	Financial intermediation	4 906,0	6,0	20 077,0	9 177,0	7 945,0	8 566,0	22 367,0	1 757,0	34 200,0	71 353,0	13 217,0	8 333,0	3 491,0	1 524,0	1 719,0	208 638,0	23 893,0	1,0	0,0	9,0	0,0	23 903,0	8 794,0	32 697,0	27 826,0	213 509,0	
11	Real estate, renting & other business activities	1 509,0	2,0	7 753,0	8 267,0	1 305,0	10 843,0	25 232,0	897,0	35 954,0	8 004,0	26 440,0	7 671,0	3 473,0	2 352,0	6 650,0	146 352,0	241 387,0	7 706,0	1 417,0	45 703,0	0,0	34,0	296 247,0	1 036,0	297 283,0	4 050,0	439 585,0
12	Public administration & defense; compulsory social security	2,0	0,0	15,0	7,0	4,0	5,0	12,0	1,0	12,0	2,0	61,0	254 789,0	2,0	1,0	39,0	254 952,0	95,0	150 769,0	75,0	9,0	0,0	2,0	150 950,0	6 396,0	157 346,0	9 716,0	402 582,0
13	Education	1,0	0,0	3,0	8,0	1,0	4,0	22,0	22,0	811,0	7,0	169,0	98,0	42 819,0	1,0	240,0	44 206,0	25 711,0	95 533,0	0,0	16,0	0,0	0,0	121 260,0	0,0	121 260,0	11 396,0	154 070,0
14	Health & social work	2 385,0	0,0	46,0	158,0	13,0	13,0	40,0	5,0	47,0	14,0	212,0	113,0	9,0	22 523,0	136,0	25 714,0	20 551,0	68 331,0	260,0	20,0	0,0	4,0	89 166,0	19,0	89 185,0	24 545,0	90 354,0
15	Other community, social & personal service activities	40,0	0,0	2 283,0	518,0	824,0	166,0	320,0	215,0	894,0	195,0	15 600,0	1 648,0	435,0	31,0	10 198,0	33 367,0	18 949,0	10 747,0	19 901,0	273,0	0,0	38,0	49 908,0	264,0	50 172,0	9 292,0	74 247,0
	Intermediate consumption at basic prices	157 762,0	98,0	324 240,0	424 041,0	113 448,0	228 230,0	152 005,0	42 742,0	446 590,0	100 312,0	200 898,0	336 818,0	66 801,0	49 369,0	41 910,0	2 685 264,0	1 531 859,0	344 419	23 257,0	829 208,0	787,0	277 259,0	3 006 789,0	1 586 400,0	4 593 189,0	1 783 199,0	7 278 453,0
	Net taxes on products	9 426,0	9,0	9 956,0	8 702,0	- 1 881,0	13 619,0	2 840,0	822,0	27 575,0	189,0	6 066,0	1 332,0	253,0	516,0	970,0	80 394,0	180 404,0	69	0,0	20 501,0	139,0	13 502,0		16 730,0	311 738,0		
	Intermediate consumption at purchaser's prices	167 188,0	107,0	334 196,0	432 743,0	111 567,0	241 849,0	154 845,0	43 564,0	474 165,0	100 501,0	206 964,0	338 150,0	67 054,0	49 885,0	42 879,0	2 765 657,0	1 712 263,0	344 488	23 257,0	849 709,0	926,0	290 761,0		1 603 130,0	7 590 191,0		
	c.a.f.f.o.b	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	0,0	0,0	0,0	0,0	0,0		0,0	0,0		
	Direct purchases abroad by residents	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	151 502,0	0	0,0	0,0	0,0	0,0		0,0	151 502,0		
	Direct purchases in domestic market by non-residents	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	- 181 286,0	0	0,0	0,0	0,0	0,0		184 286,0	0,0		
	Total intermediate consumption / final uses at basic prices	167 188,0	107,0	334 196,0	432 743,0	111 567,0	241 849,0	154 845,0	43 564,0	474 165,0	100 501,0	206 964,0	338 150,0	67 054,0	49 885,0	42 879,0	2 765 657,0	1 679 479,0	344 488	23 257,0	849 709,0	926,0	290 761,0		1 787 415,0	7 741 693,0		
	Compensation of employees	29 736,0	61,0	72 935,0	40 771,0	45 806,0	32 889,0	43 923,0	6 463,0	99 994,0	25 114,0	50 866,0	64 432,0	66 018,0	29 716,0	19 574,0	628 298,0											
	Net taxes on production	1 359,0	1,0	36 433,0	15 741,0	2 123,0	9 329,0	16 490,0	250,0	7 413,0	1 173,0	3 631,0	0,0	102,0	467,0	316,0	94 828,0											
	Gross capital consumption	3 461,0	2,0	45 191,0	15 601,0	23 436,0	4 842,0	9 611,0	4 762,0	49 975,0	10 190,0	7 264,0	0,0	136,0	1 029,0	3 424,0	178 924,0											
	Operating surplus, gross / mixed income, gross	558 655,0	232,0	465 710,0	95 580,0	12 469,0	42 684,0	167 808,0	7 131,0	191 816,0	76 531,0	170 860,0	0,0	20 760,0	9 257,0	8 054,0	1 827 547,0											
	Gross value added at basic prices	593 211,0	296,0	620 269,0	167 693,0	83 834,0	89 744,0	237 832,0	18 606,0	349 198,0	113 008,0	232 621,0	64 432,0	87 016,0	40 469,0	31 368,0	2 729 597,0											
	Total output at basic prices	760 399,0	403,0	954 465,0	600 436,0	195 401,0	331 593,0	392 677,0	62 170,0	823 363,0	213 509,0	439 585,0	402 582,0	154 070,0	90 354,0	74 247,0	5 495 254,0											

### Appendix 3. Social Accounting Matrix of Mongolia-2005, million tugrug

		Activity															Factor		Indirect tax		Final Demand			External	Total
		AGR	FIS	MIN	MAN	ELE	CON	TRD	HOT	TRA	FIN	REA	PUB	EDU	HEA	OTH	CAP	LAB	IDT	TRF	HOH	GOV	INV	EXT	
Activity	AGR	80 816,0	18,0	22 559,0	146 186,0	3 281,0	19 103,0	5 600,0	13 425,0	32 662,0	427,0	8 876,0	4 536,0	1 809,0	2 249,0	795,0					285 524,0	227,0	297 482,0	66 132,0	991 707,0
	FIS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	179,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0					35,0	0,0	6,0	192,0	412,0
	MIN	724,0	0,0	4 739,0	7 510,0	33 456,0	7 319,0	1 112,0	337,0	2 448,0	75,0	688,0	842,0	191,0	312,0	255,0					12 820,0	37,0	69 079,0	816 678,0	958 622,0
	MAN	42 038,0	45,0	157 046,0	149 410,0	24 056,0	125 545,0	27 278,0	10 392,0	196 673,0	3 256,0	57 379,0	17 981,0	4 778,0	13 377,0	5 523,0					373 161,0	1 733,0	306 453,0	217 964,0	1 734 088,0
	ELE	2 092,0	0,0	27 804,0	26 341,0	16 679,0	3 315,0	8 983,0	8 698,0	18 931,0	2 979,0	21 739,0	3 650,0	2 590,0	1 512,0	5 563,0					49 374,0	1 417,0	233,0	119,0	202 019,0
	CON	36,0	0,0	13 711,0	1 968,0	2 250,0	4 362,0	885,0	87,0	21 083,0	1 544,0	9 830,0	5 482,0	1 107,0	68,0	550,0					941,0	2 643,0	268 501,0	1 166,0	336 214,0
	TRD	10 368,0	7,0	21 873,0	35 797,0	6 723,0	17 440,0	16 375,0	2 249,0	22 143,0	361,0	8 245,0	2 538,0	752,0	2 078,0	762,0					125 057,0	421,0	58 691,0	64 702,0	396 582,0
	HOT	67,0	0,0	1 803,0	1 441,0	297,0	870,0	9 428,0	301,0	6 432,0	3 299,0	1 630,0	691,0	956,0	64,0	1 027,0					34 558,0	197,0	544,0	330,0	63 935,0
	TRA	12 778,0	20,0	44 528,0	37 253,0	16 614,0	30 679,0	34 351,0	4 177,0	74 300,0	8 796,0	36 812,0	28 446,0	4 389,0	3 277,0	8 453,0					321 407,0	4 657,0	60 157,0	402 608,0	1 133 702,0
	FIN	4 906,0	6,0	20 077,0	9 177,0	7 945,0	8 566,0	22 367,0	1 757,0	34 200,0	71 353,0	13 217,0	8 333,0	3 491,0	1 524,0	1 719,0					23 893,0	1,0	9,0	8 793,0	241 334,0
	REA	1 509,0	2,0	7 753,0	8 267,0	1 305,0	10 843,0	25 232,0	897,0	35 954,0	8 004,0	26 440,0	7 671,0	3 473,0	2 352,0	6 650,0					242 804,0	7 706,0	45 737,0	1 036,0	443 635,0
	PUB	2,0	0,0	15,0	7,0	4,0	5,0	12,0	1,0	12,0	2,0	61,0	254 789,0	2,0	1,0	39,0					170,0	150 769,0	11,0	6 396,0	412 298,0
	EDU	1,0	0,0	3,0	8,0	1,0	4,0	22,0	22,0	811,0	7,0	169,0	98,0	42 819,0	1,0	240,0					25 711,0	95 533,0	16,0	0,0	165 466,0
	HEA	2 385,0	0,0	46,0	158,0	13,0	13,0	40,0	5,0	47,0	14,0	212,0	113,0	9,0	22 523,0	136,0					20 811,0	68 331,0	24,0	19,0	114 899,0
	OTH	40,0	0,0	2 283,0	518,0	824,0	166,0	320,0	215,0	894,0	195,0	15 600,0	1 648,0	435,0	31,0	10 198,0					38 850,0	10 747,0	311,0	264,0	83 539,0
Factor	CAP	562 116,0		510 901,0	111 181,0	35 905,0	47 526,0	177 419,0	11 893,0	241 791,0	86 721,0	178 124,0	0,0	20 896,0	10 286,0	11 478,0									2 006 471,0
	LAB	29 736,0	61,0	72 935,0	40 771,0	45 806,0	32 889,0	43 923,0	6 463,0	99 994,0	25 114,0	50 866,0	64 432,0	66 018,0	29 716,0	19 574,0									628 298,0
Indirect tax	IDT	10 649,1	9,9	42 745,7	22 868,9	29,7	22 015,1	17 681,0	1 047,0	34 246,7	1 244,7	9 333,9	1 332,0	344,8	936,3	1 254,4									165 739,2
	TRF	135,9	0,1	3 643,3	1 574,1	212,3	932,9	1 649,0	25,0	741,3	117,3	363,1	0,0	10,2	46,7	31,6									9 482,8
Final demand	HOH																2 006 471,0	628 298,0							2 634 769,0
	GOV																		165 738,2	9 483,8	692 206,50				867428,5
	INV																				523009, 5			196798,0	1107254
External	EXT	231 308,0	9,0	4 157,0	1 133 652,0	6 618,0	4 621,0	3 905,0	1 765,0	310 339,0	27 825,0	4 050,0	9 716,0	11 396,0	24 545,0	9 291,0									1 783 197,0
	Total	991 707,0	412,0	958 622,0	1 734 088,0	202 019,0	336 214,0	396 582,0	63 935,0	1 133 702,0	241 334,0	443 635,0	412 298,0	165 466,0	114 899,0	83 539,0	2 006 471,0	628 298,0	165 738,2	9 483,8	2 634 769,0	867 428,5	1 107 254,0	1 783 197,0	

Source: Author's compilation

## Appendix 4. GAMS input file for the Mongolian CGE model

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$Title Mongolia CGE Model

* Definition of sets of suffix-----
Set u SAM entry /AGR, FIS, MIN, MAN, ELE, CON, TRD, HOT, TRA, FIN, REA,
      PUB, EDU, HEA, OTH, CAP, LAB, IDT, TRF, HOH, GOV, INV, EXT/
i(u) goods /AGR, FIS, MIN, MAN, ELE, CON, TRD, HOT, TRA, FIN, REA,
      PUB, EDU, HEA, OTH/
h(u) factor /CAP, LAB/;
Alias (u,v), (i,j), (h,k);
*-----

*Loading data-----
Table SAM(u,v)      social accounting matrix
      AGR  FIS  MIN  MAN  ELE  CON  TRD  HOT
AGR  80816  18   22559  146186  3281  19103  5600  13425
FIS  0      0   0      0      0      0      0      179
MIN  724    0   4739   7510   33456  7319   1112   337
MAN  42038  45   157046  149410  24056  125545  27278  10392
ELE  2092   0   27804   26341  16679  3315   8983   8698
CON  36      0   13711   1968   2250   4362   885    87
TRD  10368  7   21873   35797  6723   17440  16375  2249
HOT  67      0   1803   1441   297    870    9428   301
TRA  12778  20   44528   37253  16614  30679  34351  4177
FIN  4906   6   20077   9177   7945   8566   22367  1757
REA  1509   2   7753   8267   1305   10843  25232  897
PUB  2       0   15      7      4      5     12     1
EDU  1       0   3       8      1      4     22     22
HEA  2385   0   46      158   13     13    40     5
OTH  40      0   2283   518   824    166   320    215
CAP  562116 234   510901  111181  35905  47526  177419  11893
LAB  29736  61   72935  40771  45806  32889  43923  6463
IDT  10649.1 9.9   42745.7  22868.9  29.7   22015.1  17681  1047
TRF  135.9   0.1  3643.3  1574.1  212.3  932.9  1649   25
HOH
GOV
INV
EXT  231308 9     4157   1133652  6618   4621   3905   1765

```

+	TRA	FIN	REA	PUB	EDU	HEA	OTH	CAP
AGR	32662	427	8876	4536	1809	2249	795	
FIS	0	0	0	0	0	0	0	
MIN	2448	75	688	842	191	312	255	
MAN	196673	3256	57379	17981	4778	13377	5523	
ELE	18931	2979	21739	3650	2590	1512	5563	
CON	21083	1544	9830	5482	1107	68	550	
TRD	22143	361	8245	2538	752	2078	762	
HOT	6432	3299	1630	691	956	64	1027	
TRA	74300	8796	36812	28446	4389	3277	8453	
FIN	34200	71353	13217	8333	3491	1524	1719	
REA	35954	8004	26440	7671	3473	2352	6650	
PUB	12	2	61	254789	2	1	39	
EDU	811	7	169	98	42819	1	240	
HEA	47	14	212	113	9	22523	136	
OTH	894	195	15600	1648	435	31	10198	
CAP	241791	86721	178124	0	20896	10286	11478	
LAB	99994	25114	50866	64432	66018	29716	19574	
IDT	34246.7	1244.7	9333.9	1332	344.8	936.3	1254.4	
TRF	741.3	117.3	363.1	0	10.2	46.7	31.6	
HOH							2006471	
GOV								
INV								
EXT	310339	27825	4050	9716	11396	24545	9291	

+	LAB	IDT	TRF	HOH	GOV	INV	EXT
AGR			285524	227	297482	66132	
FIS			35	0	6	192	
MIN			12820	37	69079	816678	
MAN			373161	1733	306453	217964	
ELE			49374	1417	233	119	
CON			941	2643	268501	1166	
TRD			125057	421	58691	64702	
HOT			34558	197	544	330	
TRA			321407	4657	60157	402608	
FIN			23893	1	9	8793	
REA			242804	7706	45737	1036	

<i>PUB</i>	170	150769	11	6396
<i>EDU</i>	25711	95533	16	0
<i>HEA</i>	20811	68331	24	19
<i>OTH</i>	38850	10747	311	264
<i>CAP</i>				
<i>LAB</i>				
<i>IDT</i>				
<i>TRF</i>				
<i>HOH</i>	628298			
<i>GOV</i>	165739.2	9482.8	692206.5	
<i>INV</i>	387446.5	523009.5		196798
<i>EXT</i>				
;				
* Loading the initial values-----				
Parameter	Y0(j)	composite factor		
	<i>F0(h,j)</i>	the h-th factor input by the j-th firm		
	<i>X0(i,j)</i>	intermediate input		
	<i>Z0(j)</i>	output of the the j-th good		
	<i>Xp0(i)</i>	household consumption of the i-th good		
	<i>Xg0(i)</i>	government consumption		
	<i>Xv0(i)</i>	investment demand		
	<i>E0(i)</i>	exports		
	<i>M0(i)</i>	imports		
	<i>Q0(i)</i>	Arlington's composite good		
	<i>D0(i)</i>	domestic good		
	<i>Sp0</i>	private saving		
	<i>Sg0</i>	government saving		
	<i>Td0</i>	direct tax		
	<i>Tz0(j)</i>	production tax		
	<i>Tm0(j)</i>	import tariff		
	<i>FF(h)</i>	factor endowmnet of the h-th factor		
	<i>Sf</i>	foreign saving in US dollars		
	<i>pWe(i)</i>	export price in US dollars		
	<i>pWm(i)</i>	import price in US dollars		
	<i>tauz(i)</i>	production tax rate		
	<i>taum(i)</i>	import tariff rate		
;				

```

Td0    =SAM("GOV","HOH");
Tz0(j) =SAM("IDT",j);
Tm0(j) =SAM("TRF",j);

F0(h,j) =SAM(h,j);
Y0(j)   =sum(h, F0(h,j));
X0(i,j) =SAM(i,j);
Z0(j)   =Y0(j)+sum(i,x0(i,j));
M0(i)   =SAM("EXT",i);

tauz(j) =Tz0(j)/Z0(j);
taum(j) =Tm0(j)/M0(j);

Xp0(i)  =SAM(i,"HOH");
FF(h)   =SAM("HOH",h);

Xg0(i)  =SAM(i,"GOV");
Xv0(i)  =SAM(i,"INV");
E0(i)   =SAM(i,"EXT");
Q0(i)   =Xp0(i)+Xg0(i)+Xv0(i)+sum(j,X0(i,j));
D0(i)   =(1+tauz(i))*Z0(i)-E0(i);
Sp0     =SAM("INV","HOH");
Sg0     =SAM("INV","GOV");
Sf      =SAM("INV","EXT");

pWe(i)  =1;
pWm(i)  =1;

Display Y0,F0,X0,Z0,Xp0,Xg0,Xv0,E0,M0,Q0,D0,Sp0,Sg0,Td0,Tz0,Tm0,
        FF,Sf,tauz,taum;

*Calibration-----
Parameter  sigma(i)      elasticity of substitution
           psi(i)        elasticity of transformation
           eta(i)        substitution elasticity parameter
           phi(i)        transformation elasticity parameter
;
sigma(i)=2;
psi(i) =2;

```

$$\eta(i)=(\sigma(i)-1)/\sigma(i);$$

$$\phi(i)=(\psi(i)+1)/\psi(i);$$

*Parameter      alpha(i)      share parameter in utility func.*

*beta(h,j)      share parameter in production func.*

*b(j)      scale parameter in production func.*

*ax(i,j)      intermediate input requirement coeff.*

*ay(j)      composite fact. input req. coeff.*

*mu(i)      government consumption share*

*lambda(i)      investment demand share*

*deltam(i)      share par. in Armington func.*

*deltad(i)      share par. in Armington func.*

*gamma(i)      scale par. in armington func.*

*xid(i)      share par. in transformation func.*

*xie(i)      share par. in transformation func.*

*theta(i)      scale par. in transformation func.*

*ssp      average propensity for private saving*

*ssg      average propensity for gov. saving*

*taud      direct tax rate*

;

$$\alpha(i)=Xp0(i)/\sum(j,Xp0(j));$$

$$\beta(h,j)=F0(h,j)/\sum(k,F0(k,j));$$

$$b(j) = Y0(j)/\text{prod}(h,F0(h,j)**\beta(h,j));$$

$$ax(i,j)=X0(i,j)/Z0(j);$$

$$ay(j)=Y0(j)/Z0(j);$$

$$\mu(i)=Xg0(i)/\sum(j,Xg0(j));$$

$$\lambda(i)=Xv0(i)/(Sp0+Sg0+Sf);$$

$$\text{deltam}(i)=(1+\text{taum}(i))*M0(i)**(1-\eta(i))$$

$$/((1+\text{taum}(i))*M0(i)**(1-\eta(i))+D0(i)**(1-\eta(i)));$$

$$\text{deltad}(i)=D0(i)**(1-\eta(i))$$

$$/((1+\text{taum}(i))*M0(i)**(1-\eta(i))+D0(i)**(1-\eta(i)));$$

$$\gamma(i)=Q0(i)/(\text{deltam}(i)*M0(i)**\eta(i)+\text{deltad}(i)*D0(i)**\eta(i))$$

$$**(1/\eta(i));$$

$$\text{xie}(\text{"AGR"})=E0(\text{"AGR"})** (1-\phi(\text{"AGR"}))/(E0(\text{"AGR"})** (1-\phi(\text{"AGR"}))+D0(\text{"AGR"})** (1-$$



$\phi("AGR"))$ ;  
 $xie("FIS") = E0("FIS") \cdot (1 - \phi("FIS")) / (E0("FIS") \cdot (1 - \phi("FIS")) + D0("FIS") \cdot \phi("FIS"))$ ;  
 $xie("MIN") = E0("MIN") \cdot (1 - \phi("MIN")) / (E0("MIN") \cdot (1 - \phi("MIN")) + D0("MIN") \cdot \phi("MIN"))$ ;  
 $xie("MAN") = E0("MAN") \cdot (1 - \phi("MAN")) / (E0("MAN") \cdot (1 - \phi("MAN")) + D0("MAN") \cdot \phi("MAN"))$ ;  
 $xie("ELE") = E0("ELE") \cdot (1 - \phi("ELE")) / (E0("ELE") \cdot (1 - \phi("ELE")) + D0("ELE") \cdot \phi("ELE"))$ ;  
 $xie("CON") = E0("CON") \cdot (1 - \phi("CON")) / (E0("CON") \cdot (1 - \phi("CON")) + D0("CON") \cdot \phi("CON"))$ ;  
 $xie("TRD") = E0("TRD") \cdot (1 - \phi("TRD")) / (E0("TRD") \cdot (1 - \phi("TRD")) + D0("TRD") \cdot \phi("TRD"))$ ;  
 $xie("HOT") = E0("HOT") \cdot (1 - \phi("HOT")) / (E0("HOT") \cdot (1 - \phi("HOT")) + D0("HOT") \cdot \phi("HOT"))$ ;  
 $xie("TRA") = E0("TRA") \cdot (1 - \phi("TRA")) / (E0("TRA") \cdot (1 - \phi("TRA")) + D0("TRA") \cdot \phi("TRA"))$ ;  
 $xie("FIN") = E0("FIN") \cdot (1 - \phi("FIN")) / (E0("FIN") \cdot (1 - \phi("FIN")) + D0("FIN") \cdot \phi("FIN"))$ ;  
 $xie("REA") = E0("REA") \cdot (1 - \phi("REA")) / (E0("REA") \cdot (1 - \phi("REA")) + D0("REA") \cdot \phi("REA"))$ ;  
 $xie("PUB") = E0("PUB") \cdot (1 - \phi("PUB")) / (E0("PUB") \cdot (1 - \phi("PUB")) + D0("PUB") \cdot \phi("PUB"))$ ;  
  
 $xie("HEA") = E0("HEA") \cdot (1 - \phi("HEA")) / (E0("HEA") \cdot (1 - \phi("HEA")) + D0("HEA") \cdot \phi("HEA"))$ ;  
 $xie("OTH") = E0("OTH") \cdot (1 - \phi("OTH")) / (E0("OTH") \cdot (1 - \phi("OTH")) + D0("OTH") \cdot \phi("OTH"))$ ;  
  
 $xie("EDU") = 0$ ;  
  
 $xid("AGR") = D0("AGR") \cdot (1 - \phi("AGR")) / (E0("AGR") \cdot (1 - \phi("AGR")) + D0("AGR") \cdot \phi("AGR"))$ ;  
 $xid("FIS") = D0("FIS") \cdot (1 - \phi("FIS")) / (E0("FIS") \cdot (1 - \phi("FIS")) + D0("FIS") \cdot \phi("FIS"))$ ;  
 $xid("MIN") = D0("MIN") \cdot (1 - \phi("MIN")) / (E0("MIN") \cdot (1 - \phi("MIN")) + D0("MIN") \cdot \phi("MIN"))$ ;  
 $xid("MAN") = D0("MAN") \cdot (1 - \phi("MAN")) / (E0("MAN") \cdot (1 - \phi("MAN")) + D0("MAN") \cdot \phi("MAN"))$ ;  
 $xid("ELE") = D0("ELE") \cdot (1 - \phi("ELE")) / (E0("ELE") \cdot (1 - \phi("ELE")) + D0("ELE") \cdot \phi("ELE"))$

```

phi("ELE"));
xid("CON")=D0("CON")**(1-phi("CON"))/(E0("CON")**(1-phi("CON"))+D0("CON")**(1-
phi("CON")));
xid("TRD")=D0("TRD")**(1-phi("TRD"))/(E0("TRD")**(1-phi("TRD"))+D0("TRD")**(1-
phi("TRD")));
xid("HOT")=D0("HOT")**(1-phi("HOT"))/(E0("HOT")**(1-phi("HOT"))+D0("HOT")**(1-
phi("HOT")));
xid("TRA")=D0("TRA")**(1-phi("TRA"))/(E0("TRA")**(1-phi("TRA"))+D0("TRA")**(1-
phi("TRA")));
xid("FIN")=D0("FIN")**(1-phi("FIN"))/(E0("FIN")**(1-phi("FIN"))+D0("FIN")**(1-
phi("FIN")));
xid("REA")=D0("REA")**(1-phi("REA"))/(E0("REA")**(1-phi("REA"))+D0("REA")**(1-
phi("REA")));
xid("PUB")=D0("PUB")**(1-phi("PUB"))/(E0("PUB")**(1-phi("PUB"))+D0("PUB")**(1-
phi("PUB")));

xid("HEA")=D0("HEA")**(1-phi("HEA"))/(E0("HEA")**(1-phi("HEA"))+D0("HEA")**(1-
phi("HEA")));
xid("OTH")=D0("OTH")**(1-phi("OTH"))/(E0("OTH")**(1-phi("OTH"))+D0("OTH")**(1-
phi("OTH")));

xid("EDU")=1;

theta(i)=Z0(i)
/(xie(i)*E0(i)**phi(i)+xid(i)*D0(i)**phi(i))*(1/phi(i));

ssp =Sp0/sum(h,FF(h));
ssg =Sg0/(Td0+sum(j,Tz0(j))+sum(j,Tm0(j)));
taud =Td0/sum(h,FF(h));

Display alpha,beta,b,ax,ay,mu,lambda,deltam,deltad,gamma,xie,
xid,theta,ssp,ssg,taud;

*-----

*Defining model system-----
Variable Y(j) composite factor
F(h,j) the h-th factor input by the j-th firm
X(i,j) intermediate input

```

$Z(j)$	<i>output of the the j-th good</i>
$Xp(i)$	<i>household consumption of the i-th good</i>
$Xg(i)$	<i>government consumption</i>
$Xv(i)$	<i>investment demand</i>
$E(i)$	<i>exports</i>
$M(i)$	<i>imports</i>
$Q(i)$	<i>Arlington's composite good</i>
$D(i)$	<i>domestic good</i>
$pf(h)$	<i>the h-th factor price</i>
$py(j)$	<i>composite factor price</i>
$pz(j)$	<i>supply price of the i-th good</i>
$pq(i)$	<i>Arlington's composite good price</i>
$pe(i)$	<i>export price in local currency</i>
$pm(i)$	<i>import price in local currency</i>
$pd(i)$	<i>the i-th domestic good price</i>
$\epsilon$	<i>exchange rate</i>
$S_p$	<i>private saving</i>
$S_g$	<i>government saving</i>
$T_d$	<i>direct tax</i>
$T_z(j)$	<i>production tax</i>
$T_m(i)$	<i>import tariff</i>
$UU$	<i>utility [fictitious]</i>

;

<i>Equation</i>	$eqpy(j)$	<i>composite factor agg. func.</i>
	$eqF(h,j)$	<i>factor demand function</i>
	$eqX(i,j)$	<i>intermediate demand function</i>
	$eqY(j)$	<i>composite factor demand function</i>
	$eqpzs(j)$	<i>unit cost function</i>
	$eqTd$	<i>direct tax revenue function</i>
	$eqTz(j)$	<i>production tax revenue function</i>
	$eqTm(i)$	<i>import tariff revenue function</i>
	$eqXg(i)$	<i>government demand function</i>

$eqXv(i)$	<i>investment demand function</i>
$eqSp$	<i>private saving function</i>
$eqSg$	<i>government saving function</i>
$eqXp(i)$	<i>household demand function</i>
$eqpe(i)$	<i>world export price equation</i>
$eqpm(i)$	<i>world import price equation</i>
$eqepsilon$	<i>balance of payments</i>
$eqpqs(i)$	<i>Armington function</i>
$eqM(i)$	<i>import demand function</i>
$eqD(i)$	<i>domestic good demand function</i>
$eqpzd(i)$	<i>transformation function</i>
$eqDs(i)$	<i>domestic good supply function</i>
$eqE1(i)$	<i>export supply function for sector 1</i>
$eqE2(i)$	<i>export supply function for sector 2</i>
$eqE3(i)$	<i>export supply function for sector 3</i>
$eqE4(i)$	<i>export supply function for sector 4</i>
$eqE5(i)$	<i>export supply function for sector 5</i>
$eqE6(i)$	<i>export supply function for sector 6</i>
$eqE7(i)$	<i>export supply function for sector 7</i>
$eqE8(i)$	<i>export supply function for sector 8</i>
$eqE9(i)$	<i>export supply function for sector 9</i>
$eqE10(i)$	<i>export supply function for sector 10</i>
$eqE11(i)$	<i>export supply function for sector 11</i>
$eqE12(i)$	<i>export supply function for sector 12</i>
$eqE13(i)$	<i>export supply function for sector 13</i>
$eqE14(i)$	<i>export supply function for sector 14</i>
$eqE15(i)$	<i>export supply function for sector 15</i>
$eqpqd(i)$	<i>market clearing cond. for comp. good</i>
$eqpf(h)$	<i>factor market clearing condition</i>
$obj$	<i>utility function [fictitious]</i>

```

;
*[domestic production] ----
eqpy(j)..   Y(j) =e= b(j)*prod(h, F(h,j)**beta(h,j));
eqF(h,j)..  F(h,j)=e= beta(h,j)*py(j)*Y(j)/pf(h);
eqX(i,j)..  X(i,j)=e= ax(i,j)*Z(j);
eqY(j)..    Y(j)=e= ay(j)*Z(j);
eqpzs(j)..  pz(j)=e= ay(j)*py(j)+sum(i,ax(i,j)*pq(i));

*[government behaviour] ----
eqTd..      Td =e= taud*sum(h,pf(h)*FF(h));
eqTz(j)..   Tz(j)=e= tauz(j)*pz(j)*Z(j);
eqTm(i)..   Tm(i)=e= taum(i)*pm(i)*M(i);
eqXg(i)..   Xg(i)=e= mu(i)*(Td +sum(j,Tz(j))+sum(j,Tm(j))
              -Sg)/pq(i);
*[investment behaviour]----
eqXv(i)..   Xv(i)=e= lambda(i)*(Sp+Sg+epsilon*Sf)/pq(i);

*[savings]-----
eqSp..      Sp =e= ssp*sum(h,pf(h)*FF(h));
eqSg..      Sg =e= ssg*(Td+sum(j,Tz(j))+sum(j,Tm(j)));

*[household consumption]--
eqXp(i)..   Xp(i)=e= alpha(i)*(sum(h, pf(h)*FF(h))-Sp-Td)
              /pq(i);
*[international trade]---
eqpe(i)..   pe(i)=e= epsilon*pWe(i);
eqpm(i)..   pm(i)=e= epsilon*pWm(i);
eqepsilon.. sum(i,pWe(i)*E(i))+Sf
              =e=sum(i,pWm(i)*M(i));

*[Armington function]----
eqqps(i)..  Q(i)=e= gamma(i)*(deltam(i)*M(i)**eta(i)+deltad(i)
              *D(i)**eta(i))*(1/eta(i));
eqM(i)..    M(i)=e= (gamma(i)**eta(i)*deltam(i)*pq(i)
              /(1+taum(i)*pm(i)))*(1/(1-eta(i)))*Q(i);
eqD(i)..    D(i)=e= (gamma(i)**eta(i)*deltad(i)*pq(i)/pd(i))
              *(1/(1-eta(i)))*Q(i);

```

*\*[transformation function]*

*eqpz d(i)..*  $Z(i)=e= \theta(i) * (\chi(i) * E(i) * \phi(i) + xid(i) * D(i) * \phi(i)) * (1/\phi(i));$

*eqE1("AGR")..*  $E("AGR")=e=$

$(\theta("AGR") * \phi("AGR") * \chi("AGR") * (1 + \tau_z("AGR")) * p_z("AGR") / p_e("AGR")) * (1/(1 - \phi("AGR"))) * z("AGR");$

*eqE2("FIS")..*  $E("FIS")=e= (\theta("FIS") * \phi("FIS") * \chi("FIS") * (1 + \tau_z("FIS")) * p_z("FIS") / p_e("FIS")) * (1/(1 - \phi("FIS"))) * z("FIS");$

*eqE3("MIN")..*  $E("MIN")=e=$

$(\theta("MIN") * \phi("MIN") * \chi("MIN") * (1 + \tau_z("MIN")) * p_z("MIN") / p_e("MIN")) * (1/(1 - \phi("MIN"))) * z("MIN");$

*eqE4("MAN")..*  $E("MAN")=e=$

$(\theta("MAN") * \phi("MAN") * \chi("MAN") * (1 + \tau_z("MAN")) * p_z("MAN") / p_e("MAN")) * (1/(1 - \phi("MAN"))) * z("MAN");$

*eqE5("ELE")..*  $E("ELE")=e=$

$(\theta("ELE") * \phi("ELE") * \chi("ELE") * (1 + \tau_z("ELE")) * p_z("ELE") / p_e("ELE")) * (1/(1 - \phi("ELE"))) * z("ELE");$

*eqE6("CON")..*  $E("CON")=e=$

$(\theta("CON") * \phi("CON") * \chi("CON") * (1 + \tau_z("CON")) * p_z("CON") / p_e("CON")) * (1/(1 - \phi("CON"))) * z("CON");$

*eqE7("TRD")..*  $E("TRD")=e=$

$(\theta("TRD") * \phi("TRD") * \chi("TRD") * (1 + \tau_z("TRD")) * p_z("TRD") / p_e("TRD")) * (1/(1 - \phi("TRD"))) * z("TRD");$

*eqE8("HOT")..*  $E("HOT")=e=$

$(\theta("HOT") * \phi("HOT") * \chi("HOT") * (1 + \tau_z("HOT")) * p_z("HOT") / p_e("HOT")) * (1/(1 - \phi("HOT"))) * z("HOT");$

*eqE9("TRA")..*  $E("TRA")=e=$

$(\theta("TRA") * \phi("TRA") * \chi("TRA") * (1 + \tau_z("TRA")) * p_z("TRA") / p_e("TRA")) * (1/(1 - \phi("TRA"))) * z("TRA");$

*eqE10("FIN")..*  $E("FIN")=e=$

$(\theta("FIN") * \phi("FIN") * \chi("FIN") * (1 + \tau_z("FIN")) * p_z("FIN") / p_e("FIN")) * (1/(1 - \phi("FIN"))) * z("FIN");$

*eqE11("REA")..*  $E("REA")=e=$

$(\theta("REA") * \phi("REA") * \chi("REA") * (1 + \tau_z("REA")) * p_z("REA") / p_e("REA")) * (1/(1 - \phi("REA"))) * z("REA");$

*eqE12("PUB")..*  $E("PUB")=e=$

$(\theta("PUB") * \phi("PUB") * \chi("PUB") * (1 + \tau_z("PUB")) * p_z("PUB")$

```

/pe("PUB"))**(1/(1-phi("PUB")))*z("PUB");

eqE13(i)..    E("EDU")=e= 0;

eqE14("HEA")..    E("HEA")=e=
(theta("HEA"))**phi("HEA")*xie("HEA")*(1+tauz("HEA"))*pz("HEA")
/pe("HEA"))**(1/(1-phi("HEA")))*z("HEA");
eqE15("OTH")..    E("OTH")=e=
(theta("OTH"))**phi("OTH")*xie("OTH")*(1+tauz("OTH"))*pz("OTH")
/pe("OTH"))**(1/(1-phi("OTH")))*z("OTH");

eqDs(i)..    D(i)=e= (theta(i)**phi(i)*xid(i)*(1+tauz(i))*pz(i)
/pd(i))**(1/(1-phi(i)))*z(i);

*[market clearing condition]
eqpqd(i)..    Q(i)=e= Xp(i)+Xg(i)+Xv(i)+sum(j,X(i,j));
eqpf(h)..    sum(j,F(h,j))=e=FF(h);

*[fictitious objective function]
obj..    UU=e= prod(i,Xp(i)**alpha(i));
*-----

*Initializing variables-----
Y.l(j)=Y0(j);
F.l(h,j)=F0(h,j);
X.l(i,j)=X0(i,j);
Z.l(j)=Z0(j);
Xp.l(i)=Xp0(i);
Xg.l(i)=Xg0(i);
Xv.l(i)=Xv0(i);
E.l(i)=E0(i);
M.l(i)=M0(i);
Q.l(i)=Q0(i);
D.l(i)=D0(i);
pf.l(h)=1;
py.l(j)=1;

```

```

pz.l(j)=1;
pq.l(i)=1;
pe.l(i)=1;
pm.l(i)=1;
pd.l(i)=1;
epsilon.l=1;
Sp.l=Sp0;
Sg.l=Sg0;
Td.l=Td0;
Tz.l(j)=Tz0(j);
Tm.l(i)=Tm0(i);

*-----

*Setting lower bounds to avoid division by zero-----
Y.lo(j)=0.00001;
F.lo(h,j)=0.0000;
X.lo(i,j)=0.0000;
Z.lo(j)=0.00001;
Xp.lo(i)=0.00001;
Xg.lo(i)=0.0000;
Xv.lo(i)=0.00001;
E.lo(i)=0;
M.lo(i)=0.00001;
Q.lo(i)=0.00001;
D.lo(i)=0.00001;
pf.lo(h)=0.00001;
py.lo(j)=0.00001;
pz.lo(j)=0.00001;
pq.lo(i)=0.00001;
pe.lo(i)=0.00001;
pm.lo(i)=0.00001;
pd.lo(i)=0.00001;
epsilon.lo=0.00001;
Sp.lo=0.00001;
Sg.lo=0.00001;
Td.lo=0.00001;
Tz.lo(j)=0.0000;

```



```
Tm.lo(i)=0.0000;
```

```
*-----
```

```
* Exogenous variable
```

```
FF("LAB")=1.0*FF("LAB");
```

```
FF("CAP")=1.0*FF("CAP");
```

```
Sf=1.0*Sf;
```

```
*pWe(i)=1.0*pWe*(i);
```

```
*pWm(i)=1.0*pWm*(i);
```

```
*tauz(i)=1.0*tauz(i);
```

```
*taum(i)=1.0*taum(i);
```

```
*analysis
```

```
*Change exogenous variable
```

```
*numeraire-----
```

```
*pf.fx("LAB")=1;
```

```
*-----
```

```
*Defining and solving the model-----
```

```
Model Mongolia /all/;
```

```
Solve Mongolia maximizing UU using nlp;
```