

Key Success Factor of Special Economic Zone for Thailand

P. Pakdeenurit, N. Suthikarnnarunai *Member, IAENG*, and W. Rattanawong

Abstract— The main purpose of this paper is to find out the key factors of the Special Economic Zone(SEZ)'s success by applying the appropriate mathematical model and using 11 variables to analyze in order to get its result. For example, some of the factors are; FDI, GDP, high-technology, R&D, Co² and export. In the beginning, this research was tested in China and India. This same mathematical model will be tested in The USA and Thailand in the near future to guarantee its precision. However, this model shall be tested in some other countries and regions. That to make sure the assumptions and key factors are reliable, suitable and able to support the future area to come.

Index Terms— Special Economic Zone, Key Success Factor, FDI, Mathematical Model, Thailand.

I. INTRODUCTION

SPECIAL Economic Zone (SEZ) is the area with a special privilege that is to established specifically by any countries in order to attract the foreign business persons in investing in the country. The privilege might include a special investment policy or rule or regulation and special support in infrastructure e.g., a tax break, a financial support, or issuance of work permits for foreign workers. The businesses that have been to promoted under the SEZ includes industry, agriculture, commerce, tourism, services or any other operation supporting a Free Trade Area [1-9].

The Special Economic Zone can be divided into 6 types, which include the Free Trade Zone, Export Processing Zone, Enterprise Zone, Single Factories, Free Port, and Specialized Zone. This section briefly describes the characteristics of each SEZ with other names that might be possible [1], [10-12].

II. WHY HAVE THE SPECIAL ECONOMIC ZONE

The main objective of developing SEZ is to spread out wealth from the main city to different regions throughout the country. This not only helps to enhance the quality of life for

Manuscript received December 23, 2013; revised February 5, 2014. This work was supported in part by University of the Thai Chamber of Commerce.

P. Pakdeenurit is Ph.D. student at University of the Thai Chamber of Commerce, Bangkok, Thailand (phone: 6687-031-5425; email: nailleks@gmail.com).

N. Suthikarnnarunai is with the Logistics Engineering Department, University of the Thai Chamber of Commerce, Bangkok, Thailand (phone: 6685-907-1889; fax: 662-692-3014; e-mail: nanthi_sut@utcc.ac.th, ssnsj@yahoo.com).

W. Rattanawong is Dean of the School of Engineering, University of the Thai Chamber of Commerce, Bangkok, Thailand (e-mail: wanchai_rat@utcc.ac.th).

people in those regions but also increases its chance of competing in the global arena.

OECD (Organization for Economic Cooperation and Development) is association where countries join hand in hand to develop the SEZ. Their aims are not to improve the SEZ for the purpose of improving the economy, but they rather focus on improving the whole service system. Whereby, they start by eliminating all the rules and regulations that are unnecessary. They also keep track of all the data in electronic forms, where they countries collaborate and share resources. (Service Center) They also make use of new technology to aid their service. Thus, customers are more satisfied with the fast delivery speed. For example, in the case European Union, they utilize Free Trans-bordering of goods, labor and capital so countries in European Union do not have to focus on just trying to improve the economy and focus on improvement the service system instead [2], [13-15].

In most cases, The special economic zone are to established in developing countries, and it is rather difficult. The fact is that these countries are not suitable for SEZ to be established all at once because the process will require more time and effort to do so. The fact is that the world's economy is changing so drastically, by the time SEZ are successfully to established the special privileges in the SEZ will no longer be effective. So this developing country must focus on development of district zone that made service system can expand around their country in the future [16-17].

We will now observe how countries manage their Special Economic Zones. Let us take a look at the 2 cases below for India and China. India has the most SEZ in the world [18-20]. While, Shenzhen in China was the first to set out successful Special Economic Zones [21-23]. Shenzhen was able to do this because the government has a clear goal of what they wish to improve and to find all the resources needed to do so. It also adapted the westerner's fast response system to its local regions. Special privileges that they provide in their SEZ include things like reduction in the tax rate, special exchange of currency, and special labor regulations [24-25].

In conclusion, the objective of setting up the SEZ is to stabilize the country and help the country to expand sustainably.

This is sustainable growth includes:

- 1) Satiability of the economy
- 2) The spreading effect of cash inflow into different regions throughout the country
- 3) High performance, knowledge-based, creative economy

III. KEY SUCCESS FACTORS OF THE SPECIAL ECONOMIC ZONE

The establishment of SEZ has limitations that must be realized. Due to it might create a long term impact such as environment pollution, and so on. After reviewing all the data [1-2], [26-27], we see that the key factors to be observed in order for us to judge if that SEZ will be a successful one are listed below.

- 1) Location advantage
- 2) Macroeconomics of the country
- 3) Industrial investment support
- 4) Investment cost
- 5) Skilled labor
- 6) Management and service
- 7) Government policies
- 8) Laws and regulations
- 9) Stability and consistency of the government.

IV. MATHEMATIC MODEL OF SPECIAL ECONOMIC ZONE

The literature reviewed showed the key success factors of the special economy zone by building algebraic equations in which the majority use the variables: FDI, GDP to be the index points of the key success factor of SEZ [28-39]. Then the author wants to build the mathematic model for analysis of the key success factors of SEZ with consideration of another various factors.

A. The procedure studies to analysis.

The literature reviewed showed about 8 key success factor of that special economy zone. We can separate the basic necessities to get 3 main dimensions; international environment, domestic environment, and the role of the state. We have data from World Bank for analysis to support the aforementioned factors [40-41]. As follows.

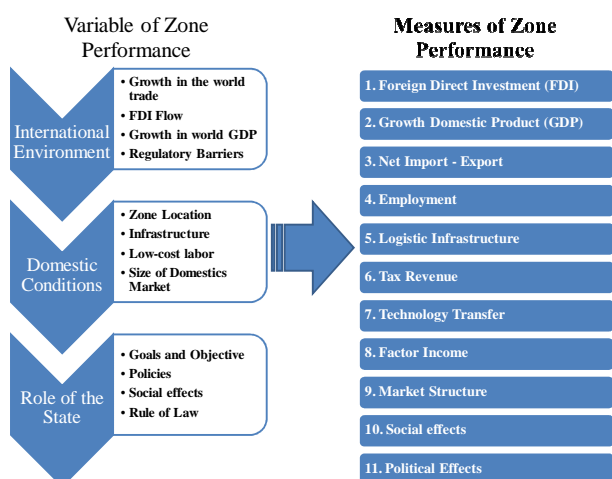


Fig 1, The procedure analyses the data

From the factors above, the 27 variables listed below will help us utilize the Run Model. This includes air transport, internet users, roads, railway, rail lines, telephone system, mobile cells, high-technology exports, Gross Domestic Product (GDP), Foreign Direct Investment (FDI), claims on

central government, urban population, trademark applications, market capitalization, labor force, trade, researchers in R&D, imports, export, Tax on goods and services, tariffs, tax revenue, agriculture, inflation, improved water, electric, and CO₂.

TABLE I
VARIABLES FOR SEZ

Independent: Foreign Direct Investment (FDI)	
Key success Factor	Dependent variables
1. Location Advantage and Macroeconomic of country	air transport, internet users, roads, railway, rail line, telephone system, mobile cells, urban population, improved water,
2. Industrial investment support	GDP, imports, export, trade
3. Investment cost	market capitalization, inflation,
4. Skilled Labor	labor force
5. Management and service	high technology, R&D, electric,
6. Government policies	tax on goods, tariffs ,tax revenue
	agriculture, Co ² ,
	trademark applications
7. Laws and regulations	claims on central government
8. Stability and consistency of the government	

B. Formulate a Mathematical Model.

To Formulate a mathematical model for use in relationship analysis, with the variables from above, to be able to calculate if SEZ will succeed, we will use the algebraic equation linear Regression and Eviews Programming for evaluation [42-44].

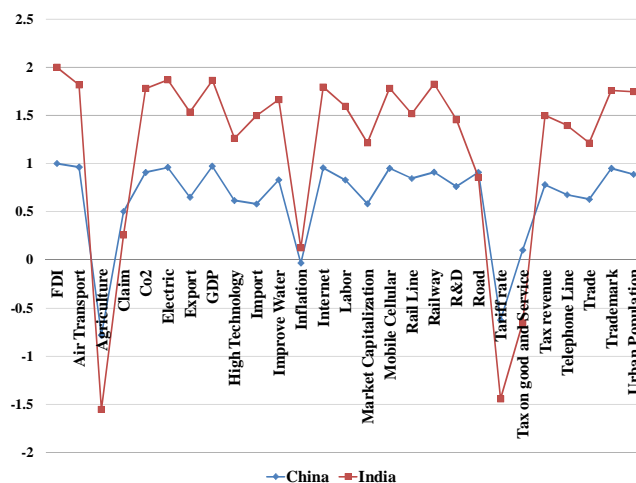


Fig 2, The Result of Correlation between 27 variables in the People's Republic of China and the People's Republic of India.

The Formulation above used to test for correlation between variables. It will leave us with only 11 variables to consider as we have eliminated some of the variables to protect against the problem of autocorrelation.

TABLE II

VARIABLES USED TO SEZ

Independent: Foreign Direct Investment (FDI)	
Key success Factor	Dependent variables
1. Location advantage and macroeconomic of country	air transport
2. Industrial investment support	GDP, export
3. Investment cost	market capitalization
4. Skilled labor	labor force
5. Management and service	high technology, R&D
6. Government policies	Co ²
7. Laws and regulations	trademark application
8. Stability and consistency of the government	claims on central government

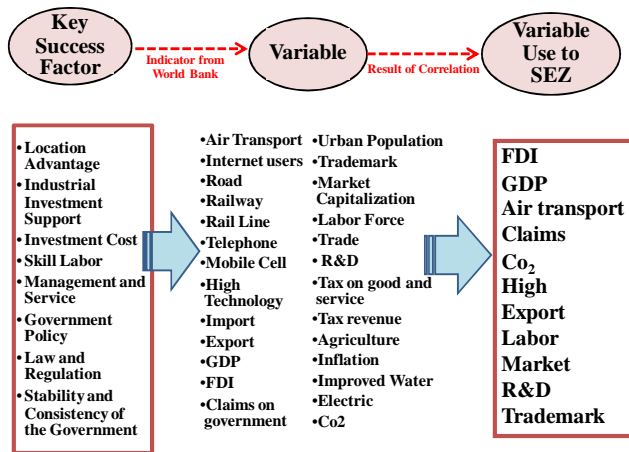


Fig 3. Processing of Methodology

Above variables can now be used to formulate the Linear Regression: Log-Linear as follows:

$$\hat{Y} = \beta_0 + \beta_1 X + \varepsilon$$

$$\log(FDI) = \alpha + \beta_1 \log(Airtran) + \beta_2 \log(GDP) + \beta_3 \log(Claim) + \beta_4 \log(Co_2) + \beta_5 \log(High) + \beta_6 \log(Export) + \beta_7 \log(Labor) + \beta_8 \log(Market) + \beta_9 \log(RD) + \beta_{10} \log(Trademark)$$

- 1) FDI = Foreign direct investment: FDI, net inflows (BoP, current US\$)
- 2) Airtran = air transport, freight (million ton-km)
- 3) GDP = Gross Domestic Product: GDP (Current Us\$)
- 4) Claim = claims on central government, etc. (% of GDP)
- 5) Co² = carbon credit emissions from transport (million metric tons)
- 6) High = high-technology exports (% of manufactured export)
- 7) Export = export of good and service (% of GDP)
- 8) Labor = labor force, total
- 9) Market = market capitalization of listed companies (% GDP)
- 10) RD = researchers in R&D (per million people)
- 11) Trademark = trademark applications, total

C. Using Mathematical Model to formulate with Linear Regression on Eviews Programming

TABLE III

THE RESULT OF FORMULATE OF THE PEOPLE'S REPUBLIC OF CHINA

Dependent Variable: LOG(FDI) -- China --

Method: Least Squares

Date: 12/15/13 Time: 01:05

Sample: 1992 2011

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	461.7586	303.3178	1.522359	0.1622
LOG(AIRTRAN)	0.351903	0.514384	0.684125	0.5111
LOG(GDP)	1.245971	0.585285	2.128828	0.0621
LOG(CLAIM)	-0.007854	0.248424	-0.031614	0.9755
LOG(CO ²)	0.481120	1.427693	0.336991	0.7438
LOG(EXPORT)	0.753632	0.625410	1.205020	0.2589
LOG(HIGH)	-0.136467	0.499284	-0.273326	0.7908
LOG(LABOR)	-24.06000	15.86898	-1.516166	0.1638
LOG(MARKET)	0.148955	0.150800	0.987768	0.3491
LOG(RD)	0.553614	0.261175	2.119701	0.0631
LOG(TRADEMARK)	0.606043	0.353202	1.715854	0.1203
R-squared	0.979052	Mean dependent var	24.86225	
Adjusted R-squared	0.955776	S.D. dependent var	0.817787	
S.E. of regression	0.171976	Akaike info criterion	-0.381435	
Sum squared resid	0.266181	Schwarz criterion	0.166217	
Log likelihood	14.81435	Hannan-Quinn criter.	-0.274528	
F-statistic	42.06352	Durbin-Watson stat	2.134151	
Prob(F-statistic)	0.000002			

TABLE IV

THE RESULT OF FORMULATE OF THE PEOPLE'S REPUBLIC OF INDIA

Dependent Variable: LOG(FDI) – India --

Method: Least Squares

Date: 12/15/13 Time: 01:45

Sample: 1992 2011

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-178.0446	141.3299	-1.259781	0.2394
LOG(AIRTRAN)	-1.148711	0.915790	-1.254339	0.2413
LOG(CLAIM)	-2.500889	1.198498	-2.086686	0.0665
LOG(CO ²)	3.423055	1.872451	1.828114	0.1008
LOG(EXPORT)	1.141549	1.699377	0.671745	0.5186
LOG(GDP)	0.240272	0.941925	0.255087	0.8044
LOG(HIGH)	2.147547	0.879384	2.442104	0.0372
LOG(LABOR)	9.505952	7.744964	1.227372	0.2508
LOG(MARKET)	-0.579589	0.319295	-1.815216	0.1029
LOG(RD)	1.723140	1.396581	1.233827	0.2485
LOG(TRADEMARK)	-0.688507	0.728475	-0.945135	0.3693
R-squared	0.985855	Mean dependent var	22.37211	
Adjusted R-squared	0.970139	S.D. dependent var	1.414003	
S.E. of regression	0.244344	Akaike info criterion	0.321013	
Sum squared resid	0.537336	Schwarz criterion	0.868666	
Log likelihood	7.789870	Hannan-Quinn criter.	0.427921	
F-statistic	62.72835	Durbin-Watson stat	2.060195	
Prob(F-statistic)	0.000000			

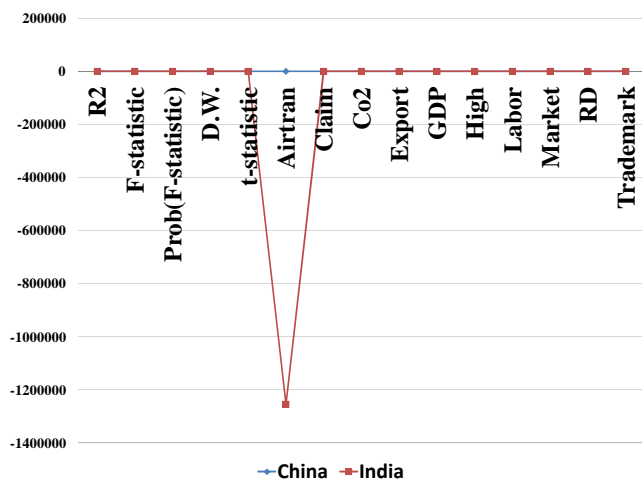


Fig 4, The result of formulation the factor in the Liner Regression by Eviews program.

The result of formulation the factors in the Linear Regression by Eviews program. Shows that the relationship are in the same direction in which the relationship value will depend on the value of the variable that are to stated in the equation. Thus, we can conclude as follows.

A. The cause in the People's Republic of China

From the above equation is the equation for the supply of foreign direct investment. It can be seen that this equation, the independent variable can be explained by the dependent variable up to 97 percent (consideration of the R^2) and consideration of the F-statistic, a hypothesis test that the calculated coefficients are all equal to zero. It turns out that the calculated coefficient value has a value different from zero at the 95% confidence level. [consideration of the F-statistic value, which is greater than the critical value at the 95% level of confidence or $\text{Prob.} < \alpha$] and the $D.W.=2.13$ is closed to 2 shows that there is no problem with autocorrelation. From the equation can describe the preliminary; air transport, claims on central government, Gross Domestic Product, high-technology, researchers in R&D (per million people), Co^2 , export, market capitalization of listed companies, and trademark applications that there is a relationship with foreign direct investment in the same direction. Part of labor force shows there is the relationship with foreign direct investment in the opposite direction

The significant relation between the key factors especially the foreign direct investment is to shown in table(3) and the linear graph figure(4)

B. The cause in the People's Republic of India

From the above equation is the equation for the supply of foreign direct investment. It can be seen that this equation, the independent variable can be explained by the dependent variable up to 98 percent (consideration of the R^2) and consideration of the F-statistic, a hypothesis test that the calculated coefficients are all equal to zero. It turns out that the calculated coefficient value has a value different from zero at the 95% confidence level. [consideration of the F-statistic value, which is greater than the critical value at the 95% level of confidence or $\text{Prob.} < \alpha$] and the $D.W.=2.06$ is

closed to 2 shows that there is no problem with Autocorrelation. From the equation can describe the preliminary; high-technology, exports, Gross Domestic Product(GDP), market capitalization, researchers in R&D, Co^2 , and labor force that there is a relationship with foreign direct investment in the same direction. Part of air transport, claims on central government, and trademark applications show there is the relationship with foreign direct investment in the opposite direction.

The significant relation between the key factors especially the foreign direct investment is to shown in table(4) and the linear graph figure(4)

With the formulation from both of the two countries, there are corresponding economics theories that Foreign Direct Investment.

The measurement if SEZ will succeed or not depends on variables used in the formulation model. What is to be considered as the main variable is foreign direct investment, as it pushes the economy growth. In addition, foreign investment in a country also leads to transfer of technological advances from a developed country to a developing country. A country can boost its growth in the economy by free trade, foreign direct investment, and only by supporting the import and export of goods.

From the studies, we found out that the objective of foreign direct investment is to

- 1) Find potentially new markets in order to reduce the transportation cost
- 2) Find new resources be to used in the production process which may be a result of the expansion of vertical integration and tighter control for the value chain
- 3) Creates diversification in target customers as to mitigate the risk
- 4) Reduces the level of competition
- 5) Transfer of technological advancement

In conclusion, it can be said that foreign direct investment is one of the key mechanisms that drive the economic growth in the country. Furthermore, it leads to higher GDP growth, which helps the SEZ to be developed. As for Thailand, it should adopt using the mathematical model for establishing the SEZ. As such, the author has drawn the scope for Thailand and breaks it into 3 phases.

V. THE FUTURE OF SPECIAL ECONOMIC ZONE FOR THAILAND

Accurate inspection of the mathematical model with many countries has an increased the accuracy of the mathematical model, which can be applied to other countries, providing a location advantage such as United States of American [45-47] and AEC country.

For the case of Thailand, the authors plan a scope for developing SEZ in Thailand in 3 phases as shown in fig 5

--Phase 1, formulate equation using the mathematic model. The used the mathematical model will require careful analysis with Thailand to check if it is suitable or not.

--Phase 2, study the environment. Looking into the actual data collection process and analyze the possibility that will be most suitable for Thailand's environment.

--Phase 3, establish SEZ. After the analysis, we want to study the actual area that will be use to create the SEZ. We want to make sure that these areas can support the upcoming AEC.

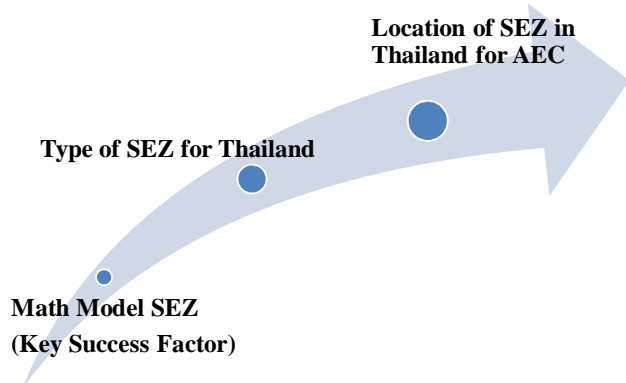


Fig 5, Scope for developing SEZ in Thailand

VI. CONCLUSION

Establishing a Special Economic zone (SEZ) is the key factor in attracting foreign investment into the country. The government must truly realize the importance and then, invest heavily to establish the SEZ in their countries. In order to evaluate if a SEZ will be a success or not, we must measure it by the amount of foreign direct investment, private investment, and investment that arises within the country itself. These factors lead to higher GDP and higher national income. Moreover, GDP is a key indicator of a country's stability, wealth, and the success of the previous regulations implemented by the government.

As such, one can establish the special economic zone by establishing incentives for international investing by lowering the tax rate, and loosening some of the rules and regulations like rules about transferring the company's income, trade, or even the foreign labor.

REFERENCES

- [1] T. Farole, "Special Economic Zones: Performance, Lessons Learned, and Implications for Zone Development," The multi-donor investment climate advisory service managed(FIAS) by the International Finance Corporation(IFC) and supported by the Multilateral Investment Guarantee Agency (MIGA) and the World Bank (IBRD), The World Bank, Washington DC, 2008.
- [2] M. Murray. (2013, May 10). What Are Special Economic Zone [Online]. Available: <http://ebook.law.uiowa.edu>.
- [3] Marrakech, "Towards Best Practice Guidelines for the Development of Economic Zones," A Contribution to the Ministerial Conference by Working Group 1: MENA-OECD Investment Program 2009, pp 1-15.
- [4] T. Farole and G. Akinici, "Special Economic Zones: Progress, Emerging Challenges, and Future Directions," The International Bank for Reconstruction and Development, The World Bank, Washington DC, 2011.
- [5] T. Farole, "Special Economic Zones in Africa Comparing Performance and Learning from Global Experience," The International Bank for Reconstruction and Development, The World Bank, Washington DC, 2011.
- [6] T. Farole, "Special Economic Zones: What Have We Learned?," The World Bank Economic Premise, Washington DC, Number 64, Sep. 2011.
- [7] T. Farole, "Special Economic Zones Performance, policy and practice- with a focus on Sub-Saharan Africa," International Trade Department, The World Bank, Washington D.C, 2011.
- [8] T. Farole and J. Kweka, "Institutional Best Practices for Special Economic Zones: An Application to Tanzania," Affica Trade Policy Notes Note#25, Aug. 2011.
- [9] T. Farole, "Second Best? Investment Climate and Performance in Africa's Special economic Zones," International Trade Department, The World Bank, Washington D.C, 2010.
- [10] A. Bernsein, "Special Economic Zones: Lessons for South Africa from international evidence and local experience," Edited proceedings of a Round Table convened by the Centre for Development and Enterprise, The Centre for Development and Enterprise, Johannesburg, 2012.
- [11] Wei Ge, "Special Economic Zone and Technological Learning: An Analytical Framework," Economic and Finance Review Vol. 2(3), 2012.
- [12] Jing-dong Yuan; Lorraine Eden, "Export Processing Zones in Asia: A Comparative Study," Asian Survey, Vol.31 No.11, 1992.
- [13] Owen C.H. Ho "Determinants of Foreign Direct Investment in China: A Sectoral Analysis" School of Economics & Commerce University of Western Australia, 2004.
- [14] U. Halim. "Special Economic Zones(SEZ): Untold Agonies Experiences from Asian Countries"
- [15] A. Aradhna, "Impact of Special Economic Zones on Employment and Human Development" In Indian Council for Research on International Economic Relations, Working Paper No.194, 2007.
- [16] T. TSUNEISHI, "Development of Border Economic Zones in Thailand: Expansion of Border Trade and Formation of Boder Economic Zones" Institute of Developing Economics, IDE DISCUSSION PAPER No.153, 2008.
- [17] T. TSUNEISHI, "Development of Border Economic Zones in Thailand: Between the Four Country" Institute of Developing Economics, IDE DISCUSSION PAPER No.205, 2009.
- [18] S. Chatterjee, "The Economics of Special Economic Zones in India: Ground Realities and Key Considerations," Department of Business Economics, Social Science Research Network: SSRN, India, 2008.
- [19] A. A. Raheem, "Impact of Special Economic Zone(SPEZ) on Human development and poverty Reduction: An Indian," Department of Economics, The New College, University of Madras, Chennai, 2011.
- [20] Ministry of Commerce & Industry. (2012, November 26). Special Economic in India [Online]. Available: www.sezindia.nic.in.
- [21] P. Hao, Richard Sliuzas, Stan Geertman. "The development and redevelopment of urban villages in Shenzhen," Habitat International 35, pp.214-224, 2011.
- [22] J. Zhu, "Changing land policy and its impact on local growth: the experience of the Shenzhen Special Economic Zone, China, in the 1980s," Urban Studies, 31(10), pp.1611-1623, 1994.
- [23] J. Wang, "The Economic Impact of Special Economic Zones: Evidence from Chinese Municipalities" Hong Kong University of Science and Technology, 2010.
- [24] The World Bank. "Export Processing Zones," Policy and Research Series No. 20, The World Bank, Washington, DC. 1992.
- [25] C. Johannesburg, Town, and Durban, "Special Economic Zones Policy & Bill," Department of Trade & Industry, South African, 2012.
- [26] C. Monga, "Cluster-Based Industrial Parks: A Practical Framework for Development Economics Vice Presidency Action," The Structural Transformation Unit, Africa Region; and Development Economics Vice Presidency, The World Bank, 2011.
- [27] The World Bank. "Unlock Central American's Export Potential: 4 Infrastructure for Unlocking exports: SEZ, Innovation and Quality System," Finance and Private Sector Development Department Central America Country Management Unit Latin America and the Caribbean Region, The Worldbank. 2012.
- [28] J. Guo, "The Effects of Tax Rates on Foreign Direct Investment in China" school of Economic and Business Administration, Beijing Normal University, China. The Journal of International Management Studies, Volume 5, Number 1, April, 2010.
- [29] R. M.Aldaba "FDI and Corporate Taxation: The Philippine Experience" Philippine Institute for Development Studies, 2010.

- [30] S. tung and Stella Cho, "The Impact of Tax Incentives on Foreign Direct Investment in China" Journal of International Accounting, Auditing & Taxation, 2000.
- [31] M. V. Ryazantseva, "Stimulation of Foreign Investments in Russian Region Economic" Moscow State University of Geodesy and Cartography (MIIGAiK), Russia, 2012.
- [32] S. Tang, E.A. Selvanathan and S.Selvanathan, "Foreign Direct Investment, Domestic Investment, and Economic Growth in China" United Nations University, Research Paper No.2008/19, 2008.
- [33] S. Ray, "Impact of Foreign Direct Investment on Economic Growth in India: A Co integration Analysis" Shyampur Siddheswari Mahavidyaya, University of Calcutta, India, Advances in Information Technology and Management (AITM), 2012.
- [34] P. S. K. Chi and Charng Kao, "Foreign Investment in China: A New Data Set" China Economic review, Volume 6, Number 1, 1995.
- [35] K. WEI Shujie YAO and Aying LIU, "Foreign Direct Investment and Growth Differentials in the Chinese Regions" The University of Nottingham, China Policy Institute, 2007.
- [36] P. Nelson, "An Analysis of the Impact of Foreign Direct Investment on the Indian Economy," International Journal of Latest research in Science and Technology Vol.1 Issue 2, 2012.
- [37] R. Anitha, "Foreign Direct Investment and Economic Growth in India," International Journal of Marketing, Financial Service & Management Research, 2012.
- [38] X. Dang, "Foreign Direct Investment in China" Department of Economics College of Arts and Sciences, Kansas State University, Manhattan, Kansas, 2008.
- [39] M. Wen, "Foreign Direct Investment, Regional Geographical and Market Conditions, and Regional Development: A Panel Study on China", Division of Economics, RSPAS, AUN, 2003.
- [40] World Bank (2012), Doing Business 2012, [Online]. Available: www.worldbank.org.
- [41] World Bank (2013), Doing Business 2013, [Online]. Available: www.worldbank.org.
- [42] EViews 5.1 Command and Programming Reference. Quantitative Micro Software, LLC, 2005.
- [43] EView 5.1 User's Guide. Quantitative Micro Software, LLC, 2005.
- [44] R.R. Johnson. A Guide to Using EViews with Using Econometrics: A Practical Guide. University of San Diego, 2000.
- [45] U.S. Foreign - Trade Zone Board. (2012, November 26). New to FTZs? [Online]. Available: <http://ia.ita.doc.gov/ftzpage/>.
- [46] National Association of Foreign - Trade Zone. (2012, November 26). Fundamentals of FTZs [Online]. Available: www.naftz.org.
- [47] Foreign Trade Zone Resource Center. (2012, November 26). Potential Subzones [Online]. Available: <http://foreign-trade-zone.com>.