CHAPTER

RESULTS & ANALYSIS

5.1. INTRODUCTION

The fast development and increasing demand for electricity during Communist development of Eastern Europe created speeding deterioration in air quality. As air pollution was regarded as the most urgent environmental problem in Eastern Europe, the Czech Republic and Poland were chosen in this research as examples of coping with this problem in order to expose the difficulties and success of the general approach to environmental management in energy sector /position in the electricity industry that is shared by both countries.

The required methods for the purpose of acquiring results of the research questions of this study were introduced with the statement of the research questions in the first chapter as well as discussed in the third chapter of this document. In this chapter, the results are provided along with their detailed analysis.

The results of this study are a combination of statistical and descriptive findings, each of which are presented in this chapter separately. This presentation of the findings has been done in tabular and diagrammatic style for convenience of the audience.

The presentation has also been done with the consideration that each research question of the study is addressed separately. For this purpose, the researcher has also followed the sequence with which the research questions were listed in the first chapter of this document. Hence, at first the research question requiring statistical calculations has been discussed below, after which the other two research questions are analysed in description.

- This chapter sums up the results of the research conducted. It reports the factual and formal information that has been discovered by the researcher. Count is **usually kept to 10-15%** of the dissertation, but in cases such as this sample, where results of statistical tests, analysis conducted, and conclusive remarks are united as one, it exceeds.

- Briefly remind the readers the core theme of your work. It will keep them focused and enable swift transition of intended information.

- Precise details about what the chapter would entail and how the findings have been presented. Details like these acquaint readers about what to expect from content ahead.

- For thissample, the following research questions were used:
  - How did selected critical policy, economic and institutional factors such as rising incomes (*e.g.*, GDP per capita), regulatory structure (*i.e.*, environmental expenditures to GDP) and the structure of the respective country's economy (*i.e.*, index of small-scale privatisation) relate to improvement in the indicators of air quality such as CO_2, SO_2 and solid particulate levels?
  - Why did market economy prove to be one of the most effective ways to initiate environmental regulation?
  - What was the influence of accession in the European Union on facilitating improvements in environmental standards of Poland and the Czech Republic?

5.2. POLICY, ECONOMIC FACTORS, & AIR POLLUTION

For the first research question, the needed data represented only the input of structural reforms by using the index of structural reforms constructed on 44 underlying variables as presented in the working paper of Campos and Horváth (2009) instead of the indexes commonly used in the relevant literature (EBRD, WB, IMF, the UN *etc*.). The rationale behind this unusual selection of data form was to obtain well-defined reference – the measurement of points instead of the indexes that provide lack of information which helps variable in making reform indicators, or how scores in these indexes are generated (EBRD Air Pollution Index- ESI (Environmental Sustainability Index), for example).

In addition, majority of indexes provide data for only a few isolated years, leaving a researcher only with a limited opportunity for research studies (Andonova, Mansfield and Milner 2007). As stated by both authors, the methodology to create the "real" indexes was originally developed by Eduardo Lora (1997). Campos and Horváth (2009) argue that a major advantage of these indexes is that they provide "quality-weight" data that isolate *input indicators* from *outcome indicators* of reforms, unlike the indexes that receive high weight-based predominately on outcomes. Compared to the existing indexes, the indexes based on the "Lora transformation" generate less "optimistic assessment" of the reform process in all post-communist states as well. In short, all three variables: internal, external liberalisation and privatisation data in Lora Transformation cover EBRD, WB, OECD index, and other transition reports and data from both the Czech and Polish statistical offices and Ministries (Appendices C and D).

Canonical correlation was used to study the relationship between sustainability factors and key air quality pressure indicators in this research. The idea behind this combination was to firmly and comprehensively determine the direct effect of such policy decisions of the studied countries' governments that had been considered effective role-players in the environmental revival of the Czech Republic and Poland. Canonical correlation has been used repeatedly in economics to measure the overall relationship between two sets of variables. In this study, three sets of variables were devised and are as follows:

SET 01: This set comprises of three variables. These variables are placed in a dependent position as they are the ones this study seeks to evaluate in light of the independent variables. The

- Result of each research question can be described separately under different headings. As 5.2 describes details of results acquired against research question 1.
- Explanation/Rationale pertinent to data selection and variables provide a clear picture of research process and further clarify provided results.
- In-depth explanation of set of research variables is done, in case the study involves sophisticated and complex data which requires extensive explanation to understand the entire research process. (See headings: set 01, set 02 and set 03 onpg. 47-48)

variables included in this set are part of the emissions from the energy sector, which has been found to be the greatest emissions-producing sector in both the studied countries (Kabala 1993; Carter 1985; Pavlínek 1995; Tickle and Vavroušek 1998). In light of these cited works, and others, it was determined that Carbon dioxide, Sulphur dioxide, and Nitrogen Oxides comprised the air emission more than any other substance recorded to be emitted in air. Hence, the variables were set upon:

1. Emissions of the Carbon dioxide (CO_2),
2. Emissions of the Sulphur dioxide (SO_2) , and
3. Emissions of the Nitrogen oxides (NO_x).

SET 02: Set 02 comprises of independent variables. It was one of the two sets of independent variables of this study. The set was based on the policies of the studied countries that led to environmental restructure in the region. The purpose of measuring these elements of regulatory structure in the studied countries was to establish the direct correlation between the rates with which these regulatory elements and the reduction of air pollution resulting from the shift of the two countries towards improved environmental conditions. These elements were selected considering the effect of investments made by the governments of the studied countries on environmental development. In this regard, the following determinants were selected:

1. GDP Growth
2. Rising GDP per capita, and
3. Environmental expenditures to GDP

SET 03: The third set of variables is also an independent one and is the last set of variables used in this study. This set comprises of economic factors that played their role in the environmental restructuring of Poland and the Czech Republic. This aspect of the first research question also relates to the second research question, considering the nature of elements considered in the two. The factors selected for this set of variables are:

1. Internal liberalisation,
2. External liberalisation, and

3. Privatisation

5.2.i. CANONICAL CORRELATION

In the canonical correlation analysis, the researcher conducted two examinations where the first one was to study the association between variables of set 01 and set 02, while the second one to study the association between set 01 and set 03. However, since data was to be used for two countries, adjustments were found for country variations by including the variable *country* to both sets 01 and 02.

ASSOCIATION BETWEEN SET 01 & SET 02:

Dimensions	Canonical Correlation	Squared Canonical Correlation	Approx. F Value	Num DF	Den DF	Pr > F
1	0.998271	0.996545	92.56	12	24.103	<.0001
2	0.966332	0.933798	28.66	6	20	<.0001
3	0.914352	0.836039	28.04	2	11	<.0001

Table I: Tests of Canonical Dimensions (Sets 01 and 02)

Tests of dimensionality for the canonical correlation analysis, as shown in Table I, indicate that the three canonical dimensions are statistically significant at 0.05. The three dimensions had a canonical correlation above 0.91 between the two sets of variables. The canonical analysis yields a score called canonical-R, which can be interpreted as the simple correlation between the weighted sums of scores from each set of variables, computed with the weights pertaining to the first canonical root. The third canonical-R is fairly substantial (0.91) and highly significant ($p<0.0001$), suggesting that it is likely that the true correlation between the two sets of constructs is very high. This high value of the true correlation determined with the help of table I is directly proportional to the extent of effect of variables in set 2 over those in set 1. Thus, the greater the values of the third canonical-R and greater the significance found, the

- Pointing to the comparisons and contrast between the acquired data leads to newer and unexpected revelations.
- In case an image or a matrix has been added, the content below it must clearly explain what the data/image points to.
- **Formatting Tip:** Quantitative data, when in matrix form, should be aligned in the centre of each cell. It adds to the ease of reviewing the data.

greater effective relationship is found between regulatory structure of the studied countries and the improvement of air quality during the studied years.

Further, the second canonical-R indicates that the air-quality pressure canonical variate and the regulatory structure canonical variate share about 84 percent of the variance, which means that 84% of the variability in air pollution pressure could be explained by regulatory structure after adjusting for country variation.

It should be realised that this high level of interrelatedness found between the two sets of variables shows that highly significant effects are found on the movement toward improved air quality in Poland and the Czech Republic by governmental policies and restructured regulations with regard to environmental sustainability (Andrzejewski and Baranowski 1993).

- Conclusive remarks at the end further accentuate the significance of highlighting association/comparison between any set of variables.

ASSOCIATION BETWEEN SET 01 & SET 02:

Dimensions	Canonical Correlation	Squared Canonical Correlation	Approx. F Value	Num DF	Den DF	Pr > F
1	0.999141	0.998282	83.05	12	29.395	<.0001
2	0.960530	0.922618	14.22	6	24	<.0001
3	0.614350	0.377426	3.94	2	13	0.0459

Table II: Tests of Canonical Dimensions (Sets 01 and 03)

Tests of dimensionality for the canonical correlation analysis, as shown in table II, indicate that the three canonical dimensions are statistically significant at 0.05. The three dimensions had a canonical correlation above 0.61 between the two sets of variables. The third canonical-R is acceptable (0.61) but marginally significant (p=0.0459), suggesting that it is likely that the true correlation between the two sets of constructs is significant.

When compared with the results drawn from the analysis between variables of sets 01 and 03, it becomes clear that the level of canonical significance between correlation of air quality of the studied countries and regulatory restructure is considerably greater than that between air quality in the two countries and economic factors studied in this research.

Furthermore, from the results the second canonical-R indicates the air-quality pressure canonical variate and the structure of the economy canonical variate share about 38 percent of the variance, which means that 38% of the variability in air pollution pressure could be explained by restructure of the economyafter adjusting for country variation. It also implies that the quality of air in the two studied countries has improved significantly lower under the influence of economic changes when compared with the improvement due to effect of regulatory restructuring of the two countries focused on air quality improvement.

5.2.ii. PRINCIPLE OF COMPONENTS ANALYSIS

Now, after providing evidence that canonical association between sustainability factors and key air-quality pressure indicators exists, the researcher will try to examine its direction by using the principle of components analysis.

The principle component analysis indicates that the 1st component for set 01 explains about 94.7% of its variability (see Table III). Thus, the first factor from set 01 was chosen to represent the set.

EIGENVALUES OF THE CORRELATION MATRIX: TOTAL = 3 AVERAGE = 1				
COMPONENT	**EIGENVALUE**	**DIFFERENCE**	**PROPORTION**	**CUMULATIVE**
1	2.84166643	2.70777741	0.9472	0.9472
2	0.13388902	0.10944447	0.0446	0.9919
3	0.02444455		0.0081	1.0000

Table III: Principle Component Results for Set 01

- Ideally, the chapter of result is expected to convey just the results, may it be in the form of quantitative or qualitative data, and not analysis. However, in case of this study “results and analyses” are being presented together within a single chapter; thus, detailed analysis (as pointed) can be included.

1. **Formatting Tip:** While numbering sub headings lower-case of alphabets should be used, so subheadings can separately be pointed out even at a quick review.

Similarly, for set 02, the principle component analysis indicates that the 1st and the 2nd components of the set explain about 91.3% of its variability (see Table IV). Thus, the first two factors were chosen to represent set 02.

EIGENVALUES OF THE CORRELATION MATRIX: TOTAL = 3 AVERAGE = 1				
COMPONENT	**EIGENVALUE**	**DIFFERENCE**	**PROPORTION**	**CUMULATIVE**
1	1.69488031	0.64966052	0.5650	0.5650
2	1.04521979	0.78531988	0.3484	0.9134
3	0.25989991		0.0866	1.0000

Table IV: Principle Component Results for Set 02

The principle component analysis indicates that the 1st and the 2nd components for set 03 explain about 92.3% of its variability (see Table V). Thus we choose the first two factors to represent set 03.

EIGENVALUES OF THE CORRELATION MATRIX: TOTAL = 3 AVERAGE = 1				
COMPONENT	**EIGENVALUE**	**DIFFERENCE**	**PROPORTION**	**CUMULATIVE**
1	1.81916129	0.86858805	0.6064	0.6064
2	0.95057324	0.72030776	0.3169	0.9232
3	0.23026548		0.0768	1.0000

Table V: Principle Component Results for Set 03

5.2.iii. THE REGRESSION MODEL

Considering the regression model for this analyse, the following equation emerges:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

where Y denotes the 1st factor of set 01, X_1 and X_2 denotes the 1st and 2nd factors of set 02, X_3 and X_4 denotes the 1st and 2nd factors of set 03 and X_5 denotes country.

- Every time a unique set of equation is used, it is crucial to denote what the elements of equation refer to.

REGRESSION ANALYSIS RESULTS:

The results of regression analysis on the components of sets 01, 02, and 03 are significant (F=32.21, p<0.0001 see Table VI), and indicate that sets 02 and 03 can explain about 91.23% of the variability of set 01 (see Table VII).

- It is good to remind readers of any petty detail that helps them in understanding the fact mentioned.

ANALYSIS OF VARIANCE					
SOURCE	**DF**	**SUM OF SQUARES**	**MEAN SQUARE**	**F VALUE**	**PR > F**
MODEL	5	14.55711	2.91142	32.21	<.0001
ERROR	10	0.90381	0.09038		
CORRECTED TOTAL	15	15.46092			

Table VI: ANOVA Table for Regression Analysis

VARIABLE	VALUE
ot MSE	0.30064
Dependent Mean	-0.04452
Coeff Var	-675.30172
R-Square	0.9415
Adj R-Sq	0.9123

Table VII: Goodness of Fit for Regression Analysis

The values collected with the help of tables VI and VII indicate high effect of the used independent variables from both assigned sets over the set of dependent variables. The finding that the regulatory restructure and economic factors studied effectively produced over 91% variability in air quality of both Poland and the Czech Republic as a whole through remarkable reduction of air emissions is of great importance of this study and supports the hypothesis of the study that both these countries have worked hard to improve their political and economic structures in order to reduce pollution in the region.

PARAMETER ESTIMATES					
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T VALUE	PR > |T|
INTERCEPT	1	2.40360	1.88247	1.28	0.2305
x1	1	-2.30525	0.47628	-4.84	0.0007
x2	1	0.96226	0.26339	3.65	0.0044
x3	1	1.28122	2.59332	0.49	0.6319
x4	1	1.57135	6.04589	0.26	0.8002
x5	1	-4.26032	1.24196	-3.43	0.0064

Table VIII: Parameter Estimates for Regression Analysis

The parameter estimation done in table VIII indicates that set 02 is negatively associated with set 01 while set 03 is positively associated with set 01. Further, it shows that differentials are significant between the selected two countries in the relation between their sustainability factors and key air-quality pressure indicators (t=-3.43, p=0.0064). We also note that set 02 influences set 01 more significantly than set 03 (p=0007, 0.0044 versus p=0.6319, 0.8002).

Theoretically speaking, nature of the cumulative relationships found among the three sets of variables is complex and various. Following the approach of separately considering the relationships between sets 01-02 and 01-03, it is found that in terms of parameter estimation, the relationship between air quality improvement and regulatory restructure of the two countries is direct while the relationship between air quality improvement and economic restructure has a negative estimated value.

- A coherent analyses not just points out the positive but the negative points in the data, particularly while making comparisons.

5.3. THE CHOICE OF MARKET ECONOMY

The matter of choice of a suitable economic system after the collapse of Communism in Eastern Europe is highly significant for this study due to the reason that governmental policies in Poland and the Czech Republic began to move towards reduction of effects of the Communist industrial era. This natural opposition to the Communist systems led the region to the opportunity of Eastern and Western integration. The industrialisation of the Communist era was undoubtedly one of the major most reasons in the development of high air emissions of substances, such as SO_2, CO_2 and NO_x (Pavlínek 1998; Tickle and Vavroušek 1998; Phinnemore 1999; Pavlínek and Pickles 2004; Weresa 2004). The new governments were laden with the weight of numerous misdoings of the previous ruling system, yet effective policy-making and regulatory enforcement were the tools in which they found solutions (CENIA 2008; Andonova 2004).

Eradicating the environmental effects of the industrial empire of Communism was one of the leading priorities of the new governments in ECC, the reason being the infrastructures of these countries were crumbling and political credibility could only be achieved with a bold display of strict policies and their implementation (Andonova 2004; Botcheva 2001; Andonova 2007). There were a number of reasons, including the desire to become part of the EU, which initiated the transition thought in the mind of the region's leadership (Fabry and Zeghni 2006). Politicians had realised by this stage that outstanding efforts would be needed to solve the issue of deteriorating ecosystems of the region.

The prospects of the determined change were considerable, but the path to reach this destination was needed to be the smoothest. CEE governments needed money to back their ideas for environmental recovery, which could only be done under the influence of an economic system which ensured constant flow of investment from foreign states, and to achieve this end, CEE governments required an attractive business environment with opportunities for investors (Demekas, Horváth, Ribakova and Wu 2007). Hence came the choice of market economy for the CEE states, including Poland and the Czech Republic (Fabry and Zeghni 2006).

In this regard, Poland and the Czech Republic, who were also influenced by their wish to join the EU, unlike some of the CEE states, were required to apply the conditions established by

- Introductory rationale added to the section enables readers to comprehend researcher's point of view but it should be concise. As lengthy rationales are not supposed to be a part of presenting "results" and conducting "analysis".

- Additional explanation with regard to elucidating research questions should be avoided in chapter of results and analysis.

the EU, which included a set of instructions and standards related to establishment and maintenance of "an efficient market economy" which these states were required to meet before they could be given accession to the EU as well as afterwards as part of their membership responsibilities (Fabry and Zeghni 2006).

However, the process that led to this choice is long and many factors are discussed in literature that may be considered responsible for the decision over this choice, including the need of such a system arisen by the impact of restructured regulatory policies, definition of property rights, and efficient enforcement of law *etc*. (Andonova 2004). Such influence of these elements makes them critically important for research on the topic under consideration. Hence, they were included in the second research question of this study.

The researcher focused on the study of three core elements that would throw sufficient light on the response sought for the second research question of this study: ability to attract foreign investment (FI) after the fall of Communism, the actual foreign direct investment (FDI) inflow, and the fines the governments of the studied countries collected from their industrial sectors with the instigation of environmental policies in the post-Communist era. These factors give a comprehensive picture of the three important causes that would justify the selection of the open-market economy as the economic system in the studied countries (Borensztein, De Gregorio and Lee 1998; Charlier 1998).

- Acronyms should be introduced along the text to avoid writing lengthy words.
- In case there are number of things mentioned in the text that would individually be explained ahead, it is deemed good to list them with bullets or number points.

5.3.i. ABILITY TO ATTRACT FDI:

It must be understood that with the influence of integration to the Western Europe, the CEE states also needed to improve the efforts towards a globalised economy, which meant surety of constant FDI inflow to remain competitive (Fabry and Zeghni 2006). The ability to attract FI is both a cause as well as an effect of Poland's, and the Czech Republic's, choice of the open-market economic system. It is a cause, as the political history of the region in the modern era shows democracy and secularism have brought about the openness of trade and convenience to business as important measures towards successful economy of a state under the umbrella of Capitalism (Pavlínek and Pickles 2000). The end of Communism left CEE states on the verge of making many major choices, as has been said previously. The established systems of the anti-Communist bloc in Europe were the greatest influence, naturally. Hence, CEE states, such as the

Czech Republic and Poland identified to the need of a successful economic system that would be adaptable and bring them close to their successful neighbours, especially under the influence of the desire to join the EU. It may occur to some that the choice of this system was simply practice of following the established trend of the time, yet it must also be understood that Capitalism has already demonstrated success of some Western economies, and with the added advantage that this choice would help CEE states to relate to the rest of their region these weak countries were expected to follow democracy and Capitalism (Low 1999).

Poland and the Czech Republic are two of the few CEE states that were recorded to have the greatest potential for attracting FDI, according to World Bank. Similarly, studying for the World Bank, Valahu (2006) writes, discussing the investment advantages for foreign investors in this region of Europe:

> "For investors – particularly those in labour-intensive manufacturing sectors or back-office service sectors – this could be the perfect time to make a move. Consider this shortlist of competitive advantages: a huge, emerging market of 150 million people sitting on the doorstep of the EU; a driving desire to do what it takes to complete the transformation to market economies; access to seaports, rail and highway; a low-cost underemployed labour force with strong engineering skill sets and an eagerness to get back to work" (p. 1).

Considering an example of the automobile manufacturing industry, it is found that some countries in the region have high rate of annual increase in production of cars, such as the Czech Republic with a rate as steeping as 35% in 2005 (Valahu 2006). This region created ten times the number of jobs created by the automobile sectors of the UK and Germany put together during 2004 and 2006.

Scholars have already determined that countries focusing more than others on growing their economic strength attract greater FDI than the rest (Borensztein *et al*. 1998; Merlevede 2000; Carkovic and Levine 2002). It has already been found by research that Poland and the Czech Republic have kept focus on their growth, such as the GDP level, which rose through the transition period before and after EU accession, as shown in figures VI and VII.

- After referring to scholars' view for any piece of shared knowledge, it should then be discussed in context of the study, as well.

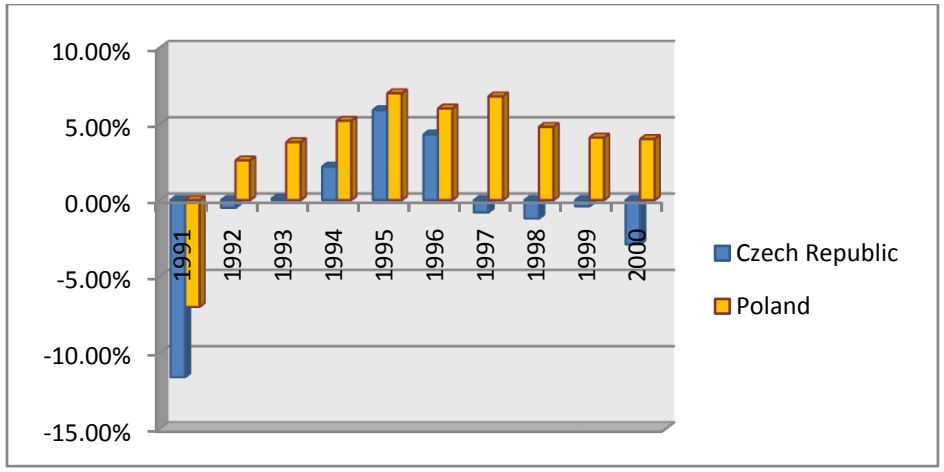

Figure VI: Nominal GDP Growth in the Czech Republic and Poland (Source: World Bank 2002)

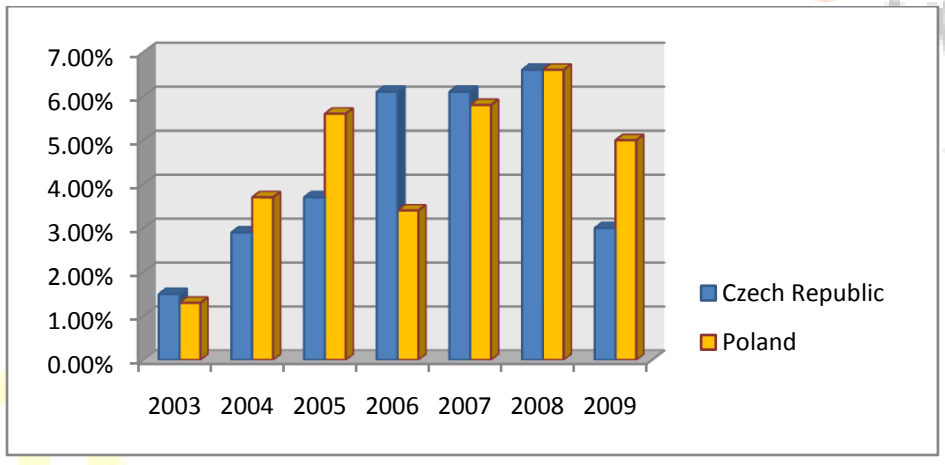

Figure VII: Real GDP Growth Rate of the Czech Republic and Poland (Source: indexmundi.com)[1]

This economic growth in the two countries resulted in the establishment of great opportunities for foreign investors, as discussed earlier. At the same time, the investment of this growth in the GDP has been used by both of the studied countries for improving air quality.

[1]It should be noted that the GDP data presented in figure VI is nominal while the data from figure VII is real in nature.

- Footnotes don't always present trivial details. Therefore, when adding a footnote researcher must wisely decide as to what information is of little significance in relation to the study and content mentioned.

There are a number of important advantages that transition economies can acquire by increasing FDI attraction, including importing technology and best practices, developing trade internationally, and acquire modernisation with limited resources (Paas 2003; Fabry and Zeghni 2006; Demekas *et al*. 2007). While Communist left with increased opportunities for CEE states, it also created an institutional void (Grogan and Moers 2001). It is understood by many that in such circumstances institutions are created in order to lead the market and maintain inflow of FDI and that such institutions are necessary for the success of this cycle (Fabry and Zeghni 2006).

Research has already found that FDI has played a key role in the economic reformation of Poland (Sadowski 2000; Weresa 2000; Weresa 2004). For example, it has been noted that econometrically speaking, during the period of 1991 to 1995 that increase of one US Dollar resulted in the increase of GDP at the rate of US$ 1.14 (Bak and Kulawczuk 1996; Weresa 2004). Factors, such as the continued demonstration of efforts of transiting the economy to open-market, membership to OECD in 1996, and accession to NATO in 1999 helped the country build its integrity for FDI and increase its potential for FDI attraction.

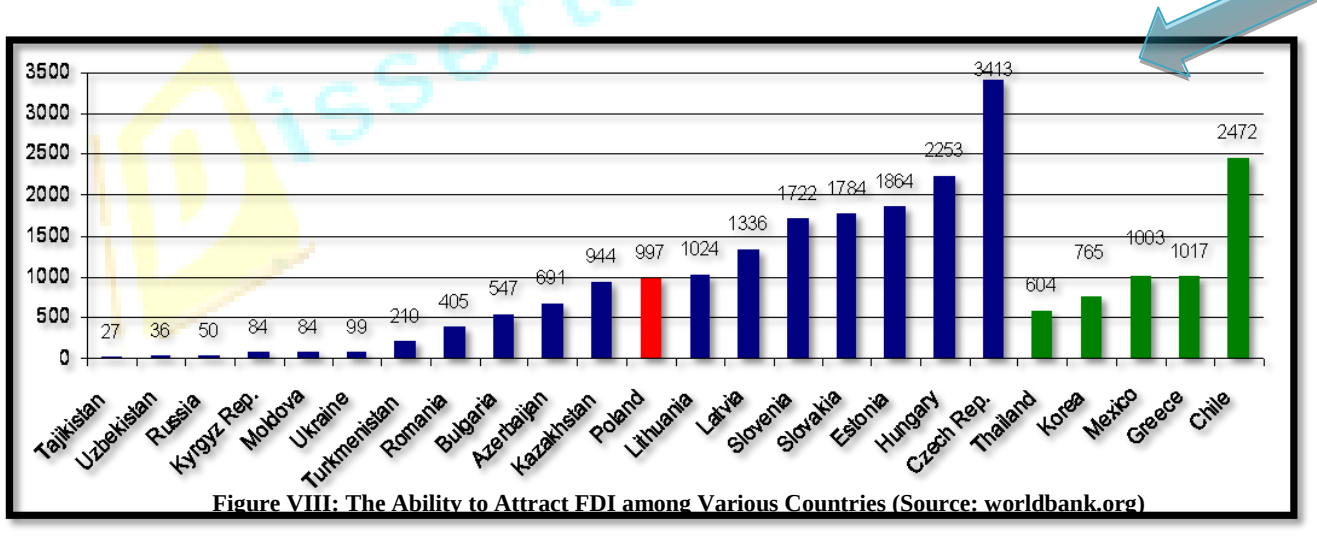

Figure VIII: The Ability to Attract FDI among Various Countries (Source: worldbank.org)

Figure VIII shows that among many countries of the European and Asian regions, the Czech Republic, one of the two countries studied in this research, holds greatest attraction for FDI, while the other subject of this study, Poland, is on the 11th position, according to the statistics provided by the *World Bank* web site.

- If a graph entails use of different colours for its bars/line then it should be denoted which colour presents what pattern or suggest what findings.

5.3.ii. FDI IN POLAND & THE CZECH REPUBLIC

As has been discussed, the studied countries have tended to exploit their potential for FDI with considerable effectiveness. Poland used this potential to acquire smoother transition during the 1990s, yet at the turn of the century its GDP measuring purchasing power parity accounted for only a little over 35% of the EU members' average of the same (EUROSTAT 2001). Hence, the country was required to focus more on FDI in both directions, internal and external (Weresa 2004).

The factors studied at the end of the previous section in the chapter provide knowledge of the motivators for foreign investors with regard to Poland. It should be noted that by using these motivators, Poland had acquired the first position for FDI inflow in the CEE region by 1997 (Weresa 2004). Studying the period of 1990 to 2000, the researcher has come to realise, like Weresa (2004), that the period can be divided into two short eras of progress of the country's FDI: 1990 to 1994 and 1995 to 2000. It is also noted that the first part of this era encouraged FDI significantly but in the latter part, FDI accelerated considerably in the country's economy. Over the years in the first shorter era, many sectors of the country's industries attracted FDI inflow, including manufacturing sectors, finance sectors, whole-selling and retailing sectors, and the transportation, warehousing and communication sectors, and during the latter era of 1995 to 2000, the FDI inflow in these sectors has increased with stability (Weresa 2004).

The most attractive sectors of the Polish economy have been the manufacturing ones, especially related to food and tobacco (). It was noted that though the manufacturing sectors of the country have grown during the studied era with consistent FDI inflow, their share in the inflow over time has decreased. This is highly suggestive of a positive trend in the FDI inflow economics of Poland, as it is similar to the investment systems established in the developed countries. Table IX shows the FDI structure of Polish economy with regard to FDI inflow, FDI outflow, Polish inward stocks, and Polish outward stocks, giving a comprehensive idea to the reader regarding the FDI aspects of Polish economy.

FDI	INFLOW	OUTFLOW	INWARD STOCK	OUTWARD STOCK
1990	88	9	109	95
1992	678	13	1370	176
1993	1715	18	2307	194
1994	1875	29	3789	223
1995	3659	42	7843	539
1996	4498	53	11463	735
1997	4908	45	16593	678
1998	6365	316	22479	841
1999	7270	31	26075	1365
2000	9341	17	34227	1025

Table IX: FI Stocks & Flows in Poland 1990-2000 (US$ in millions) (Source: Weresa 2004)

- The strength of a study lies in presenting the contemporary and up-to-date findings; condition does not apply on peculiar situations where it is imperative to review chronological data.

Similar to the strategy of Poland, in general, the Czech Republic also utilised its potential for attracting FDI. During the period studied in this research the FDI inflow in the Czech Republic increased near to 14 times each year and by 2001, over 18 percent of the country's GDP was resulting from FDI (Kippenberg 2005). The Czech Republic kept its focus on the inflow of technology sectors into its economy and created various opportunities for foreign investors during this period. However, what remains unanswered is the inability of the country to exploit its ability to attract FDI as completely as Poland and some other CEE states did, while it has already been established with the data provided in figure VIII that the Czech Republic was

evaluated to have the greatest potential for attracting FDI. Nonetheless, by 1998, the government had established such attractive investment systems for foreign firms along with considerable incentives that brought about such strong figures as the GDP share mentioned by Kippenberg (2005). It should be realised that this amount of success is also extraordinary. However, roots of the causes of this success lie deep in the Czech History. The researcher discovered during the study of literature that FDI existed in the old Czechoslovakia even before 1989 (fall of Communism) in the Hotel industry in the form of construction projects, which were joint ventures of Socialist firms of the country and Capitalist firms from Western Europe (Tisuanen 1996; Zemplinérová and Benácek 1996;Pavlínek 1998). Pavlínek (1998) even considers this presence of joint ventures as a considerable cause of the Communist fall.

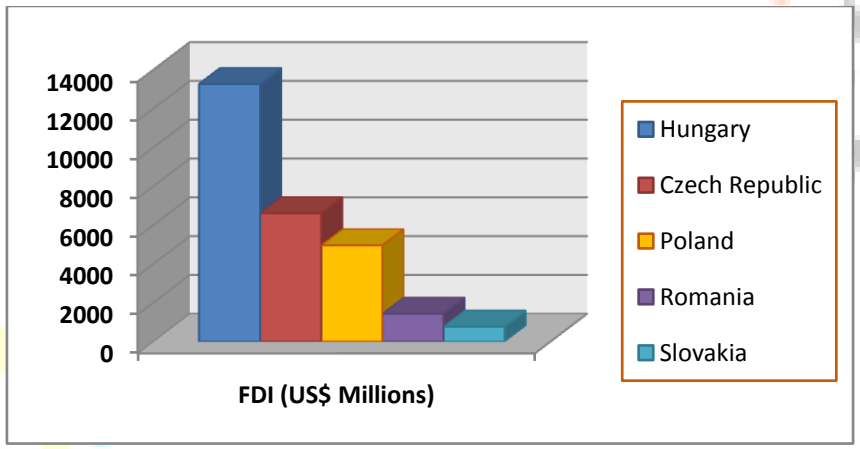

Figure IX: Top 5 FDI-Earning CEE States 1989-1996 (Source: Pavlínek 1998)

Among the determinants of the Czech Republic's high attractiveness to FDI, which still hold considerable unexploited potential, as stated earlier, are its location close to Western Europe on the geographic map, which makes it a favourable trade route to many European nations, giving the incentive of low transportation expenses; its convenient accessibility from the Eastern European states; and its market of low-cost labour with high level of expertise (Pavlínek 1998; Pavlínek and Pickles 2000).

Using these important intangible assets, the Czech Republic has advanced through the CEE states in earning FDI. The transition towards an open-market economy began with a steep decline in GDP (see figure VI), which altered in a couple of years, and near the end of the 20th century over 70 percent of the country's GDP was emerging from the private sectors (Done

- Neat paragraphs contain detailed arguments with citations from numerous publications of repute.

1996). As understood by the *World Bank*'s ranking of the Czech Republic as the most-potent state in the CEE region for FDI, *The Economist* (1996) also rated the country as the most efficient risk for national investment while *Wall Street Journal* (1993) rated it the best choice for FDI.

Among the reasons due to which the Czech Republic has been unable to exploit its potential for FDI are the state's policies with regard to tax incentives. Fearing unwanted economic restructuring, the government refused to give foreign investors tax relaxation in return for their investments (Pavlínek 1998). This is a setback for FDI inflow in the Republic as virtually all the other countries of the region were providing tax-related incentives to foreign investors, which affected the decisions of some international investors, as has been admitted by the government (*Hospodárské noviny*1995). At the same time, the nullity of labour-cost benefits arising from the productivity resulting from low labour (Dinga and Munich 2010), particularly with the sensitivity the government has for emissions into the environment, makes the evaluation whether the advantages of investment in the Czech Republic outweigh the disadvantages tricky (Klaus 1992).

Another very significant reason for this lack of exploitation of the present capabilities with regard to FDI is the usage of major FDIs in a very limited set of firms. For instance, about 60 percent of the total FDIs received during the first five years of the studied decade (Uhlír 1995; Pavlínek 1998). Hence, the positive impact on the country's overall economy was not as great as would be expected with the amount of inflow received.

5.3.iii. ENVIRONMENTAL MANAGEMENT & FINES

The third, and the last, determinant studied in this research with regard to the choice of open-market economy as most suitable, particularly for transition economies like the Czech Republic and Poland, is the management of environmental standards in a state by fining industries for emissions over a given limit. Most of the environmental funds spent by the governments for meeting expected requirements have been capitalised through the collection of penalties and taxes on polluting actors in the economy and remain the single important source of public financing for the environment (Andonova 2004). Therefore, environmental funds are a very important aspect of environmental policy and implementation in both transition economies.

- Description is provided in this section of how the studied states used policy-making as a crucial tool to contain environmental pollution.

After the fall of Communism, there was an inevitable need of redeeming the environmental conditions, which would be impossible without considerably high costs (CENIA 2008). As highlighted by Weresa (2004), this is an important reason for initiating the transition to open-market economy, as FDI inflow generates a continued source of income for the host country.

The problem of need for environmental investment revolves around the much discussed paradoxical and confusing problem of globalisation and environmental effects (Low 1992; Fredriksson 1999; Copeland and Taylor 2004; Andonova 2006). While there are a number of arguments included on both sides of the debate, the essence is the fear of establishing deteriorating environmental conditions under the influence of a globalised market which would presumably encourage investors to choose such countries that have relaxed laws regarding environmental accountability and standards of production. This fear of such encouragement arises from the assumption that firms would want to avoid costs and host countries would like to attract greater investors, they would lower their environmental standards. On the other hand of the debate, it is argued that globalised economy would actually increase the probability of improved environmental conditions by encouraging firms and governments to utilise more efficient and sustainable resources (Andonova 2006).

However, countries like Poland and the Czech Republic do not intend to succumb to such pressures of investors, which are in fact real (Kippenberg 2005). According to many authors (Pavlínek and Pickles 2000), marketisation and democratisation initiated efforts to redo environmental legislation from passsive to active. New legislative environment allowed the coordination of environmental and economic policies as can be observed in both states. The Czech Republic and Poland acquired better, more efficient enforcement and incentive mechanisms that were missing in the Soviet-style centrally-planned economy.

In short, both countries emerged from the transition period as veritable economic juggernauts that continue to outperform many of their neighbours and the global economic indices as well.

The reason for choosing market economy is embedded on a number of levels of pressures for transition economies in the CEE region. The factors involved, including those studied in this research are interrelated and interdependent. While one may cause the initiation of the other, it may also be related to the progress the new factor makes in future. Hence, it may be held that while there are certain reservations among circles of scholars and practitioners, it is virtually accepted by all that globalised economy is in the favour of world trade, and holds considerable opportunities for transition economies to grow, such as the Czech Republic and Poland, which have radically shifted towards the goal of acquiring open-market economies for better futures.

5.4. IMPACT OF EU ON TRANSITION

In the 1940s, the communist regimes in Central and Eastern Europe (CEE) began heavy efforts for industrialisation, which required paved the way for coal-fired power generation plants. Lignite coal, which was easily available, entered widespread use for power generation, but the high sulphur and ash content led to excessive emissions of sulphur dioxide and pollutant particles leading to large-scale environmental degradation in the region (US Department of Commerce 2000).

During the communist era, Czech Republic and Poland also used lignite coal for their power generation, resulting in inferior output and excessive environmental pollution. This coupled with inadequate government regulations to curb industrial emissions raised their environmental crisis and projected them as two of Europe's biggest polluters. Furthermore, the environment condition of the common border region of Poland, Czech Republic and Germany became so degraded that it came to be known as the "Black Triangle", where the sky would remain 'clogged' with smoke during winters (Lu 1995).

After the fall of communism in Europe, Poland, Czech Republic, and many other CEE countries sought accession into the European Union (EU) (Lavigne 1998). However, it was a daunting task for them, as they had to undergo crucial transformation before they could achieve eligibility for membership to the union.

To facilitate accession of applicants into the union, the European Council meeting in Copenhagen, in 1993, laid out the following criteria for membership (2):

1. Political Criterion: it required the guarantee of institutional stability, democracy, the rule of law, human rights and respect for and protection of minorities;

2. Economic Criterion: it demanded the presence of a market economy as well as the capacity to cope with competitive pressure and market forces within the union; and

3. The Legislative Criterion: it obliged adherence to the union's objectives as defined in the *acquis communautaire*, which consists of 35 chapters.

The union enjoys several powers over its members and it has the authority to exercise them to ensure proper enforcement of its regulations. Therefore, in order to they had little choice except to take concrete policy measures against industrial emissions and to enforce the need to preserve the natural environmental and improve air quality.

They needed to deal with complex administrative challenges and assemble concrete policy measures to show positive results considering that their past record was not going to improve their chances of entering the union. Simultaneously, they also needed to move away from the rigid system of centralized planning and control, which the communist regimes of the past had integrated, into their system of governance. This caused a three-fold challenge for them: (1) to decentralize the structure of their administrative system and adapt to a different paradigm of governance; (2) to liberalize their economies and encourage free markets; and at the same time (3) to enforce environmental regulations with the diminished powers that remained with them (Toman 1994).

However, in May 2004, both Poland and Czech Republic succeeded in earning accession to the European Union. Poland and the Czech Republic are now recognised classic success stories of effective in economic and environmental transformation.

This section evaluates the phenomenal improvement in air quality of Poland and Czech Republic vis-à-vis two factors: (1) the importance of gaining accession to EU for both of these countries and (2) the impact of funding and incentives in ensuring compliance and enforcement of environmental regulations in those countries.

5.4.i. ACCESSION TO THE UNION

Medvec (2009) notes the CEE states, despite being NATO members, the Czech Republic, Hungary and Poland sought accession to the EU as their primary objective. Accession to the EU was an opportunity for CEE countries to boost regional cooperation, which they much needed in order to uplift their economies through after a failed experience with communism. However, western countries looked at the participation of post-communist countries in the EU with caution, which caused disappointment for them. Moreover, Medvec (2009) notes a number of other obstacles were also present, such as: disparity of wealth between EU member states and the CEE states, environmental damage, undeveloped infrastructure, the EU's free-movement-of-labour policy, and EU concerns regarding the impact of expansion into East Central Europe on agricultural subsidies under EU's Common Agricultural Policy (CAP).

The Agenda 2000 report, produced by Commission of the European Communities (CEC) in 1997, Poland became the first CEE country to develop a national environmental policy setting out priorities and listing policy tools (Commission of the European Communities 1997). In 1995, it published a detailed review of policy implementation and set detailed targets for next five years. In November 1996, it passed an environmental protection law. Its Regional Environment Inspectorates granted permits at the regional level according to calculations of ambient air and water quality. The CEC recognised the effectiveness of Polish government in implementing air emission standards that provided useful basis for monitoring and management. Moreover, the report commends their introduction of air and water monitoring equipment and procedures in some of the worse polluted areas (Commission of the European Communities 1997).

In 1991, Poland carried out the first pilot project of emissions trading in Chorzow, after an agreement between the Minister of Environment and regional authorities. It permitted several polluters in one of the most contaminated neighbourhoods to comply jointly with individual emissions standards. Despite legal and political opposition, it helped reduce pollution and led to significant savings (Zylicz 1995).

The environmental transformation of Czech Republic A 2006 survey of 133 countries ranks Czech Republic in fourth place behind New Zealand, Sweden and Finland (Esty *et al*. 2006). Now compare this with the 1980s, when the air quality in the Czech Republic was one of the worst in Europe (Český Rozhlas 2004).

- Conclusive remarks on the results are distributed into subcategories and discussed in detail, leading the report towards its climax.

Air quality in the Czech Republic had improved since 1989 due to decreased use of brown coal (lignite) that large plants consumed for power generation. This helped them effectively address problems with traffic and industrial emissions of sulphur dioxide and particulate matter. The current situation of Czech Republic is now comparable with other European countries.

5.4.ii. IMPACT OF FOREIGN FUNDING AND INCENTIVES

Poland's allocation for 1996 was ECU[2] 203 million, and for 1990-96 overall nearly ECU 1.4 billion. The main sectors are agriculture, restructuring and privatisation, finance and banking, infrastructure, social programmes and environment. For cross-border programmes, PHARE has committed a total of ECU 165million to support projects in transport, environment, utilities and economic development in border regions with Germany, Denmark, Sweden and Finland. Despite initial difficulties, PHARE managed to achieve overall contracting rate of 75%, thus, helping Poland in furthering reforms (Commission of the European Communities 1997).

Following the collapse of socialism and the following economic crunch, CEE countries showed genuine intent toward economic reforms for opening their markets to external countries. Hence, they had access to funding and investments from foreign nations that wanted to help them build a fully functional open market economy.

Earning the trust of their western partners was a key issue for them toward realizing their goal of accession to the EU, for which they needed foreign investments in building eco-friendly power plants and guidelines for policy integration from other European nations that had already implemented such measures at home.

[2]The ECU (symbol: ₹) was replaced by the Euro (symbol: €) on January 1, 1999 at the rate ₹1= €1.