



International successes in clean development mechanism implementation: lessons for South Africa

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ABSTRACT

The pace at which South Africa is implementing Clean Development Mechanism projects has been regarded as slow, below the country's potential and lagging other developing countries. Factors discouraging implementation of CDM projects in South Africa are universal and not just unique to South Africa. China, India and Brazil were evaluated for the purpose of this research and were found to be implementing very similar interventions to address these factors. Further to this, factors that are regarded as success factors in the implementation of CDM were also found to be similar across these countries.

There were three objectives that the research sought to address. The first objective was to establish if documented factors discouraging CDM in South Africa are unique to South Africa or also applicable to other countries. The second objective was to establish the interventions these countries implement in addressing factors discouraging CDM as well as success factors that encouraged CDM in the above mentioned countries. The third objective was to develop a framework with lessons that can be transferred and applied to the South African environment.

An interpretive methodology was used in analysing data collected from 13 semi-structured interviews, conducted with international and local CDM experts. The research further sought to identify recurring themes across South Africa, China, India and Brazil. The outcome of the research was aimed in highlighting a framework of lessons for South Africa and recommendation on how South Africa can implement such lessons to accelerate CDM implementation.

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements of the degree of Masters in Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any other degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Linda Ramakgahlele Seroka

10 November 2009

Dedication

This degree is dedicated to my late father, Moshito'a Mphela for having been pure inspiration and my mother, Selogadi'a Mphela, for holding on and believing in my "impossible" dream. I am forever indebted to you both.

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CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Introduction

There has been exponential economic development across the globe, before the current global economic downturn began. This unrestrained growth has had big implications on the climate and use of infinite resources. As the awareness in global climate change continue to grow, various stakeholders began to look for interventions to reduce global climate warming. The issue of climate change has been dominating policy debates among various stakeholders around the globe. South Africa for example, held among many other forums, a conference on climate change between 17th and 20th October 2005 (Lovett, Barnard & Midgley, 2005).

The major concern has been the suggested increase in the level of anthropogenic emissions (CO₂ and other greenhouse gases (GHGs)) into the atmosphere, which is believed to cause anthropogenic climate change. Whatever the cause, if climate predictions are true, the environment, sustainable development and economic growth in both developed and developing countries is under significant threat. In an attempt to mitigate the threats to the environment, the United Nations (UN) has developed mechanisms which developing countries can implement to promote a cleaner environment with reduced levels of anthropogenic emissions, while driving sustainable development goals (United Nations, 1998).

The Clean Development Mechanism (CDM) is considered to be the only mechanism capable of delivering emission reductions (Haites and Yamin, 2000). The aim of this research was to determine international successes in the implementation of CDM and as well as develop a framework of lessons for South Africa. The research did not intend to evaluate the science of climate change, or uncover evidence of the international successes, but to inform South African stakeholders of the success factors in implementing CDM project in countries that has implemented the largest number of CDM projects. However global climate change is important in understanding the reasons behind implementation of CDM.

1.2 Background

The United Nations has in 1992 adopted United Nations Framework Convention on Climate Change (UNFCCC) to address the global warming problem. The objective of the UNFCCC was to reduce emissions that are believed to be contributing to global warming. In December 1997, the Kyoto Protocol to the UNFCCC was agreed upon. The aim of the Kyoto Protocol was to limit emissions of greenhouse gases by developing countries with emission reduction targets for the first period of the Kyoto Protocol. Such countries are classified as Annex 1 countries. To reduce carbon emissions the Annex 1 countries must invest in CDM projects in developing countries classified as non-Annex 1 countries.

CDM projects are projects implemented by developing countries to assist developed countries that have ratified the Kyoto Protocol to reduce their greenhouse gas emissions. The developed countries can earn Certified Emission Reductions (CERs) through investing in CDM projects in developing countries. To earn CERs, a CDM project must be approved by the host country CDM approval authority and the CDM Executive Board (CDM EB), provided such projects demonstrate that they limit or avoid greenhouse gas emissions that would have occurred without the project.

The South African Government signed the UNFCCC and ratified the Kyoto Protocol in 2005. As a signatory of the Kyoto Protocol, the government supports emission targets set in the Kyoto Protocol for industrialised countries to reduce greenhouse gas emissions by approximately 5.2% below 1990 levels by 2012 (United Nations, 1998).

A study conducted by Chandler, Schaeffer, Dadi, Shukla, Tudela, Davidson and Alpan-Atamer (2002) have shown that there is potential of CDM projects in countries such as Brazil, China, India, South Africa, Mexico, and Turkey during the Kyoto Protocol's first commitment period (2008–2012).

As on the 2nd of November 2009, South Africa had 17 CDM projects registered with United Nations (UNFCCC, 2009). Table 1 below shows top 15 countries with projects registered with the UN as per information available by the 2nd of November 2009.

Table 1: Top 15 countries with highest number of CDM projects registered with UN (UNFCCC CDM Statistics, 2009).

Country	Number Of Projects registered with the UN		CDM Pipeline	
	no of projects	Ranking	no. of projects	Ranking
China	653	1	1878	1
India	464	2	1192	2
Brazil	164	3	350	3
Mexico	119	4	160	4
Malaysia	66	5	126	5
Philippines	40	6	73	9
Chile	35	7	68	11
Republic of Korea	34	8	72	10
Indonesia	33	9	95	7
Thailand	27	10	112	6
Peru	20	11	33	13
Colombia	19	12	44	12
South Africa	17	13	28	15
Argentina	16	14	28	14
Israel	16	15	28	16

Implementation of CDM projects in South Africa is lagging behind other developing countries based on the total number of projects registered with the UN (Little, 2006). According to the UNFCCC CDM statistics (2009), South Africa ranks as the 13th country among the 55 countries which registered CDM projects with the UN. China is currently leading and represents the largest number of CDM registered projects, with 653, followed by India's 464 and Brazil's 164, then Mexico with 119 projects. In terms of CDM project pipeline South Africa ranks 15th. Implementing fewer projects imply that South Africa is not taking full advantage of the CDM market opportunities.

1.3 Research problem

A study by Little (2006) on “Accelerating the implementation of the Clean Development Mechanism in South African industry” revealed factors that discourage CDM implementation in South Africa. These factors include fundamentals of the CDM structure as well as other country specific characteristics that discourage CDM implementation. The research problem was to determine how other developing countries such as China, India and Brazil have dealt with such factors, as well as determine such countries success factors in implementing CDM.

As part of the study, a framework of factors that discourage CDM as well as success factors that encourage CDM in the selected countries was developed. This framework was used to develop lessons and recommend way forward for South Africa. It is hoped that the outcomes of the study will develop an understanding of CDM success factors that can be transferred to South Africa to improve the rate of CDM implementation.

1.4 Purpose of the research

This research sought to evaluate CDM implementation in developing countries - such as China, India and Brazil. More specifically the research is structured to achieve four main objectives:

- Understand CDM implementation in China, India and Brazil
- Determine factors that hinder CDM implementation in China, India and Brazil and how these factors have been dealt with

- Determine success factors in CDM implementation in China, India and Brazil
- Develop a framework of lessons that can be transferred to South Africa to improve an understating of CDM with the hope that this understanding will improve implementation of CDM

The intended outcome of the study was to develop a conceptual framework of inhibiting factors and encouraging factors of CDM implementation, which can then facilitate the development of lessons that can be transferred to South Africa as well as testing of applicability of such lessons to South Africa.

1.5 Significance of the study

In view of the study that argues that South Africa is lagging in implementation of CDM (Little, 2006), this study was conducted to determine lessons that South Africa can learn from other developing countries to improve CDM implementation. The study was conducted with a hope that, with an improved understanding gained through the study, the local CDM stakeholders will improve CDM implementation should they choose to act upon the findings.

Some of the evidence that supported existence of challenges South Africa is faced with in implementing CDM as well as the need for this study is the recent recommendation of the UNFCCC methodology panel that the CDM EB reject a Sasol application for registering one of its projects as a CDM with the UN (van der Merwe, 2009). The UNFCCC sighted various reasons driven mainly by the

cumbersome CDM processes that have to be satisfied before a project can be registered with the UN.

The UNFCCC was dissatisfied with the Sasol methodology as well as calculation of emission reduction (van der Merwe, 2009). If this recommendation were accepted, the rejection of the project will be the second for the same project. A local non-governmental organisation supported the UNFCCC recommendation arguing that the Sasol project did not satisfy the additionality requirement of the CDM. (van der Merwe, 2009). Additionality means that the CDM project will result in emission reductions that are additional to what would occur in the absence of the project. The additionality requirement has been sighted by Little (2006) as one of the factors discouraging CDM implementation in South Africa.

The research was confined to the top three developing countries that led South Africa in number of CDM projects registered with the UN as on the 27th of July 2009. These countries were limited to China; India and Brazil – as this three countries were the major players together contributing 69% of the CDM projects registered with the UN at the time (UNFCCC CDM statistics, 2009).

1.6 Structure of the Report

Chapter 2 provides a review of the literature related to the research problem. The chapter begins with an examination of global response to global warming, how CDM functions, and the CDM environment in China, India, Brazil and

South Africa. The chapter then closes with an examination of factors impacting CDM implementation in these countries.

In Chapter 3, three research questions are proposed. The outcome of the literature review lays important groundwork for the establishment of the research questions.

Chapter 4 provides an explanation of the research design and methodology used in the study. Included in the chapter is a discussion about the type of data collected, the specific methods used to collect the data as well as the method used to analyse the data.

In Chapter 5 the results of the research are presented.

In Chapter 6, the research results presented in Chapter 5 are analysed and discussed to answer the research questions and consider pertinent findings that emerged from the study.

Chapter 7 concludes the research by providing the main findings of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Climate change has become a major concern and is at the top of business and political agendas worldwide. Summits are held across the globe to raise awareness of climate change and effects of global warming. One example is the National Climate Change Conference held in Johannesburg on 17th – 20th October 2005. Scientists, policy makers and a wide range of stakeholders from non-governmental organizations to business and energy sector representatives came together to discuss climate change and its effects on Africa and elsewhere in the world (Lovett, Barnard and Midgley, 2005). According to the authors, the workshop debates reflected evidence that policy makers considered the seriousness of scientific evidence of climate change.

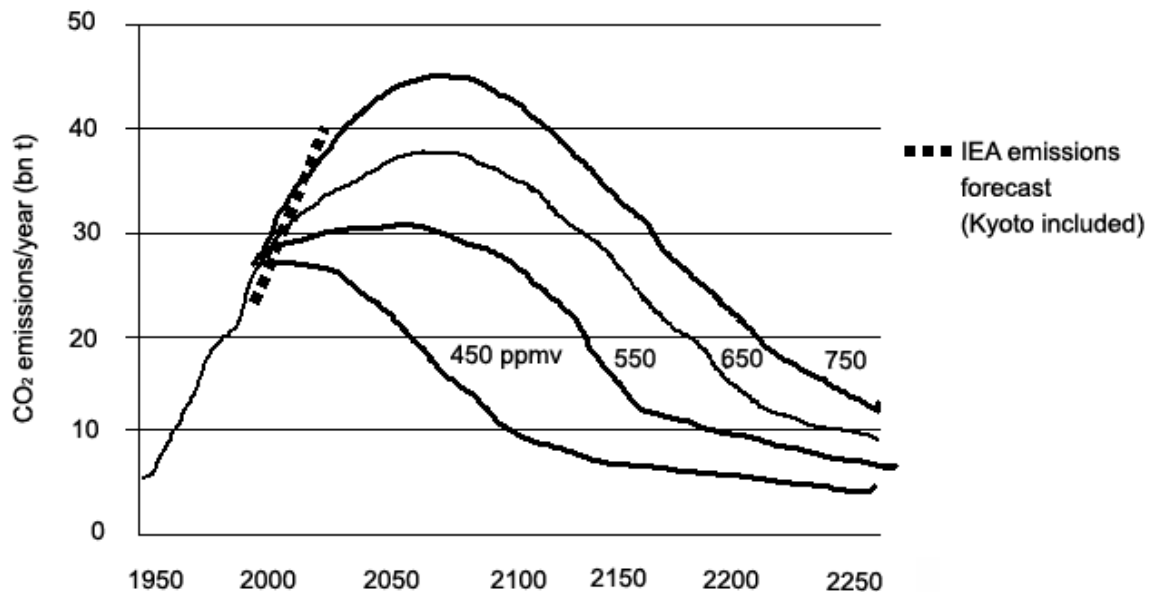
The Intergovernmental Panel for Climate Change (IPCC) suggested that there has been a global temperature rise of 0.6°C since 1760 (IPCC, 2007). According to the report the rise in temperature was caused by the intensification of the greenhouse effect which in turn is related to the increased concentration of various types of gases such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). In 2007 the atmospheric concentration of CO₂ has increased by to 379 ppm in 2005 in comparison to its pre-industrial levels; atmospheric methane (CH₄) concentrations have increased by about 50% since 1970, and 50% increase in nitrous oxide (N₂O) has been observed for same period (IPCC, 2007).

The convincing evidence that the earth is warming resulted in public debates focusing on what measures to put in place to stabilise greenhouse gasses at a level that will prevent dangerous interferences with the climate system. The section below evaluates the measure(s) that has been put in place.

2.2 Global response to global warming

The growing concern about risk of global climate change resulted in the United Nations drafting the UNFCCC in an attempt to develop mitigation plans against such risk. The UNFCCC's primary objective is to stabilize atmospheric concentrations of greenhouse gases at a level that will prevent dangerous anthropogenic interference with the climate system (Wicke and Duerr-Pucher, 2006). To achieve this, the UNFCCC established the 1997 Kyoto Protocol (United Nations, 1998) as a primary response to global warming. The objective of the Protocol is to contain emissions of the main greenhouse gases. Figure 1 below illustrates the level of emissions prior to Kyoto Protocol and the projected levels from the time the protocol is implemented. The picture clearly shows that the pace of greenhouse gas emissions seem to have accelerated in the recent years, and the introduction of the Kyoto Protocol aims to stabilise emissions in future years.

Figure 1: Co2 emissions (Wicke and Duerr-Purcher, 2006)



To reduce emissions to acceptable levels, governments in most developed countries, with an exception of the United States and Russia, accepted legally binding commitments to reduce greenhouse gas emissions between 2008 and 2012 - the first period on the Kyoto Protocol - by an average of 5.2% from the 1990 levels (United Nations, 1998). These countries were listed as non-Annex I countries (United Nations, 1998) and became parties to UNFCCC through ratifying the Protocol.

The Kyoto Protocol introduced three mechanisms through which countries can reduce greenhouse gas emissions. Such mechanisms are International Emissions Trading (IET), Joint Implementation (JI), and Clean Development Mechanism (CDM), (Haites and Yamin, 2004).

Haites and Yamin (2004) provided a definition of each of these mechanisms.

- “Joint implementation (JI) is a project mechanism established under Article 6 to govern the issuance of emission reduction units (ERU) for emission reduction and sink enhancement in Annex B parties
- The Clean Development Mechanism (CDM) is a project mechanism established under article 12 to govern the issuance of Certified emission Reductions (CERs) for emission reduction afforestation, and reforestation project in non-Annex B parties
- International Emissions Trading (IET) is a non-project mechanism established under Article 17 to govern the Assigned Amounts Units (AAU) and acquired ERUs, CERs, and removal units (RMUs) from Annex B parties to another” (Haites and Yamin, 2004, p.199 – 200)

This research focuses the CDM. The research will also adopt Haites and Yamin (2004)’s definition of CDM.

2.3 Clean Development Mechanism

The Clean Development Mechanism emerged under the Kyoto Protocol as one of the primary measures developed to mitigate greenhouse gas emissions (Ganapati and Lui, 2009; Olsen, 2007). The primary purpose of CDM is to assist developed countries to reduce greenhouse gas emission while providing developing countries with opportunities to drive sustainable development goals (United Nations, 1998). The CDM will enable developed countries to meet their

emission reduction commitments through purchase of emission reduction credits from projects in developing countries.

To participate in CDM project implementation, host countries must fulfil three fundamental requirements - participation must be voluntary, establishment of a Designated National Authority (DNA) and ratification of the Kyoto Protocol (UNFCCC, 2001).

For a project to qualify under the CDM, Article 2(5)(c) of the Kyoto Protocol requires that such projects result in reduction of emissions that are additional to what would occur in the absence of the project (United Nations, 1998). A qualified CDM project can earn CERs which can be traded carbon markets which are similar to commodity markets.

The Clean Development Mechanism project lifecycle involve project description; validation and registration; monitoring; verification and certification and Issuance of CERs (Lopes, 2002).The activities under each phase as well as the relevant governing bodies are described below (Lopes, 2002).

- Project description – project developers describe the project, the baseline methodology, the duration of the project, as well as the environmental impact of the project.
- Validation and registration –the Designated Operational Entities (DOEs) validate that the proposed project meets all CDM project

requirements. The CDM Executive Board registers the projects after validation.

- Monitoring – involve calculation of emission reduction by project participants.
- Verification and certification – DOE verify the emissions reduction actually achieved by the projects. As well as certify that the project actually achieved the verified emissions reduction
- Issuance of CERs – The CDM EB issue CERs equal to the verified emissions reduction.

As per the requirements of the Kyoto Protocol, one additional CDM body which must be established by the local authorities is the Designated National Authority (DNA). The main objectives of the DNA are to oversee CDM activities, approve projects as well as certify that CDM activities meet the host country sustainable development goals.

The UNFCCC encourages host countries to develop their own structures of the DNA and these are different across different countries. In Brazil for example, the DNA is hosted by the Ministry of Science and Technology and constituted by various ministries (Lopes, 2002) and is the final approval body of the CDM projects. The DNA in India is hosted by the Ministry of Environment and Forests (MoEF), constituted by various ministries and is the final approval body of CDM projects (Ganapati and Liu, 2009). China's approval process is different from

that of Brazil and India. The DNA in China is the National CDM Board, hosted by the National Development and Reform Commission (NDRC). Instead of approving projects, the National CDM Board reviews and recommends projects to the NDRC which makes the final approval. In South Africa, the DNA is hosted under the Ministry of Minerals and Energy and is the final CDM approval body (DME, 2009).

Although considered to be the only mechanism capable of delivering emission reductions (Haites and Yamin, 2000) there are various debates on whether or not the CDM does achieve the objective of reducing greenhouse gases as well as deliver sustainable development goals in developing countries. Wara (2007) suggested that the majority of CDM projects implemented reduce other greenhouse gases than CO₂ which is the biggest contributor of global climate warming. Many projects that do not meet Additionality requirement are being groomed for CDM, particularly in India (Shukla, Sivaraman and Yajnikc, 2004) while many such projects provided no sustainable development to host countries (Bozmoski, Lemos and Boyd, 2008; Pearson, 2006).

The major focus of CDM has been emission reductions. Moreover, debates held and literature written on CDM focuses very little on sustainable development compared to emphasis on emission reductions. Olsen (2007) provided a list of literature on sustainable development of CDM projects, and the majority of the authors make reference to potential sustainable benefits from

CDM and very little is mentioned of actual sustainable development results observed.

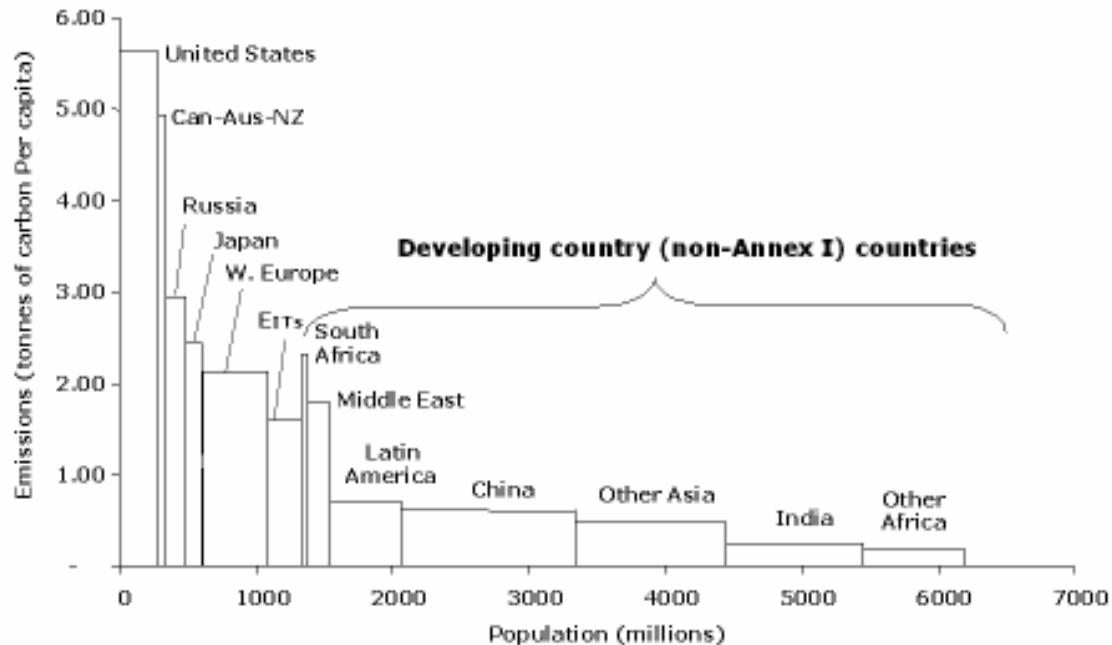
Despite the criticisms, the CDM gained momentum after the Kyoto Protocol came into force – as on the 2nd of November 2009, 1879 project were registered with the UN, with 68% held collectively by China, India and Brazil (UNFCCC statistics, 2009). The number of CDM projects in the pipeline were estimated at 4734, with 40% originating from China, 25% from India and 7% from Brazil with estimated emission reductions of 624 million CERs, while South Africa share only 1% of total CDM projects in the pipeline (Fenhann, 2009).

This literature was focused on uncovering success factors of implementation of CDM projects in the China, India and Brazil. The main focus of the study is however, to assess how these countries have dealt with factors that discourage implementation of CDM as well as identify success factors in place.

2.4 CDM in South Africa, China, India and Brazil

Various literature and debates suggested that the developed economies are the largest carbon emitters. Figure 2 below support this suggestion and illustrates the level of carbon emissions per capita per country. Among China, India, Brazil and South Africa, South Africa is the largest emitter per capita, yet these three countries are the top three countries with the largest number of CDM projects registered with the UN.

Figure 2: Co2 emissions per capita and population by region in 2000 (Grubb, 2004)



In this section a comparison of different countries was made in order to identify what could explain the differences in CDM activities when compared to South Africa. The section seeks to highlight different countries economic structures, response to global warming; issues with CDM implementation as well as progress made in CDM implementation as it pertains to governance structures and the actual number of projects implemented.

2.4.1 Key statistics –China, India, Brazil and South Africa

China, India, Brazil and South Africa have broad economic, demographic, and resources diversity. China, India and South Africa are similar in terms of their dependence on fossil fuels particularly coal, while Brazil has moved from dependence on fossil fuels in 1990's to cleaner technology in the early 2000s

(UNIDO, 2003). Table 2 below has been developed to illustrate the various indicators per country. GDP data has been used as on end of October 2009 (IMF, 2009) and CDM statistics as on 02 November 2009 (UNFCCC CDM statistics, 2009).

Table 2: Indicators per country (UNFCCC CDM statistics, 2009 and (IMF, 2009)

Country	Number Of Projects	Average Annual Reductions	2009 GDP in USD (\$)	GDP per Project	GDP per CER
China	653	190,827,044	4,757,743,000	7,285,977	25
India	464	36,499,018	1,242,641,000	2,678,106	34
Brazil	164	20,867,610	1,481,547,000	9,033,823	71
Mexico	119	9,333,467	866,336,000	7,280,134	93
South Africa	17	2,959,270	277,379,000	16,316,412	94

China and India have large populations which poses immediate development needs and sustainability challenges to these countries. They are incorporating CDM projects as part of the countries' sustainable development objectives. South Africa as a developing country could learn success factors of CDM implementation from these countries.

Table 2 suggests that South Africa requires more units of economic activities to produce CDM projects, while India requires much less units when compared to South Africa. Although leading all countries in terms of number of projects registered, China requires three times more units of economic activities when compared to the country with the second highest number of CDM projects.

2.4.2 CDM in China

China is one of the world's fast developing countries. In the past decade the country has experienced exponential economic growth, with highest GDP growth rate of 10.1% in 2008 (Economist Intelligence Unit, 2008). China's economy is now rated among the largest in the world. The world still predicts China's economy to grow substantially over the next decade.

China is today the world's populous country with a projection of 1.3 billion people (IMF, 2009). The large population poses immediate development needs and sustainability challenges for the country. The growing population has resulted in increased demand for energy, power generation and transport. China's economy is heavily reliant on coal and oil to produce and thus resulted in increased emissions of greenhouse gases. Growing the economy while controlling pollution as well as reducing greenhouse gasses remains China's priority (Shiqiu, 2008).

To address challenges associated with mitigating greenhouse gas emissions, China has incorporated CDM projects as part of sustainable development objectives. China signed the UN Framework Convention on Climate Change in 1992 and ratified the Kyoto Protocol in August 2002 (Serra; Egler; Tomowski and Xiaofang, 2004) and established a National Coordination Committee on Climate Change to develop measures and policies to address climate change for the period up to 2010 (China's National Climate Change Programme, 2007).

To date, China host the largest number of CDM projects and has a great share of future CDM projects in the pipeline. According to the CDM statistics, China host 40% of CDM projects in the pipeline with majority of the projects in Wind and Hydro power (Fenhann, 2009).

Some of the barriers for the implementation of CDM project in China include lack of CDM awareness at provincial and local levels, lack of support to improve energy efficiency (and therefore CDM projects in energy efficiency), as well as complexities with determining project baselines (Serra *et al*, 2004).

To summarise barriers to CDM implementation in China, a report by the World Bank and government of China sighted the following as serious universal barriers discouraging private sector involvement in CDM in China (World Bank, 2004):

- Lack of market demand
- Lack of political will for some major players
- Complex or uncertain rules,
- high transaction costs with respect to small-scale projects
- lack of up-front funds for project development

The report further described additional barriers specific to energy sector as:

- Lack of awareness of the CDM at the strategic level

- Uncertainty and skepticism about the financial benefits of CDM compared to costs
- Lower returns under current markets
- Lack of government guidance on the CDM project approval process in relation to existing requirements for Chinese power plant approval

2.4.3 CDM in India

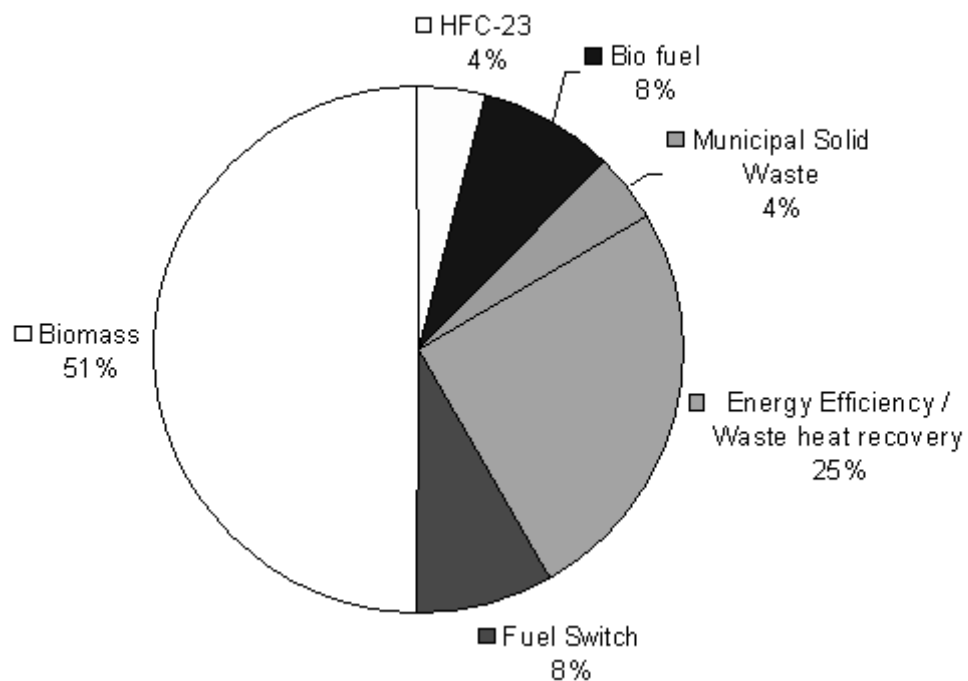
India is the world's fourth largest economy with a population of 1.2 billion people (IMF, 2009). The large population present India with many economic, social, and political challenges such as poverty, low standards of health, food security, which can be inflated by effects of climate change. India has experienced exponential economic growth since 2003, with GDP growing at an average of 9% at the end of 2008 (Economist Intelligence Unit, 2008).

India's economy is heavily reliant on coal-fired energy which dominates India's electricity production. Maintaining high economic growth while using the coal-fired plants will potentially increase India's carbon emissions. India's current emissions per capita are below that of China, Brazil and South Africa (see Figure 2). A paper written out of a workshop entitled Implications of Global Climate Change in India held on March 27 2009, suggests that India prioritise economic growth and will not sacrifice it for the sake of climate change mitigation. This means that the country will, if needs be, drive economic growth with no consideration to potential effects on the environment. This is a puzzling

view given the progress India has made in implementing CDM projects. Although the number of CDM projects registered to date can be referenced to as testimony to the importance India places in climate change mitigation, Shukla *et al*, (2004) suggest that these projects are selected based on availability of buyers and not contribution to national development priorities.

Along with China, India is also perceived to be one of the most attractive Non-Annex I countries for CDM project development (Chandler, Schaeffer, Dadi, Shukla, Tudela, Davidson and Alpan-Atamer, 2002). Figure 3 below illustrates the CDM project in various sectors. The majority of the projects are in Biomass and energy efficiency.

Figure 3: CDM projects in various sectors (Shukla, Sivaraman &Yajnik, 2004)



Some of the challenges experienced in India in CDM implementation include involvement of multiple agencies at state and central level which often cause delays in decision making, professional incompetence of the structures within the DNA for as long as it is positioned within a federal ministry, complexities involved in determining baselines, lack of technology transfer potential as well as high transaction cost incurred in small CDM projects (Shukla *et al*, 2004).

2.4.4 CDM in Brazil

Brazil, South America's largest country is experiencing rapid economic development. The country's GDP has grown at an average of 4% between 2006 and 2007, with 4.5% in 2008 (Economist Intelligence Unit, 2008). The country is home to 191 million people (IMF, 2009). Similar to China and India, Brazil is faced with social challenges such as poverty. da Cunha; Walter and Rei, (2007) suggests that poverty is the most concerning issue in the rural and isolated areas of Brazil - Northeast and North (Amazon) regions of Brazil.

Brazil was the first country to sign the United Nations Framework Convention on Climate Change (UNFCCC), on the 4th of June 1992, and ratified it on the 28th of February 1994 (Schaefer, 2003). According to the author, Brazil played an influential role in the origination of CDM. In 1997 The Brazilian government proposed the development of a Clean Development Fund from which developing countries will fund activities in projects that will address climate

change challenges – particularly reduction of greenhouse gas emissions. This proposal was accepted in Kyoto, Japan and resulted in the birth of the CDM.

Table 1 shows Brazil as the third developing country with the largest amount of projects registered with the UN. The majority of Brazil's projects are in Biomass and Hydropower (Fenhann, 2009). Some of the challenges Brazil faces in implementing CDM projects particularly renewable energy technology projects include high investment costs, little priority placed on renewable energy technologies as well as lack of subsidies in renewable energy technologies (da Cunha, Walter and Rei, 2007)

2.4.5 CDM in South Africa

South Africa is a home to a population of 49 million people (IMF, 2009), living in nine provinces. Economic, social and political challenges are not unique to China, India and Brazil. Poverty, income inequalities as well as HIV/AIDS are the South Africa's biggest social challenges. Despite these challenges South Africa has achieved GDP growth of 5% in 2008 (Economist Intelligence Unit, 2008).

The South African economic structure is both energy and carbon intense, and therefore contributes to the emission of green house gases.

Figure 2 shows South Africa as the largest national source of emissions in Africa and the seventh country globally. To respond to the threat of global climate warming, South Africa ratified the UNFCCC in 1997 and the Kyoto

Protocol in 2002 (Chandler, Schaeffer, Dadi, Shukla, Tudela, Davidson and Alpan-Atamer, 2002).

South Africa has to date registered 17 projects with the UN (UN, 2009) and has 29 CDM project in the pipeline (registered project included) (Fenhann, 2009). The projects originate from various sources such as biomass energy, fossil fuels, landfill gases as well as reduction of N₂O.

2.5 Factors discouraging CDM in SA

The CDM framework has been developing gradually since its inception, with 1740 projects having been registered with the UN as on the 27th of July 2009 (UNFCCC, 2009). Table 1 show that South Africa ranks 14th in terms of the absolute number of projects registered with the UN. South Africa ranked 13th on the 9th of August 2006, with 12 projects (Little, 2006). This indicates the slow pace at which the framework is progressing in South Africa. A number of studies confirm that in general the CDM framework has been developing at a pace below original ambitions (Grubb, 2004 and Matsuo, 2004).

As part of a master's degree studies, Little (2006) identified several factors that hinder implementation of CDM in South Africa. Such factors included:

Fundamental factors relating to CDM itself:

- The lack of sufficient capacity in the CDM process
- Additionality evidence requirements for projects
- Price volatility of carbon credits (CERs)

- Uncertainty regarding Kyoto Protocol post-2012
- The bureaucratic processes and overall complexity of the CDM process
- High transaction costs relating to CDM implementation

Other factors specific to South Africa

- Ineffective Government policies and leadership
- Relatively low energy prices
- Scepticism regarding the benefits of CDM
- Conservative approaches by industry

The next section will explore whether the factors relating to fundamentals of CDM are unique to South Africa or affect other countries engaging in implementation of CDM projects.

2.6 Factors discouraging CDM beyond SA

Despite the huge potential and success in number of projects registered, there are currently several obstacles to implementation of the CDM. A number of studies by Matsuo (2004), Zhang and Maruyama (2001), Michaelowa and Jotzo (2005), Chadwick (2006) as well as Lloyd and Subbarao (2009) have identified obstacles to the development of CDM projects. Such obstacles can be classified under two categories – factors fundamental to CDM and factors specific to host country.

The factors fundamental to CDM are driven primarily by the requirements of the Kyoto Protocol and will apply to all countries that have ratified the Protocol and are implementing CDM projects. Those factors that are country specific will largely depend on the economics, social and political structures of such countries and will vary accordingly. The focus of the research is on factors that are fundamental to CDM itself and therefore this literature review focuses on such factors. These factors are discussed below in no particular order and are as follows:

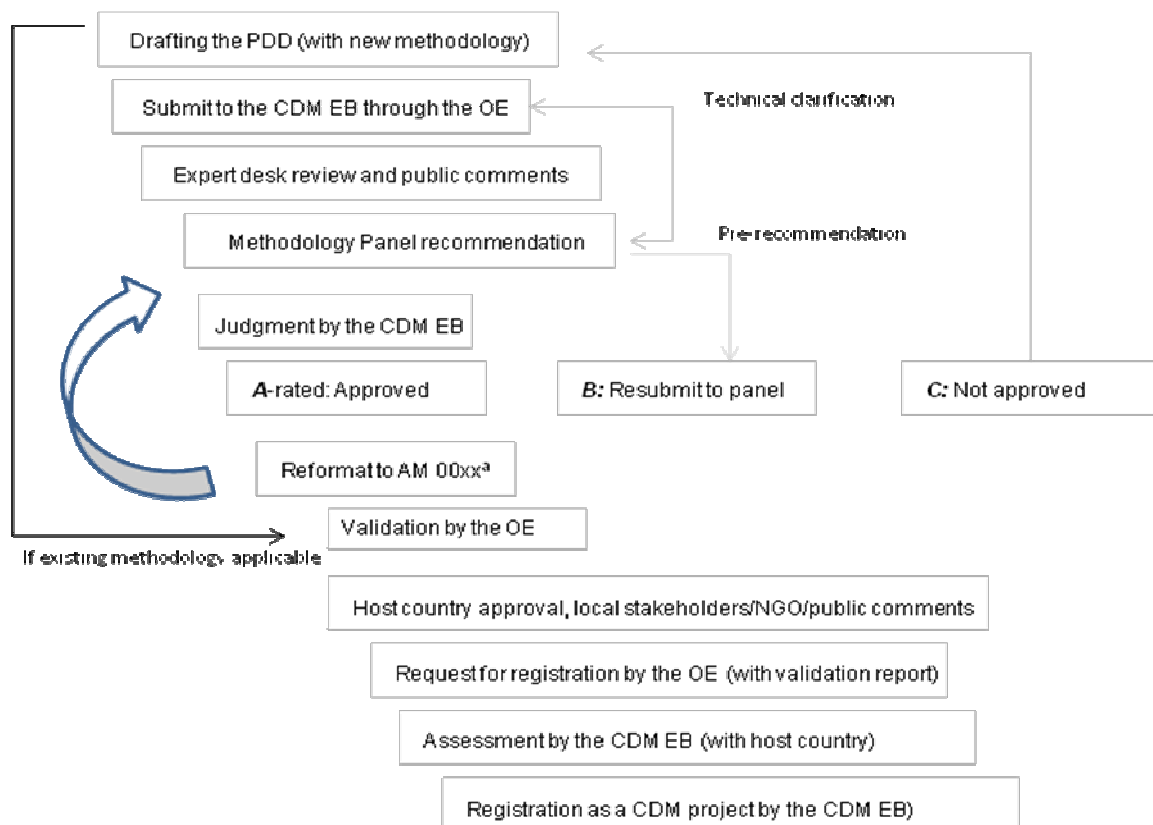
Factors
<ol style="list-style-type: none">1. The bureaucratic and complex CDM process2. Lack of CDM capacity3. Baseline methodology and additionality requirements4. Transaction costs5. Volatility if the price of carbon credits6. Uncertainty regarding Kyoto Protocol post-2012

2.6.1 The bureaucratic and complex CDM process

Article 12.5(a) requires that every CDM project must be develop approved “by the Parties” involved in CDM activities. This requires that host countries implement formal approval processes. Figure 4 below (Matsuo, 2004) shows the approval procedures involved prior to registering a CDM project. It can be observed that the picture depicts a complex process. This observation is supported by Zheng (2004), Kulovesi (2007), Pearson (2005) and Hirschle (2006) that CDM processes are bureaucratic, complicated and time-consuming. Although the CDM governances are considered complex (Grubb, 2004) and a

barrier and potential threat to the operation of the mechanism (Shrestha, 2004), other studies (Ganapati and Liu, 2009) argued that these institutional structures are crucial for implementing policies, establishing procedures, approving projects, monitoring and certifying emissions.

Figure 4 CDM project approval cycle (Matsuo, 2004)



2.6.2 CDM capacity

Implementing CDM involves many complex processes and various interest groups as illustrated in Figure 4 above. These groups include host countries, local stakeholders, DOEs as well as CDM EB who require knowledge and

understanding of, among other things, technical and legislative aspects of CDM. Lack of this knowledge and understanding can render the CDM processes inefficient and lead to CDM projects being rejected and therefore inhibit progress on CDM implementation.

According to Zhang (2005) China has engaged in several capacity building programmes to position itself to take advantage of CDM opportunities, India holds yearly workshops to build CDM capacity and awareness to attract CDM projects (Parikh and Parikh, 2004) while South Africa holds CDM conference to build awareness of CDM (Lovett, Barnard and Midgley, 2005). Creating CDM capacity and increasing awareness can create favourable conditions for CDM investor and in turn increase CDM activities as observed with China and India.

Limited engagement in CDM in South Africa could be attributable to lack of CDM capacity (Little, 2006). There are, however, various consulting companies who provide CDM industry services and thus support the CDM development in South Africa. Both the public and private sector can improve CDM capacity in South Africa through investing in capabilities on CDM methodologies, project development, institutional arrangement and operation.

2.6.3 Baseline methodology and additionality requirements

In order for a project to qualify under the CDM, the project needs to fulfil two criteria – additionality and sustainable development (United Nations, 1998). In

terms of Article 12 of the Kyoto Protocol additionality means “reductions in emissions that are additional to any that would occur in the absence of the certified project activity” (United Nations, 1998, p. 12).

This requirement is one of the most contentious points in the development of the CDM framework. Several studies suggested that determining Additionality of a CDM project is problematic (Pallav and Michaelowa, 2007; Bréchet and Lussis, 2006; Pakirh and Pakirh, 2004; Matsuo, 2004; Roy, Das, Sathaye and Price, 2002) and complicates the CDM framework (Chadwick, 2006 and Painuly, 2001).

For example, countries that enforce policies that encourage climate-friendly investments that will reduce carbon emissions will not register such projects under the CDM.

To determine that the project is additional, the reduction of carbon emissions by the CDM projects must be measured against a baseline of “business as usual”. The baseline scenario must be determined by the host country as the best estimate of emissions quantity that would occur if the CDM projects were not implemented (United Nations, 1998). Whilst baselines are considered a substantially important aspect to CDM (Chadwick, 2006), it is argued that considerable costs of baseline development reduces the attractiveness of the CDM (Michaelowa and Jotzo, 2005).

Many countries that host CDM are what the Kyoto Protocol classifies as non-Annex 1 which does not have emission reduction commitments. To determine appropriate baseline for a country with no reduction commitments poses many pitfalls. Michaelowa and Jotzo (2005) suggested that the CDM host country with no reduction commitments have an incentive to overstate baseline to maximise the number of marketable CERs from the project in order to earn maximum profits. Chadwick (2006). supported this argument by suggesting that the higher the baseline, the more CERs will be generated from the project and therefore the incentive for project developers to overstate the baselines.

To determine baseline scenario accurately is also a major challenge. This problem has been observed with the Sugar Industry in India (Shukla *et al*, 2004) and in China's renewable energy technologies such as hydropower, wind and solar thermal (Lloyd and Subbarao, 2009). Common to these countries is the challenge to accurately determine appropriate baselines and be able to prove the Additionality of the projects.

The CDM EB rejected a number of baseline methodologies submitted by CDM project developers in June 2003 due to lack of Additionality testing (Michaelowa and Jotzo, 2005). The authors suggested that the rejection of these methodologies by the CDM EB was an indication that the rules for Additionality testing for CDM projects will be more stringent than expected.

Intergovernmental Panel Climate Change estimates the range of uncertainty in baseline estimation to be between approximately 35 percent and 60 percent, which is dependent on project type (Pakirh and Pakirh, 2004).

Setting up project baselines will, according to Roy *et al* (2002) and Pakirh and Pakirh, (2004) increase project transaction costs and therefore reduce the number of CDM project that attract investments. Lloyed and Subbarao (2009) also supported this suggestion that the transaction costs and the Additionality requirements are one of the challenges for project developers. Transaction costs are discussed further in the section below.

2.6.4 Transaction costs

CDM transaction costs are incurred at various stages of the CDM process – pre-implementation, during implementation and post implementation. Table 3 below illustrates the various stages and process at which transaction costs are incurred as well as an estimate of costs at each stage.

Table 3: Transaction costs components (Parikh and Parikh, 2004), (Michaelowa and Jotzo, 2005)

Transaction cost components	Description	Estimates of transaction costs
1. Project based (Joint Implementation, Clean Development Mechanism): Pre-implementation		
- Search costs	- Costs incurred to seek out partners for projects	- €15 000
- Negotiation costs	- Consultation costs and project design document preparation costs	- €25 000 – €40 000
- Baseline costs	- Development of a baseline (consultancy)	- €35 000

<ul style="list-style-type: none"> - Approval costs - Validation costs - Review costs - Registration costs 	<ul style="list-style-type: none"> - Costs of authorisation from host country - Costs for validating the project - Costs of reviewing a validation document - Registration by the UNFCCC Executive Board/JI Supervisory Committee 	<ul style="list-style-type: none"> - €40 000 - €15 000– €30 000 - €10 000 - Based on number of CERs to be issued
2. Project based (Joint Implementation, Clean Development Mechanism): Implementation		
<ul style="list-style-type: none"> - Monitoring costs - Verification costs - Certification costs - Enforcement costs 	<ul style="list-style-type: none"> - Costs for monitoring CDM - Cost to hire an DOE to verify emission reduction. - Issuance of certified emission reductions (CERs) by the CDM EB - Includes costs of administrative and legal measures incurred in the event of departure from the agreed transaction 	<ul style="list-style-type: none"> - €10 000 - €8 000 per turn - Depend on UN administration fees, financial transaction fees - n/a
3. Trading		
<ul style="list-style-type: none"> - Transfer costs - Registration costs 	<ul style="list-style-type: none"> - Brokerage costs - Costs to hold an account in national registry 	<ul style="list-style-type: none"> - 1% - 0.03%

The conceptual framework above based on Parikh and Parikh (2004) and Michaelowa and Jotzo (2005) was constructed to provide a summary of transaction cost components and estimates for each component.

Parikh and Parikh (2004) suggested that CDM transaction costs are high and one of the barriers to implementation on CDM. Lloyd and Subbarao, (2009); Zhang and Maruyama, (2001); Michaelowa and Jotzo, (2005); Shukla *et al*, (2004); Roy *et al*, (2002); Chadwick, (2006); Matsuo, (2004) and Kallbekken and Westskog (2005) supported this suggestion. The transaction costs above depend largely on the administrative and approval process. The process of CDM approval is long and complex and often results in delays that result in high transaction costs. This implies that countries with inefficient administrative and

approval process are likely to incur high transaction costs compared to countries with efficient process.

Project developers expect to earn revenues from trading CERs earned from the CDM projects. Transaction costs are a component of the CER price and high transaction costs mean that projects developers will earn less than expected revenues which then threaten the financial sustainability of CDM projects.

The high transactions costs were considered as strongly reducing attractiveness of the CDM projects (Br'échet and Lussis, 2006 and Michaelowa and Jotzo, 2005). Michaelowa and Jotzo (2005) argued that the attractiveness of CDM is reduced due to the fact that the CDM process involves considerable costs of baseline development, project registration, verification and certification.

The transaction costs in small CDM projects account to a large portion of the project costs (Shukla *et al*, 2004) and such costs can often outweigh the benefits of implementing small CDM projects (Parikh and Parikh, 2004). Lloyd and Subbarao (2009) used China Renewable Energy projects as an example. The energy projects transaction costs are high as compared to the expected CER volume, and also higher than other CDM project types.

Despite the high transaction costs cited by many authors, Michaelowa and Jotzo (2005) argued that transaction costs have fallen due to maturity of

institutional structures which was driven mainly establishment of routine procedures. Zhang (2005) also suggested that transparent CDM procedures and sound governance will reduce the transaction costs of implementing CDM projects.

2.6.5 Volatility of the price of carbon credits

The carbon market is highly volatile (Capoor and Ambrosi, 2009). The introduction of the European Emissions Trading Scheme (ET EUS) saw the price of European Union Allowance (EUA) increase substantially. As illustrated in Figure 5 the price of carbon credits continued similar pattern until before collapsing in 2008 and 2009 (Capoor and Ambrosi, 2009).

Figure 5: Carbon Prices (Capoor and Ambrosi, 2009)



- EUA –spot price – the price at which European Union Allowance trade in the ET EUS market. The EUA is highly volatile (Figure 5) The prices increased by about 19% between August 2008 and October 2008, before a sharp decline from €25 to between of €10-15) in April 2009.
- sCER - guaranteed and issued CERs. The price of sCER fell from approximately €20 between August 2008 and €10 in April 2009.
- pCER – primary CERs are CERs that are not traded in markets for guaranteed and issued CER. The prices of pCER vary widely and are depended on CDM risks levels. The price of pCER fell from between €10-15 in August 2008 and €5-10 in April 2009.

2.6.7 Uncertainty regarding Kyoto Protocol post-2012

The first commitment period under the Kyoto Protocol ends at the end of 2012. There is currently no certainty regarding the continuation of the Kyoto system after 2012 (Pearson, 2005). It is interesting though to observe that countries continue invest in long term CDM projects that can only earn return on investment in the longer term despite the uncertainties on mechanism beyond 2012.

The above analysis supports the fact that the barriers to CDM implementation are not only isolated to South Africa, but apply to all host courtiers. Shrestha (2004) suggested that the existence these barriers hamper attainment of economic potential of the CDM in developing countries.

Despite these obstacles to CDM implementation, progress made by other developing countries in implementing CDM is encouraging and indicates that there are prospects in CDM implementation. A study by Chandler *et al* (2002) and Dechezlepreêtre, Glachant and Ménière (2009) showed that there is potential for CDM project in various countries such as Brazil, China, India, South Africa, Mexico and Turkey. The section below explores how the barriers to CDM have been dealt with to accelerate CDM implementation.

2.7 Addressing factors that discourage CDM implementation

A review of various literature showed that of the many factors cited as discouraging CDM implementation, transaction costs, CDM process complexities and baseline issues were considered the strongest discouraging factors. This section will explore how these barriers have been dealt with to accelerate CDM implementation.

2.7.1 CDM process and its complexities

Michaelowa and Jotzo (2005) suggested that host countries must improve the quality of domestic institutions through implementing rules that enhance transparency and streamline CDM related procedures to minimize such complexities. This process will potentially reduce the delays caused by complex procedures and inefficient governances.

2.7.2 CDM capacity

Countries such as China engaged in numerous CDM corporation studies with foreign countries to build capacity and awareness of CDM. According to a study on CDM capacity building projects in China (2004), some of the capacity building projects are focused on in the CDM methodologies, training researchers and policy makers.

2.7.3 Baseline methodology

Baselines vary across project-level, state-level, as well as national-level and therefore makes it impossible to develop common baselines across all these levels. This view is supported by Shukla *et al* (2004) that it is impossible suggest that to find accurate baselines given the counterfactual assumptions involved in determining baselines. To resolve the pitfalls associated with determining baselines Shukla *et al* (2004) suggested that project proponents agree on common signals that should be considered in project assessment.

2.7.4 Additionality requirements

Making Additionality requirements more transparent will reduce the complexities and uncertainties involved proving Additionality (Shrestha, 2004). The project developers in host countries must also take a strong stand and reject CDM projects that are groomed for CDM but do not meet the Additionality requirement. This will improve consistent application of the processes.

2.7.5 Transaction costs

Whatever the transaction costs maybe, they could never be eliminated completely. These costs are necessary for continuous monitoring, verification and evaluation of CDM projects in order to protect the integrity of the mechanism. Transaction costs are incurred throughout this process and for as long as these activities are required, transaction costs.

Several authors suggested that these costs can be reduced. Michaelowa and Jotzo (2005) argued that transaction costs can be reduced by improving the quality of domestic institutions and streamlining CDM related procedures. Project developers reduce CDM transaction costs through implementing sound CDM governance structures to eliminate delays that result in increased transaction costs project design (Zhang and Maruyama, 2001 and Zhang, 2005). For CDM governances to be considered as being sound and also be seen that way, they must implement principles of transparency, equity as well as effectiveness and efficiency which will encourage participation of various stakeholders

Implementing projects with high potential and simplified procedures can aid to reduction of transaction costs (Shukla *et al*, 2004). Shukla *et al* (2004) uses India as an example of a country that reduced transaction costs through CDM project design. Using consistent methodologies and bundling projects into groups can potentially reduce the transaction costs of small projects (Ganapati and Liu, 2009).

2.8 Success factors for CDM implementation

Some of the factors identified as enabling CDM implementation in India included strong skilled institutions and project developers, availability of data for developing baselines and development of robust and efficient monitoring methodologies (teri, 2005). China places emphasis on a robust project selection criterion that improve prioritization of projects, capacity building programmes, as well as effective an efficient institutional structures (Zhang, 2005).

The Brazilian government is playing a key role in enabling and promoting CDM projects through enforcing policies that aim at:

- Encouraging CDM project activities through facilitating investments in the CDM;
- Coordinating activities with industry to identify CDM opportunities.
- Building capacity and infrastructure for CDM projects
- setting up integrated national procedures and infrastructure for CDM
- improving the existing regulatory framework for environmental issues and providing incentives to promote opportunities that can reduce GHG emissions
- Ensuring that the activities of CDM projects contribute to sustainable development;
- identifying specific project activities that meet the criteria established under the Marrakech Accords (Lopes, 2002).

2.9 Chapter Conclusion

The CDM is one of key mechanism of the Kyoto Protocol that is aimed at reducing emission of greenhouse gases. In order for the research to identify factors that play a role in implementing CDM in various developing countries and constructs lessons for South Africa, it was necessary to conduct in-depth analysis literature written on the CDM framework.

Several studies have been conducted to provide a broad view on factors that inhibit CDM implementation. Although most of the literature presented a general view and not specific to a country, these inhibiting factors are fundamental to CDM framework and impact on all countries engaging in CDM activities. A summary of the literature review illustrating the authors and factors cited by each of the authors is attached as Appendix A.

Not much literature was written on comparability of developing countries CDM activities and lessons that can be transferred between countries. This study was conducted with the hope it will aid in improving understanding of barriers in implementing CDM as well as success factor that can be implemented in order to accelerate CDM implementation where it is lagging.

CHAPTER 3: RESEARCH QUESTIONS

3.1 Introduction

This research aimed to determine international successes in the implementation of Clean Development Mechanism (CDM) and highlights lessons for South Africa. The research did not intend to evaluate the science of climate change, or uncover evidence of the international successes, but to inform South Africa Stakeholders of the success factors in implementing CDM project in countries that has implemented the largest number of CDM projects.

To clarify the problem statement above, three research questions were formulated.

3.2 Research Question one:

Are factors discouraging CDM implementation in South Africa unique to South Africa?

3.3 Research Question two:

How have China, India and Brazil addressed factors that discourage CDM implementation?

3.4 Research Question three:

What are the success factors in implementing CDM in China, India and Brazil?

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This section provides details of the research method used to resolve the research questions summarised in chapter three. The section includes the research design; survey population, sample selection, data gathering, data analysis procedures applied in the research as well as research limitations.

4.2 Research design

As already stated above, this research sought to determine how countries such as China, India and Brazil have dealt with factors that have been identified as discouraging implementation of Clean Development Mechanism (CDM) in South Africa. The research was conducted with hope that the learnings discovered will in some way establish a greater shared-understanding of CDM success factors in these countries. The research was not intended to uncover conclusive evidence of how such factors were dealt with, but rather aimed at obtaining the views and experiences of the subject experts in the CDM field in the various countries.

The research methodology used in this research was based on interpretive analysis as part of an exploratory research methodology focusing on semi-structured interviews conducted with subject experts from China, India and Brazil. Local experts were interviewed through semi-structured interviews to test the applicability of lessons learned from the international experts.

A wide range of studies have been conducted on implementation of CDM however very little was done to compare developing countries success factors to South African industries. Zikmund (2003) states that the use of exploratory research is appropriate where very little research has been conducted on a research problem, and the research seeks not to provide conclusive evidence on a particular cause of action but only to provide information in analysing the problem and providing a basis for future studies that seek to provide conclusive evidence. Based on the above explanation, this research methodology was appropriate for the study undertaken.

The research methodology included reviewing secondary data as well as gathering primary data through semi-structured interviews. The details on how data was collected are covered in the data gathering section.

4.3 Population and sampling

4.3.1 Population

The population relevant for this study was selected from top three developing countries with the highest number of CDM projects registered with the UN by the 27 July 2009. The population was defined as international experts with a minimum of four years experience in CDM implementation in their countries. The expert countries were selected based on accessibility and availability within this research project timeframes (convenience sampling) and built on identified experts' insights and connections to other experts (snowball sampling).

Such countries are: China, India and Brazil. The CDM statistics as per information on the 27th of July 2009, it was indicates that these countries have the highest number of CDM projects registered with the UN (UNFCCC statistics, 2009). Mexico is the fourth country with the largest number of CDM projects registered with the UN (UNFCCC statistics, 2009). Mexico was excluded because of time and resource constraints. The initial attempts to obtain potential interviewees in this country also yielded no results.

In terms of the number of Certified Emissions Reductions (CERs) per project, these countries still rank top three (United Nations, 2009). To perform a normalised comparison GDP was used to determine GDP per CER and GDP per project shown in Table 1.

When comparing the countries in terms of GDP per project, South Africa ranks last, and second last in terms of GDP per CER. These measures indicate that more GDP is required to implement CDM in South Africa when compared to China, India and Brazil.

The selection of China, India and Brazil was appropriate for the study because of the scale of CDM implementation in these countries and the potential lessons that South Africa can learn from their successes in implementation. By selecting more than one country, themes were identified from the analysis of the responses of the interviewees from the three countries. This allowed reasonable comparability between countries. Mexico would have been another

interesting comparable to include, however it has been excluded due to difficulty in obtaining experts to interview.

Local experts were interviewed to test lessons that can be learned from China, India and Brazil. These experts were selected based on the same criteria applied to international experts, which is being an expert in CDM with a minimum of four years CDM implementation in South Africa. The rationale for testing the lessons from international experts with local experts was to ensure that the lessons framework developed at the end of the research is appropriate for South Africa given the country's economical and political settings. Testing the learnings with local experts who have an understanding of South Africa improved the quality of the lessons recommended.

4.3.2 Sample unit and technique

A sample of individuals was selected from the population described above. Because of the purposive nature of a sample used in a qualitative research (Welman *et al*, 2005), a non-probability sampling methodology was adopted and personal judgement was used in selecting the sample.

The individuals were selected using snowballing method of sampling where referrals were obtained from local experts and further referrals from identified international experts in the selected countries. Zikmund (2003), Welman *et al*, (2005) and Marshall & Rossman (2006) support this method.

Local experts were identified using snowballing, and the identified individuals provided a further set of relevant individuals. As already stated above, this additional experts were selected to participate in the interviews on the basis of their expertise in CDM implementation.

4.3.3 Sample size

A total of 10 individuals located in the three selected countries were selected for the purpose of this study. According to Zikmund (2003), experience surveys may be conducted in the form of interviews with a small number of experts who have been carefully selected. In light of that the interviewees who were selected for the purpose of this study are experts in CDM implementation in their respective countries. However, only eight of the 10 experts initially selected were interviewed. This was because two experts withdrew from participating due to work pressures beyond their control. A list of experts interviewed is attached as Appendix B.

A total of 10 local experts were selected to assess the applicability of lessons learned from China, India and Brazil. According to Zikmund (2003) an exploratory research can be conducted through experience surveys consisting of interviews with few subject matter experts. Due to unavailability of experts at the time of conducting interviews only five of the 10 experts identified were interviewed. As stated above, the interviewed experts were selected based on accessibility and availability, which is convenience sampling). The views of the

relatively few number of experts could not be generalise over the entire CDM population in South Africa.

All experts were assured that their identity to their individual views will remain anonymous through the use of aggregated data. To ensure the validity of the research a list of respondents has been included in the research as Appendix B. This addendum has been included only for this purpose. A generic description of the respondent is provided in Chapter 5.

4.3.4 Data gathering procedures

Both secondary and primary data was gathered during the study. Secondary data was generated via a desktop analysis of peer reviewed academic literature from different academic sources – journal articles; e-journals - as well as other professional reports written on the subject. The majority of the literature reviewed in this research is not older than ten years.

Primary data were collected using experience survey in the form of semi-structured interviews with industry experts. Guiding questions were asked, and the interviewees were encouraged to discuss their perceptions and experiences in line with questions asked. Interviewees were allowed to a lesser extent to express other views not covered by the questionnaire. This was allowed provided such views were relevant for the purpose of answering research questions as stated in Chapter 3. The questionnaire used has been attached as Appendix C. The semi-structured interviews revealed the experiences and

views of the subject experts that could not otherwise have been obtained from other methods of collecting data (Welman, Kruger and Mitchell, 2005). The responses from these interviews also provided more insights on CDM, as well as substantiated the findings presented in the literature review. However the responses will be addressed in details later in the research.

Both secondary and primary data gathering took place in September and October 2009. One interviewee could not be reached telephonically and provided email response to the questionnaire.

Due to logistical challenges the interviews with international experts were conducted via telephonic interviews. A questionnaire was sent to interviewees at least a week and in certain instances a few days before the scheduled time of the interview. The majority of interviewees preferred conducting telephone interviews without completing the questionnaire in writing. The length of the questions lasted between 20 minutes to 45 minutes. The length of time varied depending on the clarity of responses to questions. One interview lasted for 16 minutes due to non-applicability of certain questions. The interviews with the five local experts lasted between 45 minutes and one hour. The interviews were conducted face to face.

The interviews were tape-recorded to ensure that the interviewees' responses are recorded accurately and completely as well as for future reference. A dicta phone was used for this purpose. The recorded tapes were not transcribed due

to time constraints as well as lack of financial resources. Interview notes were prepared instead.

4.4 Data processing and analysis

A broad desktop analysis of numerous articles on climate change and Kyoto CDM was conducted as part of the literature review (Chapter 2). This allowed the development of an understanding of climate change, how and why CDM evolved; the types of CDM and its purpose, how CDM is constituted, how it works, its potential challenges and outcomes, and different interventions being implemented in China, India and Brazil.

The literature review allowed for a comparison of differences and similarities of CDM interventions in China, India and Brazil and for the identification of overlaps between various articles. The data obtained from the emails sent by experts and interviews conducted with them, were analysed to extract the experts' views and observations on CDM implementations in their countries. The recorded interviews were compared with handwritten notes to ensure consistency.

4.4.1 Organising the data

Data was organised by country then followed up by interviewee. The responses from the interviews were transferred to an excel spread sheet to allow for easy categorisation.

A forcefield analysis method was applied to analysing the responses. Forcefield analysis is described by Kurt Lewin as a tool used to analyse casual relationship (Wilkinson, 1970). The method entails identifying opposing factors as well as positive factors for a certain phenomenon. Forcefield method was used to display factors that constrain CDM implementation and critical success factors that enable CDM implementation in South Africa, China, India and Brazil. The information was categorised according to themes that emerged from data analysis.

Themes were developed from the interviewees responses. Words were analysed to identify word repetitions and key words, compared and contrasted to identify missing information, analysed text that has not been associated with any themes to identify further themes. This method is supported by Mason (2002). The academic literature was also analysed to identify themes and used to question and review the themes identified from interviews for similarities and inconsistent themes.

4.4.2 Categorising data

A criterion with five different rankings was used to analyse discouraging factors and success factors of CDM implementation. The respondents were asked to rate each factor using the criteria in Table 4.

Table 4: A criterion used to analyse the data.

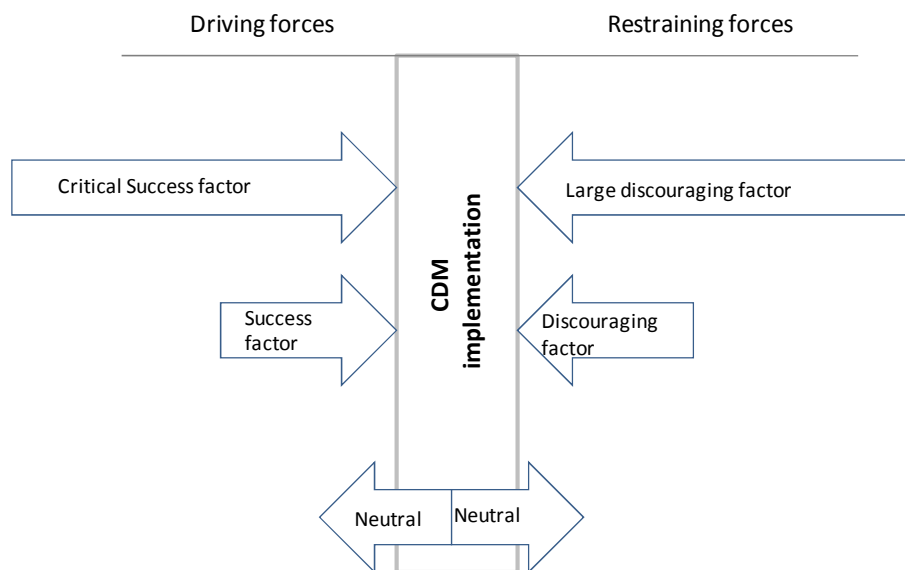
Ranking
Critical success factor
Success factor

Neutral factor
Discouraging factor
Large discouraging factor

The criterion was used by the respondents to answer question six and twelve in the questionnaire attached as Appendix C. A list of both success factors and discouraging factors was drawn from the responses.

The list was used to plot the forcefield analysis diagram to develop themes and visualise the factors that encourage and those that discourage CDM implementation (Value Based Management, 2009). Figure 6 below illustrates how the forcefield diagram was created. The length of the arrow was developed based on the criteria in Table 4 to indicate the degree with which the factor is driving or restraining CDM implementation

Figure 6: Forcefield diagram



Conclusions were drawn through noting patterns and themes, making comparisons and contrast, and also clustering similar findings. The conclusions were verified by checking notes made during the interviews and recorded interviews. The analyses above allowed for interpretation of the data to gain more insights about CDM implementation China, India and Brazil.

4.5 Limitations

4.5.1 Access to experts

Gaining access to both international and local experts proved to be challenging. Only eight of the ten international experts were interviewed. The number of interviewees was relatively small and may not be a representation of CDM experts in the various countries. A potential research bias is recognised. For this reason the views and opinion of the eight experts should be generalised with caution over the population of CDM experts.

Although the sample was relatively small, there was comfort in the quality of the responses provided particularly because the interviewees are knowledgeable individuals with vast amount of experience in CDM. For example the interviewees included a General co-ordinator on Global climate Change in the Ministry of Science and Technology, a member of CDM Methodology Panel since 2002, Executive Secretary of a Commission on Global Climate Change; 2 company directors in various organisations consulting in CDM, a CDM Project development director, a lead assessor and CDM manager, as well as a senior manager of climate Change and sustainability services in a consulting firm.

One expert has two years experience in CDM. This individual was referred to by a senior manager of a consulting firm who emphasised that this individual is very experienced in CDM market in their country. The individual is a business director of a consulting firm and is responsible for CDM project identification and transaction organisation.

As mentioned above, due to unavailability of experts at the time required only five of the ten local experts were interviewed to test international learning. This number is also not representative of the population of CDM experts in South Africa. Comfort is derived from the fact that these individuals are also knowledgeable in CDM in the country. Some are directly involved with CDM implementation while others provide advisory services in CDM.

The reliability of the research was improved by the semi-structured interviews whereby the interview was driven by a set of core questions and respondents provided responses for these direct questions. This was further enhanced by the remarkable similarities between the responses to the interview questions and findings from the literature review in Chapter 2.

4.5.2 Accuracy in interviews extracts

The presentation of interview data often raises accuracy issues on data transcribed from tape recording (Oliver, 2004). The extracts in Chapter 5 were presented in a standard transcription style, and excluded clues such as pauses,

emphasis on words, exclamation as well as stops and starts of sentences.
However the analysis of the data does not take note of these linguistic patterns.

CHAPTER 5: PRESENTATION OF RESULTS

5.1 Chapter Introduction

The objective of the research as already stated, was to identify factors that discourage CDM implementation in host countries engaged in CDM activities. This chapter considered opinions of international experts from various fields such as academic; business and government on CDM implementation and factors affecting CDM both negatively and positively, as well as views from local experts from business on applicability of lessons to South Africa.

Findings obtained from interviews with both international and local experts are presented in this chapter. The chapter comprises four sections and each section presents findings that specifically relate to the following four objectives of this research as already identified in Chapter 1:

- Understand CDM implementation in China, India and Brazil and determine factors that hinder CDM implementation in these countries
- Determine interventions implemented to address these factors
- Determine success factors in CDM implementation in these countries
- Develop a framework of lessons that can be transferred to South Africa to improve an understating of CDM with the hope that this understanding will improve implementation of CDM

5.1.1 Analysis of interview notes

Notes from interviews were captured in a spreadsheet per expert and grouped according to the various countries to identify themes and contradicting views between these experts. Where notes were not clear, recorded interviews were retrieved to obtain clarity. The responses were analysed to note recurring themes and assess any patterns reflected in the data. In cases where there were recurring themes, such themes were summarised into one category.

5.1.2 Description the sample

Respondents were assured that their participation and commentary would remain anonymous. For the purpose of consistency generic descriptions of the respondents as well as use of alphabets as identity of the respondent has been used to protect the respondents. Table 5 below provides a summary of the geographical spread of respondents and their field of work.

Table 5: Respondents geographical spread and field of work

Country	Respondents	Field of work	Role in organisation
International Experts			
Brazil	3	- Academic - Government - Business	- Professor - Ministry - Business manager
China	2	- Business	- Business director – CDM project identification - Investment advisor CDM projects
India	2	- Business	- Energy director/CDM project development - Engagement manager- CDM projects
General	1	- Business	- Director- provision of climate change consultancy services
Local Experts			
South Africa	5	- Business	- 1 Attorney advising on CDM - 3 CDM Consultant – project

			identification and development - 1 CDM financing (previous at DOE)
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Obtaining international experts proved difficult. To ensure validity of the research, experts obtained were requested to provide potential interviewees with CDM experience in fields different from their own. This was to ensure that the research covers a range of fields in order to obtain and compare views across these fields. Although the majority of the interviewees were in the business field, they also varied in terms of background and experience in the various phases of the CDM framework. For example some experts were at the CDM identification phase, some in advisory on implementation, some in academic teaching about CDM and environmental issues, while another were in government managing the country's global climate change programme.

5.2 CDM in China, India and Brazil

Part A of the interview questionnaire prompted the interviewees to describe their experience in CDM as well as how they perceive CDM to be functioning in their respective countries (see Appendix C). The questions allowed the interviewees to describe their views openly with no limitation to specific CDM structure and various elements of CDM. For example, some respondents described progress of CDM in terms of number of projects registered with the UN, some described it based on the country's perception of the CDM, while others described it based on their views of the country potential compared to

progress to date. The views were summarised and grouped in terms of similarities and differences. These views are tabulated per country in table 6.

Table 6: Respondents' view of the CDM environment in China, India, Brazil and South Africa

1. China - CDM in China is functioning well
1. Increase in number and share of CDM projects globally
2. Efficient project approval processes by the DNA
3. Acceleration of construction of renewable energy and energy efficiency projects by CDM
4. CDM is used to promote clean economic development in China
5. High levels of emissions to reduce promoted CDM
<i>Criticism by CDM Executive Board-</i>
6. CDM in China is down played due to corrupt nature of Chinese government
2. India - CDM in India is functioning well
1. Evident from large number of CDM projects
2. Projects spread across a number of sectors
3. Strong knowledge among developers on CDM and its applicability
4. Easy to identify potential CDM projects
5. Economic growth and carbon markets as a driver to develop clean technology
6. Government playing a major role in promoting CDM
7. Government providing incentives for CDM project development
3. Brazil - CDM in Brazil is complex yet successful, but beginning to lag China and India
<i>Complexity:</i>
1. Lengthy approval time by DNA
<i>Success:</i>
2. CDM more credible due to rigorous approval process
3. Early involvement in CDM activities
4. Broad awareness of CDM and Climate Change
5. Government involvement in CDM
<i>But lagging behind China and India:</i>
6. Lack of opportunities in energy sector compared to China and India
<i>But emerging CDM opportunities</i>
7. In Sugarcane industry
4. South Africa
1. Doing well compared to other African countries, not so well outside Africa

2.	There is great potential that has not been explored. There are 200 projects at PIN stage.
3.	Implementation is a major challenge
4.	Business culture is conservative
5.	Main driver was efficiency improvements that resulted in CDM

5.3 Responses linked to research questions

In this section, the data was analysed within a framework of the research questions provided in Chapter 3.

5.3.1 Factors discouraging CDM implementation in South Africa

To identify factors discouraging CDM implementation in China, India and Brazil, Part B of the questionnaire, requested respondents to describe factors that discourage CDM implementation in their respective countries, while question nine prompted respondents to describe what impact factors listed in the questionnaire had on CDM implementation in their countries.

5.3.1.1 Factors that discourage CDM

Responses were first grouped according to country, re-grouped under similar themes and categorised into ten themes outlined in Table 6 above. These themes were further categorised into factors fundamental to CDM and factors resulting from country specific characteristics.

Table 7: Factors identified by respondents as discouraging CDM implementation in China, India and Brazil.

Factors discouraging CDM implementation		Respo- ndents	Country
Fundamentals of the CDM			
1	High transaction costs	8	All
2	CDM methodology and approval process too complex	7	All
3	Challenges with demonstrating Additionality	7	All
4	Volatility of carbon markets and fluctuation of CER prices	4	China, India, General
5	Uncertainty of validity of CDM post 2012	3	China, India, General
6	Low returns compared to investment required	1	China
7	Bureaucratic management of CDM	1	General
Country specific characteristics			
8	Lengthy approval processes within host country	2	Brazil
9	Lack of capacity and skill in CDM	2	India, General
10	Low emissions base	2	Brazil
11	Investment rules that restrict foreign equity, and therefore limited foreign investment in CDM	1	China
12	Inconsistent benchmark among CDM projects	1	China
13	Global economic crisis	1	India

Throughout the data analysis, various themes emerged across all countries. These themes are presented as number 1, 2, 3, 4, and 5 in table 6 above. The data analysis demonstrated a high level of agreement on three main factors that discourage CDM implementation. Such factors are:

- i. High transaction costs
- ii. The CDM methodology and its approval process,
- iii. Challenges in demonstrating additionality of CDM projects.

Another emerging included volatility of carbon markets and fluctuation of CER prices. There were different views on the uncertainties of validity of CDM post 2012. These views are discussed in the sections below.

It was clear from the interviews conducted that many respondents viewed transaction costs as high and a discouraging factor to CDM implementation. Transactions costs are incurred throughout the CDM project life and highly depended on the time cycle of the CDM project. Several respondents linked the high transaction costs to the CDM approval process and this is discussed in details in the next section. Delays in the approval process contribute, to a large extent, to transaction cost of the CDM.

Selected quotes from respondents are included in the next sections to support findings described in table 7.

i. Transaction costs

“ The massive transaction costs is the process, the delays in the process. If you take out delays, transaction costs are not that bad. If you add in delays they become significant at times. Transaction costs in terms of getting new methodology approved add huge costs in the complexity of the methodology. Very discouraging” (General Respondent A, 2009)

“Transaction costs I think it discourages small scale projects. Projects that probably contributes a great deal to sustainable development. They are discouraged by that” (China Respondent G, 2009).

ii. CDM approval process

In addition there was a clear indication from the data that the CDM approval process is long and discourages CDM implementation. The CDM methodology and approval process is viewed as long and complex. Some of the complexities and time delays have been linked to the process of the CDM EB. One respondent suggested that CDM process takes too long, and is very inconsistent. He further suggested that the CDM EB appointments are political, and consists of academics who do not understand and appreciate business. These appointees include in the CDM methodology features that are totally unnecessary for commercial reasons, and therefore discourages business from engaging in CDM.

“It’s a very large discouraging factor and that is basically what we’ve been talking about today. The process takes too much time, there’s too much inconsistency in the decision making process. They delay things for months and months and this cost business money” (General Respondent A, 2009).

“The whole process, I think, is broken and has a massive impact. Large, large discouraging”. (China Respondent G, 2009)

What the responded meant by this was the CDM approval process is not functioning well, has a negative impact on CDM implementation and therefore discourages CDM activities.

iii. Additionality requirement

Proving additionality of projects is one of the challenges project developers are battling with. Although difficult to demonstrate additionality, one respondent suggest that the additionality requirement is necessary and that the application of the rules is a discouraging factor. Other respondents view additionality requirements as complex, some view it as unpredictable and therefore discouraging in CDM implementation.

Additionality is the fundamental element of the CDM framework. If not enforced consistently, the whole CDM is at risk of become just another commercial investment tool with no relevance to sustainable development.

“One of the major challenges that my country’s projects are facing is the demonstration of additionality of the projects. Additionality (requirement) is discouraging” (India Respondent H, 2009).

“The major issues, let’s say, why some methodologies have not been and why, let’s say, many, many projects have not been registered is the difficulty and very clearly, let’s say, to show additionality of the projects. This has for sure a negative impact on the process and I also rate this as discouraging” (Brazil Respondent C, 2009).

Respondent C was basically highlighting the point that various project methodologies have been rejected by the CDM EB because such methodologies do not show that projects meet the additionality requirement.

iv. Uncertainty of validity of CDM post 2012

The majority of the respondents view this factor as neutral and not necessarily discouraging CDM. Two respondents from two countries as well as one respondent providing general views on CDM sighted it as a discouraging factor.

A theme that emerged out of the country specific characteristics that are considered as discouraging CDM implementation was lack of capacity. Interviewees' views on this issue are provided below.

v. Lack of capacity

One respondent cited the incompetency of DOEs that discourage CDM in their country, one respondent highlighted lack of institutional capacity on host countries as a discouraging factor.

“The lack of competent DOEs who can put the project through UNFCCC in a short period of time. So, lots of delays are basically happening at their end which is actually pushing the time cycle back. The lack of competent DOEs is discouraging” (India Respondent H, 2009).

“Poor infrastructure in many non-Annex 1 countries. The poor infrastructure is a discouraging factor.You train one set of personnel to be in a DNA for instance and suddenly their stock value rises and they get offers of job from government and they take them. So government has a terrible time in some countries and is holding on to people with no experience” (India Respondent H, 2009).

Additional country specific characteristics that discourage CDM are discussed below.

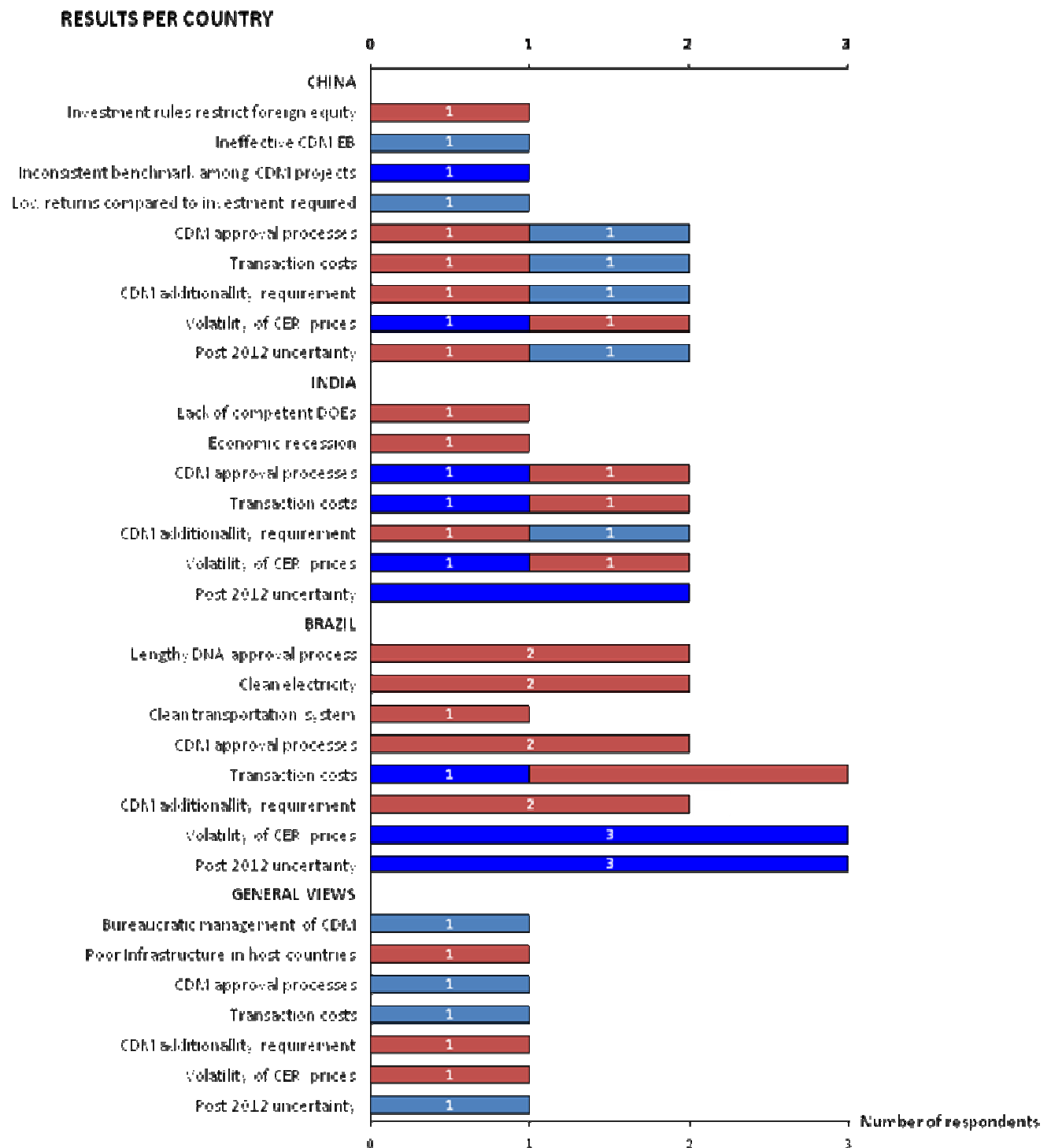
vi. Country specific characteristics

There were no other emerging themes of country specific factors that discourage CDM. With an exception of lack of capacity and skill in CDM, all other factors are constraints in particular countries and not applicable to all countries. However, lack of capacity was sighted by two respondents from two different countries.

5.3.1.2 Rating of factors that discourage CDM

Figure 7 demonstrate the degree to which the respondents rated the discouraging factors in terms of the criteria listed in the questionnaire.

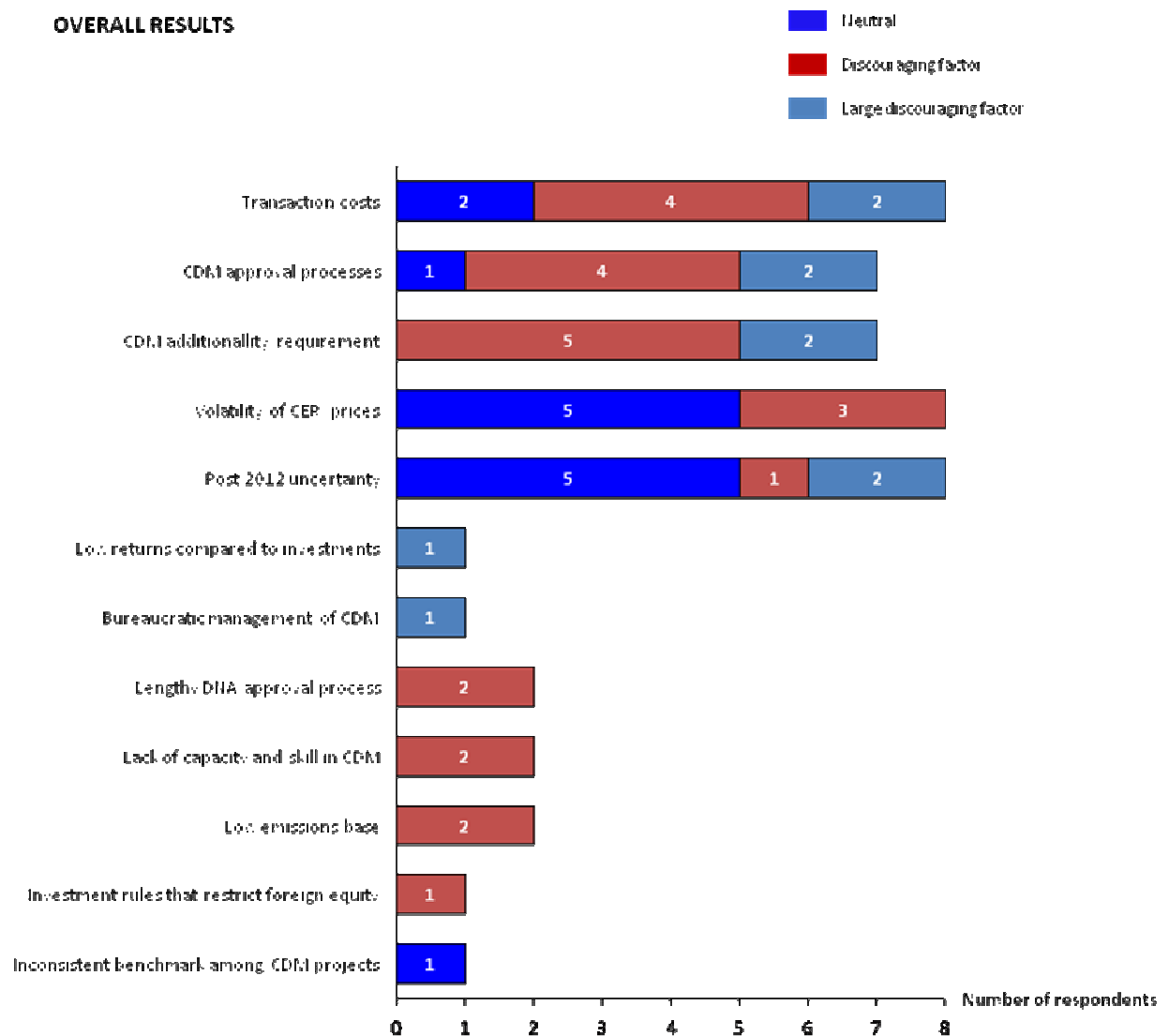
Figure 7: Distribution of the Neutral factors, discouraging factors and large discouraging factors



Respondents were requested to indicate the degree to which these factors discourage CDM implementation. The data was further analysed and summarised into overall discouraging factors.

Figure 8 below illustrates an overall summary of the discouraging factors and the degree to which they discourage implementation of CDM.

Figure 8 Overall distribution of the Neutral, discouraging and large discouraging factors



The data in Figure 8 demonstrate the high level of agreement on the degree to which transaction costs, CDM approval processes as well as CDM Additionality requirement discourage CDM implementation.

Transaction costs were regarded to be high and therefore discourage CDM implementation. One respondent linked the transaction cost with potential returns earned from the projects and suggested that the CDM investment costs are too high and not aligned with internal rate of return earned from the projects and therefore largely discourage CDM implementation.

Interestingly, volatility of carbon markets and fluctuation of CER prices was regarded by most respondents as a negative factor but neither encourages nor discourages CDM.

5.3.2 Addressing factors that discourage CDM implementation

Questions eight of the questionnaire prompted the respondents to describe interventions implemented to address the factors identified as discouraging CDM implementation. These factors are listed in Table 6 above and corresponding interventions are described in Table 8 below.

Table 8: Intervention to address factors discouraging CDM

Interventions to address factors discouraging CDM	
Fundamentals of the CDM	
1	Transaction costs - CDM needs small scale projects to reduce transaction costs - Encourage participation of multiple DOEs to create competition - CDM awareness initiatives to increase knowledge of CDM
2	CDM methodology and approval process too complex - Continuous discussions with CDM EB to review CDM methodology as well as proposal of new methodologies - Capacity building initiative to create knowledge of CDM
3	Challenges with demonstrating additionality - More scrutiny of project that get approved by DNAs. - Awareness initiatives to improve knowledge of CDM requirements
4	Volatility of carbon markets and fluctuation of CER prices - Provide capacity building in commodity markets - Establish risk management tools
5	Uncertainty of CDM validity post 2012 - Discussion on second period are already in place - Project developers not worried about 2012. Projects are long term. Companies continue to look for more projects
6	Low returns compared to investment required - Discussions with financial institutions to convert carbon asset to mortgage type assets - which can earn more returns
7	Bureaucratic management of CDM - Nothing was done about it
Country specific characteristics	
8	Lengthy approval processes within host country - Capacity building initiatives to increases awareness and knowledge of CDM - Strengthening of local DNAs to reduce time cycle
9	Lack of capacity and skill in CDM - Capacity building initiatives to increases awareness and knowledge of CDM process. - Recruit sectoral experts who understand sectoral issues and impact on CDM implementation
10	Low emissions base - Identifying opportunities in other sectors. For example Brazil is identifying opportunities in their sugar cane sector.
11	Investment rules that restrict foreign equity, and therefore limited foreign investment in CDM - Nothing can be done about it
12	Inconsistent benchmark among CDM projects - Unite with country CDM developers and carbon buyers to standardize benchmarks and CDM EB application standards
13	Global economic crisis - Nothing can be done about it

It should be noted that some of the interventions described for two specific factors listed under question 9 of the questionnaire were not described by respondents when answering these specific questions. They were, however, described when discussing these factors in other parts of the interview. They are uncertainty of CDM post 2012 and volatility of carbon markets and fluctuation of CER prices. Such relevant discussion points from other sections were included in this section.

Of the various interventions described by the respondents, awareness initiatives and capacity building initiatives emerged as the most favoured interventions. They were sighted frequent in responses to interventions in place to address various factors discouraging CDM. The clear alignment across various countries regarding these initiatives was remarkable.

i. Capacity building to improve DNA approval process

One of the countries interviewed is addressing complexities of DNAs approval processes as well as high transaction cost of DOEs through capacity building and awareness initiatives. These initiatives are aimed at creating awareness of the DNA posture and expectation as well as creating capacity of DOEs through encouraging institutions to act as DOEs to create competition in prices charged by DOEs. The role of a DOE has been described in Chapter 2 as to verify the emissions reduction actually achieved by the projects as well as certify that the project actually achieved the verified emissions reduction.

“We are trying to increase awareness on CDM institutions in order to become more familiar with CDM and may at some point become certifier of CDM projects in Brazil”. (Brazil Respondent F, 2009)

“In the case of the DNA, I think somehow the DNA has somehow held conversations, some seminars, et cetera, et cetera, trying to let’s say make it very clear to project proponents what exactly is expected from them. Once they know exactly what’s the posture of the DNA somehow before submitting the project they try to produce very good, consistent” (Brazil Respondent C, 2009).

By posture of the DNA the respondent was referring to DNA structure as well as approval processes and requirements.

Another country is also engaging in capacity building initiatives in order to address challenges associated with the complex and long application procedures of the CDM.

“Capacity building for the project owner and cooperate more closely with each CDM participating entities is equally important to accelerate the CDM implementation” (China Respondent E, 2009)

ii. Capacity building initiatives to improve knowledge of CDM EB requirements regarding Additionality

Among the countries interviewed, one of the countries stated how they engage project developers in awareness initiatives to improve knowledge of CDM.

“To have more scanner of the additionality issues that the DOE had before these are send to the UNFCCC and even the project proponents should understand that every greenhouse gas reduction is not a CDM project and how to take those forward and what are the nitty-gritties. Mostly the awareness generation would help in this regard” (India Respondent H, 2009).

By having more scanner of the additionality issues the respondent implied putting emphasis on scrutinising projects at country level prior to sending projects to UNFCCC for approval.

iii. Capacity building to address challenges with volatility of carbon markets

An expert with experience in China, India and Brazil suggested that lack of experience in commodities market in managing volatility and variation of CER prices discourage CDM implementation. The expert further suggested that to address this challenge, capacity building must be provided in commodity markets to equip project proponents with knowledge and tools on how to manage these risks.

“A lot of people in non-Annex 1 countries have not dealt with international market before and they don’t understand the fluctuations and don’t want to take the risk. In government we’re spending a lot of time and effort trying to provide capacity building on how the market operates and what the implications are for the seller” (General Respondent A, 2009).

- iv. Awareness initiatives to generate knowledge of CDM in order to encourage participation of DOEs as well as address delays that add to high transaction costs

The high transaction costs have been linked with lack of multiple DOEs as well as delays in the CDM process. To address these challenges awareness initiatives are driven to increase knowledge of CDM requirements and stimulate interest of organisations to become DOEs.

5.3.3 Success factors in implementing CDM

Section C of the questionnaire which is found in Appendix C requested respondents to describe the factors that are viewed as success factors for implementing CDM. The success factors referred to here are factors that both enabled and encouraged implementation of CDM. Enabling factors regarded as those that make it possible for easy implementation of CDM, while encouraging factors are regarded as those that present opportunities for

implementation of CDM. The respondents were requested to rate each success factor based on criteria set in the questionnaire.

The success factors were grouped per respondent, per country. They were further grouped according to themes that emerged from each respondent within a country. The findings are presented below in Figure 9. Various themes emerged across countries and these themes were used to develop overall success factors presented in Figure 10. This provided a comprehensive view of what is generally considered success factors in implementing CDM.

Figure 9: Distribution of success factors for implementation of CDM per country

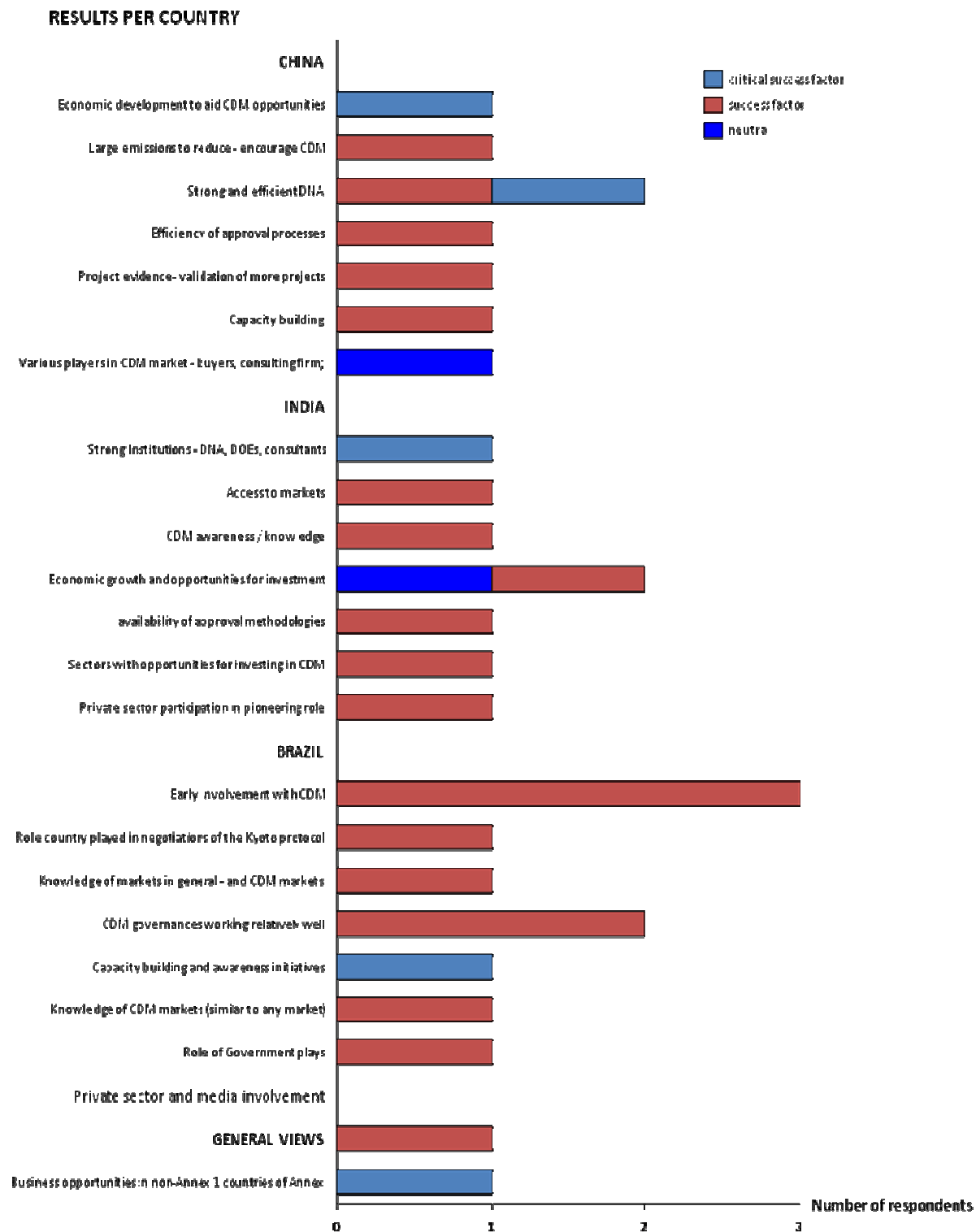
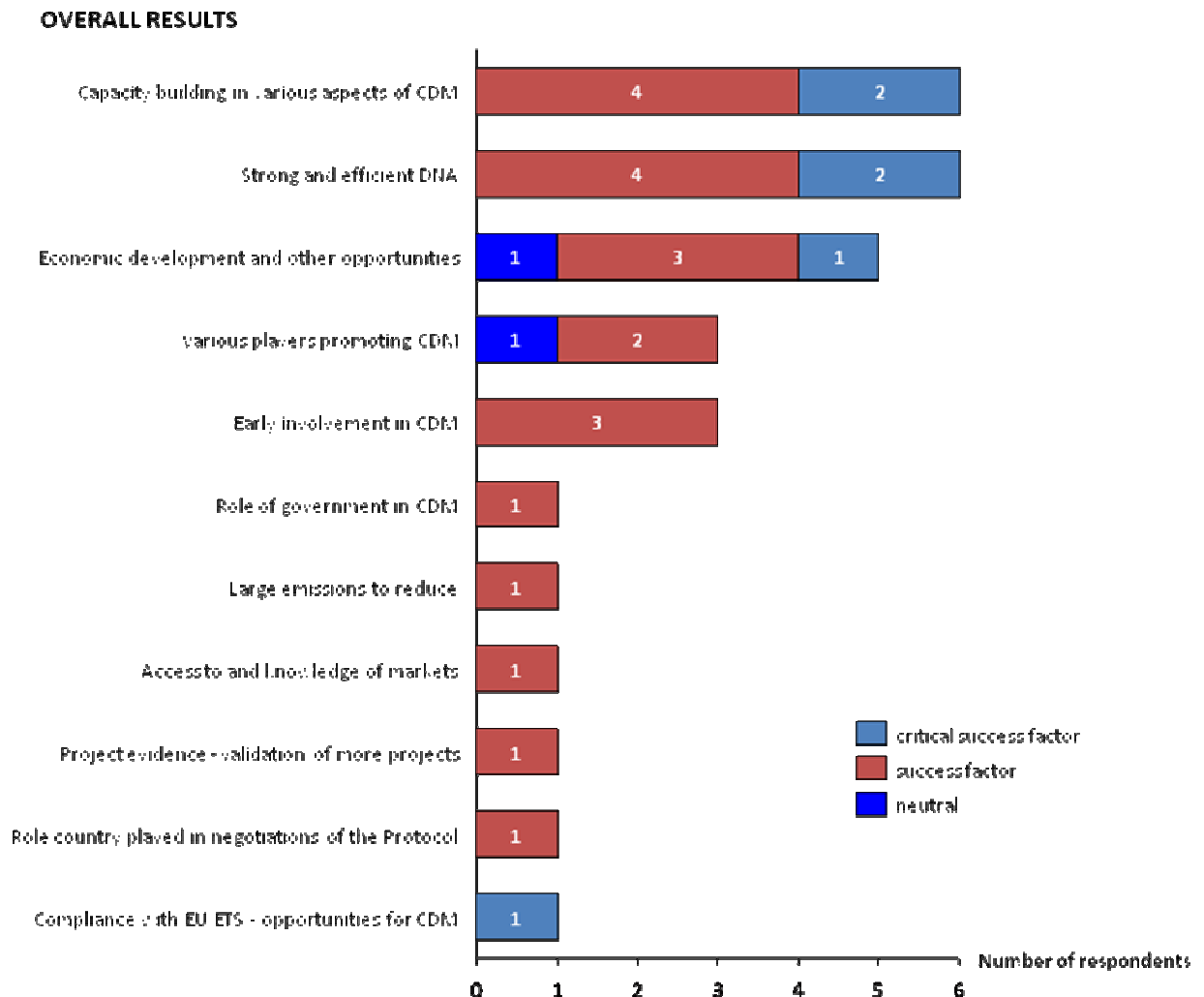


Figure 10: Distribution of overall success factors for implementation of CDM



Again, there is a notable agreement among countries on factors that encourage implementation of CDM. Capacity building, strong CDM governance structures in host country as well as economic development and opportunities for CDM were regarded as majority of the respondents as success factors. Focus was placed on factors that are applicable to more than one country.

i. **Strong CDM governance structures in host countries**

The majority of respondents identified strength of CDM governances as one of the success factors for CDM implementation. Two of the respondents rated this factor as a critical success factor. “We have institutions required, whether it is DOE, DNA, consultants, buyers, everybody. “It is a critical success factor” (China Respondent G, 2009).

ii. **Capacity building**

Capacity building was viewed as one of the success factor for CDM implementation by the majority of the respondents. One respondent from China, one from India and two from Brazil rated capacity building as a success factor.

iii. **Availability of CDM opportunity**

Availability of CDM opportunities has been regarded as encouraging CDM implementation in host countries. This was particularly the case in India.

5.3.4 Additional insights

In the last part of the questionnaire respondents were prompted to suggest ways in which South Africa can improve implementation of CDM. Respondents described their level of knowledge or lack thereof of South Africa and linked their comments to such level of knowledge. Some of the insights shared were:

- i. Internal government representative with appropriate level of seniority must lead and champion the CDM, encourage participation in CDM and

work closely with business to ensure government decision are not counter productive to business.

- ii. DNA must be more pro-active, with good interaction with project developers, implement the CDM rules in a simpler way.
- iii. Strongly drive awareness of CDM among companies in South Africa.
- iv. Train many professionals in CDM to create knowledge of CDM requirement as well as to identify CDM opportunities
- v. Focus on identifying sectors with great opportunities for CDM
 - i. In energy sector - support mechanism for renewable energy
 - ii. Deregulate the energy sector

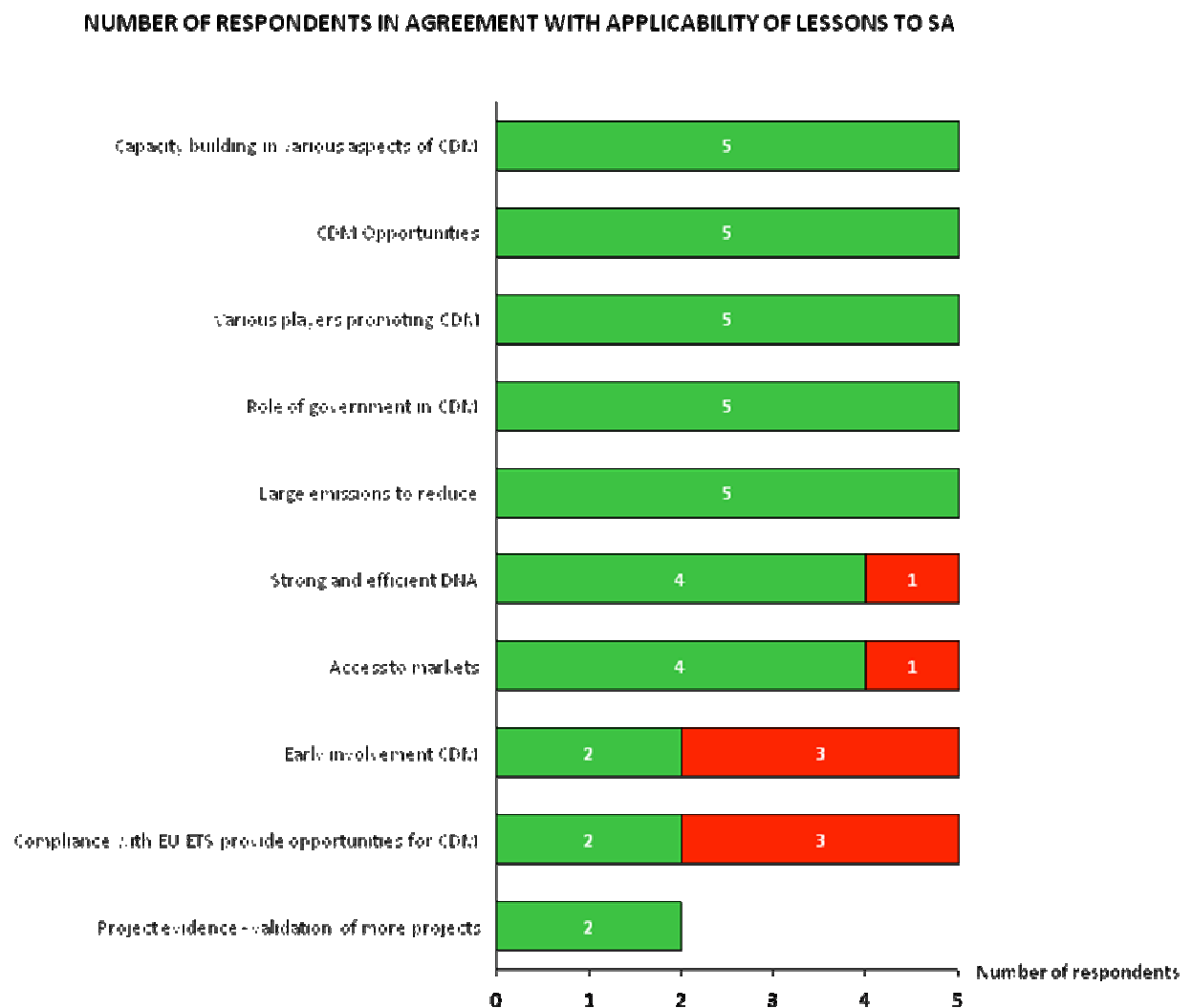
5.3.5 Learnings and the its applicability to South Africa

Learnings for South African were developed from factors in place to address factor discouraging CDM, success factors described above as well as from additional comments provided by the respondents. The various factors where categorised into themes and tested for applicability to South Africa with local experts.

Majority and in other cases all the respondents agreed with factors described as success factor for CDM implementation and that these factors are applicable to South Africa. The degree of agreement with these lessons was large. Figure 11 below illustrates the extent to which the respondents agree with the majority of these lessons.

Two respondents highlighted that there were ample of CDM opportunities in South Africa, with more than 200 projects at PIN stage. However it was not known why these projects are not being validated and implemented.

Figure 11: Degree of agreement with applicability of lessons for South Africa



5.4 Chapter conclusion

The structure of the research questionnaire provided for an opportunity to establish factors discouraging CDM in other countries, interventions to address such factors as well as success factors for implementing CDM.

Overall, the content pointed to three dominant factors that discourage CDM and these factors are:

- i. High transaction costs associated with CDM
- ii. Complex CDM methodologies and long approval processes
- iii. Challenges with demonstrating Additionality of projects

There was also a dominant intervention described as a way to address the discouraging factors described above. This intervention is capacity building and awareness creation initiatives.

The success factors for implementing CDM include strength of CDM governances, capacity building initiatives as well as available CDM opportunities. Lessons for South Africa were developed from these success factors and interventions for addressing CDM. The majority of experts interviewed to test applicability of these lessons strongly agreed with these lessons.

These findings are analysed and discussed in detail in Chapter 6.

CHAPTER 6: ANALYSIS AND DISCUSSION OF RESULTS

This chapter discusses the findings of the research and provides an evaluation of the CDM environment in China, India and Brazil, the factors discouraging CDM, interventions to address such factors as well as success factors for CDM implementation. These findings are discussed in the context of the objectives described in Chapter 1 as well as research questions stated in Chapter 3. In the findings presented in Chapter 5 various themes answering the research questions emerged across China, India and Brazil. The South African respondents to a large degree agreed with the various themes and are of the view that such factors are applicable to South Africa. These findings were used to develop lessons for South Africa that will aid for improved knowledge in CDM as well as implementation of projects.

6.1 CDM environment in China, India and Brazil

The responses on CDM environment in China, India and Brazil provided a tool that aided for a clearer understanding of the CDM in these countries, which was taken into account when conducting the interviews. The detailed findings are shown in table 6 above.

CDM in China

There were varying opinions in terms of how well CDM is functioning in China. One respondent view CDM in China as functioning well while another showed skepticism and noted that CDM in China is functioning very badly, just like

anywhere else. Literature reviewed showed that China has huge CDM potential and was doing well in terms of number of projects registered with the UN. The analysis of the recorded interviews revealed the following reasons mentioned by respondents:

- Large emissions which provide for excellent baselines,
- Use of CDM to promote economic development
- Efficient local CDM governing bodies.

It was interesting to learn from a respondent that although seen as successful, China is being criticised by the CDM EB as downplaying the CDM due to the corrupt nature of the Chinese government. This view has not been identified in the literature reviewed.

CDM in India

CDM in India is functioning well. This view was shared by two respondents who sighted the large number of project implemented as evidence to this suggestion. The literature reviewed, in particular a study by Chandler, Schaeffer, Dadi, Shukla, Tudela, Davidson and Alpan-Atamer, (2002), identified India as one of the most attractive Non-Annex I countries for CDM project development. A National Strategy Study on CDM implementation in India concluded that India has taken a pro-active approach to CDM to take advantage of the enabling factors in India to position the country well in the international carbon markets to take advantage of the CDM opportunities. To

this end, India is the second country with the largest amount of CDM project registered with the UN.

CDM in Brazil

An interesting point noted from a respondent in Brazil was that CDM in Brazil is doing well, but seen as beginning to lag China and India. “When we’re comparing Brazil to India and China, some people say we are beginning to lag behind (Brazil Respondent C, 2009).

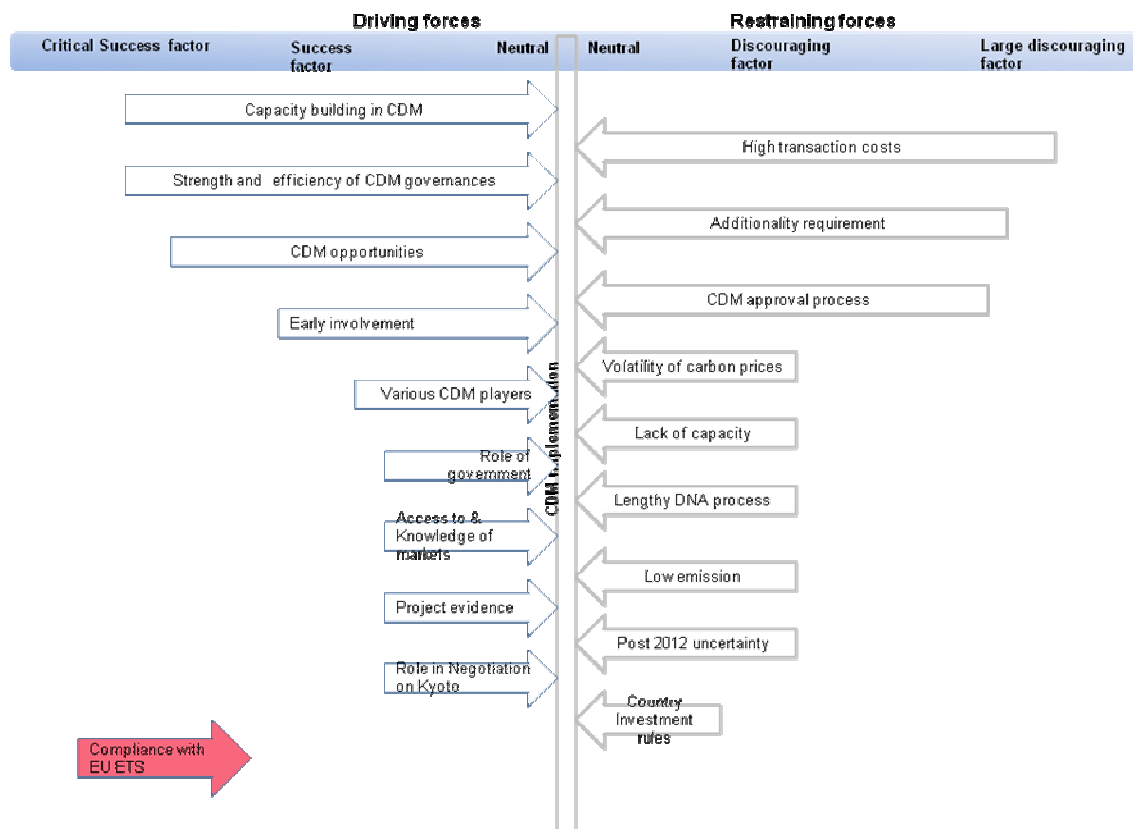
The fact that Brazil was involved in CDM from the beginning, developing first CDM methodology as well as registering the first CDM project raised some level of expectation in CDM activities from Brazil. The CDM investor guide of 2003 identified a large potential for CDM. Among others, the industrial sector in the areas of renewable energy, in particular hydro electricity, solar as well as wind. To date, of the 347 Brazil CDM projects in the pipeline, 74 are from hydro electricity, 10 from wind and zero from solar power. China on the other hand has a total number of 1804 CDM projects in the pipeline, of which 819 are from hydro electricity, 371 from wind and five from Solar.

The reason for this major difference is the suggestion by respondents that Brazil has no opportunities in the energy sector due to the fact that majority of Brazil’s electrify is from clean energy sources.

6.2 Discussion of research question 1 and 2

The force field diagram shown below in Figure 12 was developed based on data from Figure 8 and 10 above. Figure 8 and 10 shows the various factors after they have been aggregated based on the themes and rated based on degree of impact provided in the questionnaire. The categorisation in terms of universal factors and specific factors to a country context has been ignored in this analysis. The objective was to show overall driving and restraining factors irrespective of level at which such factors apply. The details of these factors are discussed below.

Figure 12: Force field diagram - factors discouraging and factors encouraging CDM



6.2.1 Research question 1

Are factors discouraging CDM implementation in South Africa unique to South Africa?

In the findings presented in Chapter 5 several themes emerged on the factors discouraging CDM. These factors are:

i. High transaction costs

CDM transaction costs were widely regarded by many respondents as high and discouraging CDM. These costs are linked directly with the CDM approval that is regarded as lengthy and causing business money. An interesting observation was from one respondent from India who disagreed and noted that transaction costs are low and have a positive impact on CDM. “Transaction costs have a negative impact. The costs here are very low. So it is positive in the CDM. It is good in the sense that we have very low transaction costs” (India Respondent D, 2009).

Despite this suggestion it is apparent from the research findings and literature review that transaction costs are a discouraging factor to implementing CDM. Parikh and Parikh, (2004); Subbarao and Lloyd,(2009); Zhang and Maruyama, (2001); Michaelowa and Jotzo, (2005); Chadwick, (2006) and Matsuo, (2004) supports this view.

ii. Additionality requirement

It is indicated also in Figure 8 above that the additionality requirement of the Kyoto Protocol is a factor discouraging CDM implementation. Additionality is the fundamental element of CDM. The challenges associated with proving additionality are attributable to the CDM EB inconsistency in approving projects. One respondent noted that 20 projects of same characteristics were submitted to the UCDM EB for approval and only two were approved. The reason given for disapproving the other 18 projects was failure to prove additionality. These inconsistency and lack of knowledge of the CDM requirement discourage implementation of projects. Pallav and Michaelowa (2007); Bréchet and Lussis (2006) support this finding. The authors stated that determining additionality of a CDM project is problematic, while Chadwick (2006) and Painuly (2001) suggested that the additionality requirement complicates the CDM framework.

iii. Complex CDM approval process,

The complex CDM methodologies and approval process discourages CDM implementation. With an exception of two respondents from Brazil and India, majority of the respondents rated this factor as either discouraging or largely discouraging CDM. A respondent who based his comments on general knowledge of China, India and Brazil labeled the management of CDM as bureaucratic, lengthy and costing business money. “The bureaucratic

management of the CDM - the bureaucracy is a large discouraging factor” (General Respondent A, 2009).

Figure 4 above, shows the process prior to registering a project. It can be seen from the picture presented there how complex the process is. Zheng (2004); Kulolesi (2007); Pearson (2005); and Hirschle (2006) confirmed that the CDM methodology and processes are bureaucratic, complex and discourages CDM.

- iv. Volatility of carbon prices as well as uncertainty around validity of CDM post 2012.

Majority of the respondent regarded that factor as having a neutral impact on CDM. Neutral impact in this context means it neither discouraged nor encourage CDM. Only three respondents from all various countries regarded it as a factor discouraging CDM. Lack of experience in managing variations and volatility in commodity markets as well as the level of risk appetite are potentially what discourages participation in the CDM markets.

No literature was found to support the two varying findings. Figure 5 as shown in Chapter 2 depicts high volatility of carbon prices between August 2008 and April 2009. When prices are high, investors gain, when they are low investors will lose potential revenues from selling CER. CDM is a market mechanism and it is normal for commodities markets to fluctuate. Various players implement various tools to manage such fluctuation risks.

v. Other factors discouraging CDM in specific countries

Additional discouraging factors described by a few respondents are low returns compared to investment required, bureaucratic management of CDM by CDM EB, lengthy approval processes at country level. The bureaucratic management of CDM by CDM EB was linked to the CDM process and therefore discussed under CDM process above. Although no particular themes emerged from these views, these factors were tested for applicability to South Africa to determine if they are a concern in the South African context. Only the bureaucratic management of CDM by CDM EB was regarded as applicable to South Africa and discouraging CDM to some extent.

Despite these complexities with CDM, China, India and Brazil have done well in terms of number of projects implemented, but failed in promoting sustainable development. This view is supported by Pearson (2005).

6.2.2 Research question 2

How have other developing countries – China, India and Brazil addressed factors that discourage CDM implementation?

During the literature review, interventions for addressing factors discouraging CDM were described. The interventions seen as encouraging CDM have been plotted in Figure 12 as driving forces. It was interesting to note that these interventions were further described by most respondents as underlying

success factors for CDM implementation. The context of the success factor is discussed in the next sections.

The details of interventions for each discouraging factor are described in Table 8 in Chapter 8. These interventions include among others:

i. High transaction costs

Capacity building and awareness initiatives were widely considered to be measures to reduce transaction costs. It is believed that knowledge and understanding of CDM requirements will reduce time delays within the CDM approval process and therefore reduce transaction costs. The lack of competition among DOEs was sighted as an element that contributes to high transaction costs. Capacity building initiatives will encourage organisations to act as DOE and therefore improve competition in prices charged. Literature reviewed strongly supports this finding. Transaction costs can be reduced reducing time delays through improving the quality of domestic institutions and streamlining CDM related procedures (Michaelowa and Jotzo, 2005). Zhang and Maruyama (2001); and Zhang (2005) support this suggestion. It was interesting to note that all the local respondents agree with these findings. These respondents stated that the South Africa DOE has closed and this resulted in use of international DOEs which charge high transaction costs. The high degree with which the findings and literature agree on these interventions pointed the importance of capacity building in CDM. It is surprising however that with this advancement in understanding of how to reduce the costs, they are

still to this end regarded as high. The key question that needs to be answered is whether these interventions are effective in reducing costs.

ii. Complex CDM methodology and approval process

Again, capacity building initiatives were sighted as an intervention to address the complexities associated with the CDM approval process. Michaelowa and Jotzo (2005) support this finding and suggest that host countries improve the quality of domestic institutions to minimise these complexities. A respondent from India stated that continuous discussions with the CDM EB regarding improving the process on their end could potentially reduce these complexities. General Respondent A categorically stated that business is engaging with the CDM EB, and the board seem to be listening however there was uncertainty around implementation of the recommendations from business. However, this can be achieved through capacity building initiatives mentioned by the respondents.

iii. Challenges with demonstrating Additionality

Awareness initiatives were yet sighted as interventions to address challenges of proving project's Additionality. The more people know the CDM requirements, the more it improves the likelihood of identifying and submitting projects that meet the Additionality. There were divergent views on the level at which the interventions are implemented. Some of the respondents stated that the DNAs must develop capacity and scrutinise projects for Additionality before they are

submitted to the CDM EB, other respondents suggested capacity building at project proponent as well as DOE levels. The local respondents supported the view that capacity building initiatives will be more effectively implemented at project proponent and DOE level. The reason for this discrepancy was found to be the fact that the DNAs' primary responsibility is to ensure that the CDM activities are aligned with the country's sustainable development goals and not testing projects for Additionality. The literature reviewed suggested Additionality requirements should be made more transparent to reduce the complexities and uncertainties involved proving Additionality (Shrestha, 2004). The debates with the CDM EB should emphasise the required improvements in the complex CDM requirements, and therefore improve the rate of projects proving Additionality. This will potentially reduce the hurdles and negativity associated with this requirement.

iv. Volatility of carbon markets and fluctuation of CER prices

Capacity building in commodity market in general will improve knowledge of the market and awareness of available tools that can be implemented to manage volatility and fluctuations risks associated with CDM markets and prices. The majority of the respondents sighted this intervention and this was supported by the local respondents as a potential intervention for South Africa. However, the literature reviewed provided no guidance on how this factor can be addressed. Based on the degree of agreement among respondents, training should be provided in areas of commodity markets with more emphasis on CDM market.

v. Uncertainty of the CDM validity post 2012

Majority of the respondents regarded this factor as not a major concern and not within any country's control. A respondent from Brazil remarked by saying, "Project developers are not worried about post 2012, CDM projects are long term" (Brazil Respondent B, 2009). Many respondents cited the fact that discussions on a second period are already in place providing project developers with comfort that the discussion will yield a positive response

vi. Low returns compared to investment required

To improve CDM returns a respondent from China suggested that countries hold discussions with financial institutions to structure deals in a manner that will convert carbon assets into better returns financial instruments. One local respondent suggested people do not understand how to structure deals, how to negotiate and value primary carbon assets. An improved understanding of markets will improve the likelihood of structuring deals in a manner that will minimise potential losses.

Capacity building was cited further as an intervention to build CDM capacity and improve host country approval processes. This has been supported by local respondents, majority of whom remarked that the South African DNA has experienced people and is functioning very well. However, the South African approval processes was not of a concern to all local respondents.

vii. Low emissions base

A respondent from Brazil sighted low emissions base as a factor discouraging implementation of CDM. To counteract this, the country is exploring CDM opportunities in other sectors. This is not applicable to South Africa. Local respondents suggested that South Africa has a high emission base caused by electricity produced from coal.

viii. Investment rules that restrict foreign equity,

The investment rules are country specific and nothing is being done to address these. This view is different from a view expressed by Lu Xuedu, Division of Resources and Environment, Ministry of Science and Technology. Lu has been quoted in a report on CDM in China, saying, “The intent [of the Interim Measures] is to reflect the spirit of the CDM, not to create barriers to CDM investment. The door is not closed for CDM hosting by 100% foreign owned enterprises, but the issue requires further consideration, and we welcome your views on these difficult issues.” It is worth noting that the report referred to was prepared in 2004 and that this could still remain a challenge even now. No literature was found to either support or oppose with the respondent’s view.

6.3 Discussion of research question 3

What are the success factors in implementing CDM in China, India and Brazil?

In the presentation of data in Chapter 5 capacity building and awareness initiatives were mentioned by many respondents as key to CDM

implementation. One respondent alluded that even the media in their country is aware of CDM activities and in addition promote CDM. Success factors for implementing CDM are illustrated in Figure 9 as presented in chapter 5.

The result of the study showed the importance of capability building as a success factor in implementing CDM. A strong capability and knowledge of CDM processes and methodologies can reduce the lengthy CDM approval process, particularly at host country level. Capability can improve the quality of projects and the likelihood that projects will meet the additionality requirement. In addition, building capability will encourage participation of multiple DOEs and create competition in prices charged by the DOEs.

A strong and efficient DNA has been sighted by the majority of the respondent as a success factor with two respondents rating it as a critical success factor. It was interesting to learn that all the local respondent regard the South African DNA as functioning very well. The majority of the respondents were concerned that the positioning of the DNA (within the Department of Energy) undermines any importance South African government places on CDM. Furthermore, respondents suggested the DNA can improve its role and become more proactive in promoting CDM. Perhaps the leadership of the DNA should be led by a senior government official to demonstrate government commitment to CDM.

Availability of sectors with CDM opportunities has been sighted as a success factor to CDM implementation with one respondent from China rating it as a critical success factor. Majority of the local respondents agreed that South Africa has plenty of opportunities for CDM in the energy sector. This has however not improved implementation of CDM in this country.

There were no themes on the additional factors described in Figure 9; however these were tested with South African respondents to test if they are applicable to South Africa. The majority of the respondents agreed that various players need to engage in CDM activities to drive implementation of CDM in South Africa. Currently the majority of South African projects registered with the UN originate from the private sector. Government has an opportunity through the State Owned Entities in particular Eskom to implement CDM project and act as a pioneer for CDM.

6.4 Lessons for South Africa

The majority of responses from local experts showed a high level of agreement of the factors described as discouraging CDM as well as the interventions and success factors for implementing CDM. This level of agreement afforded for an opportunity to develop lessons that could improve knowledge and understanding of CDM in South Africa as well as improve implementation of CDM projects if CDM stakeholders choose to act on these lessons.

Recurring themes of interventions and success factors for implementing CDM were observed throughout the content analysis and identified as factors that would assist South Africa in improving implementation of CDM projects. The following four factors were identified as the main themes:

- Capacity building initiatives
- Strengthening of CDM governances to become more efficient
- Exploring availability of CDM opportunities
- Engaging a range of players in CDM

Recommendations on how South Africa can move forward are provided in Chapter 7.

6.5 Chapter conclusions

The research questionnaire attached as Appendix C was able to answer all the research questions posed in Chapter 3. Most of the questions were answered from the structured questions under each section addressing the specific research questions, while others were answered through discussions of the same factors in other sections of the questionnaire. Both local and international respondents received the questionnaire well and were keen in sharing their experiences with South Africa.

Despite the somewhat small sample size than what was initially planned, and the fact that the research did not seek to uncover any evidence of the findings, the themes that emerged out of the findings as well as the high level of

agreement by local respondents of the applicability of these themes to South Africa provided for a clear understanding of the CDM environment locally and abroad.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

The pace at which South Africa is implementing CDM projects has been viewed as slow, below the country's potential and lagging other developing countries. This has resulted in a need to establish what is causing this lag as well as assessing successful host countries' CDM environment to establish such countries success factors. Various studies have been conducted through both business and academic institutions to assess CDM environment in host countries including South Africa. Some of these studies were analysed as part of literature review in this research.

7.1 Key findings

A combination of findings from both the literature review and interviews showed a large degree of themes emerging between the countries on factors discouraging CDM implementation. Such findings provided assurance that the factors that are discouraging CDM in South Africa are universal barriers and not unique to South Africa.

The second key finding was the various themes on interventions implemented to address the discouraging factors across the various countries. These interventions are universal based and applicable to South Africa. The key intervention has been described as capacity building and awareness initiatives. These interventions can be considered for implementation in South Africa to accelerate CDM.

A third key finding was the large degree with which the local respondents agreed with the themes emerging out of discouraging factors. Furthermore respondents strongly agreed with interventions that are implemented to address factors discouraging CDM, as well as success factors that drive implementation of CDM.

A further significant finding was that respondents found volatility of carbon markets as not discouraging CDM. The respondents argued that it is a market mechanism similar to other commodity markets which required knowledge of commodity markets in order to manage the volatility and fluctuation risks.

7.2 Results limitations

Despite the strong degree of agreement among respondents of the various factors and interventions of CDM, the fact that there had been relatively few interviewees for this research imply that the views of the respondents must be generalised over the CDM experts population with caution. The respondents may not be representative of the CDM experts. It is suggested that in future research of this nature be conducted using a larger sample size that required to guard against low response rate risks. For example, if 15 interviewees are required, the researcher could aim at obtaining and confirming with 20 interviewees. Use of a greater number than required can only enhance the quality and validity of the research findings.

It is suggested further that the sample comprises of the various stakeholders representative of CDM to obtain a range of views across the broader CDM population. For example the sample could include representatives of CDM governing bodies, project development houses, financial institutions engaged in CDM, academic, government representatives the media as well as other private sector players not mentioned in this research.

7.3 Lessons learned

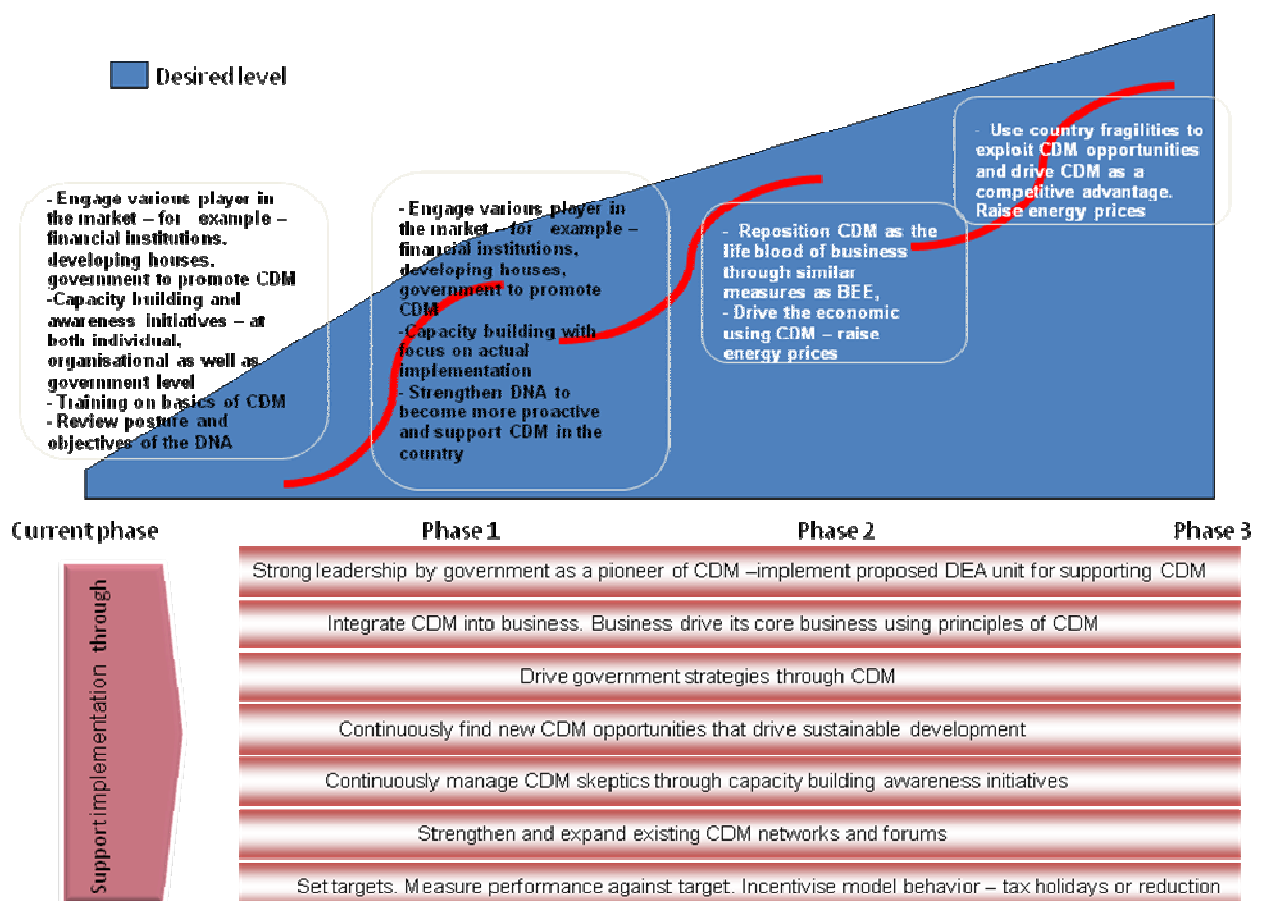
This research established a strong level of agreement between literature review, international experts and local experts on factors discouraging CDM implementation in SA, China, India and Brazil. Furthermore, there has been a great level of agreement on various interventions that address factors discouraging CDM. The fact that South African experts are well aware and agree with international experts on these interventions was a key finding of this research. What remain unclear are the reasons for the slow implementation of CDM in South Africa

Despite acknowledgement and high level of consensus between international experts and local experts on interventions that could accelerate implementation of CDM projects, it is still unclear why South Africa is not implementing many CDM projects. The limited interest of private sector in CDM remains an obstacle in South Africa. This is viewed as driven primarily by the conservative nature of

business in the country as well as a view that CDM has not yet proven its financial value.

To realise the full potential as well as future opportunities of the CDM, South Africa must begin to make changes now. A local expert said “South Africa wakes up early and go back to bed, only to wake up again a bit too late”. The missed opportunities of CDM are visible and should not be ignored any further. South Africa should consider implementing the identified interventions through the following phases as illustrated in Figure 13:

Figure 13: Model for implementing lessons for South Africa



- i. **Current phase:** Securing and protecting our current position in CDM market through implementing a scale of projects that will keep us at or above current positions (13th ranking). Drive implementation of the current projects as well as obtain approval for projects in CDM pipeline and drive implementation in order to continue reduce emissions.
- ii. **Phase 1:** Improving the current rate of CDM implementation through implementing the 200 projects believed to be at PIN stage – by utilising current CDM opportunities and skills efficiently.
- iii. **Phase 2:** Reshape private and public sector businesses in SA. Live and breathe sustainability. Make sustainability the DNA of business.
- iv. **Phase 3:** Sustain your future – exploit CDM opportunities to become a competitive country or use CDM implementation as our competitive advantage.

The above interventions should be supported by:

- i. **Strong leadership by government as a pioneer of CDM.**

A local respondent stated that the South African DNA is moving from Department of Minerals and Energy (DME) to Department of Environmental Affairs (DEA). This respondent further alluded to the fact that government is establishing a unit under DEA to support CDM. Implementation of this unit could provide government an opportunity to pioneer CDM in South Africa.

ii. Integrate CDM into business.

South African businesses consider CDM as a non-core business. This view should change in order to accelerate implementation of CDM in South Africa. Business must drive its core business using principles of CDM to drive sustainable development as well as take advantage of the opportunities in the CDM markets. The CDM markets have been growing and billions of dollars are traded in the market every year.

iii. Government must drive its development strategies through CDM.

China is doing it, South Africa can also do it. Government must provide an environment that encourages economic activities in sectors with CDM opportunities.

iv. Continuously find new CDM opportunities that drive sustainable development.

v. Continuously manage CDM skeptics through capacity building and awareness initiatives to improve knowledge of CDM and the opportunities it can provide.

Currently awareness initiatives are driven within the CDM industry in South Africa. More initiatives should be driven across all sectors and at levels that can reach individuals.

vi. Strengthen and expand existing CDM networks and forums to promote interaction among various players.

vii. Set targets.

Measure performance against these targets and incentivise model behavior. Some of the incentive measure could be in the form of tax holidays for companies with a certain amount of CDM implemented annually.

The South African government has been largely engaging in global climate change workshops. The marginal uptake of government of CDM projects particularly the State Owned Entities such as ESKOM and Transnet remain a concern and does not demonstrate any importance government places on CDM.

7.4 Recommendation for further research

- South African CDM experts strongly agreed with the CDM interventions described in this research. From the discussions with the respondents, it was not clear if these interventions are being implemented at a level that can improve implementation of CDM in South Africa. It is recommended that a study be conducted to determine whether these interventions are being implemented, whatever the response is, establish the reason why as well as potential impact of that outcome on CDM implementation.
- There has been a strong agreement among local experts that although the South African DNA is functioning well and doing the best they can,

the DNA could improve its position and become more proactive in promoting CDM. It is recommended that a study be undertaken to focus on the posture and role of DNA while within DME, the objectives of moving the South African DNA to DEA as well as the potential impact this move can have on CDM implementation in South Africa.

- The Kyoto Protocol is broadening the CDM framework through introducing Programmatic CDM. It has been argued that Programmatic CDM has the potential of providing further CDM opportunities for small CDM projects. It is recommended that a study be conducted to establish the applicability of Programmatic CDM to South African context and focus on determining the feasibility of Programmatic CDM as a tool to accelerating CDM implementation.
- Research on determining country specific discouraging factors between private sector and public sector and public sector in South Africa.
- Two of the local respondents indicated that South Africa has approximately 200 projects stagnant at PIN stage. A research can be conducted to establish specific reasons these projects are stagnant and develop immediate interventions that could facilitate immediate implementation of these specific projects.

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APPENDICES

APPENDIX A: SUMMARY OF LITERATURE REVIEW: FACTORS DISCOURAGING CDM

Factors discouraging CDM	Author
The bureaucratic and complex CDM process	Zheng (2004), Kulovesi (2007), Pearson (2005) a Hirschle (2006) Grubb (2004) Shrestha (2004) Ganapati and Liu (2009) – institutions are crucial)
Lack of CDM capacity	Zhang (2005) Parikh and Parikh(2004) Lovett, Barnard and Midgley (2005) Little (2006).
Complex baseline methodology and additionality requirements	Pallav and Michaelowa (2007) Br´echet and Lussis (2006) Pakirh and Pakirh (2004) Matsuo (2004) Roy, Das, Sathaye and Price (2002) Chadwick, 2006 and Painuly (2001). Michaelowa and Jotzo (2005) Shukla, Sivaraman and Yajnikc (2004) Lloyd and Subbarao (2009). Roy, Das, Sathaye & Price (2002)
High transaction costs	Parikh and Parikh (2004) Lloyd and Subbarao (2009) Zhang and Maruyama (2001) Michaelowa and Jotzo (2005) Shukla, Sivaraman and Yajnikc (2004) Roy, Das, Sathaye & Price(2002) Chadwick, (2006); Matsuo (2004) Kallbekken and Westskog (2005) Br´echet and Lussis (2006) Michaelowa and Jotzo (2005) Michaelowa and Jotzo (2005) Zhang (2005)
Volatility of the price of carbon credits	Capoor and Ambrosi (2009)
Uncertainty regarding Kyoto Protocol post-2012	Pearson (2005) Shrestha (2004)



APPENDIX B: INTERVIEWEES

Name of interviewees	Country	Organization	Role in the organization
TaoLan (written response)	China	Green China Exchange	Business Director
Des Godson	China	EEAFM	Investment advisor
Jed Jones	China, India and Brazil	Carbon Options Limited	Director
Prof. Roberto Schaeffer	Brazil	Federal University of Rio de Janeiro	Professor: Energy Planning Program
José Domingos Gonzalez Miguez	Brazil	Ministry of Science and Technology	General Coordinator on Global Climate Change Executive Secretary of the Interministerial Commission on Global Climate Change
Mr Fabian Peres Gonçalves	Brazil	SGS	Lead assessor and CDM manager
Ajeya Bandyopadhyay	India	Ernst & Young	Senior Manager – Climate Change & Sustainability Services
Robert Taylor	India	Agrinergy	Director –Project development
Andrew Gilder	South Africa	IMBEWU Sustainability Legal Specialists (Pty) Ltd	Director
Anton-Louis Olivier	South Africa	NuPlanet (Pty) Ltd	Managing Director
Gregor Pfeifer	South Africa	Africappractice	Senior Consultant
Mike Goldblatt	South Africa	PDG	Director
Rob Ashdown	South Africa	Merchantec capital	Climate Change Principle Consultant,

APPENDIX C: RESEARCH QUESTIONNAIRE

- RESEARCH QUESTIONS

- Are factors discouraging CDM implementation in South Africa unique to South Africa?
 - How have other developing countries – China, India and Brazil addressed factors that discourage CDM implementation?
 - What are the success factors in implementing CDM in China, India and Brazil?
-

RESEARCH TITLE: International successes in Clean Development Mechanism implementation: Lessons for South Africa

RESEARCH QUESTIONS

- Are factors discouraging CDM implementation in South Africa unique to South Africa?
 - How have other developing countries – China, India and Brazil addressed factors that discourage CDM implementation?
 - What are the success factors in implementing CDM in China, India and Brazil?
-

INTERVIEW QUESTIONS TO ANSWER RESEARCH QUESTIONS

A. BACKGROUND

1. Please state your name, your organisation name, your position and role in the organisation

Name _____

Organisation name:

Position title:

Role in the
organisation

2. How many years of experience have you had in CDM implementation?

3. How well do you perceive CDM to be functioning in your country?

4. Explain your answer to question three above?

B. FACTORS DISCOURAGING

5. Are there factors that discourage CDM implementation in your country?

What are these factors?



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6. Using the criteria below how would you rank the impact of the factors highlighted in question five above?

Ranking

Neutral factor

Discouraging factor

Large discouraging factor

Factor	Criteria

7. For each factor, describe why they have discouraged CDM implementation in your country?

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8. How have these factors been dealt with to accelerate CDM implementation?

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9. What impact has the following had on CDM implementation in your country-
positive or negative?

9.1 How would you rate those using criteria under question six and describe

9.2 Why you are of this view?

- CDM processes – from Project design through to issuance of CER.

Impact	Rating
Why?	

- Transaction costs incurred in implementing CDM;

Impact	Rating
Why?	

- CDM additionality requirement;

Impact	Rating
Why?	

- Volatility of the carbon market and fluctuation of prices

Impact	Rating
Why?	

- Uncertainty of validity of CDM post 2012 when Kyoto Protocol expires?

Impact	Rating

Why?

C. FACTORS ENCOURAGING

10. What are the success factors for implementing CDM in your country?

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11. Using the criteria below how would you rate the impact of the factors highlighted in question 11 above?

Ranking

Critical success factor

Success factor

Neutral factor

Factor	Rating

12. Why are these considered success factors?

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13. What insights would you provide to SA that will accelerate implementation of CDM as successfully as your country?

14. What other additional comments would you like to make?

LOCAL EXPERTS: INTERVIEW QUESTIONS TO TEST LEARNINGS FROM INTERNATIONAL EXPERTS

BACKGROUND

1. Please state your name, your organisation name, your position and role in the organisation?
2. What is your experience in CDM implementation in South Africa?
3. What is your view of CDM implementation in South Africa?
4. Why are you of this view?

A. FACTORS DISCOURAGING

5. The following factors have been identified by international experts in China, India and Brazil as factors discouraging CDM implementation in these countries. What is the applicability of this to South Africa?

1. CDM methodology and approval process –too complex and bureaucratic
2. Lengthy approval processes
3. High transaction costs – due to
 - lengthy approval processes
 - lack of competing in prices charged by DOEs (not many DOEs in countries)
4. Lack of capacity and skill in CDM processes – DNAs, DOE, project proponents
5. Challenges with demonstrating additionality
6. High investment costs and low returns
7. Country rules that restrict foreign investment (e.g. trying to balance inflows and outflows)
8. Lack of sectors with CDM opportunities
9. Economic downturn

6. Why are you of this view?
7. The following have been highlighted as ways in which China, India and Brazil deal with such factors. What is the applicability of this to South Africa?

1. CDM methodology and approval process –too complex and bureaucratic
 - Continuous discussions with CDM EB to review methodology and proposal of new methodologies
2. Lengthy approval processes
 - Capacity building initiatives to increases awareness and knowledge of CDM process
 - Strengthen DNAs to reduce time cycle
3. High transaction costs – due to lengthy approval processes
 - Encourage participation of multiple DOEs to create competition
4. Lack of capacity and skill in CDM processes – DNAs, DOE, project proponents
 - Capacity building initiatives to increases awareness and knowledge of CDM process.
 - Recruit sectoral experts who understand sectoral issues and impact on CDM implementation
 - Strengthen DNAs to reduce time cycle
5. Challenges with demonstrating additionality
 - More scrutiny of project that get approved by DNAs.
 - Awareness initiatives to improve knowledge of requirements
6. High investment costs and low returns
 - Discussions with financial institutions to convert carbon asset to mortgage type assets - which can earn more returns
7. Country rules that restrict foreign investment (e.g. trying to balance

inflows and outflows)

- Nothing is being done

8. Lack of sectors with CDM opportunities

- CDM awareness initiatives to increase knowledge of CDM – will aid to identification of opportunities

9. Economic downturn

Nothing is being done

B. FACTORS ENCOURAGING

8. The following factors have been identified by international experts in China, India and Brazil as success factors in implementation of CDM. What is your view on this?

1. Involvement with CDM since beginning. (e.g. Brazil)
 - Credibility of CDM in Brazil due to early involvement
2. Access and knowledge of markets in general - and also CDM carbon markets
3. Strong CDM governances – DNAs, DOEs to improve efficiency of approval processes and reduce transaction costs
4. Capacity building initiatives to create awareness of CDM and build skills on CDM methodologies (involvement of academic institution is key)
5. Government play a critical role in emphasise importance of CDM and creating an environment that encourage CDM. E.g. economic development to aid CDM
6. Private sector involvement - funding CDM opportunities
7. Large emissions to reduce – e.g. China with emissions
8. Compliance with **EU ETS**

9. Why are you of this view?

10. What is the applicability of this to South Africa?
11. What other additional comments would you like to make?