Swedish University of Agricultural Sciences
Faculty of Forest Sciences

Department of Forest Products, Uppsala

Investment in project preventing deforestation of the Brazilian Amazonas

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Foreword

This masters-level thesis has been undertaken as part of the work within the Industrial Economics in Forestry program at the Department of Forest Products, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. The research was carried out at Yale University, School of Forestry and Environmental Studies in New Haven, CT, USA.

The author wants to take this opportunity to thank the supervisors, Chadwick Oliver, Pinchot Professor of Forestry and Environmental Studies, and Director, Yale Global Institute of Sustainable Forestry and Denise McCluskey at Department of Forest Products, Swedish University of Agricultural Sciences in Uppsala, for their support. I am very grateful that I had the opportunity to perform this thesis at Yale University and would like to thank SLU's forest faculty for a stipendium that enabled this.

Thanks must also be addressed to all the people who contributed their time and knowledge in interviews, which comprises a significant aspect of this work's empirical data.

New Haven, CT, USA, April 24, 2009

Pär Hansson

Abstract

The aim of this thesis is to create an understanding of the incentives for forest companies to invest in reducing carbon dioxide emissions from deforestation and forest degradation, which is termed REDD.

The Brazilian Amazonas was chosen as the base for the investment case. Brazil has the largest area of rainforest in the world, and also the biggest problem with deforestation. The Amazon region of Brazil comprises rainforest which is largely intact and unexploited. Accordingly, there is significant potential scope for prospective investments in a REDD-project, and so have a noteworthy impact in preventing deforestation.

The research approach used the United Nation's Clean Development Mechanism concept was used as a framework for ascertaining the investment costs in potential REDD-projects. Multiple methods were used to collect data. In particular, information about the transaction costs involved with Clean Development Mechanism-projects was used as input to an investment decision model that estimated net present value outcomes.

Other bases for the investment decision model were the results from a political, economical, social and technological (PEST) analysis of Brazilian Amazonas; and, interviews with experts from five of the world's largest international forest companies about their assessment of the risks and benefits as well as perceptions of the corporate social responsibility aspects of REDD-projects.

The PEST analysis showed that Brazilian Amazonas is a suitable investment case and could be a good place for this type of investments in the future - provided regulations were significantly simplified.

The outcome on the investment model clearly showed that a company investing in a REDD-project with main purpose of preventing deforestation can expect a positive net present value. However, risks are high due to uncertainties about the value of carbon credits and uncertainties about the continued existence of carbon market.

Key words: REDD, CDM, transaction-costs, carbon offset, GHG, Kyoto Protocol, CSR, deforestation

Sammanfattning

Detta examensarbete syftar till att skapa förståelse om skogsföretagens incitament för investeringar i projekt med målet att förhindra avskogning, kallat REDD-projekt.

Regionen Amazonas i Brasilien valdes som grund för detta investeringsfall. Brasilien har det största området med regnskog i världen och också det största problemet med avskogning. Amazonas är ett område i Brasilien där de mesta av regnskogen fortfarande relativt opåverkad av exploatering och därmed är möjligheterna stora för en framtida investering i ett REDD-projekt med målet att förhindra avskogning.

Som grund för denna uppsats används FN: s Clean Development Mechanism koncept för att fastställa de investeringskostnader för ett potentiellt Redd-projekt. Flera olika metoder användes för att samla in data. Information om transaktions kostnader involverade i Clean Development Mechanism-projekt användes som underlag investeringsbesluts modellen för beräkning av investeringens potentiella nuvärde.

Andra grunder för investeringsbesluts modellen var resultatet från en analys av de politiska, ekonomiska, sociala och tekniska (PEST) förhållandena i brasilianska Amazonas, och intervjuer med sakkunniga från fem av världens största internationella skogsrelaterade företag om deras bedömning av risker och fördelar likväl med uppfattningar om företagens sociala ansvar aspekter relaterade med Redd-projekt.

PEST analysen visade att brasilianska Amazonas är ett lämpligt investerings fall och kan vara en bra plats för denna typ av investeringar i framtiden - under förutsättning att reglerna för REDD-projekt blir mer förenklat och tydligt.

Resultatet från investeringsmodellen visade tydligt att ett företag som investerar i ett REDD-projekt med främsta syfte att förhindra avskogning kan räkna med ett positivt nuvärde. Men riskerna är höga på grund av osäkerhet om värdet för kolkrediterna och osäkerhet om den fortsatta förekomsten av en marknad för utsläppsrättigheter.

Intervjuerna visade att skogenföretagen har en negativ uppfattning om Redd-projekt som en mekanism för att förhindra avskogning. De svarande ansåg att det fanns stora oklarheter i regelverket som omger investeringarna i REDD inom skogssektorn och att det arbete och de tillhörande transaktionskostnader förknippade med reglerna är för stor.

Dessa risker påverkar incitamenten för investeringar i regnskogen och avskogningen i brasilianska Amazonas på ett negativt sätt. Således är det osannolikt att avskogningen kommer att få hjälp från Redd-projekt inom en snar framtid.

Nyckelord: REDD, CDM, transaktionskostnader, koldioxid kompensering, växthusgaser, Kyoto Protokollet, CSR, avskogning

Abbreviations

AAU -	Assigned Amount Units
A/F -	Afforestation / Reforestation
BRIC -	Brazil, Russia, India & China
CER -	Certified Emissions Reduction
CDM -	Clean Development Mechanism
CO_2 -	Carbon Dioxide
COP -	Conference of the Parties
CSR -	Corporate Social Responsibility
EPI -	Environmental Performance Index
ERU -	Emission Reduction units
ETS -	European Trading Scheme
EUA -	European Allowance Units
GHG -	Green House Gas
Ha -	Hectare
HBR -	Harvard Business Review
HSBC -	Hong Kong Bank of Comers
IPCC -	Intergovernmental Panel on Climate Change
NPV -	Net Present Value
PEST -	Political, Economical, Social & Technology
MTe -	Million Ton equivalents
REDD-	Reduced Emissions from Deforestation and forest Degradation
RMU -	Removal units
t -	Metric Tones
UNFCCC-	United Nations Framework Convention on Climate Change
y -	Year

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1. Introduction

This chapter describes the problems with deforestation in tropical rainforests and the development of carbon emission rights.

1.1 Background of carbon emission reductions

Climate change is one of the most discussed subjects today among politicians, the public and media. The issue of climate change and deforestation are illustrated in the movie "An inconvenient truth", which was produced by the former US vice president Al Gore. The awareness that Gore raised resulted in a Noble Peace Prize in year 2007, which was awarded jointly to with Intergovernmental Panel on Climate Change (IPCC). This award could be considered as the "peak" in the media attraction to this subject.

Even if the movie audience has forgotten the film's message, or if the current financial crises may distract from the focus on environmental issues, climate change itself is not standing still. The report from the IPCC's network of 4500 scientists' concludes that there is global warming and the climate is changing. Different scenarios estimate temperatures will rise between 1- 2.5 Celsius in year 2100 (www, mongobay, rainforests, nr1, 2009) and sea levels will rise 3-10 m if the climate change continues as in the past hundred years.

Concern about the consequences has created action which aims to reduce emissions and clean the environment. Carbon emissions from tropical deforestation are calculated to be responsible for 18-25 % of all the worlds' emissions (Stern Review, 2006). European Union has therefore implemented a carbon emission market where member states and companies can trade carbon emission rights (CERs). By investing in emission reductions, companies can sell their surplus of emission rights and so gain revenues. These investments can be made either nationally or internationally and strategic companies invest where there is the lowest cost for the reductions.

One of these possible carbon offset strategies is to invest in rainforest to prevent deforestation and ensure carbon dioxide remains stored in trees rather than be released into the atmosphere. Brazil has the largest area with rainforest in the world and also the biggest deforested area. Since Brazil has this problem and is situated as a possible investment country for projects in preventing deforestation, they serve as an interesting alternative for investigating in this type of carbon offset investments.

Deforestation and REDD

Figure 1 shows that deforestation is the forest sector's more significant net source of green house gas emissions. Furthermore, the figure implies that to decrease carbon emissions, the forest sector can deploy three different strategies, which are:

1. Conservation
2. Reforest/afforest
3. Substitute fossil fuel with biomass

(Beyond REDD (2008)

REDD-projects aim to address one or more of these conservation strategies. Since the regulations for deforestation are neither agreed upon nor included in the current international

protocols there has yet to be a project within the reduced emissions from deforestation and forest degradation (REDD) field.

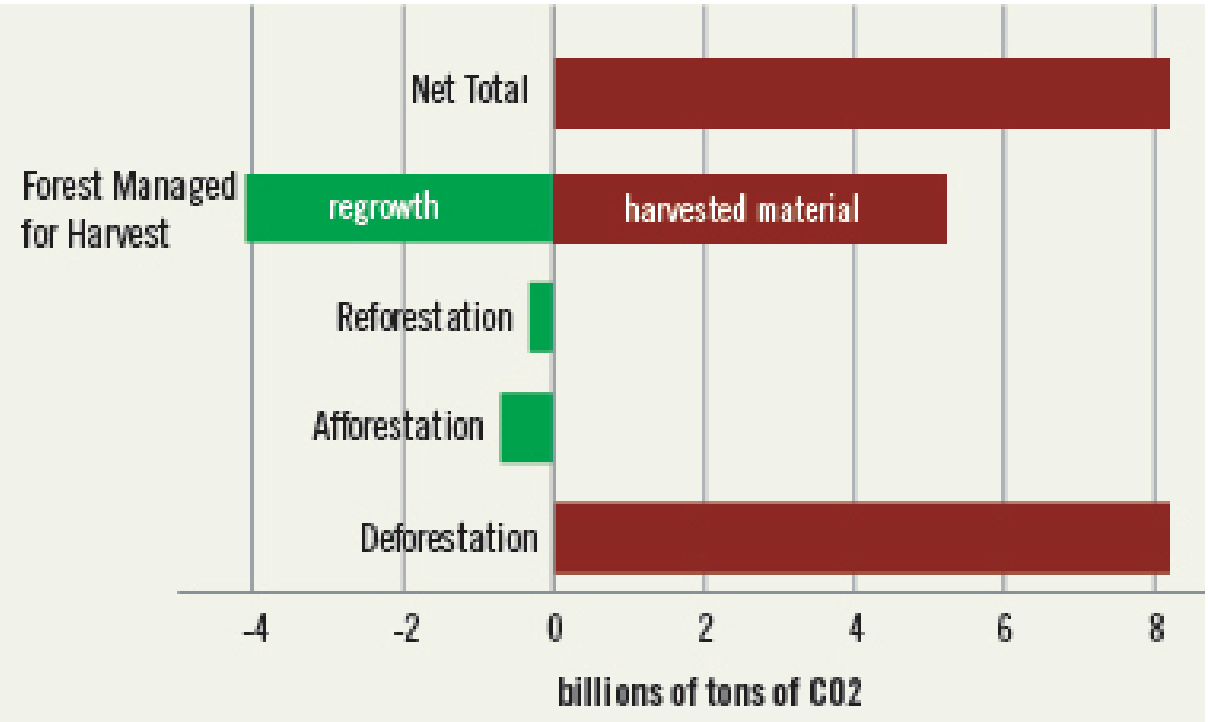


Figure 1. Carbon dioxide, conserved in different forest stages, (www, earthtrends, nr1, 2009).

REDD is different from the other mechanisms to reduce carbon emissions in the sense that REDD activities can provide carbon credits or give the owners to the forestlands under threat a certain amount of money to cover the alternative revenue the land owner could have otherwise receive from say cutting down the forest and starting an agro business instead. In Costa Rica, a trial REDD project pays land owners between $210 to $537 per hectare and year for keeping the forest intact (www, mongobay, nr1, 2009).

Brazil is known for both its massive areas with rainforest and carbon emissions through deforestation see Figure 2 below. The president of Brazil, Lula da Silva has promised to decrease the level of deforestation through protection of more rainforest areas and by making it harder to log illegally. The target is a reduction with up to 70 % compared to the past 20 year's average, which can be seen in Figure 3 below. Brazil will therefore be a key country for a mechanism like REDD that works for avoided deforestation.

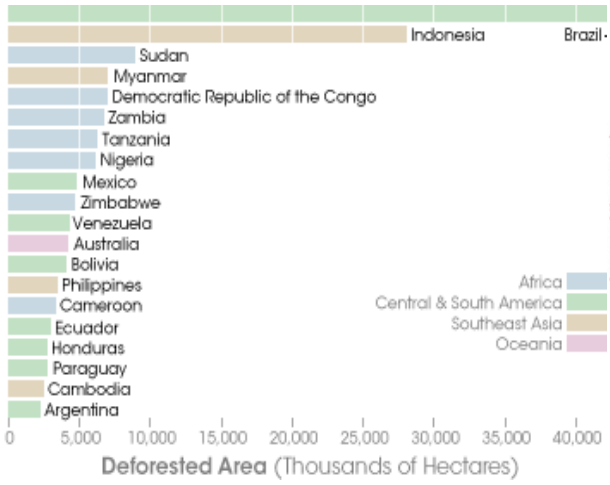


Figure 2. Brazil is the worst polluter of carbon emission through deforestation. (FAO Report, 2005)

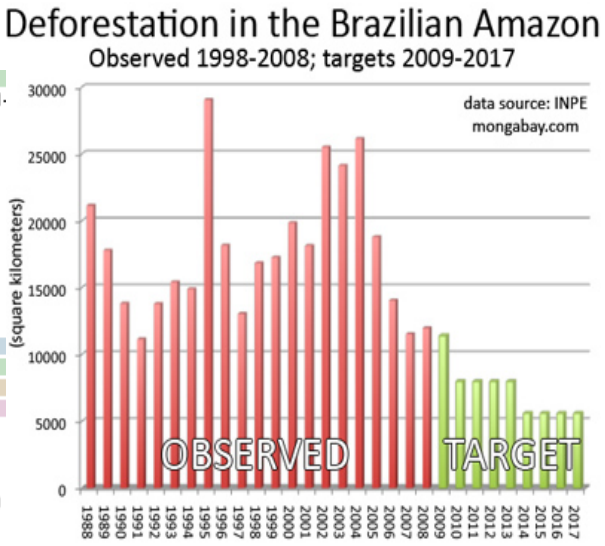


Figure 3. The targeted decrease in the level of deforestation in Brazil. (www, mongobay, nr3, 2009)

Concept of investment calculations and investment model background

As potential owners of forest/deforested areas, companies can potentially benefit from REDD incentives. However, since REDD is an emerging concept, the costs and benefits of REDD projects are generally unknown. Firms and other actors could therefore benefit from assessing the investment case that often form one basis for firms to decide whether to invest in REDD-projects or not.

A key figure in investment cases is net present value outcome. To derive this information different input data is needed such as transaction costs, cost of purchased land area, the price level on emission rights and the project time frame. NPV can in turn be used to estimate the breakeven level of the price for carbon emission rights.

However, inputs to NPV calculations often have uncertainties, with the extent of uncertainty varying from input to input. To take uncertainty into consideration, three different cost/benefits scenarios are often used in business case analysis. Uncertainty and risks are however perceptions. Experts may have different perceptions and an underlying rationale for their risk analysis. To aid decision making, a decision tree model is often used, where risk analysis values are built into the decision tree.

Accordingly, this work will devise three scenarios, assess experts' opinions about risks, and shape decision trees to illustrate the costs, benefits and uncertainty in a potential REDD-project in the Brazilian Amazonas. The decision tree will also include various transaction costs, which is the term used for the costs that associated with international efforts to control and monitor environmental initiatives. Estimates of these transactions costs therefore need to be made in order to derive net present value and assess whether there will be a positive return on the REDD investment.

Such transaction costs are of particular interest since investments in carbon offset projects are a newly developed area. Firm's knowledge about such costs are likely to be generally low and the potential outcome of REDD type investments are relatively unknown. The transaction

costs are one part of the total investment cost and this thesis is estimating into what extent they are important for the companies' investment decision. There is also the possibility that net present value outcomes of the decision model show a negative return. If this was a likely outcome then it would be of interest to ascertain whether firms have other non-financial incentives for REDD-type investments, for example corporate social responsibility (CSR). In such situations, could CSR be a sufficiently good reason for firms to accept a certain level of investment loss in REDD-projects.

1.2 Research questions

Based on the introduction to the climate change and deforestation of rainforests, this thesis will try to answer the following research questions:

1. Are firms investigating investment in REDD-projects?
2. What are firms' perceptions of the financial and non-financial benefits?
3. Is the Brazilian Amazonas a suitable area for investment in REDD-project?
4. Is there a possible economical benefit for forest companies or investors when investing in a property used for REDD-project?
5. Do the transaction costs involved with investment in REDD-project matter?

1.3 Purpose

The main purpose of this master thesis is to assess the companies' interest in investing in REDD-projects in the Brazilian Amazonas.

Factors other than purely economical benefits will also be investigated.

The thesis uses a prospective focus case of investing in 10,000 hectares of land in the Brazilian Amazonas for carbon conservation and therefore offsetting emissions as a base for the research. ”Soft” data will be used to assess the investment incentives and ”hard” data will be used for the financial calculations in the investment model. The main emphasis is in the area of carbon dioxide emissions and climate change impact through decreased deforestation.

1.4 Delimitations

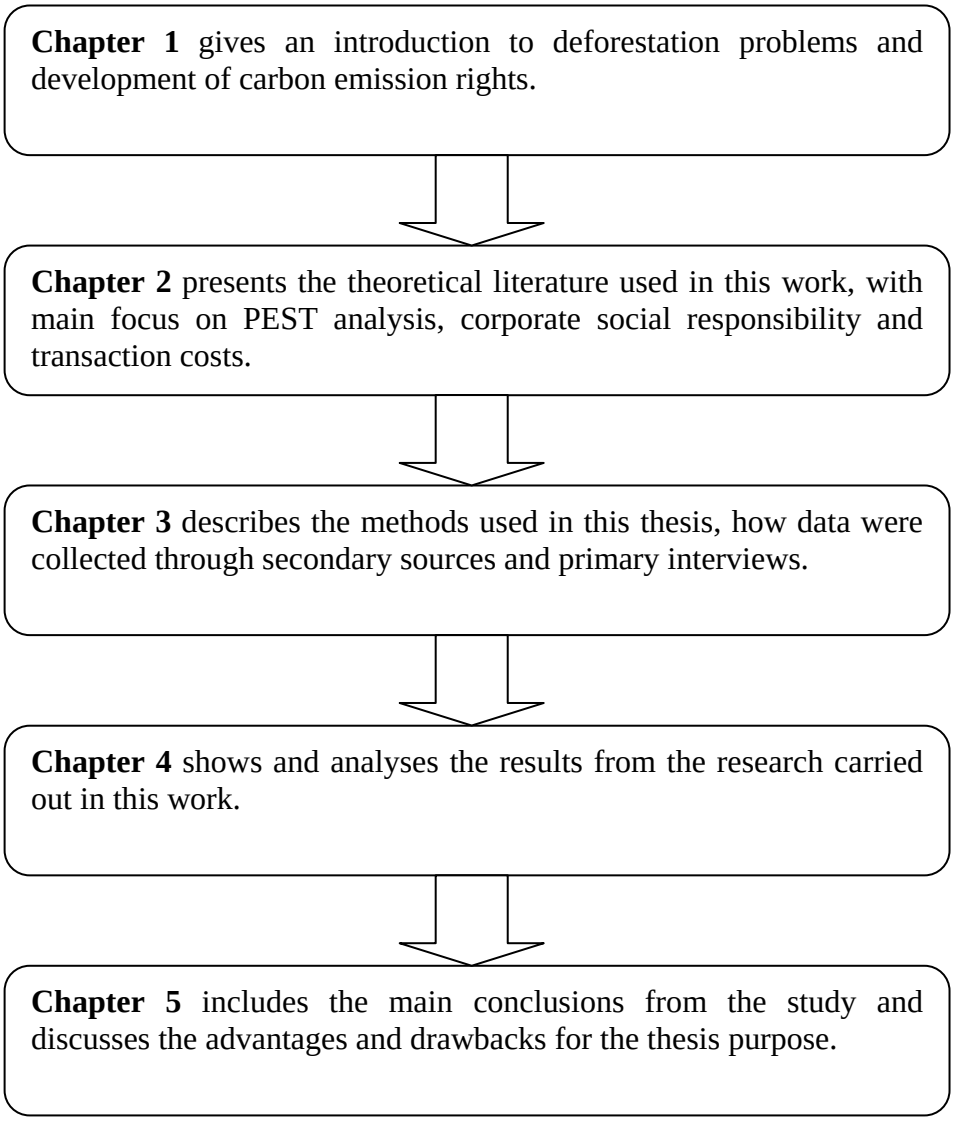
A number of assumptions and constraints have been used for being able to carry out this thesis:

- ✓ The study is case based to 10,000 hectares of rainforest in the Brazilian Amazonas
- ✓ Even if there is no implemented carbon project in deforestation yet, the assumption is made that this will be agreed upon during next UNFCCC meeting in Copenhagen in December 2009. Therefore has the framework for CDM-projects been used for the investment calculations since this is known and well developed.
- ✓ The assumption is made that the land that will be invested in, without the investment would have been translated into agricultural land with result of burning of the land and also with loss of underground carbon, therefore used as a baseline when calculating the saved amount of carbon emissions.
- ✓ Since there is no structure for deforestation project yet, the timeframe used in this thesis is 30 years, based on a trial REDD case in Indonesia
- ✓ No account for growth resumption of carbon dioxide over time, assumes that there is a constant level throughout the investment time.

- ✓ The forest ground is assumed to be burned if this investment would not have taken place, so underground conserved carbon is also taken into account when performing the calculations.
- ✓ A general baseline of 10 %, in the calculations for the conserved carbon dioxide in the decision model
- ✓ No alternative investment or opportunity costs are considered when calculating the investment model.
- ✓ In the interviews with firms and the risk assessment experts, some questions had to be about CDM-projects since REDD-projects are not implemented yet.

The assumptions and constraints originate from general knowledge in the area of REDD-projects and from CDM-projects in forestry.

1.5 Disposition of thesis



2. Theoretical framework

The following chapter presents the theories, models and calculation background used when performing this thesis. The main emphasis has been on PEST analysis, corporate social responsibility and a decision model with transaction costs and net present values for the case in deforestation. This theoretical framework has been used for the analyses of the carbon offset advantages and drawbacks and will be analyzed in the end of chapter 4.

2.1 PEST analysis

To assess whether a particular country or sector is a suitable investment target, PEST models are used to map the context. These are therefore one basis for the decision making.
The PEST-analysis is the result from a wide environmental scan, see Figure 4 below, which has the purpose to analyze the current macro environment that the forest company may meet and it is based on the following factors:

- Political
- Economic
- Social
- Technological

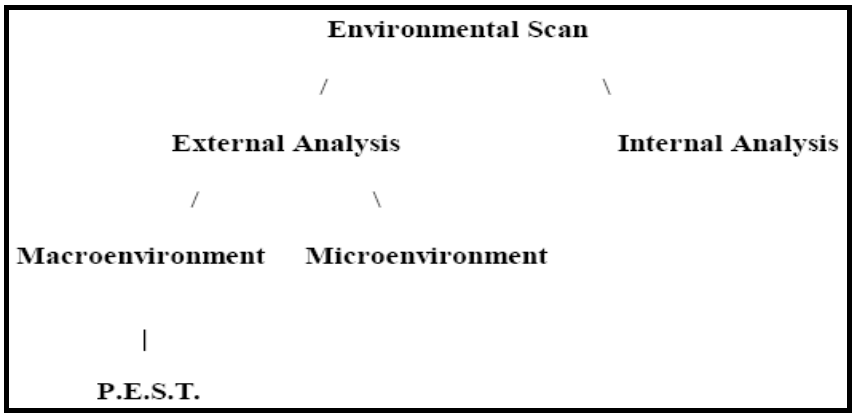


Figure 4. Overview of where PEST analysis is situated within the analytical framework. (Hansson, P., 2009)

A good starting point in the analysis is to ask the question what factors that historically have affected the environment and what impact these have in the long run on the forest companies' actions (Armstrong, M., 2006). There are many factors that could affect the forest company and according to Johnson and Scholes (1999), the PEST analysis provides a clear summary of these and the breakdown of the different categories in the PEST analysis can be seen below:

The political factors

- political stability
- environmental regulations
- media
- tax policy
- employment laws
- trade restrictions and tariffs

The economical factors

- exchange rates
- inflation rate
- economic growth
- interest rates

The social factors

- emphasis on safety
- population growth rate
- career attitudes
- age distribution
- health consciousness

The technological factors

- rate of technological change
- automation
- technology incentives
- R&D activity

The different parts in the analysis can be a good base for an information summary but for having use of the information, a critical viewpoint about the material must be done and a discussion be held on how the information may affect the firm. According to Johnson and Scholes (1999), two different questions will make the discussion easier: what are the main factors for change and what is the distinction between the effects of change from the main factors?

The main factors for change

The carbon investor can analyze a number of different factors that can affect the structure of a market or industry. The recent development of carbon emissions trading can be seen as an example of a main factor that affects the forest industries and the implementation of REDD-projects can make it possible for them to offset their emissions to where there is the lowest cost for the reduction (Esty and Winston 2007).

Another factor is how political decisions can lead to big changes, if for example new carbon offsetting mechanisms are implemented like REDD-projects. This results in global wide carbon trading where forest companies and investors seek new possibilities to gain revenue from lower emissions as well as the non annex 1 country that the investment take place in will also gain improvement.

The effect of change from the main factors

Next question a forest investor should ask when performing the PEST analysis is in what extent there is a change from a main factor. The effect from a change will result in different outcomes depending on what industry areas are affected. The company can therefore do research about historical situations and try to use that data for estimating possible future development (Johnson and Scholes, 1999).

2.2 Corporate Social Responsibility

2.2.1 General CSR background

Through corporate social responsibility (CSR), companies have found a method to communicate their message of environmental actions to their consumers, the public and media. This is a highly important task today and it is almost mandatory for a successful company to have some sort of sustainability department that outlines the companies' environmental strategies.

In chapter 2.*2.1 General CSR background*, a short introduction to this subject will be presented and followed by more adopted views in chapter 2.2.2 - 2.2.4.

CSR definition

The general definition of corporate social responsibility is that this gives a description over the company's economical, environmental as well as social impact on the community (Kytle and Ruggie, 2005). The goal for the CSR work can either be seen as a way for businesses to

maximize their profits within legal boundaries and with minimal focus on the ethical aspects, or they can use this as a tool for a broader responsibility for the society (Schwartz and Carroll, 2003). In which case, businesses' focus on CSR today is bigger than in the past, according to Marrewijk, (2002). The state has managed to take less responsibility for the society and put more responsibility into the firms' and civil society's hands, see Figure 5 below. In general, businesses are responsible for creating wealth through cooperation and competition, the civil society is responsible for shaping thr society through their collective actions and the state is responsible for creating and maintaining control of the society through legislation. The role that the civil society plays has grown through increased awareness of the importance of a healthy society and the growth of multinational and multibillion companies has put pressure on the state to act. The state has managed to put pressure on the businesses through putting a cost into emissions from the businesses factories. Raising the energy tax on household energy consumption for the civil society has increased the pressure from the state.

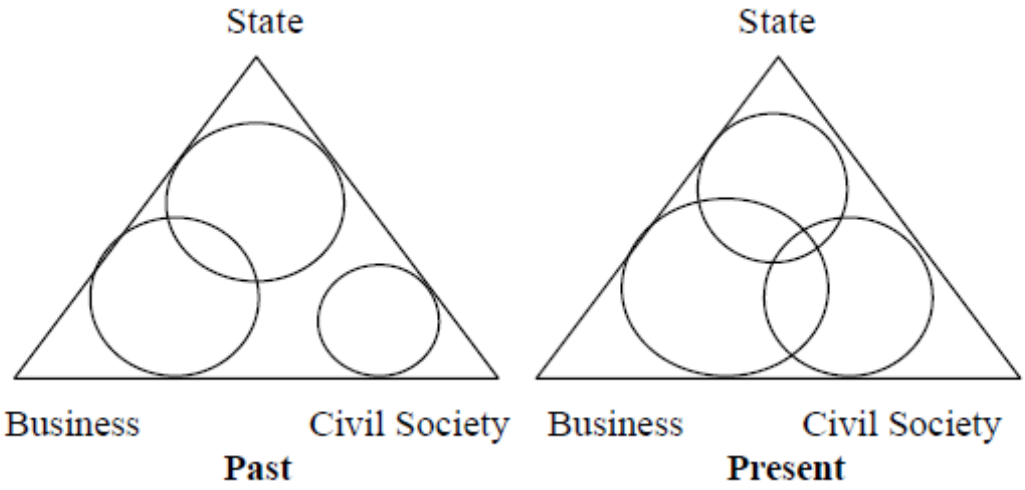


Figure 5. Shows the change in responsibility within the different actors, and the interaction between them. (Marrewijk, 2002)

With this increased pressure on businesses, the work with CSR has lead to that three different aspects of CSR have evolved (Kytle and Ruggie, 2005):

- Ethical responsibility
- Environmental responsibility
- Social responsibility

Ethical responsibility is mostly about companies way of doing their business, their business ethic (for example, policy against bribes), what kind of requirements they have on their subcontractors and how they act for following up if their subcontractors run their business in line with the requirements the company ask for. This could be about if the subcontractors' employees have acceptable working conditions, legal working hours, that the workplace is safe and that unions are accepted. This is also about to guarantee that the products do not affect the user in a negative way.

Environmental responsibility is about if companies act in a way that is sustainable environmentally and this is to ensure that the company, the customers and the subcontractors are aware of the business impact on the environment, that the company's resources are used in

an effective and sustainable way and that the products are not dangerous and transported in the most environmental way possible.

Social responsibility is about that the employees are satisfied and that there is a healthy balance between the different genders, ages, ethnicity and religions on the workplace and also that no group is discriminated in any way. The companies' social commitments are about how the company contributes to a better society through, for example, letting their employees work voluntary during their working hours or through employment of groups that are discriminated on the labor market. The social commitment is often reflected in concrete actions on every separate workplace within the company and is engaging the whole personnel. Putting money into research or sponsoring some sports arena does not count as social responsibility commitment if not several of the employees are engaged in the sports club during work time. However, within social responsibility different types of donations to charitable purposes do fit. Another approach to CSR than the above described have Schwartz and Carroll (2003) come up with. This concept is based on a four domain view on CSR, represented in a pyramid model in Figure 6 below. The four different domains of CSR are from bottom and up: economic, legal, ethical and philanthropic. This show a view were the economic responsibility is the most important and something that is required by the firm since the shareholders want profit and maximizing earnings per share is the goal, this is therefore the base of the pyramid. The second level is the firms legal responsibilities, also something required but from the society. The third level is the ethical responsibility and this is not a required responsibility, more something that is expected by the employees, shareholders, consumers, stakeholders and the community. In the top of the pyramid and the fourth level, the philanthropic responsibility is represented and this is just something the firms should work towards, more like their vision.

Figure 1
Carroll's (1991) Pyramid of Corporate Social Responsibility

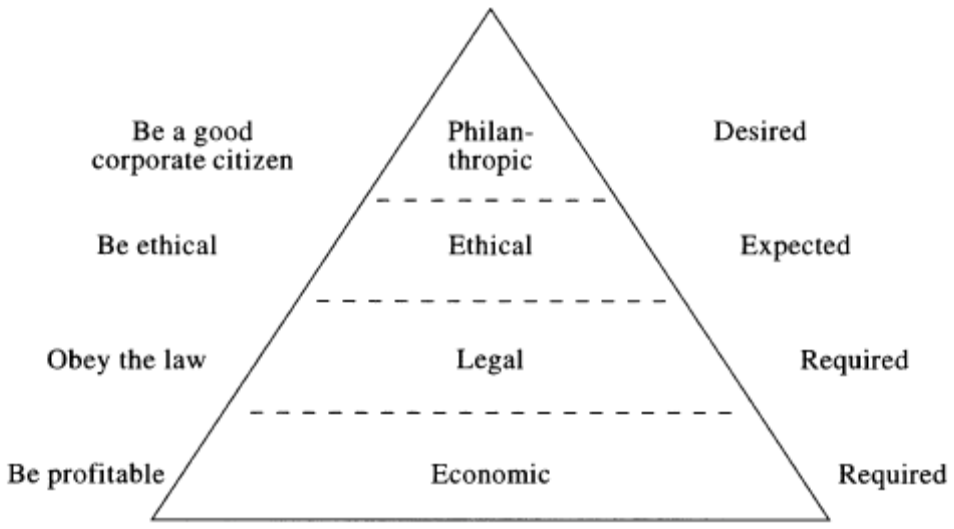


Figure 6. Pyramid of Corporate Social Responsibility with the four domains. (Schwartz and Carroll, 2003)

Since this pyramid model represent a thinking with hierarchy of the different CSR domains, it is easy to believe that the top, philanthropic responsibilities, are the most important and the economic least important. Carroll's perspective is the other way around. The dotted lines

between the domains in the models do not capture the view of non-mutually exclusive nature of the domains. So, for decreasing the risk for misunderstanding of the CSR concept, Schwartz and Carroll (2003) developed the three domain model, a new model that excludes the philanthropic responsibilities, since they are not considered as a responsibility, more a voluntary and ideological view. The philanthropic activities such as charities can be seen as an ethical activity and therefore be put under the ethical responsibility umbrella. So this model contains economical, legal and ethical responsibilities, and different levels of these responsibilities, those which are purely and not purely activities in each category, see Figure 7 below.

Figure 2:
The Three-Domain Model of Corporate Social Responsibility

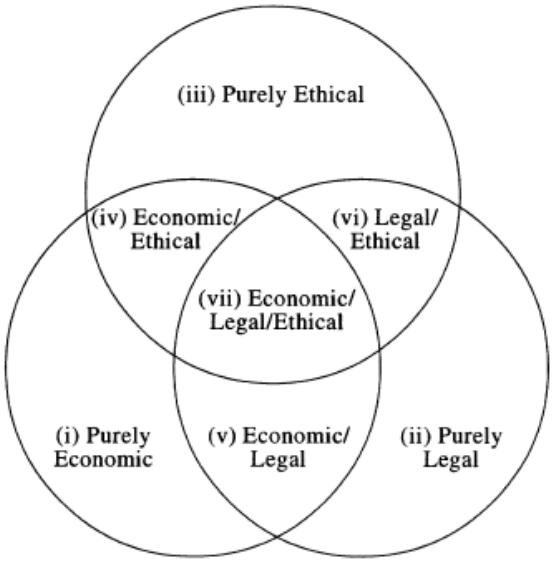


Figure 7. The three domain model of Corporate Social Responsibility. (Schwartz and Carroll, 2003)

The economic domain now consists of direct or indirect activities that have positive impact on the firm. Direct activities could be something that increases the level of sales or cut costs, meanwhile indirect activities could be something that increases the morale of the employees or help the firms' public image. Purely economic activities are the ones with economical benefit only and non-purely could be payments of salary to workers instead of fire employees when the business times are slow. This would be considered as an economical/ethical activity. A non-purely economic activity within the economical/legal area is rare but it could be a company's way of using bankruptcy laws for remaking the business and therefore save jobs.
The legal domain consists of the company's actions towards legal restrictions and obligations. Purely legal activities could be the ones not considered ethical or economical, like putting warning signs on their products despite the company's resistance and non-purely could be an investment in lower emission from the factory, which is forced by the law. This could be seen as ethical as well, since it does not provide any profit.

The ethical domain consists of the firms response towards what is expected by the society, stakeholders and consumers. Purely ethical activities could be that keeping a restaurant closed on Sundays because of religious reasons. Almost all illegal activities are also unethical and would therefore not be seen in this model. Instead, the stage all firms want to reach with their business activities is the one in the center in the three domain model, the ones that are

economical, legal and ethical. This could be a firms' decision to withdraw a product from the market, since it is based on a toxic material and could cause unhealthy situations for the consumers. Even if it is a legal product; the firm chose to make this decision based on all the tree domain factors. Also, different focus on the domains differ between firms and some put more focus into economic responsibility and therefore the weight of the total CSR value are bigger there. Some act more legal or ethical and some try to have an even distribution among the domains, see Figure 8 below for different examples.

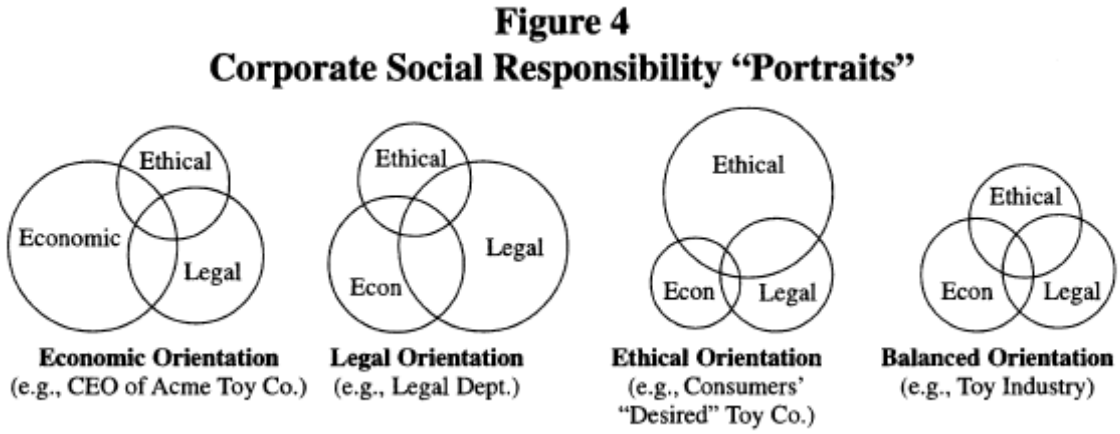


Figure 8. Different CSR portraits of firms, where different weight are put into the three categories. (Schwartz and Carroll, 2003)

2.2.2 Risk management and CSR

All this work with CSR is often wanted by the firm to be reported for information dissemination of their actions, and when reporting the company's CSR report, they can use an international standard provided by *The Global Initiative in Amsterdam.* This has 79 indicators that the companies can use as checkpoints for their actions and impact. These indicators are then ranked and compared to other companies in the *Dow Jones Sustainability Index* and *FTSE4Good Index,* to better evaluate the level of the CSR work that is achieved.

It is increasingly hard for companies to have total overlook over the concept of corporate social responsibility since their actions are watched by regulators, NGOs, consumers, investors and governments. See Figure 9 below for an overview of how different age groups tend to view climate change and CSR. This has resulted in that a well performed and outlined CSR strategy is something that is a core competitive factor today (Kytle and Ruggie, 2005).
Global companies have the most trouble with this since they meet different regulations and restrictions in different markets and therefore, the base of the CSR strategy has to be adaptable to meet the different needs.

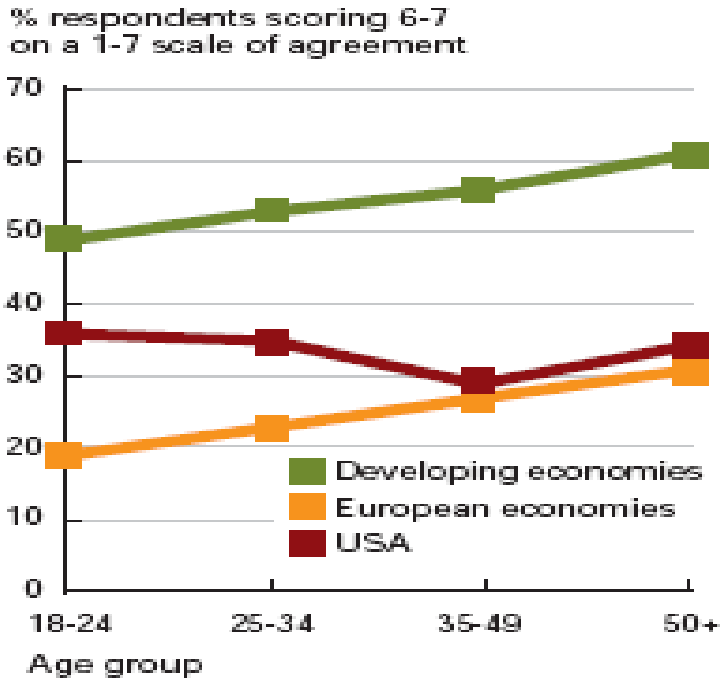


Figure 9. Concerns about climate change by age group, HSBC Climate Confidence Index 2007. (The Economist, 2008)

Companies are afraid of doing some actions that might end up hurting their consumer trust. This can be seen by analyzing the result of the question "What are the main business benefits to your organization of having a defined CSR strategy? The result was that 53 % responded "Having better brand reputation" (The Economist, 2008).

If some of the companies' way of doing business is connected with something that media could bring up some negative attention to, that would immediate affect the company's result as the sales are likely to slow down. There are many examples of companies that have misjudged the strength in negative media attention; Exxon Mobil's handle of the oil catastrophe outside Valdez in Alaska in 1989, Chevron's handling of their former oil plants in Ecuador during the 1990s that destroyed the life for 30,000 indigenous people and now is up for legal mass suit, IKEA and HM used children in their producing factories in China in the late 1990s.

Even if there only is a false accuse of having this type of business, the company will be judged by the public until the opposite is proven. Even if the sales will not be affected by a unethical behavior, there is always a risk that the investments in the companies will decrease since it is popular today that different funds invest in ethical strong companies, in USA approximately 17 % of the pension funds invest with the ethical behavior in their mindset (Karmali, 2008).

In the McKinsey & Co Survey (2006), of the responding companies did 82 % think that "Environmental issues including climate change" is a risk and provide limited opportunities. The survey results in Figure 10 below show that there is a gap between what companies aspire and their actions.

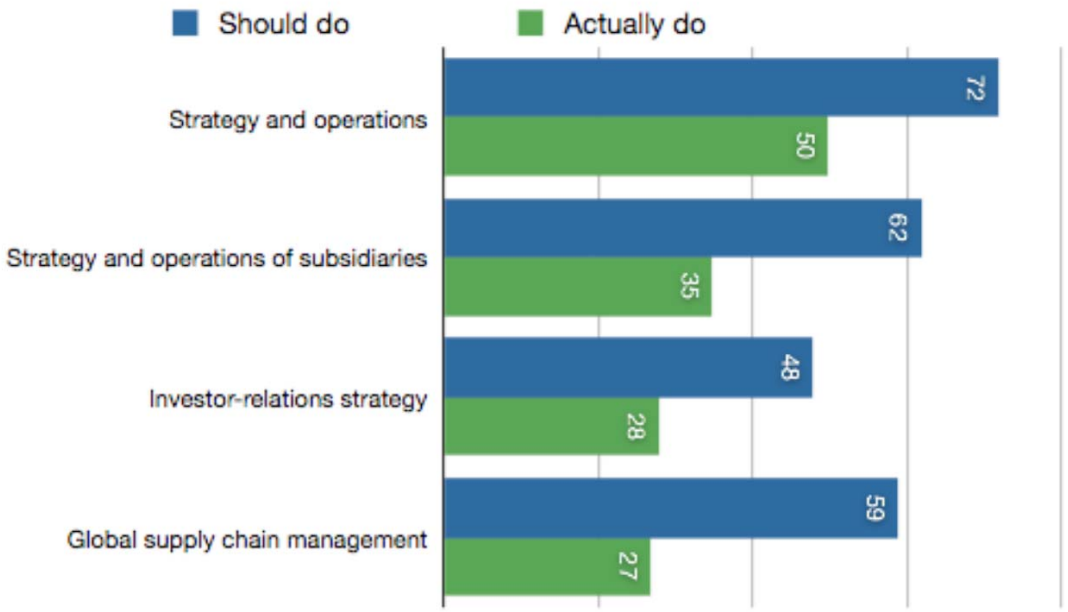


Figure 10. Answers to the question "What should your company do to address environmental, social and governance issues?". (McKinsey&Co report, 2007)

2.2.3 Risk reputation and company management

The main goal with the corporate social responsibility work is to gain competitive advantage over the companies' competitors. Consulting firms operating with CSR strategies want the companies to think that the fastest and best way to understand the world their businesses are operating in is through CSR and this will therefore help them to decrease their level of risk. Through internet, the NGOs have a fast and easy way to spread negative publication about some companies' actions and as a forest investor in rainforest in Brazil, for not losing the reputation of the company's name, the investment better be successful and not proven to be illegally harvested by the validation five years after the start. Therefore, the risk management of this case might have further incentives to have some insurance through woodmen or regular guards controlling that the forest still will remain intact. In Figure 11 below, people's look at the responsibility for different actors and the climate change focus is presented.

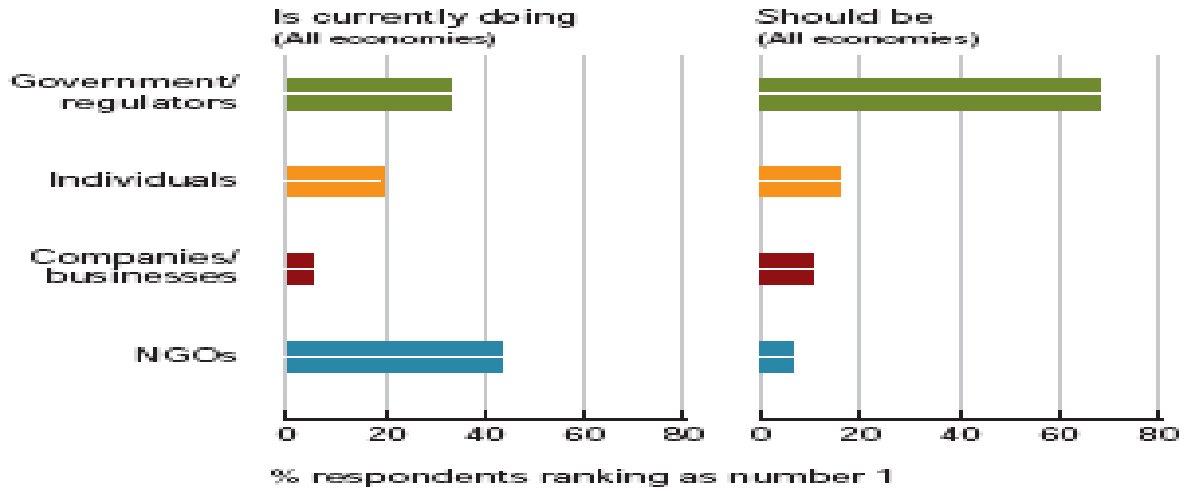


Figure 11. Answers to the question "Who do you think is currently, and should be, playing the leading role?" HSBC Climate Change Survey 2007. (The Economist, 2008)

2.2.4 Initiatives by multi stakeholders

Companies that have developed their CSR strategy work to a certain level with their reports focus on multi stakeholders initiatives. This is to gain confidence and positive publication from the participative NGOs. Since both companies and NGOs wants to achieve the same goal in the end, even if the way there can differ, the companies have understand that they are better off working close with the NGOs instead of having a constant battle (HBR, 2006).

For example, a forest company investing in a REDD-project in Brazilian Amazonas could work close with some NGO that focus on the protection of the rainforest or some other that works for the saving of indigenous people. Professor Burgman at Michigan State University has with a new model, developed a strategy of how companies and NGOs could interact, see Figure 12 below.

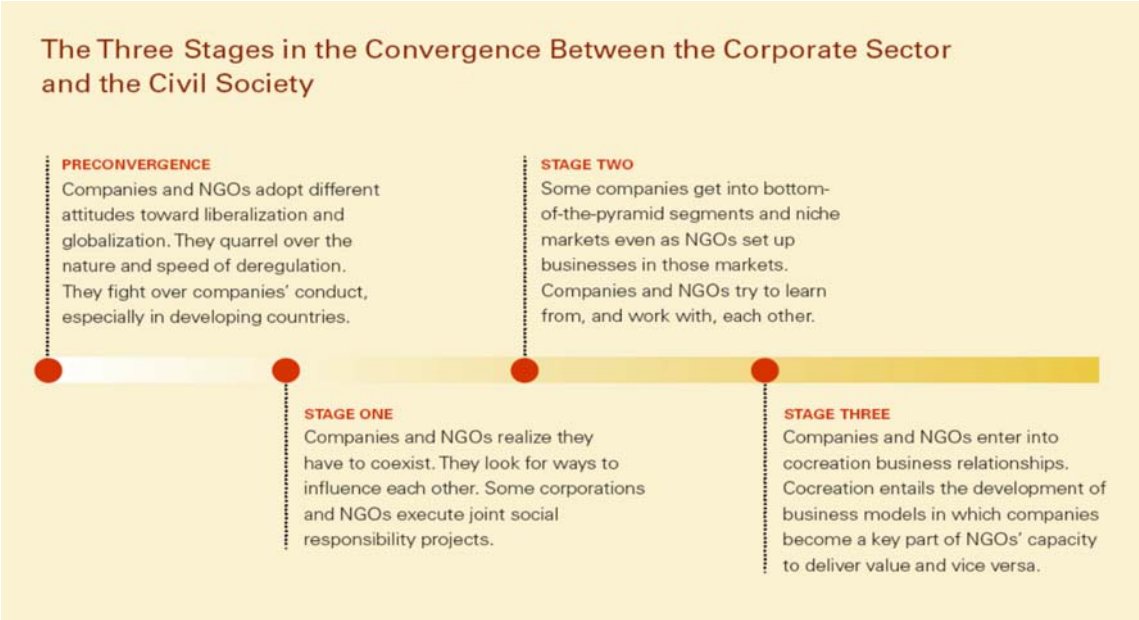


Figure 12. Brugman's model on co-operation between firms and NGOs. (HBR 2007)

2.3 Transaction costs

2.3.1 Definition

When a company does certain activities that include need for information, there is a cost included when searching for this and this is called transaction costs. These could be costs for making the transaction to happen or costs for keep the economical machinery running (Kreps, 1990). Another definition for transaction costs are costs for defining and defending the ownership in connection to the transaction. The total costs are set to be the production costs plus the transaction cost. Transaction costs can occur both for the buyer and the seller of goods or services, or both. They can arise both before and after the actual transaction. Examples of actual transaction costs can be seen in the list below:

- Search cost
  - One searches for a buyer or seller, for example marketing or pre studies for sourcing
- Information cost
  - Product description or brochures

- Measurement cost
  - Measurement of length or product testing
- Bargaining cost
  - Process where both parts agree upon the terms for the transaction
- Decision cost
  - For evaluating and comparison of the terms
- Control cost
  - Cost for controlling that the counterpart is following the agreed contract, buying order forms or bills and getting acknowledgements
- Forced cost
  - Cost to make your counterpart to correct neglects, reclamations or recovery

The reason for transaction costs to occur could be that the information is not equally distributed among the parts or that the information is not free to obtain or use. Another reason could be that the information has economical importance for the transaction (Nygaard and Bengtsson, 2002).

2.3.2 Behavioral properties

The transaction costs theories are built upon some behavioral assumptions with a realistic view on the market:

- Bounded rationality
  - You have either a limited amount of information or you cannot see all the alternatives for making the most optimal decision in no time without a cost. This is know but you try as hard as you can
- Opportunistic behavioral
  - You take into account that the actors actions are done in their own good interest, like for example they do not share all available information to the counterpart, the seller of a bad car does not tell the buyer all things that are incorrect with the car.

Three different properties can be distinguished within the actual transaction that will affect the transaction costs and they are *asset specificity, uncertainty and frequency* (Kreps, 1990).

Asset specificity can be seen as in what extent an asset result in lower value if it is used in other areas than in the one it was intended for when it was purchased. There are six different types of asset specificity:

1. Location specificity
   This is bounded to the assets physical location. This is the case for example with production machinery that demands electricity, water or oil supply and this cannot be located anywhere.
2. Physical specificity
   This is bounded to the assets natural use and if the asset only is used for a certain type of transaction, the physical specificity is high.
3. Brand specificity
   This is bounded to investments in development or marketing of a certain brand. If resources are used for and signals if a certain brand have no alternative use opportunities, could be. a component or spare part that is marked with a certain brand.
4. Dedicated asset specificity

This is bounded to the assets ownership situation. If the asset (which also can be a coworker) is obtained with purpose of a coworker, it is a matter of dedicated asset. It is dedicated to the actual transaction and it can be a special tool developed only to a certain production or a coworker who is employed for performing some special transactions between the parties.

5. Human specificity
   This is bounded to the coworkers and if a coworker has unique knowledge about a certain production process, the human specificity is high and therefore hard to replace.
6. Temporary specificity
   Describes different situations in which an asset can be used only at a certain time and on a given place. All raw materials or supplies are not infinite sustainability and the temporary assets specificity, for example, is high when it comes to a commodity or source of supply which must be supplied at a certain time in a production where timing is of great importance.

Uncertainty
No activity has all possible information available about the consequences of your own, competitors or coworkers strategizing. Therefore, it is always included a small portion of uncertainty and this will result in higher transaction costs since it increases the requirements from the planning, adaption monitoring and regular information retrieval.
Thus, the transaction costs increases gradually with the level of uncertainty, which results in an incomplete information base and increases the need for renegotiation or continuously adjustments of the contracts. Contracts are the most suitable way to lower the uncertainty levels and these can take form in three different types:

- Classical contracts, where everything is covered in every detail.
- Third part is involved, an arbitrator is the one that decides and this contract is not as detailed as classical contracts.
- Through bilateral agreements between the parties, this is often the case when negotiation

Frequency
The transaction frequency describes the level of identical transactions over time and the more identical transactions that can be organized in the same regulatory structure, the lower the transaction costs will become.

According to Kreps (1990), the overall factors that can reduce the level of transaction costs between two parties are trust and reliability. This will result in long term relationships with long term agreements and better routines, which will help to decrease the transaction costs. This will also lead to better reputation which will end up in more interested customers and the company will be seen as a reliable supplier since good reputation helps the customer to predict the company's behavior.

2.4 Decision model

2.4.1 Net present value

The net present value method is a calculation methodology, commonly used when performing profitability analysis of investments. The method calculates the present value of investments different cash flows that take place in the future and bring them back to time 0, using a given interest rate of return for the discounting (Brealey et al., 1996).

This approach can either calculate the net present value directly or through calculating the net present value of the actual investment and then compare it with the investment cost but the two variants outcomes are totally assimilated since they are doing the same thing.

The calculation of the net present value can be compared with the amount of deposit funds that are to be put into an account. Since it can be interesting to know what level of deposits will be required to put in today, to receive a certain amount at time t in the future. This calculation is a rate of interest calculation and the net present methodology can be seen as the opposite. The Figure 13 below, show the formula in how the net present value of cash flows until time T is calculated.

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}$$

Figure 13. Net present value formula (Principles of Corporate Finance, 2005)

- *t* - the time of the cash flow
- *T*- the total length of the investment time
- *r* - the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk.)
- C_t - the net cash flow (the amount of cash inflow minus cash outflow) at time *t*

Figure 14 below present the different cash flows that take place in the future affect the net present value. Without discounted cumulative values, the blue line, the cash flows in the future is worth the same amount as the net present value. The yellow line shows the discounted cash flows and what they are worth earlier/closer, to the investment period for a declining curve as the time goes by.

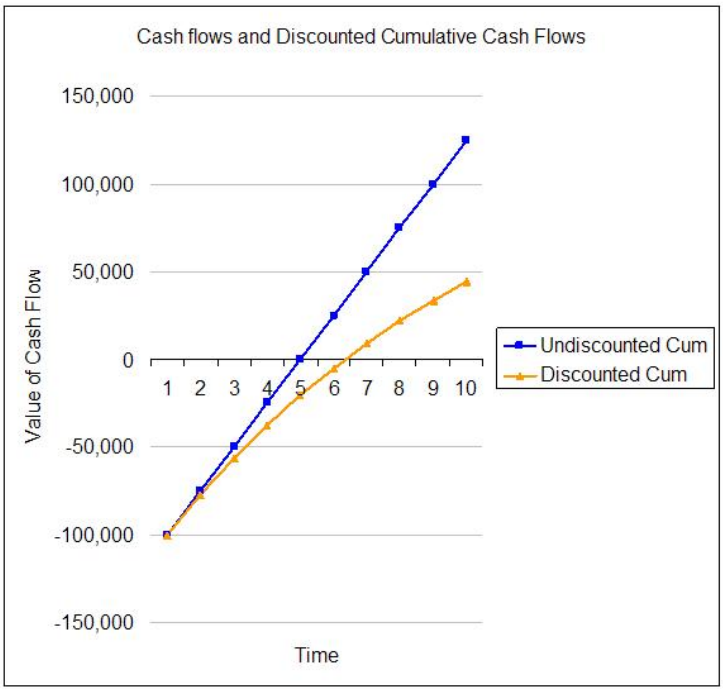


Figure 14. Graph over the difference between cash flows and discounted cash flows. (Brealey et al., 1996)

2.4.2 The decision tree method

Using a decision tree method is a useful tool when making difficult decisions according to Yuan (1995). This is a supporting tool that through using a tree look-alike model or graph, different decisions with different outcomes depending on chance events can be mapped out. The main areas to use decision trees are when performing strategy analysis, since the model help the user to identify the most likely outcome through calculating the different alternatives expected values.

For being able to compute the decision model, the different alternatives outcomes must be known and the different chances or alternatives have to be estimated through risk assessments. Every outcome is given likelihood for happening and this is a value between 0 and 1. The decision tree is built upon like in Figure 15 below. This is an example of a decision whether or not to buy a car for transportation to work. The different outcomes of the decision are stated on the branches to the right and the risk estimates are located below each branch.

The two different options in this case, results in different costs and the probabilities are estimated subjectively or through historical statistics. There is 70 % chance that the car works and if it works, there is 50 % chance that it will be high maintenance cost. So for calculating the expected value (EV) of that the car work is computed like this:

EV=Outcome 1 *probability 1 + outcome 2 *probability 2 and with numbers,
EV=2000*0.5 + 1000*0.5=1000+500= $1500

All these EVs are calculated and can be seen in the Figure 16 below. Since this is a decision about receiving the lowest cost, the decision ends up being to *Walk*, with the EV of $1,750.

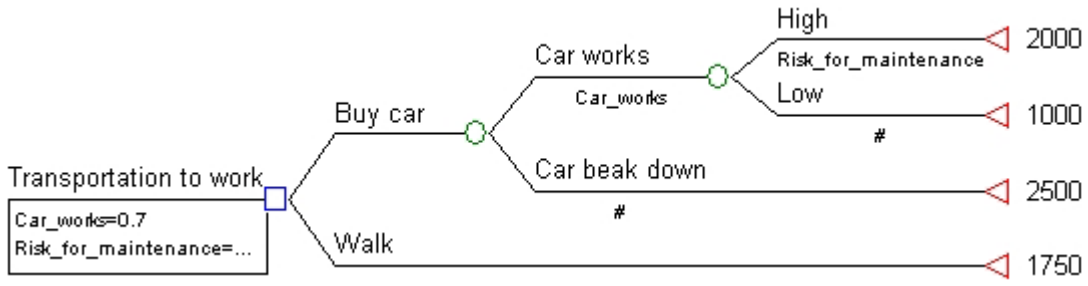


Figure 15. Decision tree before calculation of expected values. (Hansson P., 2009)

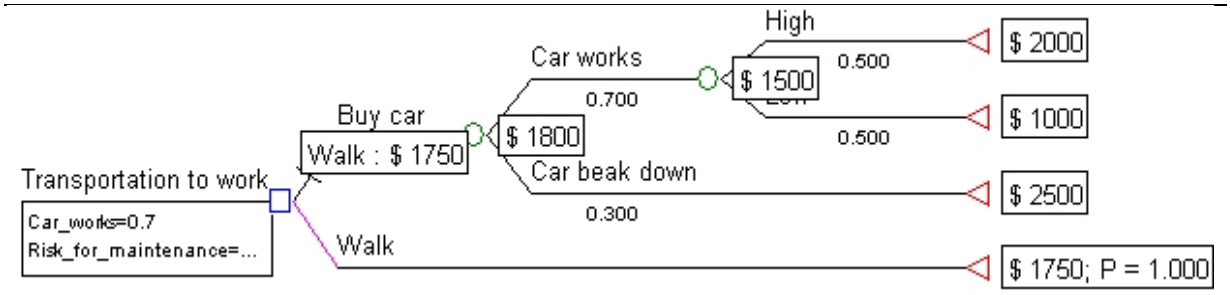


Figure 16. Decision tree after calculation of the expected values, "Walk" is the decision. (Hansson P., 2009)

3. Methodology

The following chapter presents the methods that have been used when performing this master thesis. Advantages and drawbacks are described for the collection of primary and secondary data.

3.1 Research approach

For being able to answer the asked research questions, and approach with four steps has been used in this thesis. These steps are:

1. The framework of the Clean Development Mechanism has been used as a method for structuring the net present value calculations in the investment decision model.
2. Decision tree is a tool to help in the judgment of the net present value calculations for the investment model. Interviews with experts for risk assessments have been the primary sources.
3. PEST analysis is the tool to see if firms should consider it worthwhile investing from risk/opportunity perspective and secondary sources have been used for this analysis.
4. Interviews with firms for "softer" views on risks/opportunities with this investment case have been held as primary sources.

The above described approach is further developed in this chapter and more information about CDM-projects can be found in Appendix 11.

3.2 Case study motivation

The methods that are chosen for this thesis are to suit the purpose in the best possible ways. The author has chosen to formulate this thesis as an actual case study, where focus will be on a specific prospective investment in a REDD-project in the Amazonas rainforest in Brazil. To formulate the research as a case study is set to be suitable when we want to achieve deeper level of understanding for a particular unit or section and therefore describing what is specific for just this case (Jacobsen, 2002). The reason for why Brazilian Amazonas was chosen as the base for the investment case is that Brazil has the largest area with rainforest in the world and also the largest deforested area. Amazonas is the part of the Brazilian rainforest where most of the forest still remains intact and unexploited and the possibilities for a prospective investment in a REDD-project in preventing deforestation is estimated by the author to be high.

The models that are used have the purpose to describe the reality in an easier and understandable way. The reality is still more complex and not all aspects have been taken into consideration in the modeling. This is for being able to keep the advantages with the models clearness. A too advanced model will have hard times for being accepted among the intended users, which is one of the hopes with this thesis.

According to Worlds resources Institute (WRI), paper industries should follow the guideline seen in Figure 17 below when creating their carbon offset strategies. The PEST and Survey & Statistics are situated in STEP 2, "assess your carbon related risks and opportunities" and this thesis will work within this step. Beyond this, a decision model will be used for calculating the possible positive outcome from a case specific carbon related investment.

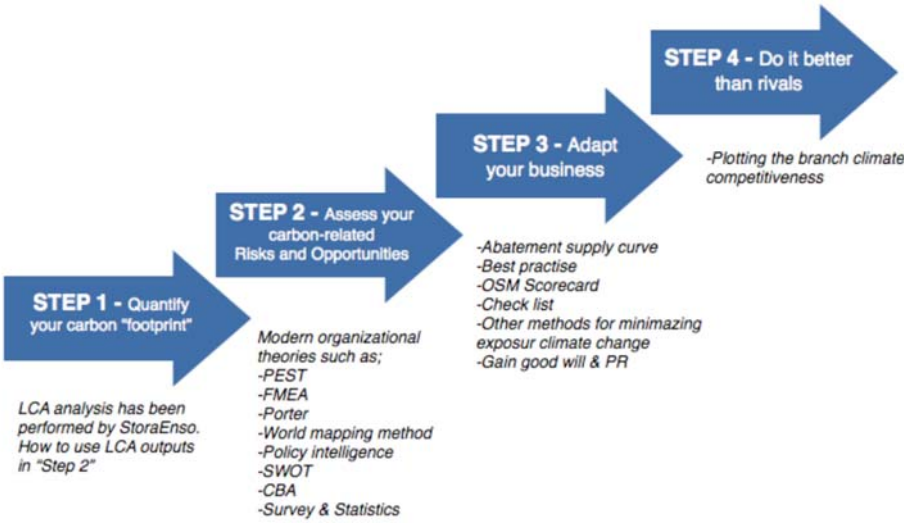


Figure 17. The figure shows the four-step method for companies carbon offset strategies, recommended by WRI. (www, hbr, nr1, 2009)

3.3 Multiple methods, qualitative and quantitative

In this thesis, multiple methods have been used for collecting information and performing the analysis of the research questions. Using multiple methods is according to Silverman (2005) a good strategy when there are several research questions as in this thesis or "because you want to use different methods or sources to corroborate each other so that you are using some form of methodological triangulation". The triangulation in this study is based on interviews with firms to evaluate the perception on CSR investments in REDD-projects, interviews with experts for evaluating the risks included with this investment type and collection of secondary data for assessment of where this investment type is suitable.

Within these multiple methods, there are different methods that are used for the collection of information in this case study and they can be divided into two categories: qualitative and quantitative methods. Both methods have the purpose to create higher level of understanding for the problems that have been stated in the purpose. Quantitative based methods strive for converting information to number and quantities which then can be used for statistical analysis or calculations.

Qualitative methods are derived from the researchers' perception or interpretation of the information that are used (Holme et al., 1997). Qualitative methods provide a picture about what possible perception forest companies may have towards REDD-projects in deforestation as a part of carbon offset management, CSR or just as an investment perspective. Quantitative methods by the collecting of data have been the base for the models and analysis. Finally, both methods have been used for the evaluation and to provide conclusions for the case study.

3.4 Reliability and validity

Reliability is about in what extent the result can be repeated and a method should therefore have high reliability no matter who have done the research. A methodology with high reliability is known by that the random variations are small and that they won't be affected by the surrounding factors in what the research is performed (Patel and Davidson 2003).

Reliability in this work has been secured through interviews with experts in the fields that have been covered. In the cases where the used secondary data felt out of date, complimentary

interviews been were held with competent personnel. A semi structured qualitative interview technique has been used along with open ended questions, this to further increase the reliability in the thesis.

Validity is a measure on the information or data that are to be analyzed, really is the right for the proposed works goal (Patel and Davidson 2003). Have right literature or sources been used and is the research relevant for the thesis research goals is a question that, the validity of the thesis has been strengthen with help of supervisors on sight and involved experts

3.5 The carrying out of the thesis

This thesis has been divided into four different parts and this can be seen in the Figure 18 below.

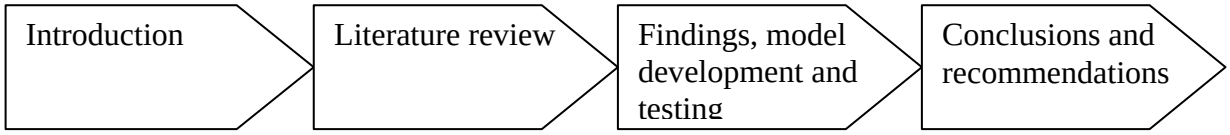


Figure 18. Overview of the carrying out of the thesis. (Hansson, P., 2009)

3.5.1 Introduction

For better understanding of the deforestation issues and progress in the development of projects in the forestry sector, for being able to process the research questions in the purpose of this thesis, a brief introduction to the subject has been performed. This includes the progress of REDD and the troublesome factors wit carbon emissions from deforestation.

The overview is to be a background for the specific areas that are covered in this thesis and it has been a contributor factor for the selection of relevant theories that are used to achieve the purpose of this work.

3.5.2 Literature review

The purpose of the theory is to increase the understanding and knowledge in the areas where this thesis will be treating and a well performed literature study will give this study higher validity and more relevance.

3.5.3 Findings, model development and testing

For being able to understand how the carbon issues impact forest companies and investors, a deep research in the risks, transaction costs and possible benefits have been identified. Interviews both for corporate social responsibility and risk estimates, and statistical numbers over historical transaction costs were used in the collection of information. This information collection has been lasting during continuously during the whole work with this thesis and not only in the beginning of this work.

Population, source critique and sampling

When sampling data, two different types of techniques can be used:

i. Probability or representative sampling: the selected populations probability is known and equal among the population
ii. Non probability or judgmental sampling: the chance is unknown for each selected case

This thesis has worked with the second technique and the choice of using the five largest companies where based on a sampling method, purposive sampling. A small sample size is good to use when the research is qualitative and the research is a case study (Mockaitis *et al*., 2006). The author found that as a complimentary study to the transaction costs and net revenue decision model, the used were usable.

The criterion for the purposive sampling for the interviews on companies CSR and REDD/CDM perception where based on the population world's largest forest companies in the paper and packaging industry, a list made by Pricewaterhouse Coopers (PwC), see Figure 19 below.

Rank '07	Rank '06	Company Name [1]	Country [10]
1	1	International Paper	US
2	3	Stora Enso [3]	Finland
3	4	Kimberly-Clark	US
4	5	Svenska Cellulosa	Sweden
5	2	Weyerhaeuser [3, 4]	US
6	6	UPM	Finland

Figure 19. List over the top ten biggest among the 100 largest forest companies in the Paper and Packaging industry. (PWC Global Forest report, 2007)

The top five largest companies where chosen as a sample and out of these, all except Weyerhaeuser accepted to participate in this study and therefore, number 6 on the ranking list, UPM, were chosen instead. The sampled participating companies where:

- International Paper (IP)
- Stora Enso (SE)
- Kimberly-Clark (KC)
- Svenska Cellulosa (SCA)
- UPM

They are all represented internationally and could all be prospective investors in carbon offset management like REDD-projects in preventing deforestation. The fact that Weyerhaeuser denied to participate in this study and that UPM were used instead, is by the author estimated to have limited impact on this thesis final results and the investment model outcome should also remain the same.

Primary data

The interviews were held with one CSR responsible expert at each sampled forest company and they were all the highest responsible for this area at the company, see the interview references at page 73. The interviews were held as phone interviews and the primary goal where the collection of information to answer research question number 1, "Are firms investigating investment in REDD-projects?" and question number 2, "What are firms' perceptions of the financial and non-financial benefits?". The semi structured questionnaire that was used as a base for the interviews can be seen in Appendix 8. The interviews with experts within the field of REDD/CDM-projects and carbon offset related issues for risks and risks assessments were also phone interviews with the goal to collect information for research question number 4 "Is there a possible economical benefit for forest companies or investors

when investing in a property used for REDD-project?" as well as for research question number 5 "Do the transaction costs involved with investment in REDD-project matter?". These experts where subjectively selected by the authors choice and this should not affect the result, since there are a limited amount of experts with the knowledge within this area. The interviewed experts are further presented in chapter 5.3.2. The questions asked to these experts were direct questions about their risk assessment for single transaction costs and the results of their assessments can be found in Appendix 1.

Interviews are the most common way to collect primary data (Bengtsson & Bengtsson, 1995) and the primary data is collected only for the purpose of this thesis. Semi structured qualitative interviews with prepared sample questions where held with the responsible managers at the selected forest companies. This made the interviews to have a structured base and that gave the direction of the discussion as the author wanted but not a totally controlled interview. The preset questions where to make sure that all questions that needed to be answered for the thesis where included. The opposite is quantitative interviews where standardized questionnaires are used and the interviews totally control the interview, without any particular discussion (Holme et al., 1997).

Secondary data
The search for secondary data has mainly been based on internet sources, web pages and environmental research reports. The criterion for sampling of secondary data was set to that the sources had to be credible. For being a credible source, it had to be information provided by NGOs, newspaper, consultancy report, academic research report or information provided by government and legal authorities. Due to the fact that the area of CDM-projects is recently implemented and the studying of transaction costs has not been done in any extensive ways yet, material and information were sometimes hard to find. In the cases where the secondary date did not feel up to date, interviews with different experts in the different areas where held, this for controlling the reliability of the secondary data. Secondary data were also used for being able to perform the PEST analysis on Brazil as an investment case and this provide answer to research question number 3 "Is the Brazilian Amazonas a suitable area for investment in REDD-project?". The main advantage with secondary data is that extensive amount of information can be collected in a short amount of time (Bengtsson & Bengtsson, 1995). This information can then be used in a more distinct way that aligns with the purpose of the study. The thesis delimitations can be seen in chapter 5.3.2.

Jacobsen (2002) writes that it is an advantage if using both primary and secondary data in the research, since they can control each other. Different data that supports one another can strengthen the result.

3.5.4 Conclusions and recommendations
Using the above approach for answering the thesis purpose, results were generated. They are presented in next chapter.

3.6 Methodology critique

Using the CDM-framework as a base for the calculations in this investment model is something that is easy to criticize but since the structure for REDD is not developed yet was something that were needed for being able perform the investment calculations. Further were the selection for interviews with the different experts regarding the risk assessments for the transaction costs something that could be seen as too subjective but since the area of REDD is under development is there a limited amount of experts available with this type knowledge.

The PEST analysis could be seen as objective enough for this investment decision but there is always parts that could be further developed and one particular could be the social aspects that surround the people in Amazonas and the need for higher standard of living. The implications with REDD have just been scratched on the surface. Further could the choice of the five interviewed firms' view on REDD-projects be seen as too limited and that do not provide a big picture enough within the forest industry.

4. Result and analysis

This chapter presents a summary of the PEST analysis, data and empirical information that was obtained by qualitative interviews with the personnel at the surveyed companies as well as the different estimates of risks for the different transaction costs made by experts in the different fields. The information is used in the decision model that calculates the possible positive outcome from an investment in a REDD-project in the Brazilian Amazonas. The topics concerning this chapter are:
PEST model for Brazil, Corporate Social Responsibility survey, transaction cost estimates and the decision model calculation.

4.1 PEST model for Brazil

After a deeper study of the investment climate in Brazil and assessment of risks and opportunities, the following affects where encountered and evaluated, based on the theory concept described in chapter 3.1. This is an assessment from the secondary data sources. Brazil is the fifths largest country in the world to its size and population, approximately 194 million people where living there in 2008 (www, ui, Brazil, nr1, 2009). The language spoken is Portuguese and the Roman Catholic Church is the dominant, making Brazil to be the largest nation in the world with Catholic belief. 74 % of the population is Catholics, 15 % Protestants, some 7 % are Amerindian religions and the rest belongs to other religions.

4.1.1 The political affect on the investment climate for forest industry sector

The political effect on the investment climate is one of the four sub-categories in the PEST analysis that is performed in this thesis. This chapter will present a description of what the political environments different affects and influence the prospective investor and why. Some key findings are important for all the affected factors and these are highly dependent on the region.

Political stability
The political environment in a country highly affect the investment climate, it sets the possibilities and restrictions over the investment factors, both on a national and international level. Brazil used to be a Portuguese colony but it is a self standing republic since 1889 with a presidential system. The military took the power between 1964 and 1985. It has only been a republic between 1946 and 1964 and from 1985 to present; it had a dictatorship during the years between. The past 20 years have been fairly stable without any interruptions or unexpected reelections.

The current president is Luiz Inacio Lula da Silva and he has held that position since October 2002. The president in Brazil is elected for four years at a time with the option to be reelected for one more period. Da Silva was reelected in 2006 and some believe that he works for proposing a new law, making it possible to be reelected even for a third period since he voted for the president in Venezuela, Hugo Chavez proposal for being able to be reelected a third time. President da Silva has transformed Brazil into the economical and political leader in Latin America but as we will find out, economic and social problems prevent it to become a strong player on the global level. His earlier political ideas belonged within the center left social democratic way of thinking but he has now changed his focus towards more moderate left wing politics with a more reformist line. New labor, judicial, tax and retirement reforms have been passed with the result that many members have left the party.

Brazil's foreign policy is based on the current position as the leader in Latin America and in general multilateralism with peaceful and non intervention in the affairs with other countries. The constitution of Brazil states that the country's goal should be to seek integration with the rest of Latin America on political, economic and cultural level (www, CIA, factbook, nr1, 2009).

Political unions
When electing the current president and former union leader da Silva, many expected Brazil would move into an even more socialistic era, more like its neighbors countries but as mentioned before, he moved in the other direction. This has made it harder for the unions to keep up with their strong positions.

Media and NGOs
The media plays a central role as an information carrier since they communicate companies' messages and actions, whether they want it or not. Media can be used by companies and investors to communicate their CSR strategy and it plays a central role in this case, when investing in rainforest and carbon offset projects. Next chapter will clarify how our respondent companies think and act with media when dealing with their CSR strategy. Using media in the wrong way or when actions made are not aligned with let's say local communities or NGOs have ruined many companies brands and when the damage is done, it takes long time to rebuild the customer trust again. If the company in our case, buys the property with the goal for carbon offsetting and it later shows that silviculture and logging have been made, that could ruin the customer confidence or their client reliance really bad. In Sweden, forest companies in the north struggle when dealing with the Sami[1] since there are conflicting interests with the land use.

The same situation is the fact in Brazilian Amazonas where many native people or Indians live from and within the rainforest. A forest company that buy a property and then starts with logging in the rainforest will with high likelihood receive bad marketing in the press. The native people's rights can cause strong feelings within customers and to be a successful investor, it is very important to handle these questions with caution. In the case of this thesis, the carbon investor will be helped by media when spreading the knowledge about the positive things investing in rainforest has as a result for the environment. Figure 20 below show how media play an important role in communicating knowledge from the institutions to employees and shareholders, who in turn influence the companies' or investors' actions. The companies or the investors have to try selling the change that their actions results in back to the employees and shareholders.

[1] Native Scandinavian people living in the northern parts of Norway, Sweden, Finland and Russia. Their main way of living is from reindeer farming and this collides with the silviculture. Source, www.samefolket.se

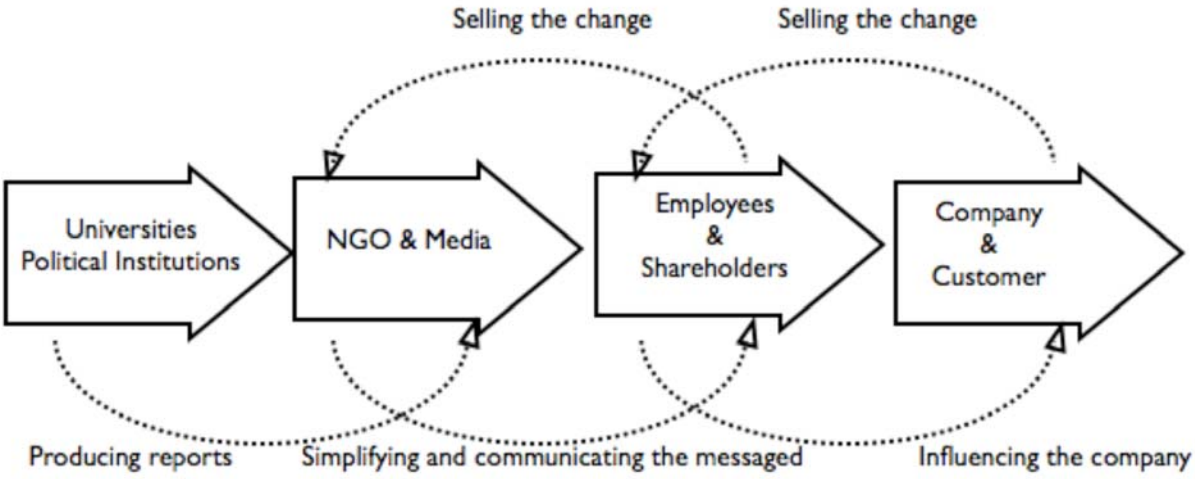


Figure 20. Information supply chain. (Hansson P., 2009, based on HBR, 2007)

4.1.2 Economy

The second factor of the four in the PEST analysis is the economy and in this case, the economy in Brazil. It is a big problem for companies and investors with the pricing of environmental values due to the effect of the climate change. The government in the country can with regulations or economical incentives steer the actions made in the right direction. An example is the carbon market in Europe that allows the countries and companies to take responsibility over the caused effect on the environment the industry have, through reducing emissions, buying carbon credits or through tax reduction for industries or people using renewable energy sources for example heating. The emissions get a value that will be controlled by the market. To increase and speed up this action, a cost benefit comparison can be done. When the politicians implement new constituencies today, they need benefit for it but it has to be paid by someone in the future. Businesses and people can accept to pay for these benefits over a certain amount of time and according to the Stern report (2007), "we must spend money now so that the future generation can benefit from it in the future, maybe hundreds or thousands year from now". The costs and benefits between the industry and politicians have to be aligned, for being able to solve the climate change issues. Therefore, compromising have to be made from both parts.

Economic growth

With the more free market thinking from the president da Silva, Brazil has moved from just being a poor non developed country to be an emerging market where investors tend to compete about the new possibilities that arises. Brazil has now got the investment grade on its head as late as in 2008 and during the past ten years, his reforms have led to a surplus in the budget and decreased the credit risk of Brazil (www, greenlandsecurities, Brazil, nr 1, 2009). The government in Brazil has never been so focused on the capital markets improvements. The GDP per capita has grown to 8 680 US dollar in 2008, (compared to $38,500 in Sweden) and da Silva's grant program "Bolsa Familia", for poor families has helped over 44 million people to gain better economic strength, since his goal is to let the Brazilian people to take advantage of the global economy through faster growth domestically (www, globalpropertyguide, Brazil, nr 1, 2009).

This has led to that Brazil now is the tenth largest economy in the world and the predictions for the future is that Brazil will be among the top four dominating economies in year 2050 (www, ui, Brazil, nr 1, 2009)

The production of forest products is growing steadily, see Figure 21 below and the average paper consumption per capita is the highest in South America but still far behind the more developed countries, see Figure 22 below. For example, in Sweden the per capita consumption is 223 kg per year and it is less than 40 kg in Brazil (www, swivel, nr 1, 2009).

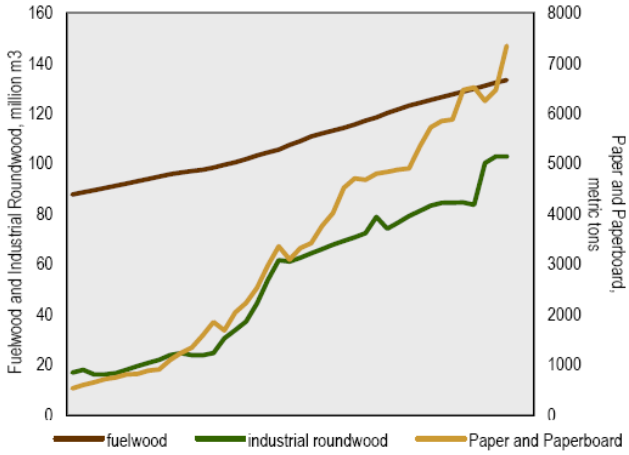


Figure *21. Production increase of the forest industry in Brazil 1961/2001. (www, earthtrends, wri, nr 2, 2009)*

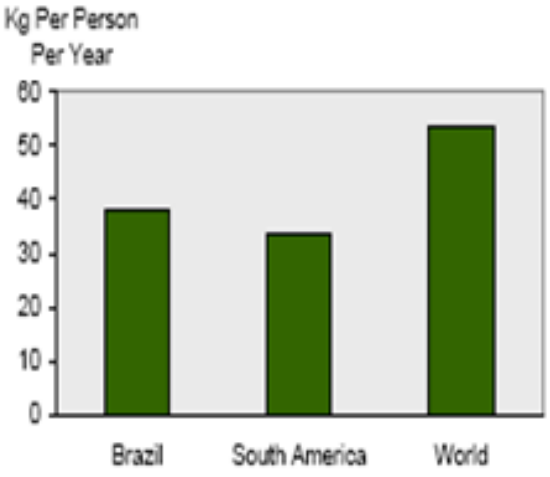


Figure 22. Average paper consumption per capita in year 2000. (www, earthtrends, wri, nr 2, 2009)

Interest rates and monetary policy

The time in Brazil when the economy was instable has been moved into the history books by now. The current interest rate was 11.25 % in April 2009, which was all time low and the jobless rate was 8.5 % by the same time (www, tradingeconomics, Brazil, nr 1, 2009). As we can see in the Figure 23 below, Brazil's interest trend is declining which will help the national investments in Brazil to grow, not only the international. The same trend can be seen with Brazil's inflation rate, it is steadily decreasing, see Figure 24 and it was 5.9 % in February 2009.

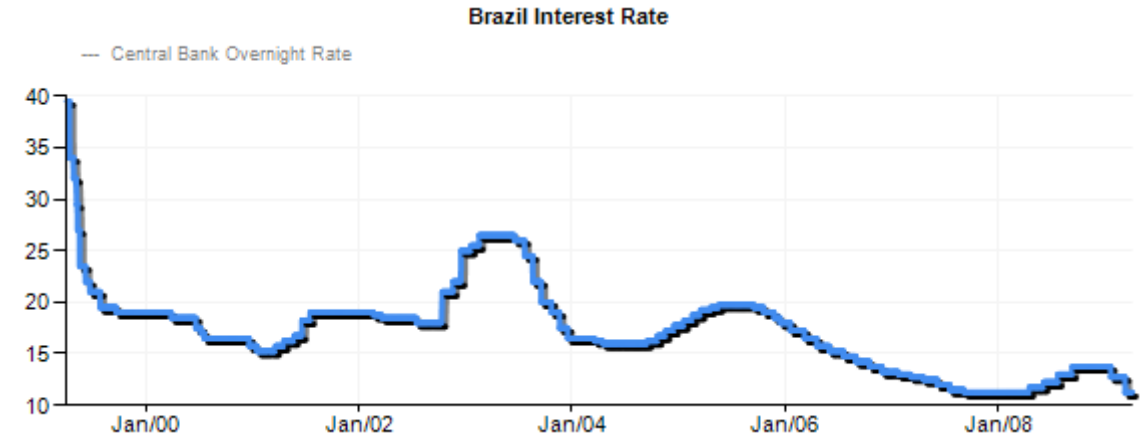


Figure 23. Brazil's interest rate since January 2000. (www, tradingeconomics, Brazil, nr 2, 2009)

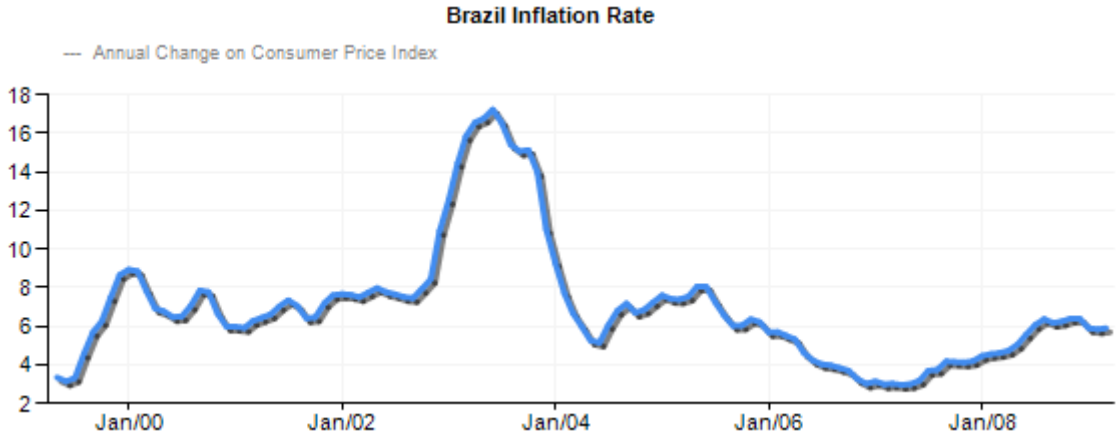


Figure 24. Brazil's inflation rates in January 2000. (www, tradingeconomices, Brazil, nr 3, 2009)

Even if many things look good when analyzing the economy of Brazil, they have a history with big problems in their monetary system, see Figure 25 below. The national currency of Brazil is real and it used to be pegged to the US$, but every since 1999 the real is now a floating currency in the same way as the Swedish crown. Before this change, Brazil had huge problems with their national economy and the currency had to be devaluated which made the economical growth to slow down, a growth president da Silva now through reforms have managed to increase again (www, tradingeconomics, Brazil, nr 4, 2009). All this trouble have led to bigger differences between rich and poor and today, around 20 % of the people in Brazil live with less than the poverty limit. More about these social issues are discussed in next chapter.

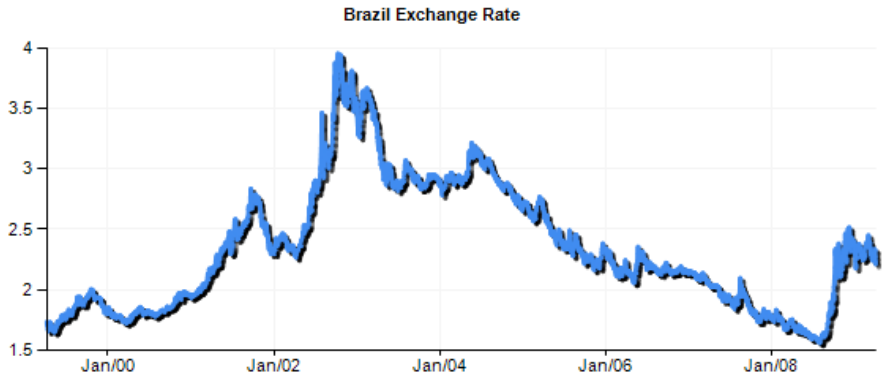


Figure 25. Brazil's exchange rate against the US$ since January 2000. (www, tradingeconomics, Brazil, nr 5, 2009)

4.1.3 Social

Conditions of life

As mentioned earlier, there are many poor people in Brazil and about 15.6 million are malnourished and president da Silva is currently working with a program called "Fome Zero" which means zero hunger (www, CIA Factbook, Brazil, nr 1, 2009). The goal with this program is to stop all hunger through strengthen the families' economy and help them with setting up an efficient agriculture.

This program has led to that more than 46 million people have received monetary help from the government. Despite this, there have been big protests against this program. The criticisms include opinions like that this is a way for president da Silva to buy votes from the poor or that this just makes the helpless people more dependent on the government, instead of addressing the real issues causing the problems.

The overall social problems in Brazil are not better in the Amazonas region, where the investments in carbon conservation projects may take place. Every since the Europeans arrived to the region searching for profitable businesses, the conflicts and violence have been an issue. Landowners, indigenous people and colonists struggle to align their interests with each other and in 2004, more than 1,800 violent conflicts appeared in Brazil's countryside. The peak of the violence was reached when the American nun, Dorothy Stang, was murdered and the army had to be sent in to cool down the feelings. Miss Stang was working in the poor and rural areas against logging in rainforest and establishment of new plantations and farming (www, mongobay, rainforests, nr 5, 2009).

Since people in the Amazonas are struggling for survival, there is no surprise that they look into whatever profitable business there might be. The standing rainforest just tend to be a problem, even if the value of the erosion protection has been estimated to $238 per ha and year, the value of livestock and the construction of giant soybean plantations on previous rainforest land has a value of between $143 and $595 per hectare and year (Verweij et al . 2009). This has resulted in that the Amazonas is transformed into an area of agricultural businesses where the rainforest has to give space to soy beans and cattle farming. In Figure 26 below, the green areas are the remaining totally intact areas with rainforest, compared to the general picture of the Amazonas like in Figure 27, where it is easy to draw the conclusion that there is no problem with deforestation.

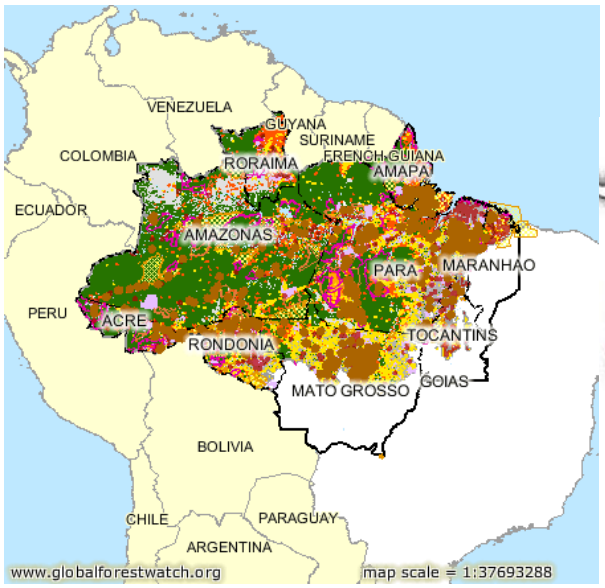


Figure 26. Map with the "true", green areas are still unexploited rainforest in Brazil. (www, globalforestwatch, nr1, 2009)

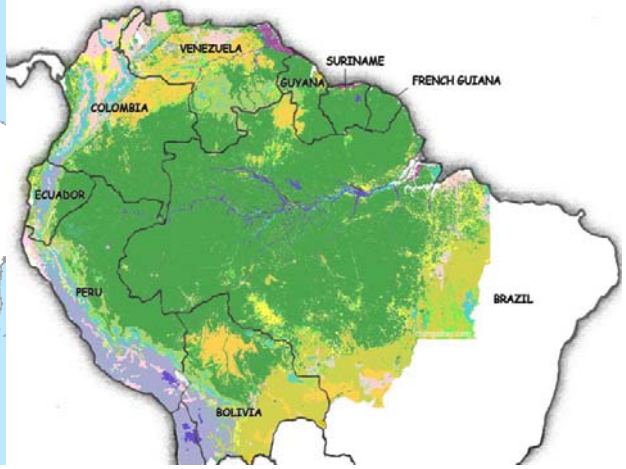


Figure 27. Map with the general "false" picture of a rainforest without interactions or affections from logging or agriculture. (www, mongobay nr2, 2009),

Employee environment and social mobility

Mentioned in the earlier section that Brazil's unemployment rate is 5.9 % and this is relatively below the average rate the past 20 years which is 7.5 %. The workforce is cooperating in unions and they are represented in all segments of the industry and they have the rights to strike but those are not very common. President da Silva has raised the minimum wage from US$ 75 per month to US$ 165 per month in year 2007, which has increased the number of people living in non-poverty situations. Mothers are allowed 90 days maternity leave and one week for the fathers. In general, there is big racism in the payment of salaries; women and black people are often underpaid (www, CIA Factbook, nr 1, 2009).

Level of education

In Brazil, children between age 7 and 14 are obligated to go to school. The education is free and provided by the government but there are limited amount of resources and the schools are too small so many children won't fit and the teachers' salaries are too low, especially on the country side (www, CIA Factbook, nr 1, 2009). According to the statistics, approximately 96% of the children goes to some kind of school but there are estimates that around 1.5 million children are left outside the system. Many of these help their families to make their living instead and it is only one third of the ones going to school who continues to high school, after completed the elementary level.

This has led to that 13.8 % of the population above 15 years old is illiterate and another 30.5% have limited skills in writing and reading. It is mostly the wealthier families that send their children to private schools where the educational level is higher. 11 % of the youth continue to university level studies and out of these, 64 % study at private universities. To the state owned universities, mostly students that have been studying at private high schools are qualified and among the university students, only 2.3 % are black or with African origin. This is highly remarkable since the population in Brazil consists of almost 50 % black people (www, UI, Brazil, nr 1, 2009).

4.1.4 Technology

The technology development in Brazil is higher than many without insight would think. They export a wide variety of goods, from airplanes like the Embraer ERJ-135 regional jet to high efficient sugar plant fuel, ethanol, which they are the second largest exporter of. Their efficiency in science was started by the Portuguese people that drove Napoleon away in 1807. Before that, Brazil did not have any universities or technological research. Most of this research are funded by the government, 73 % more precisely and Brazil has developed the most advanced space program in whole Latin America and they have been working with NASA since 1997 to build the space station ISS[2]. The focus on new technology and self sufficiency in energy procurement has led to a development in a wide range of sectors. The only nuclear power plant provide 4 % of the electricity that Brazil demands while they have the sixth largest uranium reserve and president da Silva has announced that several more power plants will be built, seven more by 2025 is the goal. The main energy source is hydropower, 83 % of the demand is covered by this sector and there is a political will for increasing this part with building another 90 dams for hydropower (www, NY Times, Brazil, rainforest, dams, nr 1, 2009). Brazil has the second largest oil reserve in South America, 11.2 billion barrels. Since 2006, Brazil is self sufficient on energy due to the increased production of ethanol and oil extraction (www, NY Times, Brazil, rainforest, nr 2, 2009).

Two thirds of the cars used in Brazil can be run on ethanol made from sugarcanes and they have been developing this product area since the late 1970s. Their constantly increasing oil production will make Brazil's future to become a superpower within the oil industry, see Figure 28 below, and this will lead to a stronger and more stable country as a whole and therefore strengthen the investment incentives and possibilities (www, CIA Factbook, nr 1, 2009).

[2] ISS, International Space Station is a facility for research that started its construction in 1998 and the goal is to be completed by 2011. The ISS program is a joint project between US (NASA), Japan, Canada, ten European nations and Brazil

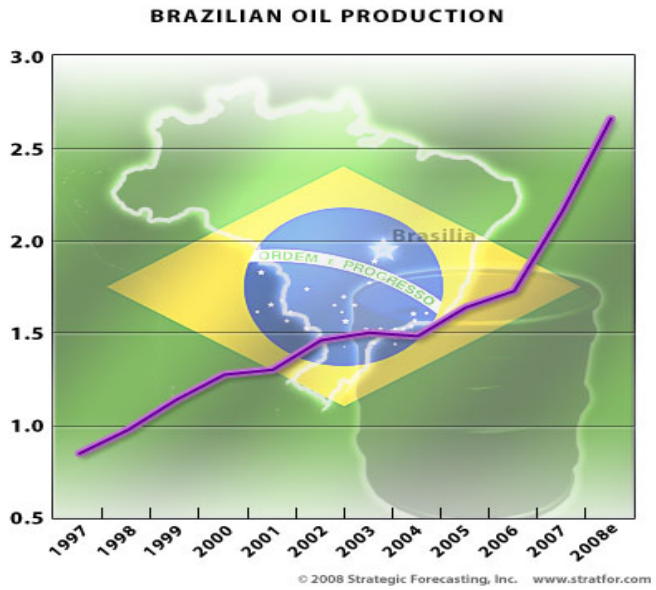


Figure 28. Brazil's increase in oil production since year 1997. (www, stratfor, Brazil, self sufficiency, nr 1, 2009)

4.1.5 Analysis of the PEST result for Brazil

When thinking about investing in a non-annex 1 country as Brazil, a major part of the risk a company face is involved within the political sphere. If there is political stability as it is in Brazil, the risk for a long term investment decreases and therefore, the investment risk for starting a project for preventing deforestation of rainforest is low just if looking at the stability issue.

The political stability is a fact today but there is always a risk that the instable forces in the past grow and no one knows what direction Brazil will take after this period with president da Silva is finished. If he manages to change the constitution so he can be re-elected a third time, this could be a good thing for an investor's investment outlook.

Even if we assume that the political stability will be the case during the next 30 years, this is not enough for considering our investment study since all the other factors involved in the PEST analysis have to be taken into account.

The political unions hard time of keeping up with the more right-focused politic that president da Silva is using does probably not affect our investment case to that extent that we have to worry about it and therefore, further analysis of this is not needed. The only risk that could be problematic is if the unions' future existent becomes even more limited, the risk will increase for having protests against the government with strikes as a result. This could also affect the social life, which is to be analyzed later in this chapter.

Media's and NGOs roles in Brazil, and especially in the part that we are to be investing in, rainforest in Amazonas, are very important for this investment case. Since the goal is to prevent deforestation, there should mostly be positive feedback and publicity from media and the NGOs but if there is illegal logging or if the native people in some way loses their right to be or live in the forest, negative information will be spread and this will of course have an effect on our investment company's reputation and trust.

It is good for our investment that the economy in Brazil is more stable now, with decreasing interest rate, unemployment rate and monetary exchange rates. A healthy economy in general will provide lower risk since this creates better social conditions for people and can help the rate of educated people to increase, which will provide new jobs in new industries as a result. A more healthy economy can also lead to an urbanization of the amount of people living on country side, moving towards education or more well paid jobs in the bigger cities along the coast.

Economical growth can on the other hand also create problem for the investor in rainforest, since growth means an increase in the sectors that are in conflict with the rainforest. This means the agricultural business in general and soy bean, palm oil and sugar canes production in particular. This is a huge industry in the district of Mato Grosso and very important for Brazil's economy, since these are the biggest export products. A continuous growth in this area will lead to a continuation of the deforestation rate and a threat to our investment purpose. President da Silva has, as we showed earlier, promised to decrease the deforestation rate with up to 70 % with more deposition of rainforest as natural park and protected land as well as harder control of illegal logging. This will hopefully have positive impact on the remaining natural rainforest and be a barrier for future growth in the industrial and agricultural sectors. But, we should not forget that this is just a promise of a decreased level, not a total removal of the existent deforestation and investments that want to achieve and prevent deforestation therefore will in the future still face resistance and competition.

The fact that Brazil is politically stable and has enjoyed high economic growth with an increase in the vital conditions for the residents the past years is partly a result of an improvement in the technological sector. A tremendous increase in the oil extraction has lead to the almost energy independent situation that Brazil has today. This could release the pressure on the forest as a energy source if energy from oil replaces energy from bio-fuel but there is no trend for that, president da Silva focuses on growth in all possible energy fields and the biggest threat to the tropical rainforest in Brazil could be his goal for increasing the hydroelectricity with building another 90 river dams that are unused today. This would swamp huge areas of tropical rainforest.

4.2 CSR qualitative interviews

4.2.1 Overview of participated companies for the CSR and REDD/CDM study

Kimberly and Clark (KCC)

Kimberly-Clark is one of the leading global health and hygiene companies and they employ around 53,000 people. Kimberly and Clark is located worldwide, operate in 35 different countries and with customers in more than 150 countries. Their turnover in 2008 was $19.4 billion. Some of their most recognized brands are the diaper, Huggies and their tissue, Kleenex. The head-quarter is located in Dallas, Texas, USA (www, Kimberly, nr1, 2009).

Stora Enso (SE)

Stora Enso is one of the leading global packaging, paper and forest products companies, with product focus in newsprint, book paper, consumer board, magazine paper, fine paper, industrial packaging and wood products. They employ 32,000 people in more than 35 different countries. Stora Ensos turnover in 2008 was EUR 11 billion and their headquarter is located in Helsinki, Finland (www, stora enso, nr 1, 2009).

International Paper (IP)
International Paper is one of the leading global companies in the packaging and paper sector, they have more than 51,500 employees and the turnover in 2007 was $22 billion. Their main focus is in northern America with 105 facilities but they own another 46 product facilities abroad. International Paper was ranked as Nr1 among forest companies by Fortune Magazine in 2007 and their headquarter is located in Memphis, Tennessee, USA (www, international paper, nr 1, 2009).

SCA
SCA is one of the leading forest companies in the world within tissue, packaging, personal care products, publication papers and solid-wood products and they operate in more than 90 different countries. SCAs turnover in 2008 was EUR 11.5 billion and they employed more than 52,000 people. Their main market is Europe and their head quarter is located in Stockholm, Sweden (www, sca, nr1, 2009).

UPM Kymmene (UPM)
UPM is one of the leading forest companies within energy and pulp, engineered materials and paper. They have production facilities in 14 different countries and a number of 25,000 employees. UPMs turnover was EUR 9.5 billion in 2008 (www, upm kymmene, nr1, 2009).

4.2.2 Overall CSR strategy findings within the selected companies

In this chapter, the surveyed companies' perceptions on CSR investments and REDD/CDM-projects are presented. The base questions that were used as a structure for the interview can be found in Appendix 8.

Kimberly-Clark (KCC)
Kimberly & Clark has been around for more than 130 years and they are very familiar with CSR since their CSR work is one of the core values of the firm. They look at CSR in a broader context with four main CSR strategies; sustainable, environmental, social and economical development.

In 1995, the work with the environmental vision program started. This is a program with objectives for 2015 and it is revised every five years. The focus of this program is energy efficiency, recycling, less use of toxic, development of environmental management and carbon reductions.

The CSR work at KCC is delegated from the senior management but it is implemented in the normal business plans and should therefore cover all areas of KCC.

KCC has a carbon strategy and they have discussed CDM-projects within the following sectors:

- Energy efficiency projects
- Alternative energy technologies, landfill biomass plants and solar energy
- Cap and trade system knowledge
- Carbon forestry, since they are large buyer of pulp fiber and does not own any forest

The main purpose for CSR work and REDD/CDM-projects would for KCC be for the reasons of revenue, reputation and customers. They look at it as competitive advantage with well performed CSR work and want to be seen as responsible firm.

KCC agree upon connection between CSR and REDD/CDM. They have never implemented a CDM-project but would like to do so. The fact that they think it is not flexible enough, too bureaucratic and slow system result in no actions from their side at this time.

A REDD/CDM-project at KCC must reach breakeven or more for being considerable as an interesting investment and they analyze the ratio between in-house offsetting and the price of carbon emissions.

KCC are truly interested in learning the cap and trade system in Europe, but hope that the implementation in US will be more effective with more focus on deforestation and transportation sectors. They believe that a first step for lower emissions in the US would be more energy efficient houses.

KCCs carbon emissions are 6 million tons per year but constantly declining. When investing in CSR, they do that wherever it is suitable. Now they are investing in two gas fire facilities, with environmental product features in Brazil and they have not slowed down the CSR work due to the financial crises, since it is a part of their long term strategy.

Stora Enso (SE)
Stora Enso's CSR strategy is used as an umbrella for the business operations responsible actions in the fields of economic, social and environmental responsibility and they feel very familiar with the term CSR.

SE uses sustainable action teams and business area directors in the work with their environmental objectives. They do not have any carbon or CDM-projects planned at the moment. They have limited experience in this field but are waiting for that the phase 3 of the Kyoto Protocol will use more simplified rules. Their main view of REDD/CDM is that it does not work, "no one gets free credits".

The main purpose for CSR work and REDD/CDM-projects would for SE be for the reasons of revenue and achieving their CSR goals. They own plantations in Brazil and China that both could be used for REDD/CDM-projects in the future, if the rules are made more adaptable but SE has hard to see the connection between CSR and REDD/CDM and would not consider to implement REDD/CDM-projects in the closest conceptual timeframe.

A REDD/CDM-project at SE must reach the level of breakeven or better for being considerable as interesting investment and they analyze the ratio between in-house offsetting and the price of carbon emissions.

SE is currently a polluter, because of that they sold off most of their forest land and only have a number of polluting mills left. Instead, they buy carbon credits to cover their demand. They believe that the REDD/CDM additionality criterion destroys the investment possibilities, since they never would invest in a project with risky revenue.

If they were to invest in CSR, they would do that locally in their own operations. The work and focus with CSR has not slowed down due to the financial crises but no bigger investments are currently in sight.

International Paper (IP)
International Papers are very familiar with the concept of CSR but they believe it is a badly miss used term. The firm's corporate responsibilities are first and foremost to reward the shareholders. Then, they also have responsibility against public trust, employees and to keep their permits and operating licenses.

IP has a CSR strategy that is defined by the board, with help from a strategy team and environmental team and they are also responsible for the carbon strategy. IP does not really believe in the overall carbon management thinking because it is "more smoke than fire" behind this subject. They know a lot but do not have any intentions for investing in REDD/CDM-projects at the moment, since it is bad business decisions involved with this. IP will not do anything for the environment for free since "it must provide value for the shareholders". They tried to build a biomass mill in Brazil through the CDM-project but it did not succeed because that it was a too common project area, so they keep on using fossil fuel for producing the energy needed.

The main purpose for CSR work and REDD/CDM-projects would for IP be for the reasons of revenue, reputation, shareholders and stakeholders interest. They own plantations in Brazil and have some cutting rights in Russia, Europe and USA but they sold off the main parts of their forestland some years ago and are now large buyers of fiber.

IP agree upon connection between CSR and REDD/CDM but think that the regulations surrounding these projects are set too hard and that the NGOs knows and interferes in everything. The NGOs do not want industrial plantations to work in REDD/CDM, since this is not a matter of carbon from their side, it is all about money and they want the offsets to become more expensive. IP means that you can never satisfy everyone with their way of managing the forests. A REDD/CDM-project in the forest sector is totally irrelevant because a industrial forester like IP is cutting their growth and if there is more growth than demand, then they will sell the trees, not offsetting, "carbon money is bad".

No more investments in CDM-projects are planned, since the last one failed and they would in no case ever accept lower return on an investment, in special cases breakeven and better could be the case. There is also too big risk to invest now since no one knows what the post 2012 world for carbon emissions will look like.

IP analyzes the ratio between in-house offsetting and the price of carbon emissions but they are net sellers now, if only their European business units are taken into account. Including the business units in the US, they believe that they are in total a polluter but not worse than anyone else of their competitors.

If IP were to invest in CSR, it would take place where it is most cost efficient and they have not slowed down the CSR work due to the financial crises but they are using less energy and have less emissions since they closed some mills. A cap and trade system in US, like the one in Europe, would according to IP kill many industries. The European variant is not good, "it is possible to tech EU but it just takes longer time".

About investing in REDD/CDM-projects in Brazil, IP think that they are totally opposite. Brazil tries to block everything. They do not want anyone to tell them how to do or what to do with their forest and they do not want to be seen as a non annex 1 country. If the REDD

system would come to US and tell them how to do their business, IP think that the answer would be “hell no”.

Svenska Cellulosa (SCA)
SCA’s view on CSR is that this is all about sustainability and they are very familiar with the concept of CSR. Their CSR strategy includes environmental economical and social development and this is directed by the senior management and sustainability team. SCA’s current CSR plan is to reduce the carbon dioxide emissions until 2020 with 20 %, compared to the emission level in year 2000. This is to be done through more energy efficiency, renewable energy sources and green electricity.

The main purpose for CSR work and REDD/CDM-projects would for SCA be for the reasons of revenue, CSR goals, and customers and share holders interest. Also, the society provides incentives and regulations that stimulate the reasons. SCA wants revenue from every investment but they will probably not invest in a coal power plant, even if it is profitable, since it affects the environment in a negative way and they are using green energy instead. SCA do not own any plantations in developing countries but they recognize the connection between CSR and REDD/CDM. They have implemented three CDM-projects in India with bio-energy power plant, but this is a small part of SCA’s total environmental work. The investments in India are financed by the surplus from selling the emission rights they did not need, since they are an carbon off setter. If SCA were to invest further in REDD/CDM-projects, it would take place in developing countries and their work with CSR has not at all slowed down due to the financial crises.

UPM-Kymmene (UPM)
UPM-Kymmene is familiar with the term CSR and they do have a CSR strategy. This is driven by their three core values; openness, trust and initiative. These values are implemented in the work towards a sustainable environmental impact, responsible for the people and society as well as controlling their subcontractors’ sustainability work. At UPM, it is the board that with help of the CSR department outlines the environmental objectives.

UPM’s carbon strategy is to replace the use of fossil fuel energy, saving energy, use recycled materials in their process, use well planned logistics and sustainable forest management that stores carbon.

By today, UPM only has been involved in one CDM-project. That is the “Botnia” project, a bio-energy pulp mill that produces electricity from the waste materials, established in 2006 and located in Uruguay. This reduces UPM’s carbon emissions with 45,000 $MtCO_2e$ per year, this gave them positive response from media and the public but they are not planning any further CDM-projects.

The main purpose for CSR work and REDD/CDM-projects would for UPM be for the reasons of revenue, reputation, stakeholders and customers and they agree upon a connection between CSR and REDD/CDM. A REDD/CDM investment must reach a profit level of breakeven, for being considerable as an interesting investment at UPM. They analyze the ratio between in-house offsetting and the price of carbon emissions and are highly updated on the carbon markets development.

In total, UPM is a polluter of carbon emission, since they do only own one million hectares of forest land and that cover only 10 % of their fiber demand. So they can not offset all their

emissions in-house and must therefore buy carbon credits. If UPM were to invest in further CSR measures, that would take place both locally and in developing countries, but since the financial crisis hit, the bigger investments have been deferred into the future and today only the core CSR work is done.

4.2.3 Analysis of the CSR and REDD/CDM perception findings CSR strategies

Based on the above finding, the information shows that all the interviewed companies had well developed CSR strategies and there were a number of similarities in their work with CSR, which corresponds broadly with the theoretical view on CSR in chapter 2.2. They can all be seen within the thinking of long term environmental goals and sustainable actions. This is no surprise for sure, they are all huge multi-national and multibillion dollar companies and their actions make difference. The same thing is with who is involved in defining the companies environmental objectives. The result that mostly the board and the senior management are involved is aligned with the findings from Ecosecurities Survey (2008), which can be seen in Figure 29 below.

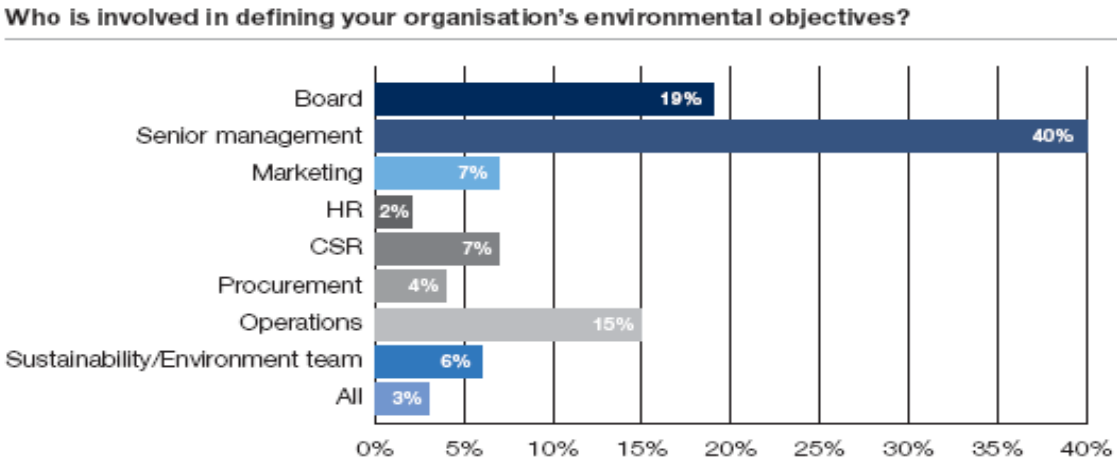


Figure 29. Companies response to the question "Who is involved in your organisation's environmental objectives?". (Ecosecurities Survey, 2008)

What is more surprising could be that none of the companies would even consider an investment in CSR measures with lower return than breakeven. The main reason for such investment is revenue and they cannot be responsible for subsidizing investments in projects that are not profitable but some of them would consider accepting lower return than normal. According to Schwartz and Carroll's (2003) mindset, in chapter 2.2.1, these companies do not see the ethical aspects of preventing deforestation, only pure economical. This is of course a result of that the companies are corporations with responsibility towards their shareholders but since they are working within the forestry sector, it is easy to believe that the requirements for CSR investments could accept negative return in some cases, just for the cause of good publicity.

CSR, carbon management and REDD/CDM-projects

The forest industry is in general recognized by having huge paper mills or factories that releases emissions, so finding that the surveyed companies all have a carbon strategy will not astonish anyone and not in the ways they are doing it either. The Ecosecurities Survey (2008), showed that 77 % of the overall interviewed companies in different sectors have or are currently developing a carbon management strategy, see Figure 30 below. This can be about, as in our companies case, sustainable forest management, energy saving or less use of fossil

fuel and this is a very important part of their business. Even if they all were focused on revenue, it is important to understand that the protection of their reputation also have primary focus. It is hard to make the conclusion that this is a result of that the forest industry is a business mostly taken place in rural areas, with products that urban people buy but it could be.

All the companies knew about the REDD/CDM mechanisms and all had been involved or implemented CDM-projects but their overall perception of this was that the rules are too hard and the restrictions are too many, so the future for CDM-projects were dark. This is interesting, since they are working in the field where there are very few implemented CDM-projects by today, the possible positive outcome for their sector with easier regulations in for example the post 2012 Kyoto Protocol could help them lower the carbon emissions. If the structure of REDD is implemented with positive perspective in mind from the regulators, this could lead to strong incentive in future investments regarding the sector of deforestation. In Figure 31 below show the price for offsetting one ton CO_2 is among the cheapest in the field of forestry and avoided deforestation, this should be an incentive enough to encourage the forest industry to harder work for an implementation of deforestation into the Kyoto mechanisms and remake of the rules regarding afforestation/reforestation.

Figure 30. Response to the question "Does your company have a carbon management strategy"? (Ecosecurities Survey, 2008)

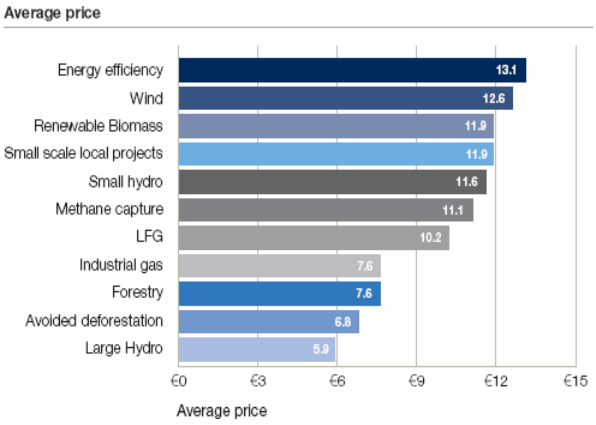


Figure 31. Graph over the average price per offset ton CO_2. (Ecosecurities Survey, 2008)

4.3 Project based REDD/CDM transaction costs and decision model

4.3.1 REDD/CDM-transaction costs

Based on the terms described in section 2.3.2, the following transaction costs were identified as key costs and suitable for this case study in a deforestation REDD/CDM-project, see Table 2 below. These are based on the different stages in the CDM-process which can be seen in Appendix 12.

The findings are based on the interviews with different experts, described in Chapter 4.3.2, and with help of Michaelowa et al. (2003). For different estimated secondary values on transaction costs that are used when estimating the actual costs for this case can be seen in Appendix 5. The different costs are put into three different categories, *search for investment, approval costs and ER sale costs.* This is a categorization made by the author, for making it possible to use the investment decision model and therefore also more understandable.

Table 2. List over transaction costs involved in this investment case study (Hansson, P., 2009)

	Explanations of the cost
Pre-implementation=search for investment	
Search cost:	This is costs that occur when investors seek for a prospective possible project in Brazilian Amazonas or search for a partner for a joint venture project that could be advantageous.
Approval costs	
Negotiation costs:	Negotiation costs are costs that are incorporated with the project design document (PDD). This is a document that states the assignments and shows the benefits for the whole project time period as well as has information about consultation with public key stakeholders.
Baseline determination costs:	These are costs for developing new baseline methodology and it is performed trough consultancy like TUV SUD.
Approval costs:	These are cost for having authorization from the host country, Brazil.
Validation costs:	Costs for reviewing and revision of the PDD.
Legal costs:	These are costs for the legal and administrative work that could take place if some of the parts break the agreement of the transaction.
Registration costs:	Costs for registration by Executive Board, UNFCCC.
Implementation=ER sale costs	
Monitoring costs:	Data collection costs, how much carbon that are stored in the forest property after five years.
Verification costs:	These are costs for hiring of operational entity and report to the UNFCCC Executive Board.
Review costs:	Verification reviewing costs and it happens every five years.
Certification costs:	Issuance of CERs by the UNFCCC Executive Board.
Trading	
Transfer costs:	Costs for brokerage fees.
Registration costs:	Costs for holding an account in national registry.

All the different types of costs that are stated above, have resulted in four different scenarios that are used in the decision model, performed in next chapter, for calculation of the net present value of the investment in the deforestation REDD/CDM-project. The outcomes of the values for scenario high, medium, low and fail can be seen in Appendix 1.

4.3.2 The decision model

Description over participants in the risk estimates assessments

This is the result of the primary data used for the decision model calculations in the next section. These experts based their estimates on their knowledge and judgments about the investment case.

R. Todd, Forest systems Services, LLC, Boston, USA

- Forest Systems is one of the largest timberland investment management organizations (TIMO's) in the world, with a forest portfolio worth more than $800 million. They invest in the world's forests, in both afforestation/reforestation projects in South America as well as in REDD land in Brazil.
- Their goal is to generate revenue from both sustainable forestry and from carbon emission offset credits.
- R. Todd is responsible for Forest Systems' commercial business interfaces and public relations. He also leads the deal structuring and transaction teams to assess the appropriate risk mitigation and hedging strategies.

Edwin Aalders, Director, International Emissions Trading Association IETA

- IETA works with developing an active global green house market that involves flexibility mechanisms such as CDM and REDD projects and emission trading and they are based in Genève, Switzerland.
- Edwin Aalders has since 2004 been the Director of the International Emission Trading Association and he was the Acting CEO of the Voluntary Carbon Standard Association in 2007 and 2008, were he held an advisory role for UNFCCC CDM and REDD processes and voluntary carbon market

Dr. Sven Kolmetz, Head of the Department, TÜV SÜD Industrie Service GmbH Carbon Management Service, München, Germany

- TÜV SÜD is a leading international consulting organization that works with tests, certification and expert opinions in the field of carbon market, CDM and REDDS projects. They carry out PDD's and help clients with the CDM process application documentations.
- Dr. Sven Kolmetz is the head of the forest department at TÜV SÜD. He has extensive experience from working with developing PDD's and knowledge about the certification of carbon emission rights.

Ms. Ellysar Baroudy, Manager of BioCarbon Fund, Worldbank, Washington DC, USA

- BioCarbon Fund is a fund that provides equity for carbon finance projects that conserve or sequester greenhouse gases from forest emissions. They are a trust fund that is administrated by the World Bank.
- Ms. Ellysar Baroudy is the Manager of BioCarbon Fund and she helps and extensive knowledge about CDM projects and investments in REDD projects in Madagascar, Colombia and Honduras.

Point Carbon, Washington DC, USA

- Point Carbon is one of the world's leading consulting companies and they carry out market analysis for the European carbon market as well as forecast scenarios with an implementation of a carbon trading system in the US.

The decision model for most likely net present value with estimated transaction costs
In the calculations for the decision model, a data program called Treeage Pro was used, for further information (www.treeage, nr 1, 2009).

The Treeage Software is created to be used when building, analyzing and distributing decision trees and influence diagrams. This program is often used by professionals and consulting companies in a wide range of fields and industries to perform different tasks that are associated with taking on risk and evaluate the level of uncertainty in for example a prospective investment analysis like this master thesis.

The program help to clarify the thresholds values and makes it easier to understand how a decision may vary with a variation of the risk level and change in cost result. When all the uncertainties and cost values are estimated and put into the model, then the program automatically will calculate the best decision and present the outcome of the best possible decision. The model can either calculate the most profitable decision or the one with the least cost.

Explanations of the decision model
The overall goal for this thesis is to investigate the possibilities and drawbacks from an investment in a possible REDD/CDM project in the Brazil Amazonas. This means that after all analysis are done, the investor will have information enough to decide whether or not to invest, if it will be profitable or to what extent the risks with investing in Brazil are affecting the net present value. Since the investment decision this thesis cover is a prospective investment in a 10,000 hectares big forest property in the Brazilian Amazonas and the model must have the option to not buy any property if that is not a profitable option. The decision maker is then better off buying the needed emission rights on the market instead, or invests the money in some other profitable areas. The property's value on the market could either be high, medium or low but since the cost for the investment will take place in the year one, no scenarios are used for this. According to an interview with Ylva Rylander (Rädda Regnskogen, 2009), a hectare of rainforest in central Amazonas in Brazil cost $200. With a total of 10,000 hectare the investment cost for property purchase will be $2,000,000. In this model, no consideration is taken to what will happen with the property's value after the investment period of 30 years. For making it possible to do this analysis, the assumption has been made that the value will be $0 after the project time is finished.

In the model there are three different stages that occur: searching for an investment, approval of REDD-project and emissions sale stage. Each of these different stages has four different scenarios and each scenario has four different outcomes: high, medium, low or fail. This result in that the decision tree in the model has a total of 41 branches and every branch has an outcome that has been calculated with the net present value formula described in chapter 2.4.1 (see Figure 32 and 33 below, for the decision tree).

Based on the transaction costs, evaluated in the theory chapter 2.3, all the 15 different costs were grouped together to three bigger parts. This was the right way to analyze the transaction cost in a decision model, according to Mr. Brygge at Tyv Syd. The risks associated with each stage and each possible outcome are estimations in interviews with the experts named in the beginning of this chapter. They have all tried to provide a reasonable answer to what could be the result for the different outcomes. All their estimates are just estimates but they provide with necessary information for being able to complete the decision model. Their estimates

should be seen in an perspective of the early stage of development for REDD/CDM-projects in general and forestry projects in particular.

Stage two, approval, only will occur if the first stage outcome is either: high, medium or low search cost. If the outcome in the search stage is fail, then there will not be any investment since no suitable property were found and the result will be an average cost of US$ 9,000 for the investor. The risk of failing in the search stage is estimated to only 5 % (risk represented by 0.05 in the model) by Mr. R. Todd at Forest Systems, since there are millions of hectares in the Amazonas area available for investors. If the search stage is successful and a property of 10,000 hectares rainforest is found, there is 60 % risk for medium search cost. 15 % for high and 20 % for low search cost. The fail cost is calculated as an average of the three other scenarios costs. With a successful search step, stage two occurs were a final approval of the actual REDD-project has to happen. Before that, transaction costs from project design document (PDD) preparation, baseline determination, approval, validation legal costs and registration have affected the investor but it is only the last part, registration that determines if there will be a stage three of the REDD-projects. Since there are no REDD-projects in deforestation by today and no one really knows what the post 2012 Kyoto protocol will be like, with only REDD projects and no CDM-projects in forestry, the estimation of the risks involved in this second stage are highly unsecure. If there will not be any projects allowed in the deforestation area, the risk of failing with the investment in this model would be 100 % and there would not be any use for the model. The risks used in this decision model are therefore based on the average risks estimated in the transaction costs involved in stage two and with help from the interviews with the different expertise, the average risk of failing the approval stage would be 7 % with a cost of $191,393, high cost of $505,000 and 19 % risk, medium cost of $210,000 and 34 % risk and low cost of $88,000 and 25 % risk. All the single estimated risks can be found in Appendix 1. If approval fails, the outcome will result in a range of negative values, from a loss of $2,336,696 in the low approval case, $2,342,696 in medium approval case to 2,348,696 in the high approval case. It is not until the final stage, stage three which is called the ER sale that the revenues from a successful REDD-project will occur. This stage has as the second; also a number of different transaction costs involved and all of them are summarized in one big pot. The ER sale stage involves monitoring costs, verification costs, certification review, and trading /brokerage fee and baseline/validation actualization. Verification and baseline/validation actualization also happens both year one and every five year in the investment period since the project has to be reviewed. Risk estimates have also been done for the different costs and the final risks that are used in the decision model are the average value of the different parts. See Appendix 1 for the full table over estimates and sources.

Analysis of the decision model calculation

Four different scenarios for the CER sale price have been used here to estimate the revenues from a successful project. A high CER price of an average of $30 per ton CO_2 over the whole 30 year period, medium price scenario has $20 value per ton CO_2, low price scenario has $10 value per ton CO_2 and fail scenario has $3 value per ton CO2. When these thesis where written, the price per ton CO_2 was around $16.72 and around euro 10,45 but the all-time high was in early July 2008 25 euro per ton CO_2. To estimate what the price will be for CERs the next coming 30 years is impossible and therefore three even levels of $10, $20 and $30 per ton CO_2 were used. The reason that $3 per ton CO_2 where used in the fail ER sale fail option and not $0 per ton was that it is highly unlikely that the carbon market will disappear totally and the value for CER will go to $0. Instead, the $3 scenario is a result of a carbon market that has been flooded with too many carbon rights and therefore the price plumbs. This could happen if

the governments continuously are too generous in the future when giving out emissions rights to the companies or if the oil price continues to stay on a low level. A scenario where the price on carbon rights will increase can occur if for example US sign the Kyoto Protocol and implement a carbon market system where there will be demand for emission rights from US based companies. The risks used in stage three in the decision model are based on the average risks estimated in the transaction costs involved in stage three, in the same way as in stage two. The average risk of failing the ER sale stage would be 3 % with a cost of $142,303, high cost of $286,534 and 19% risk, medium cost of $189,689 20 % risk and low cost of $87,845 and 59 % risk. If ER sale fails, the outcome will result in a range of low values, close to negative, see Figure 33.

So for an example, if search result is high cost, approval result is high cost and the ER sale result is high, the net present value of the investment will be $56,839,077, see Appendix 3. This calculation includes the purchase of the property for $2,000,000 in year one and the total transaction costs of $806,534, also in year one. In year five and every five year ahead until time 30, the transaction cost for validation and baseline actualization of $60,000 will occur.

The revenues in this high scenario do also happen in split parts. 80 % of the CERs are to be given the successful REDD-project investor in the years between the five year reviews and the other 20 % on year five, if the projects goal is achieved. This means that only 250,344 of the total 312,930 ton CO_2 conserved emission rights will be paid out yearly to the company and in every five year the rest 20 %, equal 312,930 ton CO_2 (0,2*312,930*5 years). With the CER price of $30 per ton CO_2 in the high scenario, the revenue will then be $7,510,320 annually and $9,387,900 every five year, during 30 years time. How all the rest net present values are calculated and the results of them, can be seen in Appendix 2. The software Treeage calculates the expected value for every node and these values can be seen in the rolled back decision tree in Figure 33 below.

With all the estimated costs and risk assessments and the calculated values put into the decision model, the optimal expected net present value from an investment in a deforestation REDD-project will be $20,379,725. This means that just from a core investment perspective, with the estimated outcomes, risks and level of transaction costs, an investor should invest in the deforestation REDD-project in Brazil since it provide high revenue. As we can see in the decision tree model, this investment has positive net present values in all outcomes except if the search and approval stages fails. The ER sale fail stage is the closest to a negative value. Sensitivity analysis shows that this investment will be profitable with a CER price of $1.23 and higher. With a current price of $16 per ton CO_2, we can argue that this is a low risk investment, all other factors equal. The CER price has to fall by another 90 % before the decision will change to not invest in the project and this could be seen as highly unlikely. If the property hectare price will rise from $200 to $2000, which is a radical change but it could happen since the rainforest competes with the agricultural industry in many parts of Brazil and the price of agricultural land is pending between $2,000- $2,800 per hectare. Then, the CER price that will have to occur to make this investment profitable must be over $10.2 per ton CO_2 and the yearly revenue per hectare would be $578 per hectare and year, (see Appendix 9).

To compare this investment to other possible REDD implementations were, let’s say that the politicians decide that farmers and rainforest owners will receive $600 per year for every hectare that is set aside for carbon conservation in the Amazonas. If we compare this figure with the figures that are a result from selling the CERs in the investment model, we find that the yearly revenue that the investor receives in scenario medium ER sale is, $6,258,600 per

year in average revenue. By dividing this with 10,000 hectares we get revenue of $626 per hectare and year. This is almost the same as the revenue that the farmers and forest owners would receive with just the $600 contribution with REDD and therefore the revenues from the sale of emission rights would work. If the carbon market plumbs and CER price fall, then will not REDD-projects be a suitable tool to protect the world's rainforests from deforestation. Not if they are in the situation to start an agricultural business, since the revenue from that average of $450 per hectare and year.

As this investment model clearly show, with positive net present value as an outcome, this case could be an acceptable investment for the interviewed firms, since they all wanted positive return from their CSR investments. As the author has investigated in the other chapters in this thesis, the core figures are not enough to make an overall good investment decision. In the last chapter, the broader implications form the PEST analysis, CSR investigations and decision model calculations are discussed.

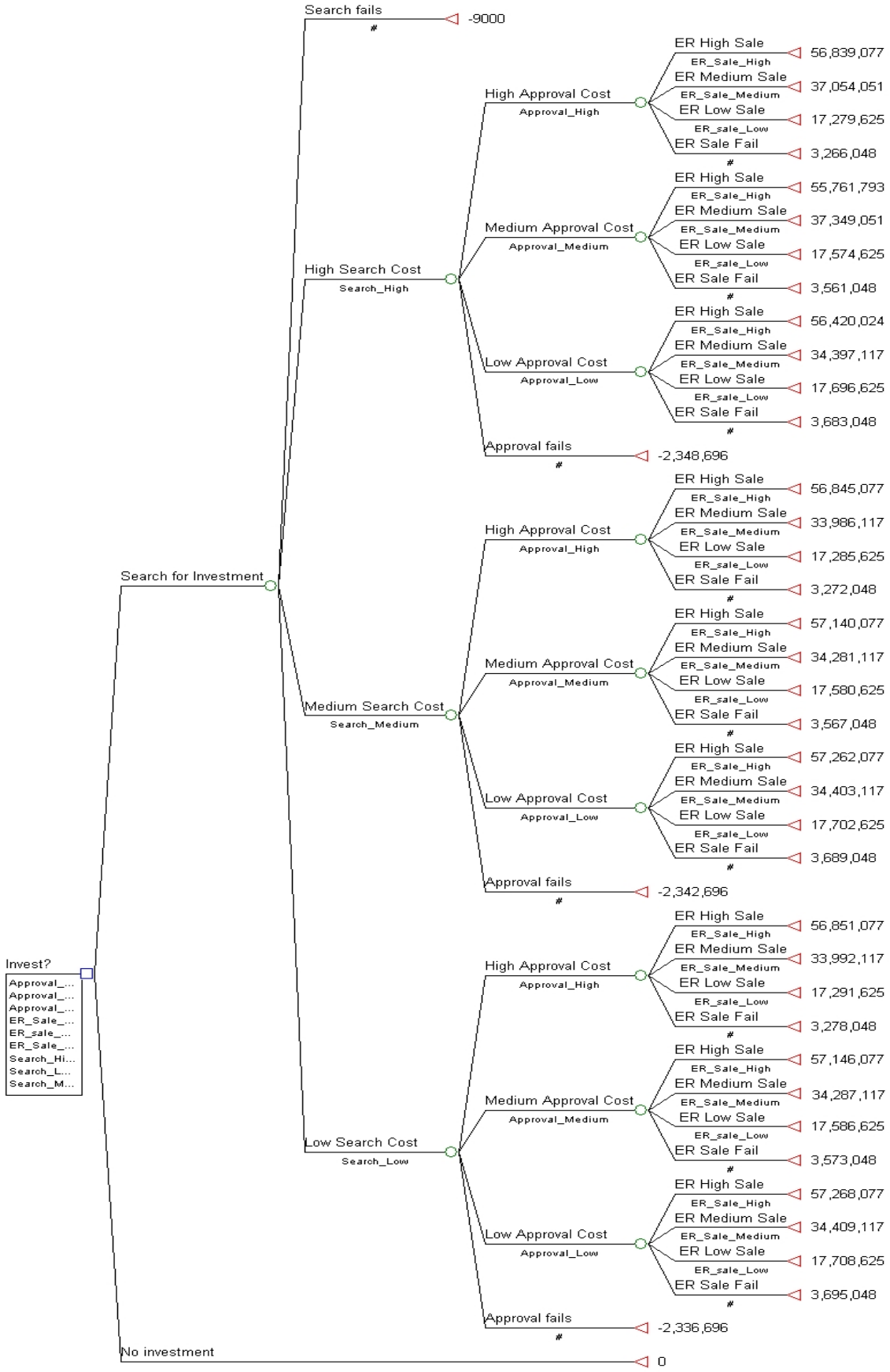


Figure 32. Decision tree with estimated risks and calculated net preset values for the investment case. (Hansson, P., 2009)

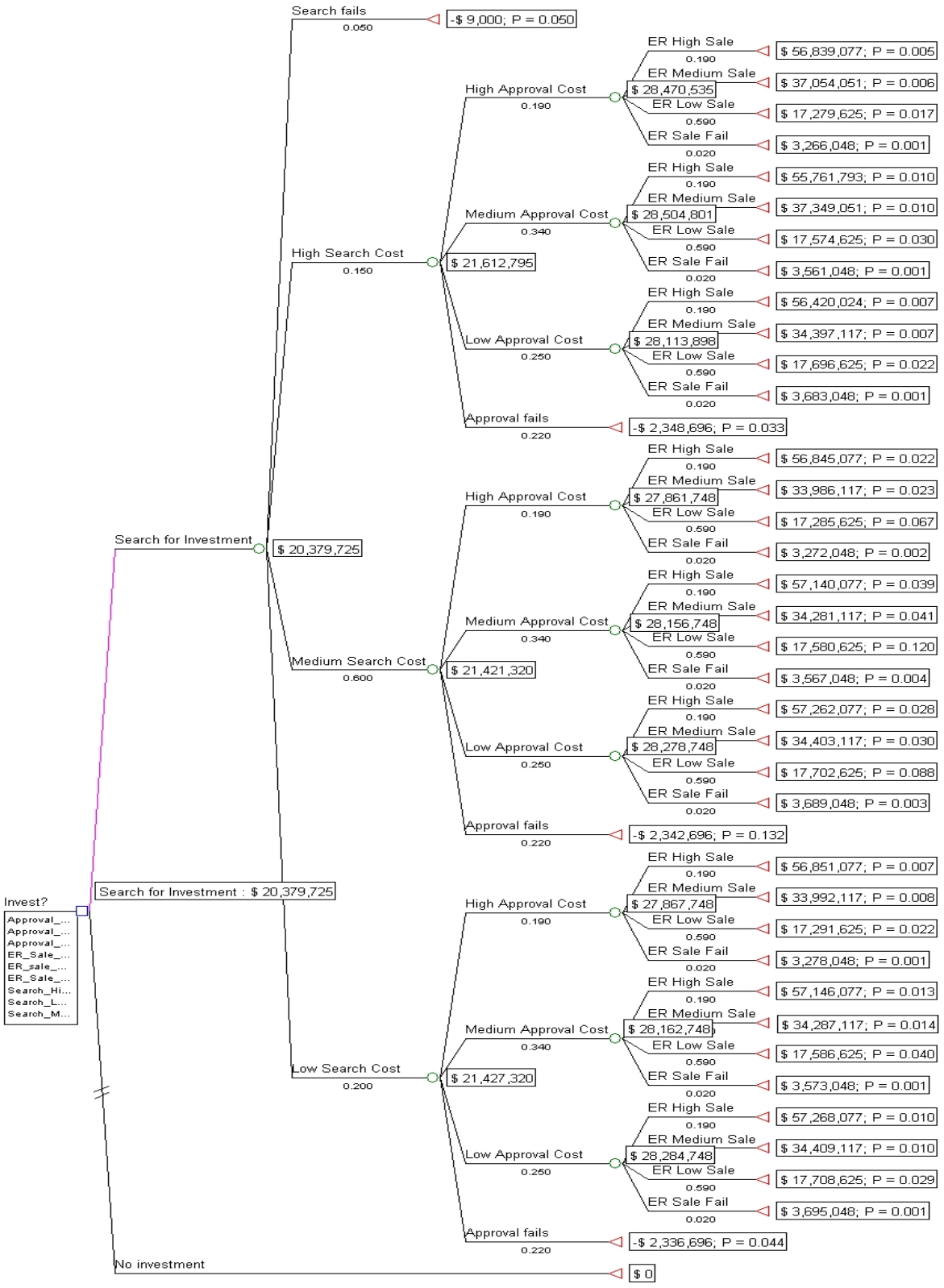


Figure 33. Finalized calculated decision tree with most likely net present value for the investment case. (Hansson, P., 2009)

5. Conclusions and discussion

This chapter presents the conclusions drawn from this study as well as a broader discussion over the implications from the findings

5.1 Conclusions about if firms and investigating investment in REDD-projects and their perceptions of the financial and non-financial benefits

The surveyed forest companies' perception on investing in REDD-projects for preventing deforestation of rainforest in general might not have been very surprising. They are all investigating investments in this type of projects but they find the problems and limitations with the rules and restrictions surrounding projects in forestry to be a too strong barrier today for being a suitable CSR investment. Since they all are huge international companies more surprising could be that they all would have to get revenue from an investment in REDD for even take it into consideration in the first place. Since all of them had well developed CSR strategies and the work with CSR played an important and profound role in the overall business work, we could argue that investment in REDD-projects for preventing deforestation of rainforest could be allowed with a loss. Even if some of them recognized the connection between CSR and REDD, a loss would never be accepted. If this is because REDD is relatively unknown among the public and prospective customers would not care about a foreign investment like this compared to some more local investment that is understandable and well known in general. This trend should be likely to change as time goes by and REDD investments becomes possible, since the climate change will not stop in a moment and companies and investors taking responsibility for these issues will probably be valuable as we move forward.

5.2 Conclusions about Brazilian Amazonas as an investment case

The PEST analysis showed both positive and negative circumstances that affect an investment in a REDD-project for preventing deforestation of rainforest. The fact that there is a growing interest for preventing and decreasing the pace of deforestation in Brazil is positive but since the deforestations just are to slow down, the possibilities for investments on a larger scale in Amazonas for preventing deforestation could be assumed to be mostly unlikely. Brazil would probably not want to sell all their tropical rainforest to foreign investors or companies since they look at the forest as a resource, comparable with their oil reserve. Even if there are huge areas available for interested investors today, this could decrease because of offsets to natural parks, more protectionist directives from the governmental direction and implementation of new hydroelectric dams.

The fact that Amazonas is the region in Brazil where most of the rainforest still remains natural and unexploited provided this study with a valid and reasonable case for possible investment in deforestation projects. Deforestation and the vital conditions for the indigenous people must also be seen as a driver and increase in incentives for this kinds of investments and carbon offsets. The value of providing natural environment for these people that makes it possible for them to survive is very hard to estimate but could in the long run be seen as priceless.

5.3 Conclusions about the economical investment benefits

This thesis clearly shows that the most likely outcome for an investment in a REDD-project for preventing deforestation in the Brazilian Amazonas has a positive net present value. Since there is no implemented project in this field, the outcome is to be seen as highly uncertain and the positive result is strongly affected by the investment time horizon of 30 years. A longer time perspective will lower the outcome and since the company want to achieve a prevention of deforestation into perpetuity, this is a big restriction included with this investment study. Many assumptions have been made for being able to carry out a complete calculation with the decision model and the estimated risk assessments by the interviewed experts are also to be seen as another uncertainty and highly important for the outcome of the decision model. This thesis has used all available information surrounding possible investments in projects for preventing deforestation but there is a constant flow of new information since this is a topic under development. The value of the result is decreasing as time passes but still, the fact that an implementation of deforestation as available projects for investments and issuances of carbon credits should be seen as an alternative in the overall work towards sustainable and environmental neutral industrial emissions.

Estimating the value of price on CERs during the next 30 years is hard and assuming that the price stays constant during that time may be considered as too simplified, but since three different price levels were used as well as the carbon market crash price of $3, made the study to cover different scenarios and raised the validity of the outcome for the decision model calculation.

5.4 Conclusions about the consequence of transaction costs

The transaction costs that have been analyzed in this thesis cover a wide spectrum of different costs and sources. The result clearly show that the transaction costs are unlikely to have any effect on the result for an investment like this study case, the outcome will only not have negative net present value the REDD-project for some reason gets turned down. The transaction cost just for searching for a possible investment case is so low that this should not prevent large companies or investors for taking the first step towards this investment. Even if the decision model have used estimated transaction costs based on estimated levels from different experts and also statistics from actual costs from CDM-projects that have taken place, the estimates could be realistic, especially since probability values have been added to every transaction cost that occur and therefore a weighted total transaction cost has been used.

One transaction cost that is not used in this thesis could be the cost for companies or investors for seeking information for this type of investment in the first place. REDD-projects are unknown as investment objects and even if we look outside the forestry sector, carbon investments are rare. Just with the implementation of carbon credits and different mechanisms dealing with this, could be seen as a political move for making it harder for companies to keep on doing business as usual. The will be a negative force against the development of the REDD-projects in the future. The negative sound surrounding this field will take long time to change and the fact that no one knows today what the world beyond year 2012 and phase III of the Kyoto Protocol’s carbon market will look like, will cause REDD-projects to be pushed several years into the future.

5.5 Suggestions on further research

This thesis is just a prospective investment study for a certain case in Brazilian Amazonas and the fact that there is deforestation all over the world provides plenty of reasons and

opportunities for further investigations. This thesis results apply only to the sampled five firms and they may or may not be applicable to other firms than with this study. Their perception on this investment type can not been seen as generalized view within the forest industry and a broader study that cover a wider spectra of companies could be interesting to carry out.

The deforestation in Brazil is a direct result of a growing agricultural sector. This area provide ultimate environment for raising cattle and the demand is high from foreign countries for cheap meat. A study on how a change in for example the agricultural politics in Europe could, with less import of meat from Brazil, change the rate of deforestation and increase the possibilities for carbon offset investments like this study investigates. This thesis also just scratches on the surface regarding Brazil's social problems and reasons for deforestation and what changes could be made for preventing deforestation of the rainforest is another area of interesting future research.

The regulations and restrictions surrounding the current system for CDM-projects in forestry, which currently is preventing forest companies and forest investors from investments in carbon conservation. A study for deeper understanding on why the rules are set to be harder for this sector than for all other sectors involved in CDM-projects could be interesting and how the CDM structure could be applied to the implementation of REDD. There might be implications that this thesis has not covered and also a broader study on how and not why forest companies are interested in REDD-projects as far as today and what the possible changes in incentives that would have to take place for a change behavior and increased interest as a result.

An agreement from the US direction on the Kyoto Protocol and an implementation of a cap and trade system in both US and China will highly affect the rule of the game for carbon credits and incentives for investments in carbon offset projects. A study covering this field and investigations in how US based as well as Chinese companies would be affected by this implementation could be interesting. The companies in EU, that currently are affected by the implemented cap and trade system, competiveness compared to those companies in US or China after their implementation of the same or similar system, could be analyzed.

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Denise McCluskey - SLU

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Appendices

Appendix 1. Transaction costs for investment case study

Transaction costs for REDD-projects				
Chance nodes	**Cost based source**	**Cost (US $)**	**Prob.**	**Source**
Search	**High**	**15,000**	**0.15**	**Forest Systems**
	Medium	**9,000**	**0.6**	**Forest Systems**
	Low	**3,000**	**0.2**	**Forest Systems**
	Fail, average cost	**9,000**	**0.05**	**Forest Systems**
Approval				
PDD Preparation,	High	180,000	0.3	TÜV SÜD
including negoation	Medium	60,000	0.4	TÜV SÜD
	Low	15,000	0.2	TÜV SÜD
	Fail, average cost	85,000	0.1	TÜV SÜD
Baseline determination	High	100,000	0.05	TÜV SÜD
	Medium	35,000	0.1	TÜV SÜD
	Low	7,500	0.8	TÜV SÜD
	Fail, average cost	47,500	0.05	TÜV SÜD
Approval	High	45,000	0.2	BioCarbon Fund
	Medium	30,000	0.5	BioCarbon Fund
	Low	1,500	0.15	BioCarbon Fund
	Fail, average cost	25,500	0.15	BioCarbon Fund
Validation	High	40,000	0.2	TÜV SÜD
	Medium	30,000	0.5	TÜV SÜD
	Low	10,000	0.2	TÜV SÜD
	Fail, average cost	26,667	0.1	TÜV SÜD
Legal costs	High	70,000	0.3	BioCarbon Fund
	Medium	27,500	0.45	BioCarbon Fund
	Low	27,000	0.2	BioCarbon Fund

	Fail, average cost	41,500	0.05	BioCarbon Fund
Registration	High	70,000	0.3	BioCarbon Fund
	Medium	27,500	0.45	BioCarbon Fund
	Low	27,000	0.2	BioCarbon Fund
	Fail, average cost	41,500	0.05	BioCarbon Fund
			1	
Sum of Approval	**High**	**505,000**	**0.19**	**Avg of high risks**
	Medium	**210,000**	**0.34**	**Avg of med risks**
	Low	**88,000**	**0.25**	**Avg of low risks**
	Fail, average cost	**191,393**	**0.07**	**Avg of fail risks**
ER Sale				
Monitoring	High	20,000	0.4	BioCarbon Fund
	Medium	12,000	0.3	BioCarbon Fund
	Low	4,000	0.29	BioCarbon Fund
	Fail, average cost	12,000	0.01	BioCarbon Fund
Verification,	High, avg for 30 years	10,000	0.33	TÜV SÜD
happens every 5 years	Medium	10,000	0.33	TÜV SÜD
	Low	10,000	0.33	TÜV SÜD
	Fail, average cost	10,000	0.01	TÜV SÜD
Review Certification,	High, CER $30	187,758	0.1	TÜV SÜD
2 % of CERs	Medium, CER $20	125,172	0.25	TÜV SÜD
	Low, CER $10	62,586	0.55	TÜV SÜD
	Fail, CER $3	18,776	0.1	TÜV SÜD
Trading,	High	18,776	0.05	IETA
Brokerage fee, 0.2 %	Medium	12,517	0.05	IETA
	Low	6,259	0.89	IETA
	Fail, average cost	1,878	0.01	IETA

Baseline actualization/	High	50,000	0.05	TÜV SÜD
validation actualization,	Medium	30,000	0.05	TÜV SÜD
happens every 5 years	Low	5,000	0.89	TÜV SÜD
	Fail, average cost	28,333	0.01	TÜV SÜD
Sum of ER Sale	**High**	**286,534**	**0.19**	**Average of all high risks**
	Medium	**189,689**	**0.20**	**Average of all medium risks**
	Low	**87,845**	**0.59**	**Average of all low risks**
	Fail, average cost	**142,303**	**0.03**	**Average of all fail risks**

Appendix 2. Result of calculated net present values

Investment outcome Search	Approval	ER Sale	Payoffs
Fail			-$9,000
High	High	High	$56,839,077
High	High	Medium	$37,054,051
High	High	Low	$17,279,625
High	High	Fail	$3,266,048
High	Medium	High	$55,761,793
High	Medium	Medium	$37,349,051
High	Medium	Low	$17,574,625
High	Medium	Fail	$3,561,048
High	Low	High	$56,420,024
High	Low	Medium	$34,397,117
High	Low	Low	$17,696,625
High	Low	Fail	$3,683,048
High	Fail		-$2,348,696
Medium	High	High	$56,845,077
Medium	High	Medium	$33,986,117
Medium	High	Low	$17,285,625
Medium	High	Fail	$3,272,048
Medium	Medium	High	$57,140,077
Medium	Medium	Medium	$34,281,117
Medium	Medium	Low	$17,580,625
Medium	Medium	Fail	$3,567,048
Medium	Low	High	$57,262,077
Medium	Low	Medium	$34,403,117
Medium	Low	Low	$17,702,625
Medium	Low	Fail	$3,689,048
Medium	Fail		-$2,342,696
Low	High	High	$56,851,077
Low	High	Medium	$33,992,117
Low	High	Low	$17,291,625
Low	High	Fail	$3,278,048
Low	Medium	High	$57,146,077
Low	Medium	Medium	$34,287,117
Low	Medium	Low	$17,586,625
Low	Medium	Fail	$3,573,048
Low	Low	High	$57,268,077
Low	Low	Medium	$34,409,117
Low	Low	Low	$17,708,625
Low	Low	Fail	$3,695,048
Low	Fail		-$2,336,696
No investment			$0

Appendix 3. Net present value calculation in scenario High, High, High

				NPV	Cash Flow	
Source	**Senario**	**TC ($)**	Interest rate (%)	High High High		**Year**
Search	High	15 000	15%	(2 806 533,80)	(2 806 534)	0
	Medium	9 000	15%	6 530 713,04	7 510 320	1
	Low	3 000	15%	5 678 880,91	7 510 320	2
	Fail	9 000	15%	4 938 157,31	7 510 320	3
Sum of Approval	High	505 000	15%	9 627 306,94	16 838 220	4
	Medium	210 000	15%	3 733 956,38	7 510 320	5
	Low	88 000	15%	3 246 918,59	7 510 320	6
	Fail	191 393	15%	2 823 407,47	7 510 320	7
Sum of ER Sale	High	286 534	15%	2 455 136,93	7 510 320	8
	Medium	189 689	15%	4 786 473,03	16 838 220	9
	Low	87 845	15%	1 856 436,24	7 510 320	10
	Fail	142 303	15%	1 614 292,38	7 510 320	11
Sum, TC cost in year 1	High	806 534	15%	1 403 732,51	7 510 320	12
	Medium	408 689	15%	1 220 636,96	7 510 320	13
	Low	178 845	15%	2 379 723,04	16 838 220	14
	Fail	342 696	15%	922 976,91	7 510 320	15
TC cost every 5 year	High	60 000	15%	802 588,62	7 510 320	16
(every year)	Medium	40 000	15%	697 903,15	7 510 320	17
	Low	15 000	15%	606 872,30	7 510 320	18
	Fail	38 333	15%	1 183 142,93	16 838 220	19
Property cost, 10 000 hectares		2 000 000	15%	458 882,65	7 510 320	20
Revenue CERs	High	7 510 320	15%	399 028,39	7 510 320	21
	Medium	5 006 880	15%	346 981,21	7 510 320	22
	Low	2 503 440	15%	301 722,79	7 510 320	23
	Fail	751 032	15%	588 231,14	16 838 220	24
Revenue CERs	High	9 387 900	15%	228 145,78	7 510 320	25
(every 5 year)	Medium	6 258 600	15%	198 387,63	7 510 320	26
	Low	3 129 300	15%	172 510,98	7 510 320	27
	Fail	938 790	15%	150 009,55	7 510 320	28
			15%	292 454,84	16 838 220	29
				$ 56 839 077		

Appenidix 4. Calculations for the investment decision model

Required rate of return (RRR) deforestation, Brazil	15 %
Timeframe, deforestation	30 years
Farm Landvalue, Brazil/ha	$2,000
Plantage land value, Brazil/ha	$1,000
Landvalue/ha	$2,800
Rainforest land value, Brazil/acre	$2,400
Rainforest, Brazil, Carbon content/ha above ground	217 tC
Rainforest, Brazil, Carbon content/ha below ground	68 tC
Total Rainforest conservation ton Carbon/ha	285
Total Conserved Carbon Dioxide, CO2, faktor: 1ton Carbon= 3.66 ton CO2	1043.1
Net Carbon conserved, net= 90 % (10 % baseline)	938.79
10 000 hectares, conserved carbon during 30 years	9,387,900
Conserved CO2 per year,	312,930
CO2 emissions, to receive CERs every year	250,344
20 % buffer, to be payed out every 5years	312,930
Rainforest land value, Brazil/hectare	$200
10 000 hectares rainforest property	$2,000,000
Total Payments from CERs sold, CER $3/tCO2	$9,387,900
Payments every year	$751,032
Payments every 5 year	$938,790
Total Payments from CERs sold, CER $10/tCO2	$93,879,000
Payments every year	$2,503,440
Payments every 5 year	$3,129,300
Total Payments from CERs sold, CER $20/tCO2	$187,758,000
Payments every year	$5,006,880
Payments every 5 year	$6,258,600
Total Paymentse from CERs sold, CER $30/tCO2	$281,637,000
Payments every year	$7,510,320
Payments every 5 year	$9,387,900

Appendix 5. Secondary data used for estimation of transaction costs for the decision model

Transactioncosts for CDM-projects in deforestation		
	Cost based source	**Cost (US $)**
Pre Implementation	Search	15 000
		40000
		15 000 euro
		5 000- 30 000
		3 000- 15 000, typ 9 000
	PDD prep	180 000
		15 000- 100 000
		15 000- 60 000, typ 37 500
	Negoation	25 000-50 000 euro include PDD
		125 000- 366 000 euro, typical 250 000
	Baseline determination	20 000- 100 000
		35 000
		30 000- 40 000 euro, typ 35 000
		7 500- 15 000
	Approval	40 000
		35 000- 207 000 euro, typical 40 000
		5 000
		1 500- 3 000
	Validation	20 000
		20 000-30 000 euro
		40 000
		15 000-30 000 euro
		8 000- 30 000
		30 000- 35 000 euro, typ 30 000
		10 000- 20 000, typ 15 000
	10 % contingency	22 000- 65 000 euro, typ 36 000
	Legal costs	5 000- 50 000, typ 27 500
	Registration	$5000-$30000
		10 000
		10 000 euro
		10 500- 350 000
		10 000- 30 000, typ 20 000
Implementation	Monitoring	6,3-12,4/ha
		10 000 euro
		3 000- 15 000 euro

	Verification	17 000+8500 every 5 years
	Review	
	Certification	2 % of CERs
		5-10 % of ERU value
		2 % of CERs
Trading	Brokerage fee	5 % of CER traded value
		1 %
		0,2-7 %, lower in highly liquid market
	Registration	10000
		0,03 %
		5 000- 30 000 depending on project size
Any additional costs	Baseline actualization	50 000 every 20 years
		5 000- 30 000
	Validation of baseline actualization	20 000 every 20 years

Appendix 6. Countries that are listed in Annex 1 to the UNFCCC

Australia	
Austria	
Belarus	a/
Belgium	
Bulgaria	a/
Canada	
Croatia*	
Czech Republic	a/ *
Denmark	
European Union	
Estonia	a/
Finland	
France	
Germany	
Greece	
Hungary	a/
Iceland	
Ireland	
Italy	
Japan	
Latvia	a/
Liechtenstein*	
Lithuania	a/
Luxembourg	
Monaco*	
Netherlands	
New Zealand	
Norway	
Poland	a/
Portugal	
Romania	a/
Russian Federation	a/
Slovakia	a/*
Slovenia	a/*
Spain	
Sweden	
Switzerland	
Turkey	
Ukraine	a/
United Kingdom of Great Britain and Northern Ireland	
United States of America	

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a/ Countries that are undergoing the process of transition to a market economy.

*Countries added to Annex I by an amendment that entered into force on 13 August 1998, pursuant to decision 4/CP.3 adopted at COP 3.

Appendix 7. Non-Annex I countries having ratified the Kyoto Protocol

The non-Annex countries do not have emission caps and are potential host countries of Clean Development Mechanism (CDM) projects.

A-C	D-L	M-P	P-Y
Antigua and Barbuda	Djibouti	Madagascar	Phillipines
Argentina	Dominican Republic	Malawi	Republic of Korea
Armenia	Ecuador	Malaysia	Republic of Moldova
Azerbaijan	El Salvador	Maldives	Rwanda
Bahamas	Equatorial Guinea	Mali	Saint Lucia
Bangladesh	Fiji	Malta	Saint Vincent and the Grenadines
Barbados	Gambia	Marshall Islands	Samoa
Belize	Georgia	Mauritius	Senegal
Bhutan	Ghana	Mexico	Seychelles
Benin	Grenada	Micronesia	Solomon Islands
Bolivia	Guatemala	Mongolia	South Africa
Botswana	Guinea	Morocco	Sri Lanka
Brazil	Guyana	Myanmar	Sudan
Burundi	Honduras	Namibia	Thailand
Cambodia	India	Nauru	Togo
Cameroon	Israel	Nicaragua	Trinidad and Tobago
Chile	Jamaica	Niger	Tunisia
China	Jordan	Niue	Turkmenistan
Colombia	Kenya	Palau	Tuvalo
Cook Islands	Kiribati	Panama	Uganda
Costa Rica	Kyrgyzstan	Papua New Guinea	United Republic of Tanzania
Cuba	Lao Democratic People's Republic	Paraguay	Uruguay
Cyprus	Lesotho	Peru	Uzbekistan
	Liberia		Vanuatu
			Viet Nam
			Yemen

Appendix 8. CSR questionnaire

Questionnaire

This survey is a part of the master thesis
regarding preventing deforestation in the Brazilian Amazonas
At
Yale School of Forest and Environmental Studies

1. What do you see as your firm's corporate responsibilities?
   What responsibilities do you take? What are the responsibilities of other actors?

2. Are you familiar with corporate social responsibility (CSR)?

   No
   Little
   Much

3. Does your company have a CSR strategy?

   Yes
   No
   N/A

4. Who is involved in defining your company's environmental objectives?

   - Board
   - Senior management
   - Marketing
   - HR
   - CSR
   - Strategy
   - Operations
   - Sustainability/Environment team
   - All

5. Has your firm discussed either carbon management/clean development mechanism?
   If so, what is the status? - Any special projects?

6. Does your organization have a carbon management strategy?

   Yes
   Under development
   No

7. Are you familiar with REDD or clean development mechanism (CDM)?

   No
   Little
   Much

8. Do you think these initiatives will be directly profitable?
   Or would you do these for other reasons?
   - Revenue
   - Reputation
   - Carbon offsetting
   - CSR goals
   - Costumers
   - Shareholder
   - Stakeholders

9. Does your company own plantations in a developing country? If so, which?

   Yes Countries:
   No

10. Does your organization recognize connections between CSR and REDD/CDM?

    Yes
    No

11. Does your organization have experiences of implementing REDD/CDM?

    Yes
    Under development
    No

12. Timing - in what time frame are you considering the possibility of any such investments?

13. How big risk is your company willing to take financially if using REDD/CDM?

    Net loss 10 %
    Break-even
    Net profit 10 %

14. Does your organization analyze the ratio between price of carbon emissions and costs of in-house carbon offsetting?

    Yes
    No

15. What would be a probable required rate of return for a forest REDD/CDM project?

    0-5 %
    5-10 %
    10-15 %
    15-20 %
    20-25%

16. How does your organization’s carbon footprint look like?

    Polluter
    Neutral
    Off setter

17. Where would your organization most likely invest in CSR measures?

    Locally
    Most cost efficient
    Developing country
    Other

18. How are the CSR and REDD/CDM strategies affected by the current economical climate?

    Not
    Cut down
    On hold
    Terminated

If you have any questions regarding the questions, the result or the thesis please contact:
par.hansson@yale.edu , +1.203.285.9174

Appendix 9. NPV calculations with hectare price of $2000/ha

				NPV	**Cash Flow**	
		TC ($)	Interest rate (%)	Medium-High-High		Year
Search	High	15,000	15%	-20408689.2	(20,408,689)	0
	Medium	9,000	15%	2235680.765	2,571,033	1
	Low	3,000	15%	1944070.231	2,571,033	2
	Fail	9,000	15%	1690495.853	2,571,033	3
Sum of Approval	High	505,000	15%	3284621.756	5,744,824	4
	Medium	210,000	15%	1278257.734	2,571,033	5
	Low	88,000	15%	1111528.464	2,571,033	6
	Fail	191,393	15%	966546.4905	2,571,033	7
Sum of ER Sale	High	286,534	15%	840475.2091	2,571,033	8
	Medium	189,689	15%	1633037.521	5,744,824	9
	Low	87,845	15%	635520.0069	2,571,033	10
	Fail	142,303	15%	552626.0929	2,571,033	11
Sum, TC cost in year 1	High	806,534	15%	480544.4286	2,571,033	12
	Medium	408,689	15%	417864.7206	2,571,033	13
	Low	178,845	15%	811908.2635	5,744,824	14
	Fail	342,696	15%	315965.7622	2,571,033	15
TC cost every 5 year	High	60,000	15%	274752.8367	2,571,033	16
	Medium	40,000	15%	238915.5102	2,571,033	17
	Low	15,000	15%	207752.6176	2,571,033	18
	Fail	38,333	15%	403661.8998	5,744,824	19
Property cost, 10 000 hectares		**20,000,000**	15%	157090.8261	2,571,033	20

Revenue CERs every year	High	7,510,320	15%	136600.7184	2,571,033	21
	Medium	5,006,880	15%	118783.2334	2,571,033	22
	Low	2,503,440	15%	103289.7681	2,571,033	23
	Fail	751,032	15%	200691.3055	5,744,824	24
Revenue CERs every 5 year	High	9,387,900	15%	78101.90408	2,571,033	25
	Medium	6,258,600	15%	67914.6992	2,571,033	26
	Low	3,129,300	15%	59056.26018	2,571,033	27
	Fail	938,790	15%	51353.26972	2,571,033	28
			15%	99779.04807	5,744,824	29
Carbon, to receive CERs every year	250,344			**$ *(11,802)* SUM NPV**		
20 % buffer, to be payed out every 5years	312,930					
		Revenues				
CER price	**10.2700**	2,571,033	every year			
CER price	10.2700	3,213,791	every 5 year			
		5,784,824				
	per hectare and year	**$ 578**				

Appendix 10. Kyoto Protocol background

In the third UN Convention meeting (COP3) in Kyoto Japan on December 11 in 1997, the meeting succeeded with an agreement that set targets for the level of carbon dioxide emissions (CO_2) as well as some other green house gases; methane, nitrous oxide, ozone and chlorofluoro carbons (www, unfccc, kyoto, nr 1, 2009). The Kyoto Protocol entered into force in February 2005 and as of 14 January 2009, 183 countries have ratified the Kyoto Protocol. According to the protocol, the industrialized countries' (listed as annex 1 countries) emissions should be reduced with an average of 5 % during the period 2008-2012, compared to the level of emissions in 1990. The member countries of the European Union (EU) have agreed upon 8 % reduction during the set period. The only country that has not signed the Kyoto Protocol by today is USA.

The Kyoto Protocol has different mechanisms which are set up to stimulate investments in greenhouse gas reductions. They are created as a market based incentive to reach the agreed targets and those are measured primarily by national measures. Through this agreement, the participating countries have a tool for determination of the consequences from the ratified protocol. The questions that the member countries sought agreement upon are rules for using existing forest and land as carbon sinks. Every emissions unit that is traded on the market is defined as one metric ton of CO_2 equivalent. There have until today been two different emission trading schemes. The first did last from 2005 to 2007 and this is called "Phase 1 Trading Scheme". The second and the current scheme started in 2008 and will last until 2012, called "Phase 2 Trading Scheme" (State and Trends of the Carbon Market, 2008).

Appendix 11. CDM background

Clean Development Mechanism (CDM) is one of the mechanisms under the Kyoto Protocol. The purpose is to reduce the environmental impact through letting Annex 1 countries invest in green house gas reduction projects in non Annex 1 countries, (see Appendix 7 and 8). The reason is; the emission reductions can be done in a less expensive way than if it would have occurred in the home country and at the same time the host country benefits from the investment through modernization with technology transfer, capacity increasing and streamlining (Klimatläget, 2007). In Figure 34 below, an overview over how the CDM credits work parallel with the EU ETS, European Union Emission Trading Scheme, in other words the cap and trade system, interact with the policy makers and end users.

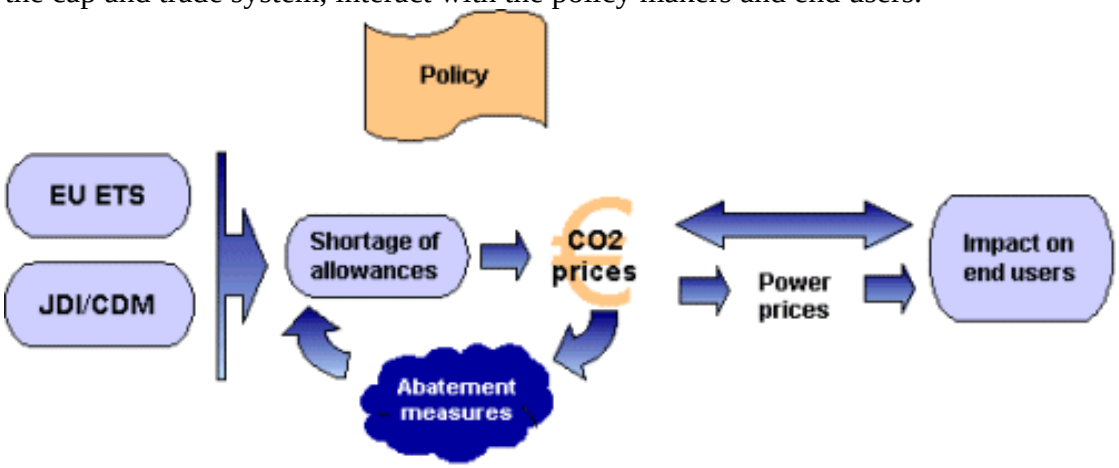

Figure 34. Overview of the interaction between the different parts on the carbon market (www, ilex energy, nr1, 2009)

For the CDM-project to be a valid emission reduction, it is a must that the emission reduction is *additional*. This is the most crucial part of all the criterions that are needed to be fulfilled for a successful project. The definition of is that "emission reductions from either mechanism must be measured against a baseline of business as usual, representing the best projection of the emissions quantity that would have taken place if CDM were not available as a market for emission reductions" (Chadwick, 2006). The baseline with scenario "business as usual" is different for every project and need to be estimated every time. This baseline can for example be, if using a preventing deforestation CDM-project in tropical rainforest, that the business as usual will mean totally deforestation of the land area for transformation to agricultural land and therefore totally removal of the stored carbon.
This additionality criterion has had and still has plenty of criticism against it since it is hard to prove that the investment in the project would not have occurred without revenue from the emission rights (Forest Fraud, 2003). There are many different stages in the development of a CDM-project and these can be seen in Appendix 12. These stages are the sources of the transaction costs that are described in chapter 2.3 and the different levels can be seen in Appendix 12 in Figure 35.

Appendix 12. CDM structure levels that are sources to the transaction costs

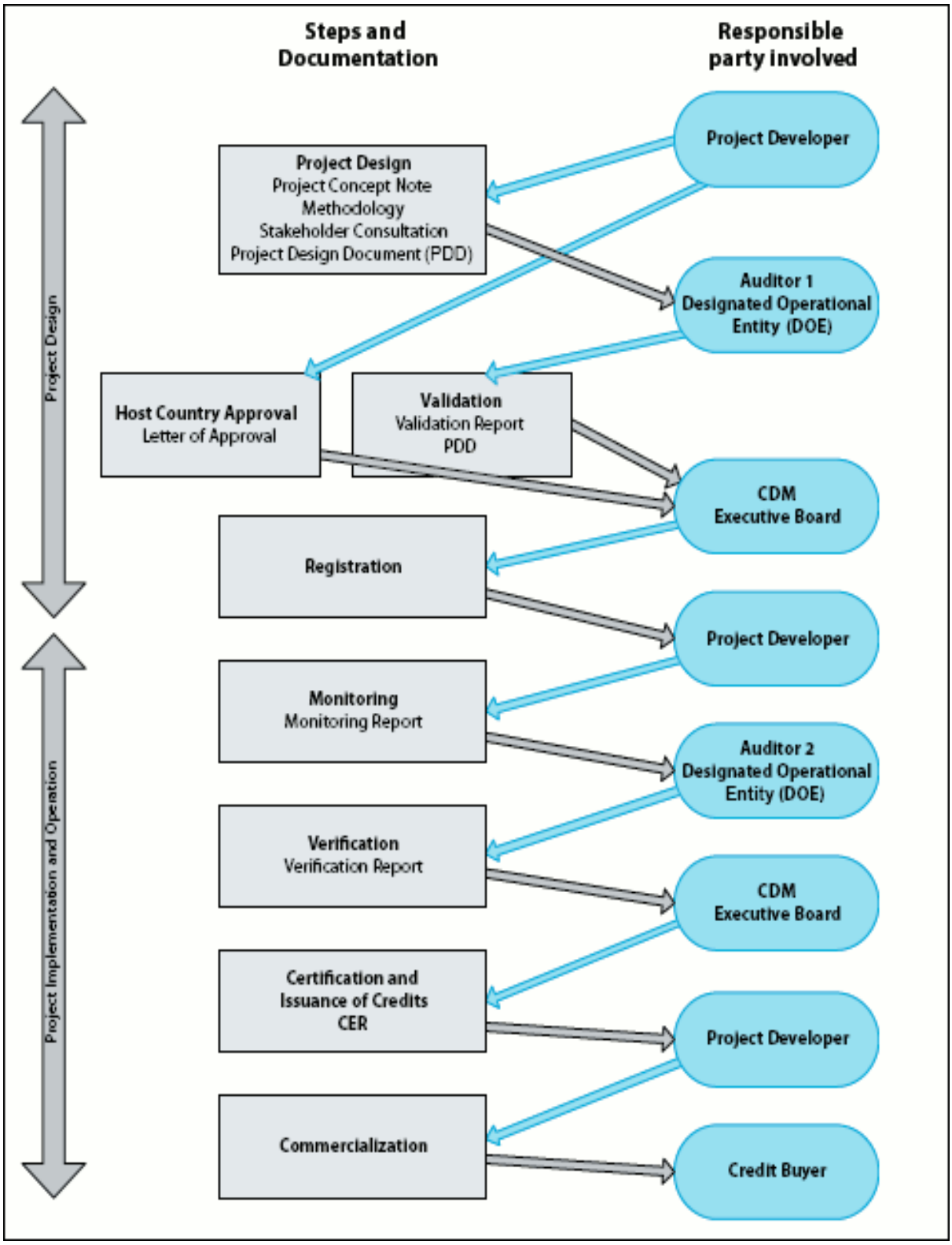

Figure 35. Overview over the different stages in the processing of a CDM-project (www, caaltd, nr1, 2009)

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