Corporate Responsibility in Brazil: Linkage between Awareness and Transformation

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Contents

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Abbreviations

ANDE	Administración Nacional de Electricidad
ANEEL	Agência Nacional de Energia Elétrica (National Electricity Regulatory Agency)
BCG	Boston Consulting Group
BRICS	Brazil, Russia, India, China, South Africa
BRICs	Brazil, Russia, India, China
CCEE	Câmara de Comercialização de Energia Elétrica (Chamber of Electric Energy Commercialization)
CDP	Carbon Disclosure Project
CEO	Chief Executive Officer
cf.	confer
CMSE	Comitê de Monitoramento do Setor Elétrico (Power Sector Monitoring Committee)
CNPE	Conselho Nacional de Politica Energética (National Council on Energy Policy)
CONAMA	Conselho Nacional do Meio Ambiente
COP	communication on progress
CR	corporate responsibility
CSE	Centre for Science and Environment
CSR	corporate social responsibility
CSR-RUG	CSR-Richtlinien-Umsetzungsgesetz (CSR Directive Implementation Act)
DGCN	Deutsches Global Compact Network (German Global Compact Network)
e.g.	exempli gratia (for example)
EIA	Energy Information Administration
ENEM	Exame Nacional do Ensino Médio
EPA	Environmental Protection Agency
EPE	Empresa de Pesquisa Energética (Energy Research Company)
FCE	free contracting environment

FDI	foreign direct investments
GDP	gross domestic product
GFSI	global food security index
GRI	global reporting initiative
HDI	human development index
i.e.	id est (that is to say)
IAE	International Energy Agency
IFK	Indústria Freios Knorr Ltda.
ILO	International Labor Organization
INPE	Instituto Nacional de Pesquisas Espaciais
KB	Knorr-Bremse
km	kilometer
KW	kilowatt
kWh	kilowatt hours
LED	light emitting diode
lx	(lux) illuminance unit
m²	square meters
m³	cubic meters
m €	million Euro
MMA	Ministério do Meio Ambiente
MME	Ministério de Minas e Energia (Ministry of Mines and Energy)
MPD	managerial perceived determinants
MPRA	managerial perceived relationship attributes
MTOE	millions of tons of oil equivalent
MW	megawatt
MWh	megawatt hours

ONS	Operador Nacional do Sistema Elétrico (National Power System Operator)
PDE	Plano Decenal de Expansão de Energia
RP	public relations
RCE	regulated contracting environment
S.A.	Société Anonyme
SISNAMA	Sistema Nacional do Meio Ambiente no Brasil
SPD	stakeholder perceived determinants
SRI	socially responsible investment
TBL	triple bottom line
TSI	total societal impact
TSR	total shareholder return
TWh	terawatt hours
UK	United Kingdom
UNDP	United Nations Development Program
UNGC	United Nations Global Compact
UNO	United Nations Organization
USA	United States of America
WCD	World Commission of Dams
WHO	World Health Organization

Chapter 1

Introduction

"Saving our planet, lifting people out of poverty, advancing economic growth ... these are one and the same fight. We must connect the dots between climate change, water scarcity, energy shortages, global health, food security and women's empowerment. Solutions to one problem must be solutions for all." *Ban Ki-moon (2011)*

Current and future generations have to face big challenges. One challenge is the preservation of environment and natural resources. This includes to avoid further excessive destruction of natural habitat and the ability to learn from mistakes made earlier. It is furthermore necessary for society to adapt to changing circumstances. This includes a fast changing global societal structure including an increased pressure on natural resources due to higher demands. Each individual member of society can contribute and is invited to do so. Members of society also include governments, companies and organizations. The pressing challenges of today and the future must be recognized and solutions are to be found. Methods for implementing solutions are therefore crucial. In this context, the approach of *Corporate Responsibility* (CR) plays an important role and is addressed at corporations, organizations and governments. Nonetheless, the awareness of individuals for CR has become higher over time and people tend to be more aware in general.

CR is therefore an important tool to methodize aspects of responsibility, which are relevant for companies. The approach is justified by current developments, such as an undeniable global warming in all regions of the earth as well as the exploitation of natural resources. The latter mentioned can be clearly recognized and is a direct consequence of mismanagement of resources, mainly for the purpose of economic development. On the other hand, global warming is a much longer process, which was triggered a long time ago and was already mentioned by Svante Arrhenius in 1896. He was one of the first scientists, who studied the effect of carbon dioxide in the air and described the greenhouse effect. His research interests focused on the effects that caused the ice age and the impact of carbonic acid on the temperature of the earth (Arrhenius, 1896).

In general, the field of CR considers two different approaches: the environmental and social aspect. CR is often claimed to be a tool for improving a company's image, and respective actions are undertaken only superficially. Nevertheless, companies should have a significant interest in sustainability for their long-term strategies. As firms often operate in several countries, the need to act responsibly has been shifted and expanded. Responsibility includes environmental and social aspects as previously mentioned. The social aspect consists of a defined set of recipients and includes stakeholders, e.g. employees, suppliers and the local

environment as well as shareholders. CR aimed at environmental aspects includes the responsible use of natural resources. The theory of Corporate Responsibility has faced criticism, such as being a tool to make companies appear “greener” than they really are as well as being a marketing instrument. The impact of CR activities should have a positive effect on the company’s image, but there is also an increasing awareness that recipients, such as customers raise questions. CR involves almost all entities of a firm, which together can have a significant impact. Companies often hesitate due to increased efforts and costs. Undoubtedly, these efforts are necessary to be taken into consideration in order to be a valuable corporate citizen and to contribute equally to society and environment. The framework in which a firm decides to be active can vary, depending on size, background and location. To establish such a framework, several methods of support are provided and should serve as a guideline to implement and realize CR activities. One of the best known principles is provided by the United Nations Global Compact (UNGC). The UNGC defines four categories relevant for CR: human rights, labor, environment as well as anti-corruption (UN Global Compact, 2018). The discussion about sustainability was triggered by the Brundtland Report in 1987. Based on a common understanding that sustainable development and responsibility go hand in hand, the Brundtland Report, describes the two main pillars of CR: social, environmental, and additionally, the economic development. It is an attempt to address the current generation not to deprive future generations from their right to access natural resources (Munoz, 2013). The framework of the UN sets the rules and defines the aspects to be considered. A deviation in terms of economic development at expense of future generations and natural resources implies immediate counter-actions to avoid further harm. Such counter-actions include individuals, companies, governments and other public or non-public organizations. The role of individuals is important in this regard, and managers can have a significant impact in leading their companies or organizations in a sustainable direction. Facing the challenge to satisfy several target groups simultaneously, suitable measures have to be put in place or introduced. It is furthermore crucial to consider a changed society, which has several opportunities to get informed. Ways of communication have changed over the past 20 years and target groups, such as customers, employees or the local community have easy access to information. The challenge is probably to find the right balance of acting economically and consider social and environmental aspects at the same time. This means that a company’s responsibility also includes to be well managed in economic terms, as it provides a livelihood for families and the community. E.F. Schumacher believed that a complete change of mindset had to be taken into consideration in order to survive. A system must be established, “so perfect that human wickedness disappears and everybody behaves well” (Schumacher, 1973). Developed countries increasingly rely on less developed nations in order to achieve economic growth, not least due to limits in established economies. These limits can include expensive labor force,

limited natural resources, regulations and high expenses in general. The aims of this study are described in the following.

1.1 Scope and Limitations

This study aims to investigate the topic of Corporate Responsibility and was conducted using several methods of research, including a survey with 58 participants as well as field research, which are summarized in three case studies. In a first step, a theoretical framework was established in order to provide a solid basis of relevant approaches. As the field is vast, the theories are limited to some major aspects supporting the relevance of the topic in a modern business environment. A contemporary approach by Ernst Friedrich Schumacher (1973) underlines that the need for Corporate Responsibility is not new. He criticized the use of natural resources by humans for the sake of financial benefits. It is important to outline the need for more responsibility in doing business. However, the pressure has increased when looking at the level of exploitation of natural resources. In the course of this thesis, several aspects are examined in that regard. Regarding natural resources, the thesis considers the position of businesses by conducting a survey to demonstrate the relevance of the topic *Corporate Responsibility*. In a next step, three case studies should show responsible actions undertaken by businesses and government. The first case study shows the construction of a new factory in the state of São Paulo. In a second case study, the realization of renewable power supply transformation is described. The focus of the third case study is on the impact of the second largest hydropower plant in the world, Itaipu Binacional. As Brazil plays an important role in terms of economic development, the country is described more in detail considering the position within the BRICS and relevant information is provided in the country profile.

The question if CR has reached the importance in the context of global warming and exploited natural resources should be investigated. In general, have companies and government institutions adapted this necessity to related internal processes and do the firms contribute with responsible actions?

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Chapter 2

Corporate Responsibility

2.1 Historical Development of Corporate Responsibility

It is rather a challenge to narrow the beginning of CR down to a specific period. It was a development of certain aspects over time, which then sometime later was summarized under the term. Those several aspects include (Carroll, 2008: 33):

- Minority hiring
- Ecology (concern for environment)
- Contributions to education
- Contributions to the arts
- Urban renewal
- Civil rights

This is an approach from the 1970s, but it combines more or less all aspects of CR now. According to Archie B. Carroll, "CSR takes shape in the 1950s" (Carroll, 2008: 24). The theories of Archie B. Carroll play an important role in the discussion, which also set eyes on an approach by Patrick Murphy and his classification model of CR illustrated in table 2.1.

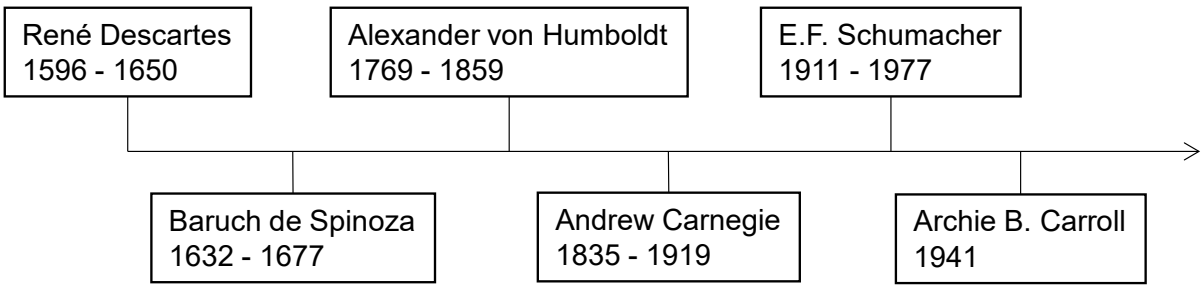
Table 2.1. Summary of P. Murphy's findings (Carroll, 2008: 25).

1. Until 1950: "philanthropic era": "[…] companies donated to charities more than anything else."	2. 1953 – 1967: "awareness era": "[…] more recognition of the overall responsibility of business and its involvement in community affairs."
3. 1968 – 1973: "issue era": "[…] companies began focusing on specific issues such as urban decay, racial discrimination, and pollution problems."	4. 1974 – 1978: "responsiveness era": "[…] companies began taking serious management and organizational actions to address CSR issues."

Those organizational actions, which were developed in the 1970s, include detailed issues, such as minority hiring, training, ecology, and the like more. All of these aspects are still present in today's perception of CR. Some of them are more or less pressing and some have vanished as time progressed. A crucial one remained: the ecological aspect, the central element of this project. The limitation of natural resources and the demand for developing other ways of sourcing have become prevalent throughout the globe. Moreover, a powerful technology progress has made it inevitable to develop new energy sources. Therefore, the "responsiveness era" by Murphy is up-to-date as it was in the 1970s. It takes "serious management and organizational actions to address CR issues" (Carroll, 2008: 25). These CR issues shall be defined by each organization separately, taking into consideration the guidelines provided by governments and organizations, such as the United Nations (Global

Compact). Other regulations are the European Commission Strategy on CSR and ISO 26000 Guidance Standard on Social Responsibility.

Instead of trying to define a point when CR started, this project looks at several aspects during the development, which have led to the modern notion of CR. For this purpose, six significant personalities are mentioned, who have shaped the topic in several aspects. In this regard, economic, ecological and social characteristics are considered, which define CR from a today's perspective. Those six main contributors from a historical perspective are summarized in scheme 2.1 arranged by their lifetimes.



Scheme 2.1. Timeline of pioneers in terms of CR (WHO'S WHO, 2015; Encyclopedia Britannica, 2018; Jakobsen, 2017: 138).

There was already a development ***before the 1950s***, when Murphy's model took shape. Looking back in history, there were several approaches shaping the topic. The importance of a suitable communication process, including raising of awareness and consensus building with all actors is decisive if it takes other values into account than the philosophical approach by Archimedes (Scherer and Palazzo, 2007). According to this theory of Habermas, a set of ethical rules is crucial in order to decide properly and ethically (Habermas, 1993; 2003). This theory proves rather to be challenging in practice, especially in a frame of modern economics and capitalism. According to Stanley M. Bergman, Chairman of the Board and CEO of Henry Schein, Inc., "Ethical Capitalism is not some idealistic dream; it is a powerful engine that drives long-term value creation" (Berman, 2014). In short terms, "Capitalism is only as good as capitalists" (Berman, 2014). When economics and capitalism developed, the demand for acting responsibly and sustainably has grown proportionally. Factors of this development include the increase of education level of people, the higher information flow as well as the limits of natural resources, which emerged especially in the 19th and 20th century.

As the project focuses on CR dedicated to environmental protection in particular, it is crucial to mention the theories of the following three scientists and their findings: René Descartes, Baruch Spinoza and Alexander von Humboldt. All of them describe the relation between humans and nature. It is noteworthy that all of these approaches were developed some time

ago: Descartes and Spinoza in the 1600s and von Humboldt in the late 1800s and early 1900s, respectively. An interesting view regarding René Descartes and Baruch Spinoza is followed by Ulrich Grober, a German journalist. His work comprises of articles and publications in the field of future visions, ecological tourism as well as sustainability (Grober, 2012: blurb). The topic of sustainability in terms of ecology is described by two opposite approaches: ***René Descartes*** on the one hand, who believed in "the existence and nature of God and the soul" (Hatfield, 2018) and though described the human as being independent: "cogito ergo sum" (Grober, 2012: 52). Humans are detached from God, who rather acts as sort of "watchmaker-god" and disappears after creating the watch (human being). The human being is now (after creation by God) responsible to preserve oneself and hence to gain possession over the nature and use resources according to their needs, as it were "maîtres et possesseurs de la nature" (Grober, 2012: 52 f.). This approach is crucial for the reflection on how to use natural resources and give an early indication that humans have power over nature, following Descartes.

On the other hand, there was the philosopher ***Baruch Spinoza*** (*1632). He studied Descartes' approach and reversed it by relating nature directly to God: "Deus sive Natura ('God or nature') is the living Ur-Being, which exists in itself, and of itself and of necessity fulfils the totality of its potential" (Grober, 2012: 54). Spinoza furthermore claimed that "all lesser 'entities', including human beings, are modes or modifications of this single universal substance" (Grober, 2012: 54). Similar to Descartes he described self-preservation as a profound instinct of human beings called conatus: "*suum esse conservare* – to preserve one's own being, self-preservation – is the fundamental human drive (*conatus*)" and the starting point of every desire including economic activity (Grober, 2012: 54). By describing "nature as natura naturata", it should be pointed out that nature is an element which can be manipulated and newly produced according to human's will. He indicated the power of humans over nature and the natural resources. It is furthermore stated that humans, although possessing over nature and resources, are part of the nature as well (Grober, 2012: 54 f.).

The former two approaches are historical concepts of philosophers, who both described the role of humans in relation with God and, in the broader sense, to the nature, insinuating that nature and God are directly related to another. Spinoza even more pointed out to the fact that nature is a crucial part to achieve economic security (Grober, 2012: 55). This approach is still valid as it was at all times, except for the fact that the matter has become more pressing today. Furthermore, Descartes and Spinoza emphasized the strong impact which humankind had on nature. This statement is crucial for most approaches, which dedicate their focus to environmental studies, especially in the field of corporate responsibility. It is therefore not astonishing that another scientist, George Perkins Marsh, came to a similar conclusion because he had "understood the world as an interplay between man and nature" (Wulf, 2017). He also strongly believed in the theories of ***Alexander von Humboldt*** (1769 - 1859) and his

views towards nature: “Humboldt was the greatest of the priesthood of nature” (Wulf, 2017). In his publications, Humboldt described the world from a different view. He travelled a lot for research and is well known in Latin America for his achievements. He is famous for discovering the global temperature zones as well as for his view on earth as an interconnected system (Ette and Drews, 2016: 53 ff.; Doherr, 2015). It is also described as a “unified whole made up of complex interrelationships” (Wulf, 2017).

Another great pioneer in the discussion of CR-related topics is ***Andrew Carnegie***. With “The Gospel of Wealth” he has expressed some ground-breaking principles on the distribution of business wealth including the question: who should benefit from it? A central pillar in the discussion within CR includes criticism that negative conditions for environment and social inequality are accepted by few in order to maximize personal wealth and profit. This central statement calls for the need and the willingness of the possessors to contribute to the community by a proper wealth management and to let the community benefit from the profit generated. It describes the methodology of CR as a three-pillar model, taking into consideration economic, ecological as well as social aspects. Carnegie demanded that people should also work for others in order to share the generated profit, especially those who enjoy advantages, belonging to a certain sociological stratum. With that claim, he provoked the basic idea of social CR, which in simple terms should be: *Let the community profit from the success of the business, in whatever terms, monetary or benefits in kind.* According to Carnegie, there are several methods of personal wealth management. It can be left to the families, it can be made available for public purposes or it can be managed by the owners (Carnegie, 1906).

The next pioneer in the timeline is ***Ernst Friedrich (E. F.) Schumacher*** (cf. scheme 2.1). His discourses and theories are discussed more in detail in chapter 3 of this project. As a short summary, Schumacher’s way of thinking was predominantly characterized by his demand to return to a human scale and to discard all forms of overacting. This is necessary to provide a solid basis for the future. He pointed out the uneven distribution of wealth: “the gap between the rich and the poor, worldwide, is quite enormously large, and there are not many people situated, as it were, in the middle (Schumacher, 1974: 9). Prevalent in all his publications was the religious view he applied because of his strong belief in Christianity.

Born in 1941, ***Archie B. Carroll*** dedicated his research as both a full-time and part-time professor at the Terry College of Business, University of Georgia at Corporate Responsibility and ethical studies. He drew attention to the studies of CR by developing *the Pyramid of Corporate Social Responsibility (CSR)*. This approach explains the topic by referring to different stages of business responsibilities. The pyramid is described in detail in section 2.4.3, as it is considered as a pivotal tool being in widespread use. Carroll explained CR as a topic, which “can only become reality if more managers become moral instead of amoral or immoral”

(Carroll, 1991). Hence, he directly addressed the responsibility to business leaders, similar to the approach of Carnegie who also saw the greater part of responsibility there.

Emphasizing that corporate responsibility is a controversial concept, corporate involvement has become more important throughout the historical development caused by the increasing level of awareness and availability of information. Moreover, the question arises if corporations are a progressive or regressive force in society. According to Post, “the roots of corporate responsibility lie deep in the history of capitalism” (Post, 2015). In the subsequent discussion of the importance of CR, it is crucial to have a look at the historical development in order to understand how the path was paved for the current motives and needs for CR. In chapter 3 of this project, the work of E.F. Schumacher is discussed in detail because he plays a significant role in the development of CR by questioning the capitalistic approaches in the 1970s. At that time, economic development was at a peak due to improved technological expertise and modern forms of production.

2.2 Causes, Motives and Needs for Corporate Responsibility

CR continuously faces one challenge: the omnipresent need to justify its motives and impacts. Furthermore, what are the reasons for CR, how is CR implemented and who pursues it? Is it companies, individuals, organizations or governments? More importantly, what are the real motives? The relationship between the owners of a business (shareholders) and the managers and stakeholders plays an important role. According to Milton Friedman, a detractor to the approach of CR, a manager has the role to serve as an employee and to fulfil the shareholder's targets, i.e. to generate profit, which he calls the only business responsibility (Friedman, 1970). His theories are explained in more detail in section 1.6.

As CR is a vast field of studies and space is limited, this project focuses mainly on companies and corporations, which by their nature have the main duty to create profit. Stakeholders, such as employees and affiliates, as well as shareholders, the owners of a company, demand that profit. Overriding questions are: who cares and how this profit is generated? This simple way of thinking is outdated and nowadays, people seem to care. People get informed and we have numerous options to stay informed. For example, the press forces a certain opinion on us in some cases. There are chances to question circumstances and events and we do so. The power of informed people, i.e. stakeholders, exerts a certain pressure on the way a corporation deals with situations. People are informed about situations and resolve the topic as good or bad. Consequently, this can be a motive for a company to present itself positively to the outside world: the external communication towards the broad public and its stakeholders and the desire to appear as affirmative as possible. Furthermore, it is important what customers think about the company. A majority of the consumers are willing to make sacrifices in order to acknowledge CR. A study, executed by the Cone Organization, suggested that 92 % of consumers say the image of the company is more positive, when a social or an environmental issue is supported (Cone Communications, 2017).
Given the fact that a corporation is constantly put on public pressure, there are several motives to conduct CR. For example, Forbes suggested following six motives in 2012 (Epstein-Reeves, 2012):

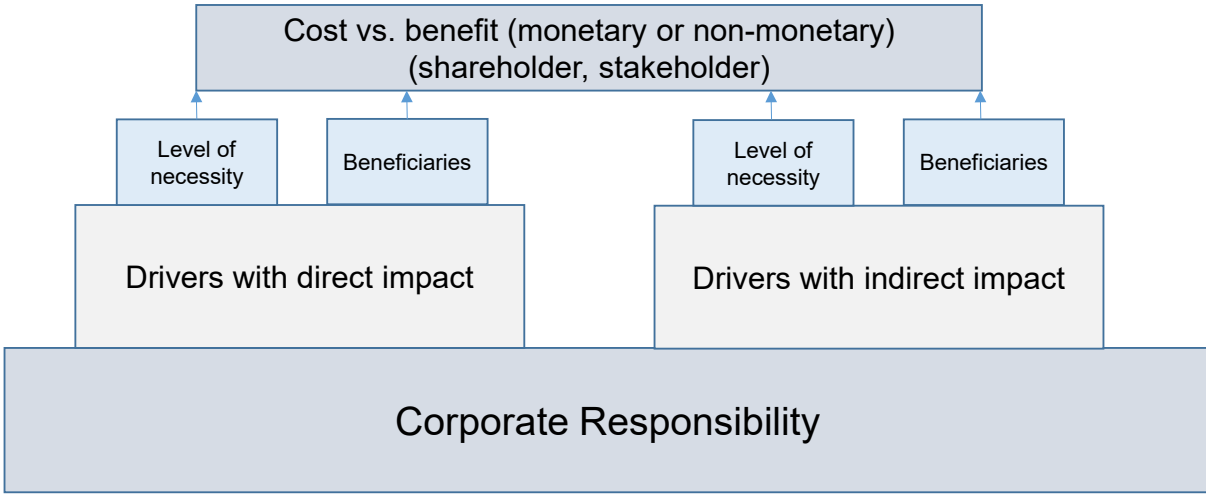
1. Innovation
2. Cost savings
3. Brand differentiation
4. Long-term thinking
5. Customer engagement
6. Employee engagement

This approach is dependent on the enterprise-driven motivation. None of the above mentioned state environmental protection at a first glance; it rather conducts a method of a sustainable management of a company or as James Epstein-Reeves put it: “Corporate social responsibility (CSR) is not going to solve the world’s problems. […] CSR is a way for companies to benefit themselves while also benefiting society” (Epstein-Reeves, 2012). This central statement of the topic describes the necessity, but also shows the limits, which are sometimes forgotten or perceived incorrectly. This can lead to a wrong perception of CR, which show the used terms Green-Washing and CSR-Washing (see section 2.6). It is furthermore important to raise awareness of CSR, as many small contributions can have an impact in summary. Hence, some basic rules, values and principles should be defined and followed. It is necessary to point out the importance of distinguishing between the several purposes of CR, in particular following two main drivers:

- *Indirect* effects, to which a sustainable and well-organized business management can contribute indirectly in terms of long-term prospects, stability and permanence.
- *Direct* impacts, such as provision of food to undernourished people, support of children to access education in underdeveloped countries, and contribution to environment in terms of direct financial support.

Following example can be considered as the main difference of the effects: A new school, which is built in Africa within six months, shows a more tangible effect than a long-term oriented business management with decisions regarding innovations, cost savings or engagement. Therefore, consequences of a direct action can become visible immediately. Depending on the intensity of doing CR activities, it is crucial to look at the respective companies’ parameters. These parameters can include internal and external factors, such as size of the company, level of research and development, customer base, market conditions and others (McWilliams and Siegel, 2001). Furthermore, the variety of goals and objectives play a significant role in the motivation for doing CR activities, which was demonstrated by the distinction mentioned above. In this regard following question arises: who profits from which measure and how? On the one hand, the beneficiaries differ between the two key drivers. Taking the mentioned example, the students will profit from a new school in item 2.

On the other hand, the approaches are different and consequently the motives. Another influence that drives CR (or not), is the necessity of the issue, which is affected by concrete measures. In general, there are different stages that drive CR, which are illustrated in scheme 2.2.



Scheme 2.2. Overview of different stages of CR.

In the model above, two major impacts are displayed: the beneficiary and the level of necessity. The beneficiaries do not necessarily profit from CR in financial terms. When staying with the examples of the school in Africa and the rainwater recycling system in Brazil, it is important to have a closer look at the two impacts by asking following question: who benefits from the respective measure? By establishing a “green” water recycling system, the company clearly profits from it and even more, it is a necessary undertaking to do business at this location. There are several benefits worth mentioning: it reuses rainwater for certain purposes, such as sanitary facilities. Furthermore, it saves money for the company by doing so, instead of using fresh water, and the company has the appearance of being innovative and caring for environmental aspects. This last benefit is important, it gives the company not only the chance to be “green” and sustainable, but also to talk about it and draw attention. This results in positive public relation and it conveys the message that acting sustainably is possible and other companies should follow such an approach. Consequently, there is a direct correlation between necessity and benefits in this case. In the second example, there is a school in Africa, which educates socially disadvantaged children. What is the level of necessity? Looking at the societal big picture, the level of necessity is undoubtedly huge. There is still a great disparity among developed and underdeveloped countries. In this thesis, it is not the task to look at CR from a global macro-economic perspective, but from a company’s perspective and therefore, following questions arise: what are the benefits and who profits from a school in Africa built by a company? General benefits are a school for children, who would have never had the chance to be educated at all. Furthermore, there is a perspective to the region to develop. The beneficiaries in this concept are students as well as the concerned residents who profit from the local development. What are the benefits for the company, who builds the school, or generally spoken, who is the sponsor? There is the possibility to create positive publicity if the company is interested in developing the region for expansion. Compared to the CR measures,

which have a direct impact on the company, the benefits with indirect impact are rather limited. Nevertheless, they create a way of being in public, which gives a chance of appearing philanthropic.

Another approach distinguishes the three motives *financial* (extrinsic), *ethical* and *altruistic* (intrinsic), following the need to put business into a broader context considering responsibility aspects. As an example for extrinsic motivation, executives see a positive effect on the company's reputation in the long run (Graafland and Mazereeuw-Van der Duijn Schouten, 2012). So extrinsic motives describe the effect of any CR-related action a business may benefit from an external view. This goes in line with the assumption that any business is highly dependent on the perception of customers and therefore enforces a positive image. An important method of communicating such an image is the way of reporting on CR actions as described in section 2.4. There several approaches are explained, such as the Triple Bottom Line (TBL), which suggests a holistic reporting, including economic, social and ecological aspects. Such extrinsic motives can also have the effect that businesses profit financially by other means. As explained in chapter 4 of this project, the case study about Knorr-Bremse Brazil shows that the transition from a conventional power to a green power supply resulted in significant financial savings and contributed to a more positive ecological balance. Though this example shows a quick result, many CR undertakings must be seen in a long-term perspective.

CR on an intrinsic level can be differentiated in two ways. In the one case, where CR actions are seen as a moral duty, the pressure to act morally is mainly created by societal values. Another intrinsic motivation is defined by altruism and this case describes the joy of supporting other humans or the desire to contribute to the society by helping others and hence contributing to CR (Graafland and Mazereeuw-Van der Duijn Schouten, 2012). In a study performed by Graafland and Mazereeuw-Van der Duijn Schouten in 2012, four hypotheses were determined as possible motives for CR:

1. Financial motive
2. Ethical motive
3. Altruistic motive
4. Income

The study's approach was to take into consideration the role of the respective business executive. It was conducted via survey by questioning these executives and considering their opinion.

The motives for doing CR activities, considering financial and ethical motives, are dependent of two factors, which are related to each other. CR actions cost money and each company's management is inclined to see the benefit from its efforts. The strategic value of CR can be described as a relation between moral duty, the importance of financial success as well as the

importance of meeting the moral duty. All factors are related to another (Graafland and Mazereeuw-Van der Duijn Schouten, 2012).

In a nutshell, all theories researched in this subchapter point out that the general motivation for CR has increased in the business world and CR is considered as a requisite. Although the implementation of CR actions takes some effort, the importance of the topic is well examined in literature and therefore underlines the importance of the matter.

2.3 CR Methodology (Social vs. Environmental)

In addition to run a company sustainably in terms of *economic* aspects, two more issues can be determined: *environmental (ecological)* as well as *social* aspects and derives from human, environmental and economic dimensions (Hawrysz and Foltys, 2015). The economic aspect does not only include financial issues, but also all decisions, which allow the companies to grow and prosper economically, e.g. in order to provide safe and long-term employment and consequently, to create a basis for people to be employed and make a living. There is also a responsibility to look after the employee's welfare and working conditions. These aspects result in CR actions considering other social conditions as well: it includes responsibility towards customers and the (global) community. As a company's development highly depends on a strong and intact relationship with their clients, customer care is a fundamental principle obeyed by all companies. This subsequently results in the responsibility to provide high quality and safe products as well as services to satisfy the needs and demands of customers in a fair and thorough way. Businesses also increase their awareness for the community. In this time of continuing globalization, this responsibility goes beyond the local community and can include support for underdeveloped countries in the world and regions, which are affected by catastrophes, such as natural disasters. Responsibility for local issues can be shown by activities in the direct proximity of the company, e.g. the city of the headquarters, by supporting or organizing social initiatives there.

Environmental aspects, which are the major topic in this thesis, play an increasingly important role, given the fact that the discussion of exploiting natural resources has never been greater. Moreover, global warming is unquestionable and businesses could also support the limitation of the effects. One case study in chapter 6 gives a detailed example what a manufacturer can do in order to avoid the exploitation of natural resources. The approaches can be summarized as activities, which influence organizational development. Organizations take responsibility for their actions, inside and outside (Hawrysz and Foltys, 2015). It is a key element of CR that the business considers itself as a citizen of the community. Hence, it adheres to a corporate culture that shares this view and reports on it.

2.4 CR Approaches

There are a number of different theoretical approaches concerning CR, which were developed over time and can be used as a foundation for implementing such undertakings in a company. The approaches described below differ in some ways, whereas the triple bottom line (TBL) shows a methodology of taking companies' "ultimate success or health" into consideration (Norman and MacDonald, 2004). The companies are not simply measured on hard terms, i.e. the financial bottom line, the measurement takes into account social and environmental factors as well (Norman and MacDonald, 2004). It is worth mentioning that all of these approaches dedicate their main purposes to the relevant target groups and recipients of information. They also try to combine several aspects with another in order to cover a holistic perception of CR.

This project sets its focus on the responsibility from business side pointing out that responsibility is not unilateral. In the approaches of stakeholder and shareholder theory, explained in 2.4.2 and 2.4.3, the impact from business side also relies on the influence delivered by the target groups and is also depicted in figure 2.7 for stakeholders.

2.4.1 The Triple Bottom Line (TBL)

"The triple bottom line (TBL) theory claims to be reporting mechanism designed to encourage businesses to give closer attention to the *whole* impact of their commercial activities, rather than just their financial performance", and "it is defined […] as a 'calculation of corporate economic, environmental, and social performance'" (Robins, 2006). According to these statements, the TBL covers the three main aspects of CR already discussed in the section before. The approach gives the opportunity to lay out the values of related CR activities instead of focusing only on the profit side. Furthermore, it is dedicated to display all CR-related efforts of the business: people, plant and profits also called the three Ps (Slaper and Hall, 2011; Savitz, 2006). The approach is widely acknowledged and continuously adjusted for the practical use. In other words, the "TBL 'captures the essence of sustainability by measuring the impact of an organization's activities on the world […] including both its profitability and shareholder values and its social, human and environmental capital'" (Slaper and Hall, 2011). As already mentioned in 2.4, the TBL serves as a method to report about CR-related business activities and hence, it provides relevant values. Table 2.2 shows examples of this measurement, according to Slaper and Hall (2011).

Table 2.2. Overview of TBL measurements.

Economic	Environmental	Social
• Personal income • Job growth • Employment distribution by sector • Revenue by sector contributing to GDP	• Electricity consumption • Fossil fuel consumption • Solid waste management	• Unemployment rate • Relative poverty • Average commute time • Health-adjusted life expectancy

The TBL was predominantly shaped by John Elkington, who called himself the originator of the term (Elkington, 1999: 1). He described the topic of CR as an agenda bound to revolution and defined following seven sustainability revolutions: markets, values, transparency, life cycle technology, partnerships, time and corporate governance. All of these elements will contribute to a complex transition in capitalism (Elkington, 1999: 3). The demand for implementing such a sustainable transition was triggered by three pressure waves, which all contributed to the discussion in a different way (Elkington, 1999: 3):

- Pressure wave 1: Understanding that use of natural resources has to be limited.
- Pressure wave 2: Development process must be more sustainable through new kinds of technologies.
- Pressure wave 3: The realization that real sustainable development will require profound changes.

The dimension, in which a business is dedicated to sustainability actions, can be measured by observing the influencers' impact and return on the overall values. It is crucial to draw attention to everyone's impact and contribution to set values and principles. Behind this demand is the successful expansion of a joint undertaking (CR), defined and described in publications like the Brundtland report or the UN Global compact as previously described. In this regard, the following charter (table 2.3) was developed, which gives the opportunity to classify the persons involved and to raise awareness of respective fields and directions of development. Elkington defined the corporate characteristics by their level of impact related to their returns concerning their life cycle behavior.

Table 2.3. Corporate characteristics (Elkington, 1999: 11).

	Low impact	**High impact**
Regenerative (increasing returns)	Butterflies (the tendency to define its position by reference to locusts and caterpillars)	Honeybees (strategic sustainable management of natural resources)
Degenerative (decreasing returns)	Caterpillars (show single-minded dedication to the business task at hand)	Locusts (periods of invisibility, when it is hard to discern the impending threat)

By simply looking at the terms in their original meaning, the main conclusion of this theory is already evident. Butterflies and honeybees behave regenerative in nature, i.e. a bee produces honey in vast quantities, but causes no harm to the nature; a butterfly is also able to pollinate flowers by touching the stigma, and similar to the honeybee, no harm to the natural environment is caused.

Elkington described the corporate butterfly as a business model that is characterized by sustainability. The level of sustainability is flexible, as it is influenced by success as driver for growth and reliance on partners. Nevertheless, such forms of companies show a strong commitment for CR and sustainable development overall. The corporate honeybee is on the same stage of regeneration with the butterfly, but shown with a higher impact, as it stands for a sustainable business model, because it is based on constant innovation and an ability of sustained heavy lifting. Due to the level of regeneration, the corporate caterpillar is opposed to the locust because "caterpillars are harder to spot than locusts because their impacts are more localized." A corporate locust stands for "the destruction of natural, human, social and economic capital" and additionally for "a business model that is unsustainable over the long run." A corporate caterpillar can be characterized is characterized by its task to "generate relatively local impacts, most of the time" (Elkington, 1999: 11).

The construct of the TBL is often challenged as being inconsistent, as the approach is not directly related to sustainability. Nevertheless, it has become popular in the late 1980s along with the term "sustainable development" in the Brundtland Report (Alhaddi, 2015). Further criticism include that it is unknown, whether "TBL is a concept that is simply in tune with contemporary thinking and right for its time, or just another management fad […]" (Robins, 2006). This statement reflects the general critique that the overall methods of CR are an approach to justify business activities. Further criticism is described in section 2.5.

Shown in the characterization of the TBL as a method of reporting CR activities, the question of the main purpose of all CR-related methods is important throughout this project. It is obvious

that CR is used to show responsibility and subsequently, to talk about it and its effects. The question remains: to whom is this reporting addressed? According to Robins, there is a responsibility to the shareholders as well as to the stakeholders. The view that a company has more responsibility than only to shareholders plays an increasingly important role (Hubbard, 2006). This means that shareholders, the owners of the business, do not have a monopoly position by contrast to the theories of Milton Friedman.

2.4.2 The Stakeholder Theory

The stakeholder theory compared to the shareholder theory considers the views of interest groups in other ways and describes their claims, which are affected by corporate decisions. These stakeholders include sponsors, suppliers, employees, customers as well as the surrounding community (Melé, 2008). A definition, which describes the approach in detail, states that a company comprises of a system of stakeholders. External influencers are the community, in which the company is located as well as the affiliated structural and legal conditions. These surroundings should be used by the company to support stakeholders and to create wealth (Melé, 2008; Clarkson, 1995). When looking at the definition of stakeholders, it is simple to understand, why there is an increased interest in the companies' welfare. An employee can rely on a company for several reasons: they have a family to nourish and a house to pay off, for example. Consequently, a job gives them a certain social value within the system. In the broadest sense, the term includes any group or individual who can affect or is affected by the company (Melé, 2008). If the wages are not paid, the employee is no longer able to provide for his family or relatives. The approach involves two main principles, which should be considered in stakeholder management (Garriga and Melé, 2004; Emshoff and Freeman, 1978):

- The main goal is to achieve maximum overall cooperation between all stakeholder groups and the targets of the business, and
- to apply stakeholder relationship management which satisfy as many stakeholders as possible at the same time.

The level of interest of stakeholders in a certain topic can be directly shaped by the company's influence. This leads to a prioritization process (cf. figure 2.1) including a model in which insignificant stakeholder's interest leads to low priority for attention at the company side. Furthermore, the model is often used as a regulation tool to handle the stakeholders in terms of control and influence (Blowfield and Murray, 2014: 207).

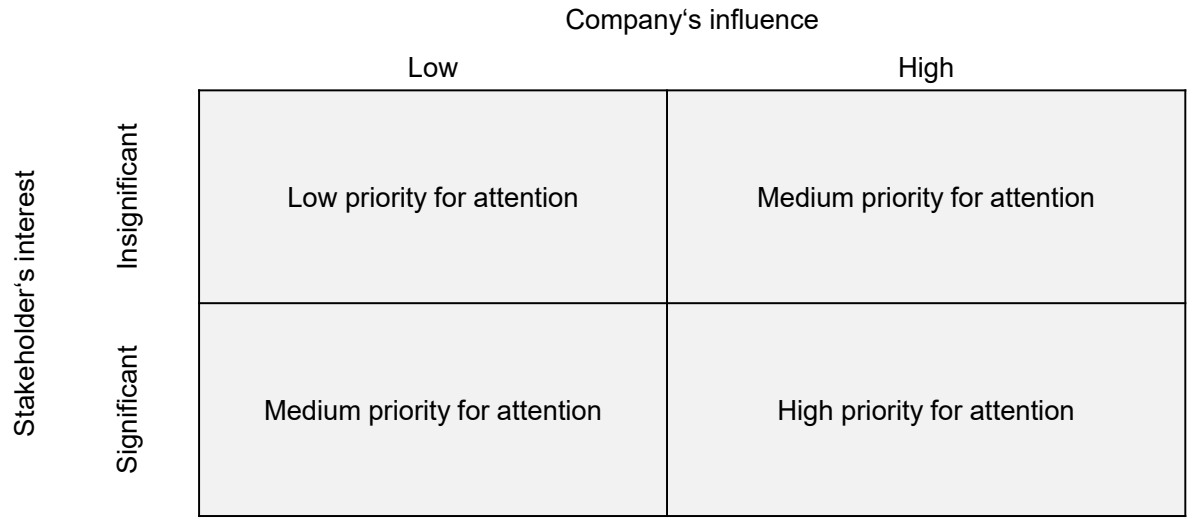


Figure 2.1. Prioritization (Blowfield and Murray, 2014: 206).

In 2015, the approach of Samantha Miles challenged the entire concept of stakeholder management, “as the term ‘stakeholder’ is an essentially contested concept” and is in her opinion “highly problematic for theory development and empirical testing” (Miles, 2015). At a closer look, stakeholder management is actually a concept, which causes high efforts undertaken by the business and mainly addresses established following moral values: long-term employment, continuous involvement in the society and maintaining supplier relations instead of choosing the supplier with cheaper prices. As addressed by Miles, the challenge with stakeholder management lies in the detail and starts with the definition of the term by saying that the theory itself is not just a theory, rather a fusion of several factors (Miles, 2015; Gilbert and Rasche, 2008). The elements (Managerial perceived determinants, MPD) according to Miles include nature of relationship, risk and power.

These elements are strongly interconnected with managerial perceived relationship attributes (MPRA) and the stakeholder perceived determinants (SPD). The connection between these elements is depicted in figure 2.2.

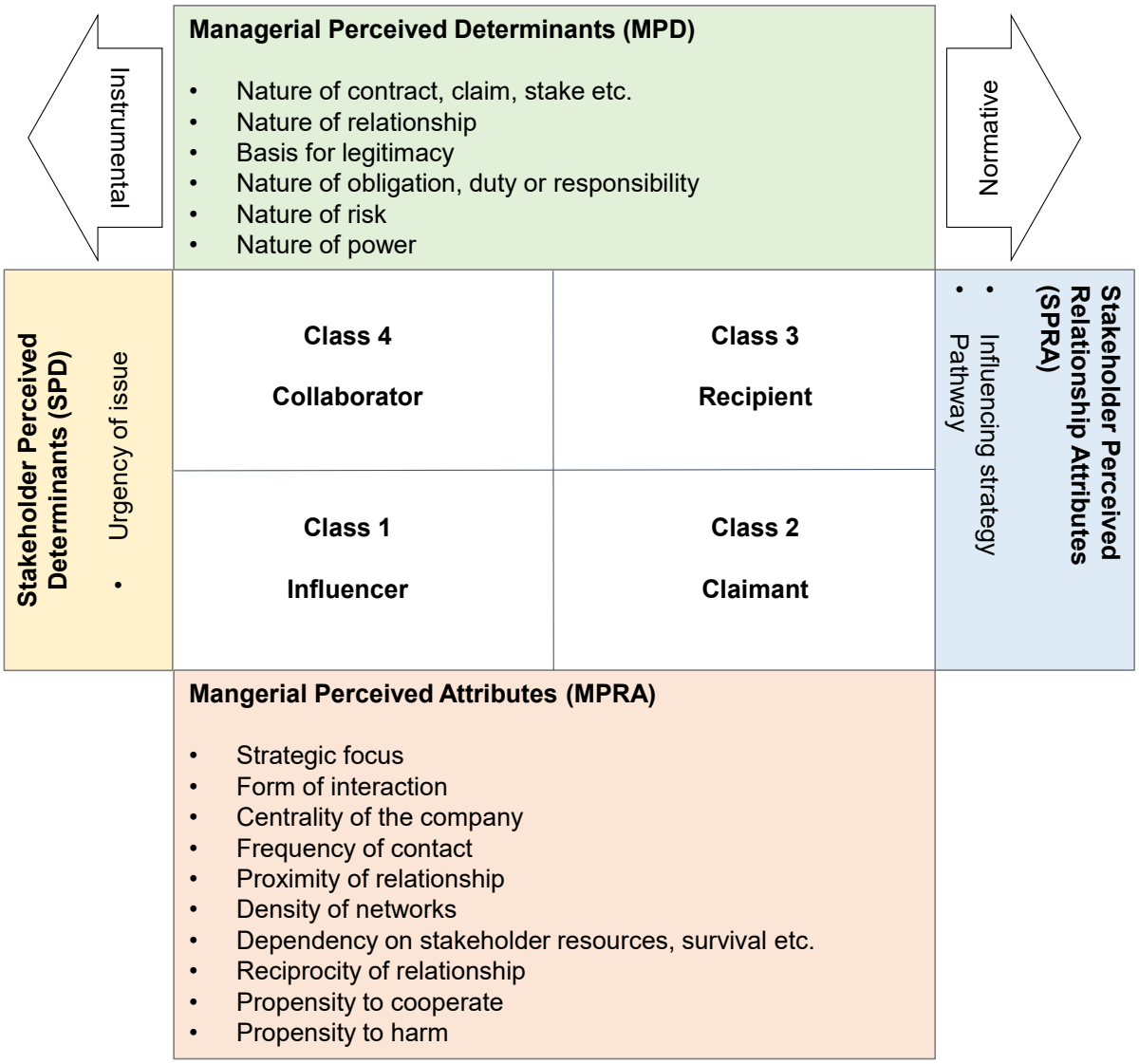


Figure 2.2. Classification model of stakeholder theory definitions, adapted from Miles (2015).

The key conclusion of the model is that the four main element groups MPD, MPRA, SPD and SPRA interact and represent a collective of all sub-elements. Furthermore, the relationship between management and stakeholders play an important role and the partnership established by both groups is to use the combined capacities for a joint achievement (Blowfield and Murray, 2014: 367). In a nutshell, the entire process of this approach is an interplay of influencers, claimants, recipients and collaborators. These interplay is influenced by attributes and determinants which can be instrumental (e.g. tool) and/or normative. Determinants perceived by the management of a corporation are specified and influence decisions significantly, such as contracts with customers or suppliers. Attributes can influence the determinants and provide space for flexibility, e.g. the density of networks is only determined to a certain degree and is subject to flexibility. The stakeholders on the other hand are similarly affected by determinants and attributes and have the power to influence. The model gives an impression of all factors

and groups involved in stakeholder theory, indicating the complexity between actual facts (determinants) and quality characteristics (attributes).

2.4.3 The Shareholder Theory

Opposed to the stakeholder theory explained above is the shareholder theory. This approach is mainly driven by increasing the benefits of the shareholders, not taking into account other target groups (Castelo, 2013). In 1970, Milton Friedman shaped the idea significantly by challenging it in the article “The Social Responsibility of Business is to Increase its Profits” published in The New York Times Magazine (Friedman, 1970). This statement refers to the main intention a business is set up for and implies that the company would be able to act socially due to generated profit. That could be realized if there is a desire to eliminate discrimination, provide employment and avoid pollution (Friedman, 1970). In this project, the focus is mainly set on business responsibility. Nevertheless, there is also a responsibility of specific target groups defined as *shareholder activism.* This approach describes activities undertaken in the belief that investors and shareholders can cooperate with the business management to affect the direction and to improve financial results over time (Blowfield and Murray, 2014: 235).

2.4.4 The Pyramid of Corporate Social Responsibility

Archie B. Carroll's approach of the pyramid of CSR (cf. figure 2.3) is based on a system, which describes the company's social responsibilities (economic, legal, ethical, philanthropic) in a hierarchical way. Carroll developed the approach in order to provide a frame which defines responsibilities of corporations in a different way, not just aiming at financial success in order to satisfy shareholders (Carroll, 1991). The four categories depicted in figure 2.3 describe which aspects belong to a corporation and how to show responsibility not only in financial terms.

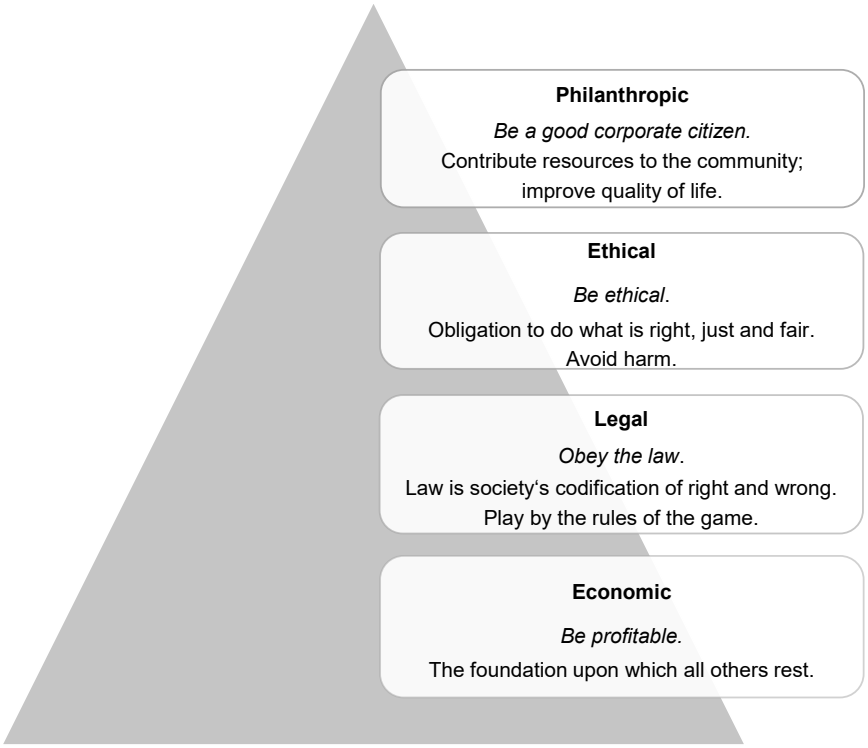


Figure 2.3. The pyramid of CSR, adapted from A. Carroll (1991).

In further explanation, each category rests on the respective layers below and consequently, a solid economic foundation is the basis of all other aspects involved. This economic foundation includes a healthy management in terms of finance (budgeting, favorable cost-benefit-ratio), but also includes providing high-quality products to its customers. In a nutshell, all activities, a business is mainly created for, are defined as core competencies. This economic welfare shall be realized within the legal frame as "law is society's codification of right and wrong" (Carroll, 1991). A business, which is not run by the rules of the society, is usually condemned to fail, as important stakeholders and shareholders pursue an interest in diligent business management. Any (willful) misconduct will subsequently have a negative effect on the corporation. As an example, the Coca Cola Company faced a serious problem in 2003, when the Centre for Science and Environment (CSE) confronted the corporation with an

accusation of an increased pesticide level in beverages in India. “CSE found high levels of toxic pesticides and insecticides, high enough to cause cancer, damage to the nervous and reproductive systems, birth defects and severe disruption of the immune system” (cseindia.org, 2010). The report drew high public attention and the reputation of the Coca Cola Company was tarnished, as the contaminated products affect a large number of customers. Consequently, the revenues declined 11 % in the third quarter of 2003 (Business-standard.com, 2013). Although Coca Cola believed in its innocence, the management had to find a solution for restoring consumer’s faith in their brands (Gentleman, 2006).

Another example, which shows the importance of obeying the law and the effects on business, is the case of Walmart Inc. The U.S. based supermarket chain tried to enter the German market in 1997 by incorporating 21 branches of a former German supermarket chain into Walmart. A real success never occurred: the strict legal frame (shop opening hours, rights of employees) forced Walmart to reconsider their business in Germany. Another cultural discrepancy caused confusion: the ethical guidelines, which had to be obeyed by the employees, were neglected in parts. Besides being illegal, it also showed that American employment is different compared to Germany. In July 2006, Walmart Germany went out of business (Spiegel online, 2006).

As shown in the Walmart case, it is important to obey the local law and to consider the consequences that a different legislation can have on the business. Moreover, businesses have an *ethical* responsibility shown as third component of the pyramid (cf. figure 1.x). It is often realized and expressed in a code of conduct in order to demonstrate the level of ethics applied. As a matter of fact a code of conduct has no legal authorized definition per se, but is rather a definition of a company’s policies and ethical standards, which should be obeyed by the employees (Darsow, 2005). Although this concept defines rules on an internal basis, it is not mandatory by law. The second level of the pyramid describes that legislation must be obeyed or otherwise results in prosecution from a legal perspective. As expressed by Carroll, the business has the “obligation to do what is right, just, and fair” and to “avoid harm”.

Above all components are the philanthropic responsibilities including the premise that “business is expected to be a good corporate citizen” (Carroll, 1991). Carroll demanded businesses to “contribute resources to the community and to improve quality of life” (Carroll, 1991).

2.4.5 The Concentric Circles of CR

The concentric circle approach aims at combining several aspects, similar to the pyramid of CR and the TBL. The aspects considered are economic, legal, ethical and philanthropic, whereas the order plays an important role. As depicted in figure 2.4, the economic aspects are displayed in the center. Every circle outside the inner circle relates directly to the inner one, suggesting that economic activity must be influenced by legal, ethical and philanthropic factors. This ensures responsible acting. The original model was developed in 1971 by the Committee for Economic Development (CED) and originally consisted of three circles and did not include legal aspects. This adapted version dedicates importance to this added circle in a globalized world (Geva, 2008). The CED was established in 1942 and contributed to historical milestones enabling economic growth and development, such as the Marshall-Plan (CED, 2018).

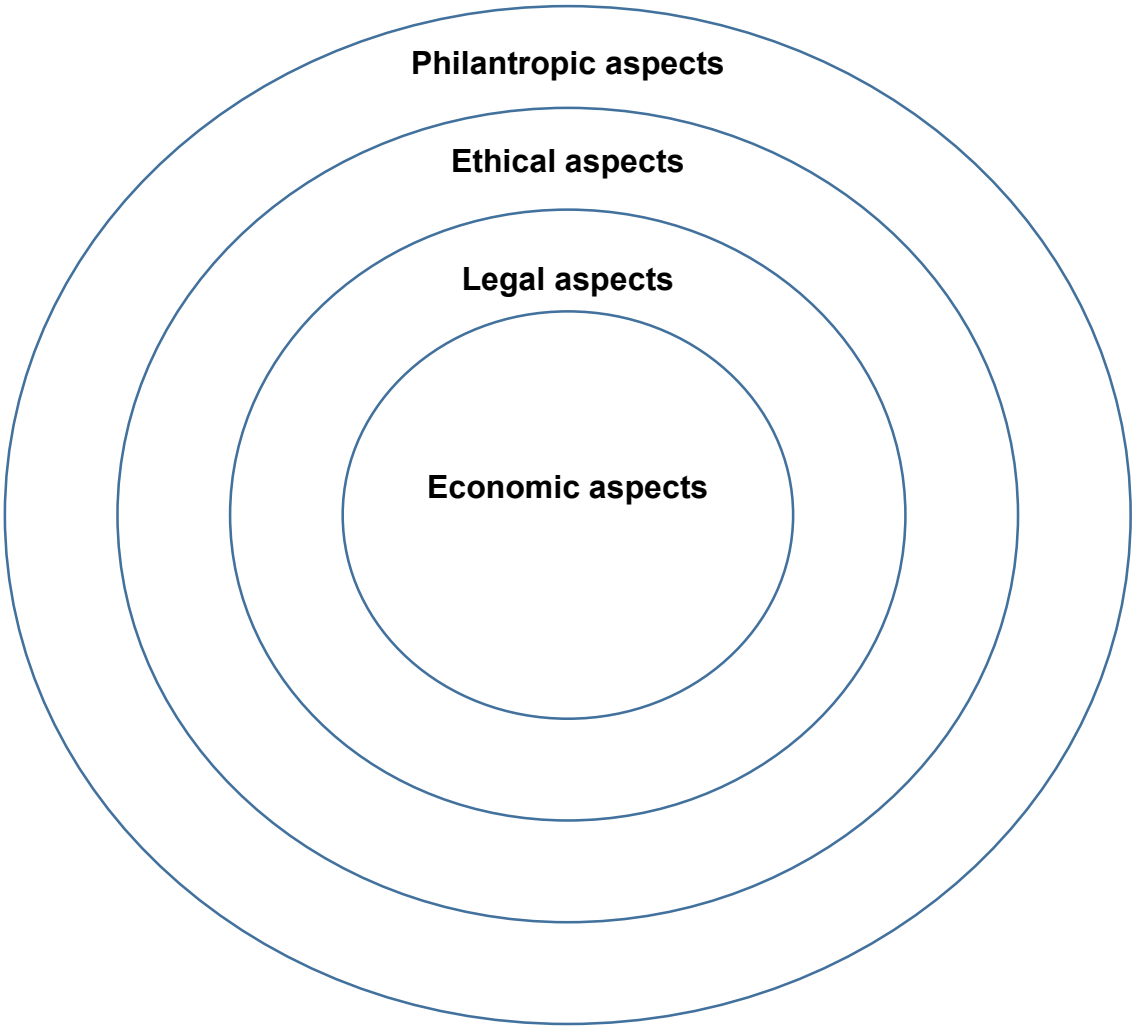


Figure 2.4. Concentric circles of CR, adapted from Aviva Geva (2008).

2.5 Critiques of CR

CR also has to face some critiques, both conceptually and with regard to content: the main fact is probably the (mis)use of CR as an instrument of marketing and public relations, or is said to be used. The criticism, CR therefore is confronted with, includes inefficient measurement possibilities and a missing obligatory definition (van Oosterhout and Heugens, 2008). In the past half-century, the economist Milton Friedman attracted attention with the provocative statement that “the social responsibility of a business is to increase its profits” (Friedman, 1970), also called the Friedman Doctrine (see also section 2.4.3). Friedman criticizes the approach as “pure and unadulterated socialism” and followers of CR “are unwitting puppets of the intellectual forces that have been undermining the basis of free society these past decades” (Friedman, 1970). This view of 1970, almost 50 years ago, is filled with bitterness expressed by Friedman’s extreme choice of words. At that time, when Schumacher also composed “Small is beautiful” (1973), there was no broad consensus regarding the topic owing to fewer opportunities, higher costs and less available information than nowadays in the Internet age. When looking at environmental issues, the problem of pollution was pressing, but also accepted, as entire industries relied on it, especially coal and mining. Luckily, awareness for this topic is easier to raise due to high information density and technical progress nowadays.

Without trying to assess Friedman’s text “The Social Responsibility of Business is to Increase its Profits” further than already done, it is noteworthy that he addressed his criticism mainly to the business managers, real persons in contrast to a corporation. A main problem in the construct is following issue: the business managers spend foreign money for social purposes. According to Friedman, the manager operates as a legislator, executive and jurist at the same time. He furthermore addressed the problem that CR is often regarded as *Window-Dressing* in order to show responsibility. This criticism is often associated with CR, as “there are not values, no ‘social’ responsibilities in any sense other than the shared values and responsibilities of individuals” (Friedman, 1970).

Among all possible types of criticism, the thesis is focused on the three main critiques, which were selected during literature research, survey and the elaboration of the case studies:

1. Frame of Corporate Responsibility: the frame is too extensive, in which companies are able to do CR activities. Subsequently, clear rules have to be defined.
2. CSR-Washing, Green-Washing, Window-Dressing: a high level of reporting on CR actions can have unintended effects associated with showing clean hands.
3. Obvious contrariness: the core business of the corporation in contrast to CR activities. (Shell is not an ecological company by their core business).

2.5.1 Frame of Corporate Responsibility

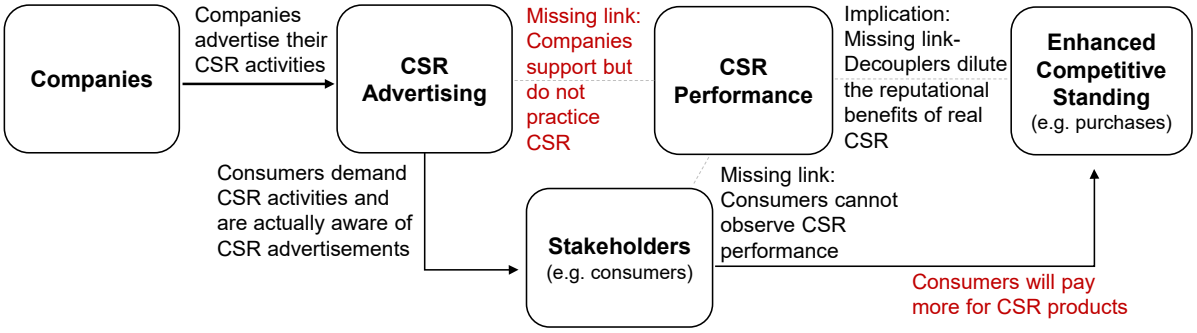
A general problem of CR arose in the past: no clear universal framework existed, in which CR actions can be classified. Certainly, there is a distinction between economic, social and ecological aspects, as well as a certain sub-categorization. Nevertheless, the approach lacks clear and strict rules in the broader sense and results in companies, which report insignificant activities as CR actions. Hence, this matter lessens the importance of the topic: it should be clear that the proportion of CR activities play a significant role. If “CSR is defined behaviorally simply as *corporate philanthropy*, then a billion dollar corporation giving a hundred dollars while continuing on contaminate large swathes the environment allows the corporation to claim it is practicing CSR” (Sheehy, 2014).

There is an obvious need to rethink values and there must be ways established to manage any credible undertakings regarding CR. In doing so, it can have an influence on how the outside world looks at the business. Companies should therefore rethink their values and use the chance of a re-evaluation of their brand names. The external pressure is high due to the increased interest of stakeholders and shareholders. The information to external stakeholders should be distributed, as the demand is high” (Lewis, 2003). Caused by this increased public pressure, companies are almost forced to find projects, which can be presented to the external world as CR actions. Therefore, it is necessary to bring context and principles to CR strategies. “Companies seem less interested in totally integrating CSR with their business strategies and goals than in devising a cogent CSR program aligned with the company’s purpose and values” (Rangan et al., 2015). As companies are usually free to perform CR in every possible way, it is important to maintain certain principles and ideally to develop regulations, which set the frame for a reliable CR strategy.

2.5.2 CSR-Washing, Green-Washing, Window-Dressing

Highly controversially discussed is any approach of making companies appear different than they are in fact, also in terms of being ecological. In simple terms, an oil company will never be an ecologically uncritical business. This form of superficial revaluation is quite common among businesses caused by the desire to be perceived as ecologically sustainable. The entire approach of CR-Washing can be considered as fragile, as the outcome may not only be complex, but insufficient (Pope and Wæraas, 2015). International surveys showed a clear perception of CR activities as some sort of superficial marketing campaign (Mountford, 2013; Kanter, 2009). In scheme 2.3, the path of CSR-Washing shows the missing link that the company does not perform the announced measures. The company only advertises CR measures in order to satisfy the stakeholders demand for information in order to pursue a positive image. The stakeholders are affected of CSR advertising, as they might pay more for

assumed sustainable goods. In general, the content of the scheme indicates a lack of sufficient reporting on CR.



Scheme 2.3. Path of CSR-washing (Pope and Wæraas, 2015).

Other terms for CSR-Washing are Green-Washing and Green-Marketing. Companies in this case are inclined to spend more money, time and efforts to appear “greener” or “cleaner” than they are in fact. It seems to be a trend that companies apply a “green” strategy to achieve a better public perception. The concrete accusation of implying “green” products or “green” production methods is a deception of consumers and can result in a misbelief of stakeholders who trust the statements of the business shown in scheme 2.3. Numerous examples of obvious Green-Washing are known. One example was the Deepwater Horizon catastrophe in 2010, which was one of the biggest disasters in environmental terms. The offshore oil rig was destructed and caused an oil spill (200 million gallons) in the Gulf of Mexico with a tremendous impact on the local ecosystem (National Commission, 2011). The study of Kassinis and Panayiotou showed that the oil company BP uses the corporate website to “narrate a visual story that helped the company construct a ‘logic of representation’ when its ‘logic of practice’ became problematic and heavily scrutinized” (Kassinis and Panayiotou, 2017).

Milton Friedman developed a similar approach: he depicted the entire topic of CR as Window-Dressing, also addressing the fact that CR methods are not in line with the system how markets work. Furthermore, he pointed out the significance of socialism, necessary for socially responsible activities, rather than market mechanisms (Friedman, 1970). This is comprehensible as the past has shown how markets work, influenced by limitations and CR activities which “are highly vulnerable to market failures” (Doane, 2005).

2.5.3 Obvious Contrariness

The business' core responsibility is to generate profit by applying methods and producing goods. Often there is an obvious dispute between the core business and the two additional dimensions of CR: to pursue ecological and social targets. Looking at the example of BP in 2.5.2, an oil company will not achieve the targets to be ecological in doing their core business. It is therefore difficult to convey a plausible CR strategy in this specific case. In general, it is a permanent challenge to detect if the core business collides with social and ecological aspects.

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Chapter 3

Ernst Friedrich Schumacher

3.1 Book Review: Small Is Beautiful – Economics as if People Mattered

„Orientate all our actions on the land towards the threefold ideal of health, beauty, and permanence“ (Schumacher, 1973: 107)

Recurring statements: increased development since the Second World War (social and economical), disparity between rich and poor, shift of sphere (distract from the real problem), nature is irreplaceable capital, communication is a crucial instrument (PR), collision course, a lifestyle designed for permanence, critics Marx and Keynes, meta-economics.

In many ways globalization has influenced our daily lives. It seems evident that our behavior is significantly influenced by the way we consume, share values, and hence, live our lives. So are the company's. Highly dependent on natural resources, manufacturing companies present creative ways to cope with the threat of these resources being diminished. The term Corporate Responsibility (CR) has developed in a variety of occurrences. The aim of this project comprises to give an impression of how companies in the manufacturing sector deal with the problem of a decline in natural resources. This is shown by means of three case studies in Brazil. In this respect, it is crucial to point out the significance of the BRIC countries. Those countries have one thing in common: economic growth above the average of other developing countries and factors that enable a strong economic growth, such as a young population and a strong development in education.

This chapter aims at exploring a theoretical framework, established by Ernst Friedrich Schumacher (hereinafter referred to as E.F. Schumacher). Regarding references, corresponding pages are given in brackets, e.g. (p. 54), when his work "Small is beautiful" (1973) was the source of information. Born in Germany, the economist lived in the United Kingdom and developed some relevant theories, mainly challenging the economic system. In the further course his theories are described and evaluated. The main focus is set on "Small is Beautiful", which can be considered as his most significant publication. Other books include "The Age of Plenty: A Christian View" (1974), in which his strong beliefs in God and Christianity sets the dominant factor. Furthermore, "A Guide for the Perplexed" (1977) and "Good Work" (1980) are important contributions by Schumacher. The years in brackets indicate the year of publication. "This I Believe and other Essays" (1997) is a collection of essays, which he first published in the 1970s in the Resurgence magazine. Among other things, the magazine enhanced awareness for climate change and world poverty and aims to present a vision of an ecological economic behavior. The magazine furthermore pointed out that poverty, possession and peace are interconnected (Resurgence, 2018). In his publications, Schumacher used strong vocabulary, which often seems exaggerated from a today's point of view. He referred

to economics as religion with its own rules and to behave economically as the main commandment (Schumacher, 1973: 42 f.).[1] This description of the topic must be ironically understood, since he did not even consider economics as a religion. It is rather a description of the holistic approach of how society deals with economics and acts economically, instead of questioning the settings. This setting can include the origin of products or the quality. Instead, according to E.F. Schumacher, the society exclusively decides because of product prices and increase its personal benefit by maximizing disposable money.

“Small is beautiful” was written in 1973, a time in which industrialization was on the rise. The awareness for sustainability was shaped by political actions such as the American Clean Air Act, which was introduced in 1963 (US EPA, 2018). During this period, a general uncertainty emerged, highlighted by the OPEC oil embargo in 1973. That made the dependency on oil even clearer (Issawi, 1978).

3.2 The Author

Schumacher developed a very strong opinion over time. Born in 1911, he has his origins in Germany. Shortly before the Second World War, Schumacher fled Germany, as he strongly opposed the approaches of the Nazi regime and settled in the United Kingdom, where he started his career working for the British chief economic adviser. Strongly influenced by his journeys to Southeast Asia, he soon developed a sense of how life’s inequality is construed here and there, and started to develop theories about how less-developed nations can adopt technologies in order to improve the situation and to develop (Wood, 1985: 1 ff.). Schumacher described the circumstances (or rather problems) he noticed not only in his book “Small is beautiful” in an explicit manner, he also used difficult wording in his publications. In describing the role of economics, he referred to people who had already undertaken uneconomic activities, even though they had previously proven to be uneconomical and “saboteurs or fools” (p. 39). However, this does not reflect his opinion of those who act uneconomically, he rather used this method as form of critique for the important role economics play. He criticized economics by summarizing the topic as irresponsible and questioned the role of an entrepreneur as such: “Economists and others are wont to treat such eccentric behavior with derision if not indignation” (p. 42). The economist, as described by Schumacher, considers any approach with “pathological growth, unhealthy growth, disruptive or destructive growth is to him a perverse idea which must not be allowed to surface“ (p. 46). He furthermore claimed that humans had sufficient knowledge of ecology, which is simply too much to be ignored (p. 108). He was capable of expressing ideas for technologies, alternative ways of living, working and conducting business based on his strong belief in Christianity. This new way of thinking in the 1970s contributed to his success. An important contributor to his success was supposedly the

[1] Das passt so → in Referenzliste drin P. 43

language he used in his publications. He used strong and powerful terms and tried to tackle problems by expressing them as they were in his view. This appealed to the readers and the choice for his words was supposedly caused by his call for a metanoia, influenced by his own conversion from an atheistic into a very religious person. Starting with his personal conversion into a strong believer in God, he called for a general rethinking of values, away from a strict and calculative approach to a deeper worldview in the Christian sense. This includes the need to recognize that materialistic things can only be useful to a certain extent, and a renunciation from this view requires time for silence and concentration (Janssen, 2017: 5). Schumacher's life was marked by certain turning points, which are described in the next section and are of great importance for understanding his way of thinking.

3.3 Turning Points by Schumacher

Schumacher's turning points help to understand his *mission*. In total, there are six turning points, of which the fifth and the sixth focus on Schumacher's metanoia (Janssen, 2017).

His first turning point was the awareness that certain natural resources are finite. This insight was created and strengthened in 1954, when he was an advisor to the coal authority in the UK. This turning point came along with the perception that the industrialized countries relied heavily on non-renewable resources and therefore, new ways had to be found.

In a second turning point Schumacher realized that it did not take much personal property to be happy. He discovered this during a trip to Burma, where the Buddhist lifestyle of the locals and their happiness impressed him. He furthermore acknowledged that the people there lived a peaceful life. In a further involvement as advisor to the Burmese government, it became clear that an anticipated development goal would lead to an elimination of existing and functioning ways of living, which could lead to a loss of livelihood and culture. This fundamental finding that happiness is not automatically linked to material wealth is central and questions our (materialist) lifestyles.

His extensive travelling certainly contributed to the development of his views, and so it was a trip to India between 1961 and 1964. That journey made him aware of the drawback that support in either way, monetary or non-monetary, was not provided in many undeveloped or underdeveloped areas. Governments received support in the form of development aid, which however often vanished in long and complex bureaucratic constructs, so that nothing would arrive at those people in need. This third turning point in his views ultimately resulted in the fourth: affordable investments.

How could people in poor areas achieve a stable income when it was impossible to make investments? It has become an ethical imperative helping people to help themselves: medium technology, organic farming, education, avoidance of mass production in favor of peasant and artisanal small structures are fundamental attempts for support. These ideas apply mainly to the undeveloped countries in the Third World. All of these findings (turning points) were collected in “Small is Beautiful. Economics as if People Mattered” in 1973 (Janssen, 2017: 3).

In addition to the aforementioned turning points described in “Small is beautiful”, two more turning points were triggered by a life-changing transformation, away from an atheistic to a very religious person. Schumacher soon realized that it depended on people and that every human being had to justify before God himself. In addition, people should take into account others, such as family and friends, and act appropriately and responsibly, which is the fifth turning point. In a sixth turning point, Schumacher realized the importance of modesty in every respect including natural resources and called for a return to human dimension (Janssen, 2017: 7). This return to a human scale is a central claim throughout his publications.

3.4 Introduction to “Small Is Beautiful – Economics as if People Mattered”

E.F. Schumacher’s approach to acknowledge our natural environment as place of limited resources is more relevant than ever before. It has become common knowledge that natural resources are limited and certain ways of living are so pathed and standardized, they cannot easily be adjusted to that premise. The way our social structure is organized, does justify the considerable utilization of natural resources. People have to go to work in order to make a living. Structures are settled and cannot easily be vanished. A development of technologies at the expense of natural resources have become so common that we can hardly imagine a world without such behavior. This thesis reconsiders Schumacher’s ideas and approaches. It is argued that his ideas are important and provide a solid base for rethinking, even though these ideas are hard to realize. This is mainly due to the fact that personal well-being in terms of materialistic comfort is ranked higher and justifies the realization at the expense of natural resources. Schumacher’s *mission* to incentivize people to rethink this approach can be dated back beyond 1973, when “Small is Beautiful” was published.

In a very sophisticated way, the German Schumacher Society acknowledges the work of this unusual economist and regularly publishes insights and approaches aimed at Schumacher’s inheritance. The following information was gathered during meetings with the president of this society, Lex Janssen and his publications (Janssen, 2016 and 2017). The society aims at finding solutions for the challenges described by Schumacher as well as searching for reasons

in order to realize better environmental standards: limits to growth, proposals for a market-oriented solution to decrease the energy and resource consumption, basic ways to overcome social inequality and to implement democracy. Furthermore, the need for global environmental standards, post-growth economics and common welfare economy are topics, which are assessed on the consideration that the economic development has not changed since the 1960s / 70s, instead deregulation has taken place in the 1990s contributed to a stronger and more inconsiderate growth. Looking at the less or undeveloped parts of the world, it is redundant to say that social inequality is not eliminated and is significantly shaped in certain regions of the world. As the book was published in 1973, the legitimate question arises whether the approaches considered by Schumacher are still valid today. According to the Schumacher-Society, no significant shift of values is discernible. This assumption is based on the fact that a large share of researchers are still trying to find solutions apart from the usual economic approach of profit maximization (Janssen, 2017: 2).

Schumacher found the strength for his mission through his strong Christian faith. His mission was to convince people that materialism does not count in life. His inheritance included more than his probably most famous book “Small is beautiful” and even though it contains his key message to all of us. His entire work formed a theoretical and practical concept of living and economic thinking. Schumacher furthermore refused the modern approaches to macroeconomics. He stated that the endlessness of resources would lead to an automatic collapse of the growth or economic system, when focusing only on maximizing production. It is important to consider the framework, in which everything takes place: the nature (p.48).

3.4.1 Impulses

The powerful book title “Small is Beautiful” is a statement, which can be interpreted in several ways: it might be one of the most provocative testimonials available and today more valid than ever. It supposedly is a hint to the developed world where life is pleasant. It can serve as an impulse to rethink habits, behaviors and ways of life.

“Small is beautiful”, initially published in 1973 by E.F. Schumacher, describes the drawbacks of industrialization and encourages the reader to take a more critical view on circumstances, which remain unquestioned. It is occasionally forgotten, maybe ignored that there is still many people in world who cannot afford proper living. For these people, it important to simply survive day after day. There is a big problem of inequality that is definitely not unknown. It is simply ignored. The main problem with unreasonable desire for consumption and the unlimited lifestyle might come down to two questions: how long can this system of dissipation be maintained, also from a social perspective? Second, how long will nature provide humanity with the resources needed for a *wasteful* lifestyle? In Schumacher’s opinion, it is necessary to

consider the approaches for the livelihood and future generations. It is not the aim of this project to point out things already known. It should rather serve as a review of a theoretical framework, making clear that the problems faced today are not new. This project reviews “Small is Beautiful” from three different facets:

1. Set a strong focus on nature, not only in this chapter, but throughout the project. Look at issues, show limits and look at industrialization as Schumacher did;

2. Emphasize the values that Schumacher tried to explain in his argumentation, these values can either be applied and / or are recommended to be applied;

3. Evaluate the criticisms that Schumacher raised throughout his book.

To understand Schumacher’s thinking, this project describes central aspects of the books in a first step. In the second part of this chapter, Schumacher’s assumptions are placed in context with the three facets mentioned above.

3.4.2 Important Aspects of “Small is Beautiful”

In general, the book is grouped into four chapters called “The Modern World”, “Resources”, “The Third World” and “Organization and Ownership”. In a first key message, Schumacher presented the problems that occurred when production exceeded natural resources. This fact was already mentioned in the introduction. The excessive consumption in developed countries has reached a high level. This fact could be a direct result of human development. Schumacher emphasized this observation as “human wickedness”, which is a direct consequence of mistakes of the political system. In the following, the most important aspects of this project are described, i.e. Schumacher’s views on the importance of nature and its resources. Some additional information supports the approach. The most important chapters regarding economic development and limited natural resources are considered, in line with the scope of this project.

3.4.3 Part 1: 1. The Modern World (p. 12 - 59)

As a direct result of “human wickedness”, Schumacher described the human attitude of understanding natural resources as a subject of power, instead of being a direct part of it. This has emerged over time and should be understood as direct consequence of technical development. This philosophy is a key element in his approach to the theory of exploitation of natural resources, which can be determined as a key driver of today’s social behavior in terms of consumption. This is in contrast to the fact that nature is crucial for human existence. Well, that is not new and we are aware of it or at least should be. Why is it so difficult for us to behave stringent in order to avoid complete self-destruction? Can that be easily answered? Not really,

as the consequence would be that we would need to reconsider the system on which our existence is based. Consequently, the classical life cycle that we know: to be born → to work and make money to live and purchase things → in the ideal case, to procreate → to die. In one way or another, all of this happens in the “spaceship earth and its passengers”. We, the humans, are the passengers, and of course all less developed species, animals for example and as a matter of fact, all species, less developed or not, must maintain the spaceship in order to be a secure conveyer along the journey of life. Now, this rather idealistic approach of keeping the spaceship in good condition faces the fact that humankind is alienated from reality. Schumacher took into account considerations, published by other economists and criticized them. For example, it is a big mistake to treat nature as income rather than conceiving of it as capital, and hence surpassed the capital theories once stated by Karl Marx. In contrast, Schumacher stated that our capital was provided by the nature and not by humans. Therefore, the production is rather limited, when using natural resources. The perception of natural resources as capital rather than income makes the difference: capital, used lavishly and without ensuring a proper stability, leads to a reduction of it. Schumacher’s conservative statement throughout the book is to use the capital carefully and to install mechanisms that ensure a stable existence of natural resources. When the book was first published in 1973, Schumacher criticized the “collision course” on which humans treated natural resources. Today, more than 40 years later, it seems obvious that mankind has recognized following fact: natural resources vanish with an increasing technical development that ensures fast and modulated processes, e.g. in the production of goods. With an increasing wealth and knowledge, provided by modern communication methods, people tend to consume more, mostly at the expense of natural resources. Schumacher used the example of fossil fuel consumption, which had a peak in 1973, caused by an increase in consumption and a strong promotion of petrol-driven vehicles in previous years. What was Schumacher’s motivation to point out the consumption of fossil fuels? In conclusion, Schumacher criticized the approach of treating natural resources as stable income and therefore recommended to look at it as capital, which would be subject of elimination when used wastefully. Furthermore, he pointed out the disparity between developed and less developed countries and more specifically, the differences between rich and poor countries that still exist today. This is a central problem, derived from a lack of education and lack of technology transfer. Schumacher’s attempt was to point out that the rich part of the world with a smaller population consumes a higher amount of natural resources than the poor part. “If we squander our fossil fuels, we threaten civilization; but if we squander the capital represented by living nature around us, we threaten life itself.” Furthermore, he said “people are waking up to this threat, and they demand that pollution must stop” (p. 16). In fact, a development towards a greener planet can be determined today. Schumacher’s optimistic approach in the 1970s already showed a development towards our

today's desperate attempts to make the world greener. It might be clear that if we wanted a fundamental change, we would have to rethink our ways of living: driving cars, going on vacation by plane, consuming as we do and generally, living as we do. Is our society ready for such a change at the expense of convenience? This can highly be doubted. Rather, we trust in the development of new, greener, technologies, such as electric cars, solar-generated power and the like more. Schumacher therefore indicated that the main objective is to improve the quality of life rather than increasing the quantity of consumption. Is this a sustainable approach? If so, how can it be realized? Has it ever been realized?

It is crucial to go back and look, just as Schumacher did, at the economic development since the end of the Second World War. It also worth to pay attention on the increasing use of natural resources, which mainly was forced by an increasing industrialization. For this progress, nature is practically powerless and the consequences might be dangerous. The industrial development since 1945 has produced a new situation. With a strong increase in production and series production, the demand for natural resources increased equally. Schumacher also made some assumptions in his book, indicating that water and wind power would not be the major energy sources by the year 2000. As we all know today, in 2019, this is the case. In contrast, Schumacher pointed out the importance of nuclear power to cover the increased power demand, including its arising problems of storing nuclear material until the decomposition process. The problem with nuclear power, according to Schumacher, is that scientists will develop a method to make nuclear power look safe and "to solve a problem simply by shifting it to another sphere, the sphere of everyday human behaviour". This means that the problem of reducing natural resources is solved by another group of humans, e.g. politicians, who try to solve the problem with support of scientists, where to store nuclear energy. In this attempt, Schumacher pointed out the deviation from the actual problem, which is the destruction of natural resources. By abstracting from that real problem and creating new concerns, the main problem is no longer the focus of contemplation and loses its importance. As already pointed out, the reasons for an increased use of natural resources can be taken from two incentives, as depicted in table 3.1.

Table 3.1. Industrial and social development.

Industrial development	Social development
• Modern technologies • Shorter production times • Increased knowledge	• Modern technologies • Different perception of life • Increased knowledge through modern communication methods

In this respect, it is crucial to point out again the differences in development between the rich and the poor countries, and the fact that rich countries highly benefit from the lack of development in poor countries, e.g. the topic of fuel consumption. If the poor countries consumed the same amount as the rich, the oil supply would be significantly lower today. It is matter of fact that a human by nature seeks for more and more: better life, better education, better jobs and more satisfaction. Modern communication concepts make it possible that people in less fortunate areas can at least visually "participate" in the wealth of others and demand the same for themselves. A steadily increasing demand lead to some challenges for the natural capital, which Schumacher categorized as follows: fossil fuels are very limited; there is a significant tolerance range of nature, which must be observed and determined, and human substance. As a recurring conclusion to the above stated, human kind must deviate from its "collision course" with the nature by performing a certain lifestyle. Hence, humans have to change and adopt certain patterns to ensure a careful use of the available natural capital by "evolving a new life-style, with new methods of production and new patterns of consumption: a life-style designed for permanence" (p. 19).

3.4.4 Part 1: 2. Peace and Permanence (p. 21 – 37)

In this chapter, Schumacher pointed out the importance and relevance of economic prosperity: "[..] the soundest foundation of peace would be universal prosperity" (p. 21). He argued the contrary that rich people are not necessarily more peaceful than the poor, given the fact that there are more poor people than rich. So is following the rich people in their attempt to become richer the way to go? This question is raised in the book and Schumacher pointed out the importance of rational thinking instead of behaving stupidly or "cutting into your own flesh" (p. 21). On the other hand, human should "be intelligent enough from time to time" and support the poor. In this chapter, Schumacher introduced the Keynesian theory of fair equals foul, foul is useful, fair is not. Based on the key message that "the road to heaven is paved with bad intentions", Schumacher encountered the following three assumptions: "universal prosperity is possible", "its attainment is possible on the basis of […] 'enrich yourselves'"; and "that this is the road to peace" (p. 22).

In the 1970s, Ernst Schumacher, known as economic philosopher, already pointed out the threats of today. Some of his key messages are prevalent in many ways what we experience today. The given natural resources have not been created to the extent which is required today. This is primarily due to the fact of increased demands arising from the BRIC phenomena: emerging countries try to adjust to more developed standards. Of course, today's declining production capacity due to a lack of natural resources has not completely affected us – nevertheless, it has become more tangible. This is also made clear by Schumacher, who associated the problem of production with the given natural resources. Along with failing

political systems, a system of “human wickedness” (p. 12) has been created, which can be interpreted in many ways:

- people put their economic benefits first;
- people therefore do not refrain from behaving increasingly unethically to achieve these economic benefits; and
- as a direct result, the awareness of our natural habitat suffers, including its resources, as people address a changed attitude towards nature; i.e. human is no longer part of the nature, but conquers and controls it (p. 13).

This is reflected at all levels of natural capitalization and behavior towards a sustainable management of resources, including the caution for these inevitable raw materials, which only nature can provide – at least until now. As a central topic in this project, the relationship between nature and human should serve to provide additional impulses to evaluate the conflict between natural resources, production and especially production and management of natural resources, especially in BRICS countries. By definition, BRICS countries are subject to increased economic growth potential, influenced by several factors, such as lower barriers (employment, patents, trade) compared to industrialized countries (Radulescu, Panait and Voica, 2014). Furthermore, all BRICS countries are faced with the fact that several development stages have been skipped, mainly due to the knowledge that already exists in developed countries. Education standards, adopted technologies and increased standards of automation production contribute to an increased exploitation of natural materials. And this seriously jeopardized one assertion of Schumacher: nature is crucial for human existence. This becomes obvious in terms of natural destruction and consequently, in the form of natural depletion, such as global warming and all its consequences. By properly applying core standards and rules for a common sustainable initiative, this destruction of our natural habitat has to be reduced to an acceptable level. Consequently, all problems should be discussed and actively addressed to eliminate them. This must be done by facing common challenges. Schumacher pointed out that technology gave human beings the illusion of unlimited power (p. 13). The fact that natural resources seem to be infinitely available has led to the problem we face globally: the consumption rate of oil alone has more than tripled since 1965, from a total daily world consumption of 30,686,000 barrels in 1965 to 98,186,000 barrels in 2017 (BP, 2018). Oil as one of the most important raw materials had also drawn Schumacher’s attention. From today’s perspective, there is a need to actively address the problem by considering alternative materials. Has all this happened in terms of acting responsibly or is there a real demand? This power, interpreted by Schumacher, is strongly related to human’s inability to distinguish between income and capital (p. 15). Now what does it mean to distinguish between these two terms? What is probably meant is the phenomenon of *what you see is what you get*. The inability of establishing a relationship between demand and available supply simply leads

to such misguided management of raw materials. Broken down to an example, it is not really divergent from our daily behavior. If people saw the effort it takes to make a certain piece of clothing, they would not take it for granted as it seems to be the case. Along the supply chain, from providing the raw material to engaging workers in the process of handling the material, it is a way over countries. Available in stores at the end, not every customer is aware of how much efforts and resources it requires to produce that certain piece of clothing and hence does not support sustainable awareness. Income as a plain source to gain economic wealth and benefits is different from the capital which is still available. Income increases capital, though a certain capital is needed to generate income. This capital can be classified in different types: monetary, natural, human capital, capacities, infrastructure and more. All of this affects the way income can be generated. The most common problem is perhaps that most end customers are not aware of what is needed to give them the lives they are living. Products from around the world provided at lowest costs cannot be manufactured without anybody or anything suffering within the supply chain. This awareness needs to be raised within the society and among all stakeholders involved in global companies, generating income and profits. How can this be realized without a reduction of profits? Would all customers still buy the products if they were aware of the production circumstances and the situation or would there be a rethink? Schumacher pointed out that the capital we used was provided by nature and referred to natural resources, which are irreplaceable and therefore limited, also in terms of production (p. 14). So far, the progress since Schumacher raised his concerns have been tangible. He accused that “man is estranged from reality” (p. 13). This would at least explain the way that natural resources are used in a very wasteful manner with the sole aim of increasing or at least retaining personal profit. Supposedly, the lack of knowledge leads to a shortage in non-renewable natural resources and only underlines the theories raised in Schumacher’s “Small is beautiful”. It describes human beings as “estranged from reality” and shows addictive tendencies in increasing or establishing personal and material wealth. How does CR fit in all of this? Do companies fear an increasing effort to provide their products? Do customers of cheap material become more conscious when products get more expensive or would they refrain from buying certain products if they knew the production process? Do companies try to prevent being overthrown or is there a serious interest in keeping these natural raw materials that are irreplaceable to generate income? Several theories are in circulation and though, CR is a topic which probably will never be subject to specified definition. There are only certain frameworks that should be agreed. The UN Global Compact has been defined as a possible framework. Consequently, organizations can apply sustainable actions by having the flexibility to move within set standards. Such standards, which are highly anticipated by current needs and developments considering a variety of aspects (e.g. environmental protection, human rights), can support companies to achieve qualitative goals that affect people’s lives as well as

nature. This is as far as the theory goes, but such standards have often proved to be only justifications for entities when trying to find solutions and to establish their thought-out actions; in fact they are not really reviewed. This would also strike Schumacher's attitude towards such "certified standards", when he was so critical in his thoughts.

Schumacher primarily pointed out the effect on natural resources and on sociological consequences, such as the role of workers and their feeling of being important and "of use". For this project, the natural aspect needs to be examined. As a key message, he reminded that natural resources must not be considered as income but as capital. The most noticeable difference is the fact that capital, at least to some extent, cannot be renewed and easily generated as income. In order to wasting limited resources, Schumacher called for alternative methods to be developed to achieve a more sustainable use of these limited resources (p. 14). Our current collision course has not disappeared, but has worsened in the last decade due to a strong growth of the BRIC countries, which faced criticism for their handling of natural resources. Especially with a view to ruthless growth, these nations have proven that monetary growth is often been endowed. Furthermore, available standards which provide a certain degree of economic protection, have been bypassed. Moreover, Schumacher described the collision course (p. 19). This term can be interpreted in more ways: one is the fact that the great majority of actors (regular consumers, producers and other stakeholders) are aware of it and condone the results. That is probably the main issue in the entire discussion, it is neither feasible nor realistic. This has been shown in the past and that is probably an aspect of basic human behavior being unable to deal with circumstances that not directly affect oneself. For example today, children have still to die because they do not have enough food to survive. The direct consequence: people, not all of them, but a majority who does not suffer of hunger cannot understand the urgency of things. This may be an extreme example, but it shows in principle how inconsistent the world's attitude towards existing circumstances is spread. The immediate effect on oneself has a big impact on how we see and respond to things. Looking at CR in particular, it is a positive development when big corporations realize social, ecological and sustainable projects by either investing in projects or implementing standards directly into processes*. Bonum fac et loqui de ea* (do good things and talk about it): it adds positively to a company's perception to the outside world, at least supposedly. Will the fact be weakened by CR that our (developed) society has a collision course? Is CR an appropriate measure to reach a "healthy course" or is it only an incentive to address things and then to do something about this? What CR means and how it is executed is subject of another chapter of this project. Nevertheless, it seems necessary to mention it when talking about the collision course. This project pointed out the immediate differences between developed and underdeveloped countries and nowadays, it is necessary to take emerging countries into consideration, the BRICs. With regard to these countries, it is necessary to mention that the stages of

development of these four nations are different due to several factors. Russia, for example, sees its identity problem and relation to the U.S. and Europe as its main concern. The fact that the West and Russia are economically interconnected does not make the situation easier. Russia is highly dependent on trade. On the other hand, the West needs Russia to ensure world peace.

Looking at China, its development was probably outstanding among the BRICs: high economic development, exploitation of industrial and commercial hubs and development of cities, including a trimming of the population towards success and commitment. All of these factors have contributed to an extensive economic growth in the past two decades. In 2015, China had a strong economic growth (GDP growth rate: 6.9 %) in contrast to Russia (-3.7 %) and Brazil with -3.8 % (UN Data, 2018). More detailed information about the BRICs regarding development is given in chapter 4 (country profile Brazil). It is no secret that most of these countries use “conventional” raw material for their production demands: coal to run factories, nuclear energy to cope with the increased power demand and others that do not positively impact their eco-balance. In 1973, Schumacher’s outlook was the quadrupling of the fuel consumption by 2000 compared to 1966 (p. 23 f.). He also stressed the role of other non-renewable energy sources such as coal, indicating that a strong reliance on these forms of energy are harmful for the environment. According to statistics, the coal consumption has significantly grown in Asia Pacific since 1965, whereas other regions remained stable with a slight decrease, shown in Figure 3.1 (BP, 2018).

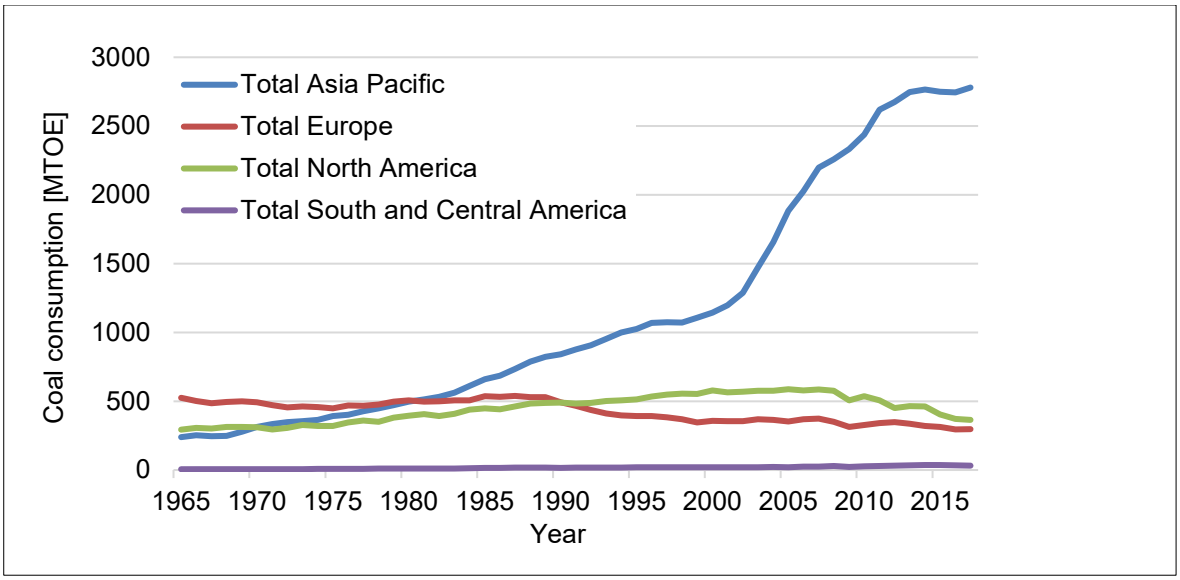


Figure 3.1. Coal consumption [MTOE: Million Tons of Oil Equivalent] in different areas of the world (BP, 2018).

Compared to other conventional resources, the share of coal as an energy source was lower than for oil as depicted in figure 3.2. The exception is Asia Pacific, where the consumption of

coal is higher than oil. For example in 2017, the coal consumption amounted to 2780 MTOE compared to oil with 1643 MTOE. Among the BRICS countries, the oil consumption increased in all countries except Russia, especially in China from 100 MTOE to 600 MTOE between 1986 and 2016 (cf. figure 3.3).

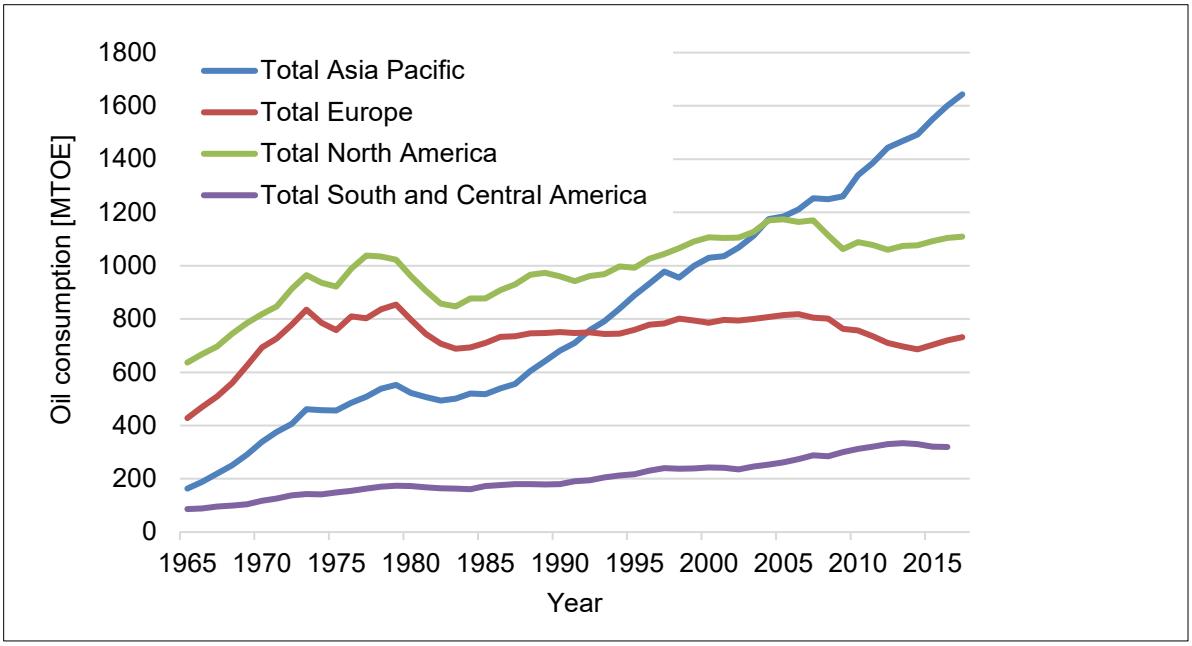


Figure 3.2. Oil consumption in different areas of the world (BP, 2018).

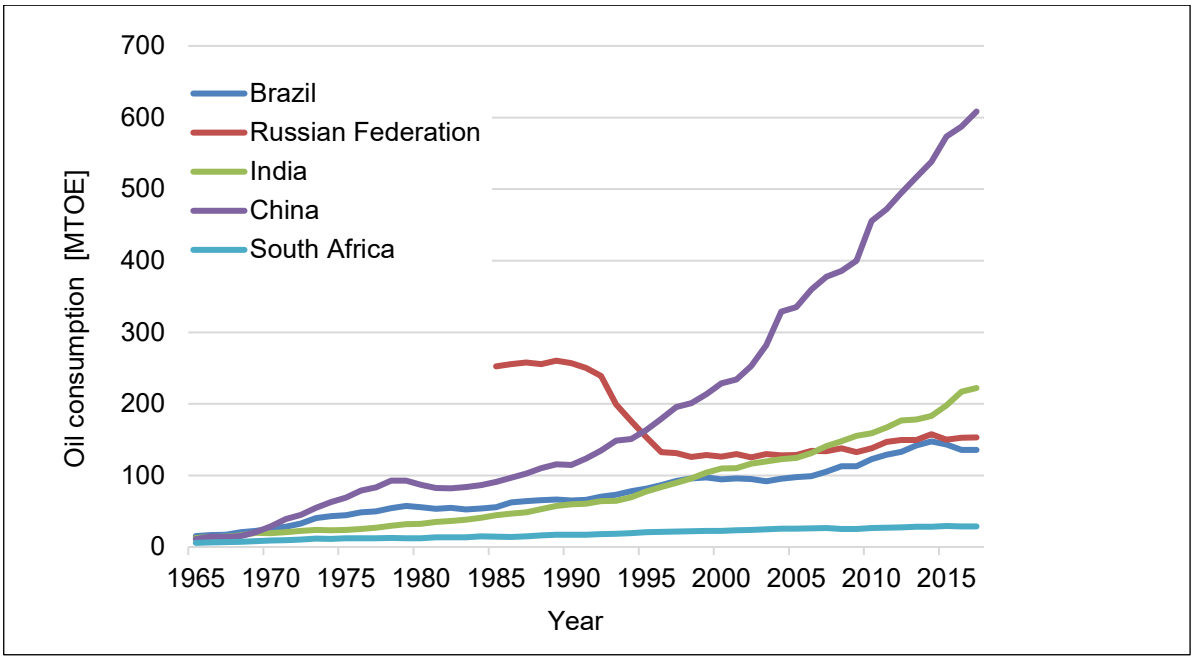


Figure 3.3. Oil consumption in the BRICS countries; data from Russian Federation has been available since 1985 (BP, 2018).

In his remarks, Schumacher asked for a change in pattern to avoid the triplication of coal. From today's perspective, the attitude towards non-renewable energy has changed in developed

countries. In emerging countries, especially in the BRICS, a significant share of energy is still generated from conventional sources. How must this change happen according to Schumacher? He had neither clear answers nor concrete measures to avoid the worst in terms of ecological development. In the last decade, the demand for these concrete measures has increased, but the world still relies on conventional energy to maintain economic growth, which implies several benefits for livelihood: more people live in much better conditions today than 50 years ago; more people have better access to education and have the chance to learn how to take care of their lives; the world has merged together, many things have become easier owing to technical developments and advances in IT solutions. But has our mindset really changed or is it just a misconception of life? One of Schumacher's main intentions throughout his studies was the belief in people's faith and especially the denunciation of the people's exorbitance, who lived in absolute wealth and a prosperous environment.

According to his statements, one of the main problems is that humans treat natural resources as expendable or reproducible good (p. 16). This circumstance represents a threat to life and this should not be the case for the future. There has to be a significant change in people's minds and attitudes towards the treatment of all of these natural resources. The main objective is to improve quality of life rather than increase the quantity of consumption. In a more prevalent way, the rise of consumption of crude oil can be observed. It has risen significantly like coal in the past three decades, especially in the Asia-Pacific region, where two countries of the BRICS benefit from the positive economic development. This is exactly what Schumacher predicted in his studies about replaceable and irreplaceable raw materials.

Based on his information available in the 1970s, he predicted a world in which raw materials, such as crude oil as a main source of power and energy, would not persist. This is basically the message conveyed when governments and organizations talk about the problem of shifting availability or vanish of material. In this respect, Schumacher talked about the emergence of hollow terms such as ecology (p. 16). How "hollow" is that term and what does it do, if any, to prevent people from intervening in nature and taking possession of natural resources? There is a direct link between the older term "ecology" and the newer concept "sustainability". The United States Environmental Protection Agency (EPA) describes its relation to sustainability as follows: "Sustainability is a priority interest for many organizations, and this is especially true at EPA. Sustainability isn't part of our work – it's a guiding influence for all of our work" (US EPA, 2018). Consequently if this matter is applied as a "guiding influence", will it be adequately addressed? Is it made tangible for all stakeholders? Or is it only a hollow gesture to pretend that acting sustainably is crucial? It is obvious that a stronger reliance on renewable resources cannot maintain our economic growth. Hence this will have an effect on human's way of living, including wealth. Consequently, this leads to the question how it is possible nowadays that people still suffer from hunger when economic prosperity and growth is easy to

achieve. What defines the very small boundary between those who are privileged to experience economic growth and all the personal gain that goes with it? Why does not a certain part of the world have the skills to realize economic growth and prosperity for its population? It is not the topic of this project to analyze all factors which prevent entities (nations, countries) to prosper economically. Nevertheless, it is significant issue in terms of sustainability and availability of raw material for economic growth.

It is obvious that the consumption of these rare raw materials is strongly related to the economic development: after the Second World War, a strong increase in consumption could be observed, which is primarily related to the increased industrialization (p. 16). In many ways, this phenomenon corresponds to the development in the BRICS countries. What can be determined as the main driver for that development? There are some major factors that have promoted this strong rise in emerging regions. Undoubtedly, one of the major drivers is globalization. According to Turner and Khondker, the term cannot be defined exactly. It is more important to look at the context in which globalization takes place and "[…] to ask whether the concepts at hand add anything new or valuable to the understanding". It is a "macro-historical process, a process of processes" (Turner and Khondker, 2010: 17). The World Health Organization (WHO) describes the process of globalization as follows: "the increased interconnectedness and interdependence of peoples and countries, is generally understood to include two inter-related elements: the opening of international borders to increasingly fast flows of goods, services, finance, people and ideas;; and the changes in institutional and policies at national international and international levels that facilitate or promote such flows" (WHO, 2018). The phenomenon of an interconnected world has faced us with several challenges and even more benefits when only thinking of open borders: lower trade burdens and a more open flow of capital. A combination of all these benefits makes the business model work faster, more efficient and flexible. Subsequently, this leads to a greater need for natural resources, as steps of development and within business models can be skipped and made more efficient. Hence, the progress is faster and the capacity of production can rise. For a better understanding, a self-developed model, depicted in figure 3.4 shall explain the matter.

First, there are several players which are necessary to get the business going: there is the business itself (*A*), including its employees and chairman, then the people who buy the respective service or product from the business. In between, there are several suppliers, which provide either the knowledge, the service or the material for the product or service of *A*. This example can vary in several ways: *A* can be a small or medium-sized enterprise that produces for the local market or a region being equivalent by several factors (e.g. language, culture, trade agreements, similarities in taxes).

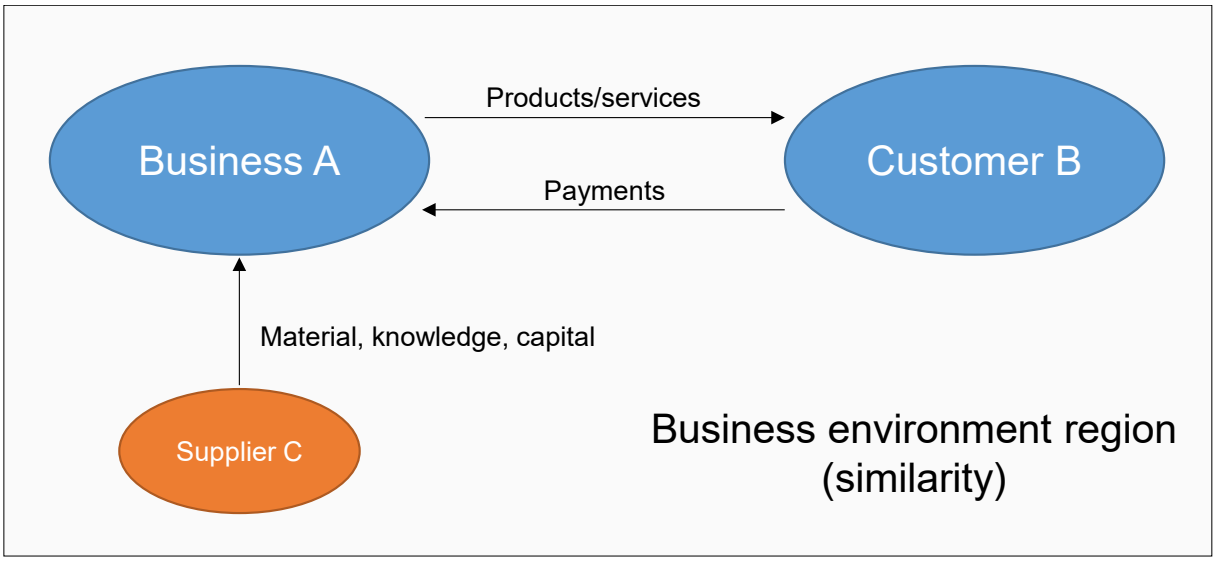


Figure 3.4. Business model (same region).

In this model it is indicated that all players (A, B and C) share the same business environment, i.e. they do business within the same business environment. The term “business environment” is defined as a macroeconomic space in which all economic parties can do their business. In the model depicted above, this business is conducted within an area with the same background in terms of culture, language and a corporate conception of business, e.g. Germany or the D-A-CH region.[2] The region is defined by the same language and a similar point of view of doing business. This model as such shows a very harmonious environment and does not put anybody under pressure, since all share a similar perception for doing business. Business *A* experiences that the production material can be purchased much cheaper and in the same quality from a player outside the region. Due to lower trade burdens, they are willing to give it a try. This means for our model that supplier *C* is suddenly under pressure. *A* is no longer willing to pay the previously paid price, as it can be purchased much cheaper from outside the region, in this case from Supplier D. It would add to the model as follows (cf. figure 3.5):

[2] D-A-CH: Germany, Austria, Switzerland: same language, same perception of business, at least in the broader sense.

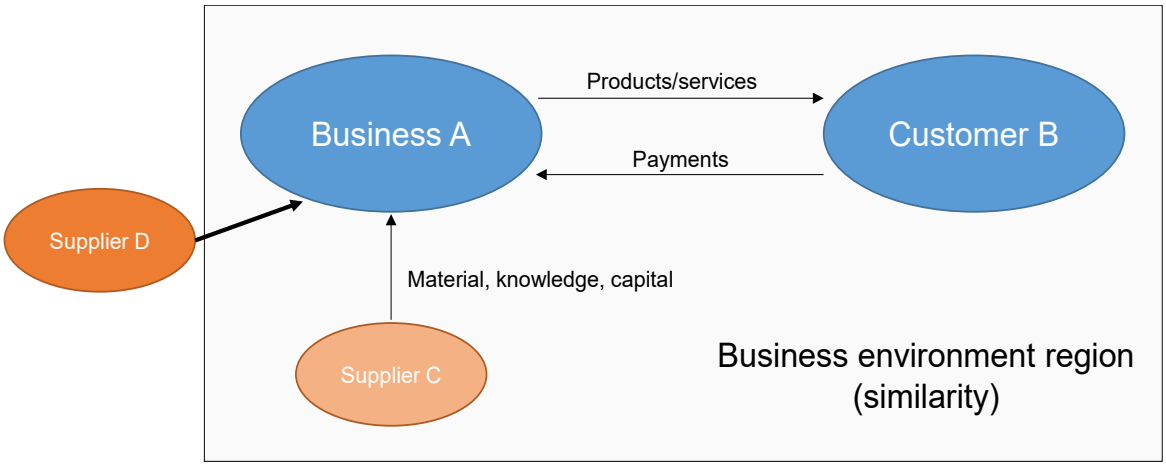


Figure 3.5. Business model (added by supplier outside of the same region).

Supplier C would try to recover the lost business by offering prices below those of Supplier D. This not only increases the competition, but also the pressure on all players. Consequently, the question arises what factors determine the players' decision on how to act. In other words, where to buy, whom to sell and how to use ethics and other decision factors.

This basic example shows how globalization works: it starts small for the individual player and gets bigger in the course of time. Usually, and in the example above, there is no way back from buying cheaper goods, mainly because people's processes and awareness change quickly to spend less money on the same product. Therefore, monetary aspects are in focus and it describes how globalization can start within an enterprise, not further defined than a company registered in a developed region. The aspect of globalization has become a matter of interest for people due to a developing digitalization around the world. This mainly includes shorter communication paths, including the emergence of the Internet. It has become common practice to communicate with people from other regions to meet the requirements of the daily business. Moreover, it has become crucial to be prepared for these needs and rapidly changing challenges in order to remain competitive. This makes it even more difficult to act sustainably and responsibly.

Schumacher this development in his book as a "unique jump in quality and quantity" (p. 17), which makes nature virtually defenseless if it comes to exploitation of natural resources to meet demands and requirements. He even went so far to compare this development with the occupation of aboriginal habitat by using machine gunfire (p. 17). From today's perspective and even in the 1970s, when the book was written, it can be seen as a true fact that this occupation of aboriginal land is rather ambivalent in the long run. It reflects a violent withdrawal from origin and fair allocation. Applied to the problem of exploitation of natural resources, it means that nature is defenseless and extradited to the aim of generating profit. Hence, it is dangerous for the future with unpredictable consequences. He predicted in 1973 that by 2000,

water and wind power would also not serve as a major source of energy (p. 17). It is well known today that this assumption was true. Even though there are developments in this regard, it is still impossible to rely solely on these alternative methods as the main energy source.

The development of nuclear power can be considered as alarming. Over the past decades, it has become increasingly acceptable among the population due to the fact that the high demand for unlimited energy cannot be based on any other sources. In fact, natural catastrophes have raised several questions whether we are all on the right track – a real change of heart could not be detected, not even after Fukushima as an example of a nuclear disaster. In real life, there has been a waste of natural resources and there is no indication that it would diminish. Looking at the context of this project, the development of emerging countries with a high demand for energy has undergone a significant economic development. The demand for energy has increased at all stages of development and this energy has not been generated by “green” methods. This is even more important facing the aspect that nature provides us with irreplaceable capital. According to Schumacher, there are three *categories of capital (p. 19)*:

1. Fossil fuels
2. Tolerance margins of nature
3. Human substance

Calling it categories has something philosophical. One possible interpretation of the meaning can be described in simple terms: fossil fuels (e.g. lignite and mineral oil) are limited and so far, the awareness among people has increased that oil is available to a very limited extent. Nevertheless, has anything changed in the behavior of most people? Are there less cars on the street? Are cars being built mainly differently than gasoline-practiced vehicles? The provided tolerance range of nature allows humans to not change things rapidly: it is still affordable to go to work by car and on vacation by airplane. In the long term, this behavior of destructive greed will ultimately affect human being, according to Schumacher. It is crucial how we see nature: our knowledge and possibilities have to be used in cooperation with nature. It would be wrong to consider humans for the managers of nature by managing and using it to a destructive extent.

Schumacher developed his theories by observing the overall development of his time and also looking ahead what might happen in future. He quoted Ghandi, who dreams “of systems so perfect that no-one will need to be good” (p. 22). Schumacher also referred to John Maynard Keynes.

John Maynard Keynes is probably most known for his controversial but also revolutionary ideas. His first publication was “A tract on monetary reform” (1923), which he developed during his academic time in Cambridge. Especially relevant for this project is the aspect that he researched the monetary system of India. Throughout his life, he devoted himself to teach and research the monetary system. Among other things, he worked for the British Treasury. One of his main theories, described in his book “The Economic Consequences of Peace” (1920), focused on the impact of monetary issues in terms of political stability. So to speak, he was the inventor of investments by claiming that investment was crucial for growth. He furthermore showed the relation between consumption and production. His influence can be seen in the doctrine of econometrics, which was developed to describe Keynes macroeconomic theories (Econlib, 2018).

Schumacher mainly utilized Keynes’ theories, saying that he explained the economic possibilities of “our” grandchildren, people aged from about 30 to 40 today. It requires the ability to distinguish between good and useful.

Throughout his books, Schumacher considered the effect of ethics on economic associations: “Ethical considerations are not merely irrelevant, they are an actual hindrance” (p. 22). Looking at the ambitious development of our economy today, this statement cannot be refuted. This is probably the entry point of the CR movement: with increasing developments in communication and information availability, it has become increasingly necessary to avoid all negative things that could serve the exigent stakeholders as sort of a “corroding surface”. The relationship between stakeholders, shareholders in terms of Corporate Responsibility is discussed in more detail in chapter 1 of this project.

Schumacher described it as a “road to heaven” (p. 22), which is paved with bad intensions. Is there really a road to heaven? And what would that road to heaven be? What would heaven be? Is there personal abundance? Does it mean heaven is a place where all people have equal chances, benefit from the same possibilities and serve the same ideal? Even today, in 2018, there are still people suffering from hunger and thirst, not being able to cope with life and its challenges. In a broad perspective, there have been several significant improvements in the world. Almost all countries in Europe have managed to overcome the lower stages of economic development due to industrialization, entrepreneurship and governmental support. Schumacher had three assumptions (p. 22):

1. Universal prosperity is possible;
2. Attainment is possible on the philosophy of “enrich yourself”;
3. This is the road to peace.

Is this a realistic approach? Is universal prosperity feasible? What does universal prosperity really mean? Does it mean basic well-being, such as food for everybody, or does it go a step further?

In this regard, it is valuable to point out some basic approaches to what a human being really needs and what level of development can be obtained, also considering the surroundings (e.g. economic or political state of environment). Maslow's Hierarchy of Needs (cf. figure 3.6) is a basic tool that has proven to some extent in this regard (Maslow, 1943; Smith, 2017).

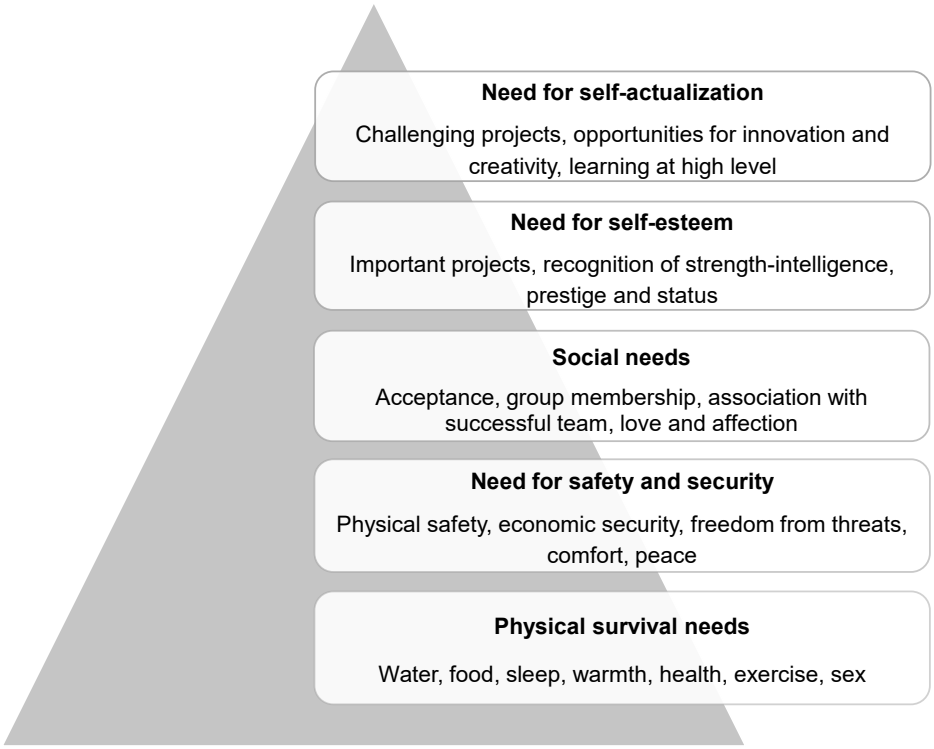
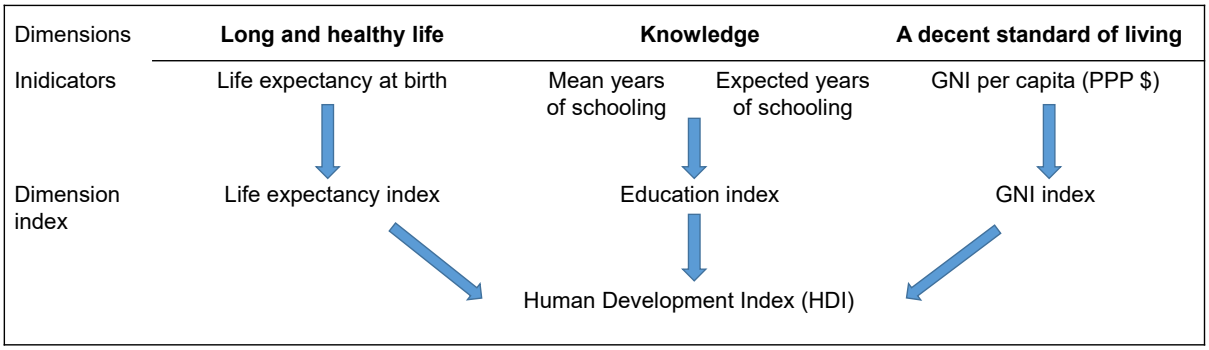


Figure 3.6. Maslow's hierarchy of needs, adapted from Maslow (1943).

The approach starts with the basic fact that a human being has *physical survival needs*, such as food, sleep, warmth and health. Once these needs are met, the next step *need for safety and security* is aspired. This comprises the exclusion of life-threatening situations as well as physical safety. In a third level, Maslow described *social needs*: love, affection and acceptance. They are important to progress to the fourth stage: *need for self-esteem*. In this important stage, it is crucial to succeed in important projects and to gain prestige and status, respectively. Only if all of these four stages are succeeded, the highest level *need for self-actualization* can be achieved.

To clarify the model and to adapt it to countries as an example, one characteristic per stage was defined to draw a conclusion on four emerging countries (BRIC) and the four most developed countries in the world (Norway, Australia, Switzerland, Denmark) according to the

UNDP Human Development Index (HDI). The dimensions and indicators involved in the HDI are depicted in scheme 3.1.



Scheme 3.1. Composition of the Human Development Index (HDI), adapted from HDR (2018).

It takes into account more than just economic development and therefore, it is considered as a sustainable tool for measuring the correct development of humans.

Explanation characteristics to stages

For stage 1 “Survival”, *food* was chosen a one of the most basic needs. The Global Food Security Index (GFSI) describes the supply with food in the respective country. It combines three measurements (affordability, availability, quality and safety) for the calculation of the food security index. The best achievable index scores 100, the lowest possible number is 0. Among the emerging countries depicted in figure 3.7, India ranked last with an index of 50 and 76th among all 113 countries, respectively. Switzerland achieved almost 84 score points and ranked 7th worldwide. Number one is Singapore with an index of 86 among all countries (The Economist Group, 2018).

Stage 2 in the hierarchy is “Safety”. *Freedom* was chosen as a characteristic for describing the second basic needs of human beings. The observed index uses personal and economic freedom as measurement for the results. The score system used here is a 0-10 rating with 0 (not existent) to 10 (best possible achievement). As shown in figure 3.8, India ranked best with 6.41 score points among the BRICs, followed by Russia with 6.27 points (Cato Institute, 2016 and 2018).

For stage 3 “Social”, employment was chosen as a sign of social engagement in society. In figure 3.8, the *unemployment rate* is shown as a percentage of total labor force. Interestingly, a difference could be determined among emerging and developed countries, respectively. Switzerland’s unemployment rate with 4.8% is almost as low as China’s with 4.7% and Russia’s with 5.1 %, respectively. Highest unemployment has Brazil with 12 % (Worldbank, 2018).

Stage 4 shows the development of each individual's self-esteem, here measured by the *enrollment in primary education*.[3] The number is given as a percentage and can exceed 100 %, as this index is the ratio of the respective enrollment and the age. Consequently if a country exceeds 100 %, it means that all individuals attend or attended primary education. Norway achieved exactly 100 %, Russia slightly more (cf. figure 3.9). India and Brazil exceed 100 % significantly. The figure considers all ages and also students who repeat a class or are late enrolled. A value close to 100 % is ideal as a higher number reflects a deviation in terms of age and class repetition.

The highest of all, stage 5 shows the *development of high-level education*[4] as a characteristic, indicating that there is no direct correlation between emerging and developed countries. More than 75 % achieved Russia, Norway, Australia and Denmark, which is shown in figure 3.9. The weakest performance was determined in India, where only 27 % attend tertiary education.

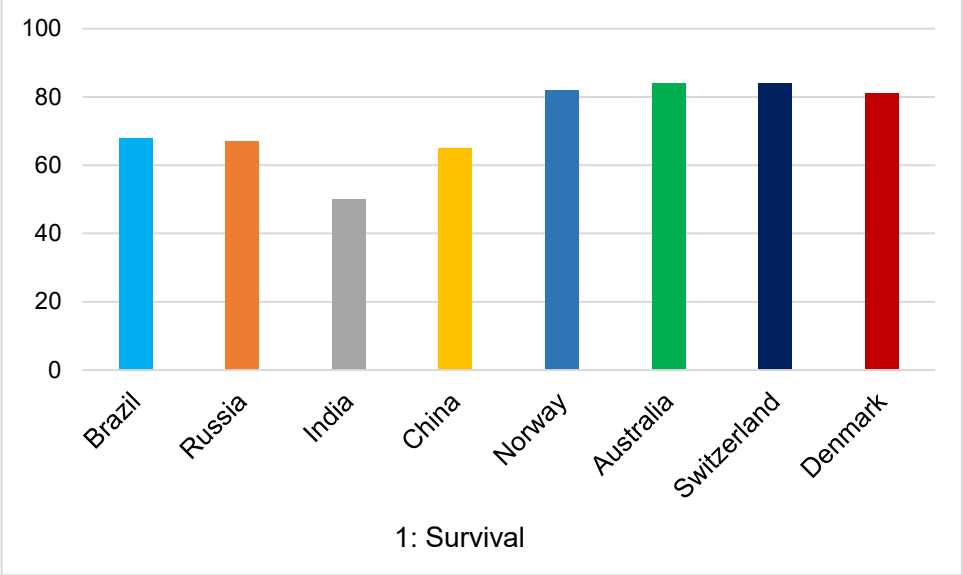


Figure 3.7. Stage 1 of hierarchy of needs; characteristic: food; parameter: Global Food Security Index (GFSI); Data represent values in % (The Economist Group, 2018).

[3] Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music. Gross enrollment ratio can exceed 100 % due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition. (Worldbank, 2016a).

[4] Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. (Worldbank, 2016b).

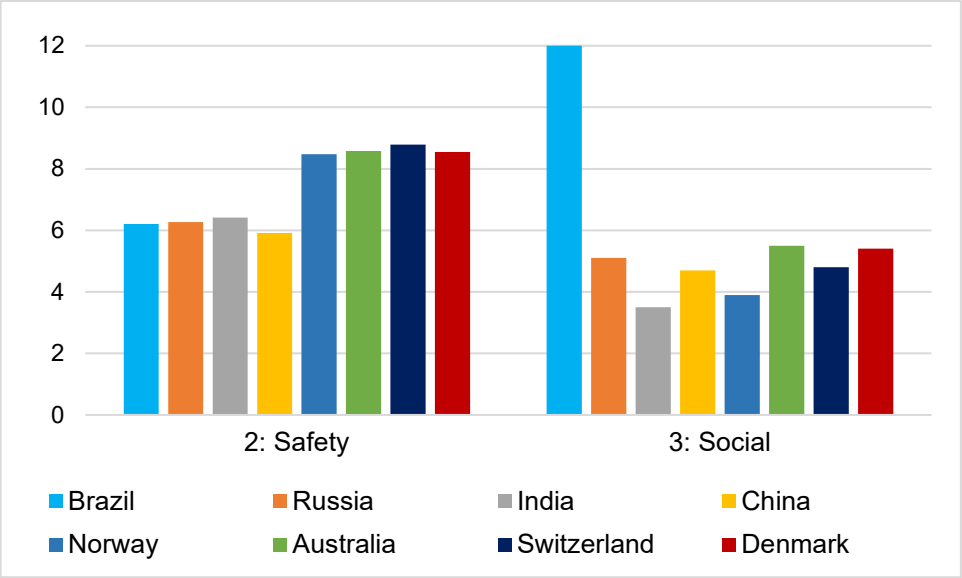


Figure 3.8. Stages 2 and 3 of hierarchy of needs; Stage 2: characteristic: food, parameter: Human Freedom Index in score points (0-10) (Cato Institute, 2018); Stage 3: characteristic: employment; parameter: unemployment rate in % of total labor force (Worldbank, 2018).

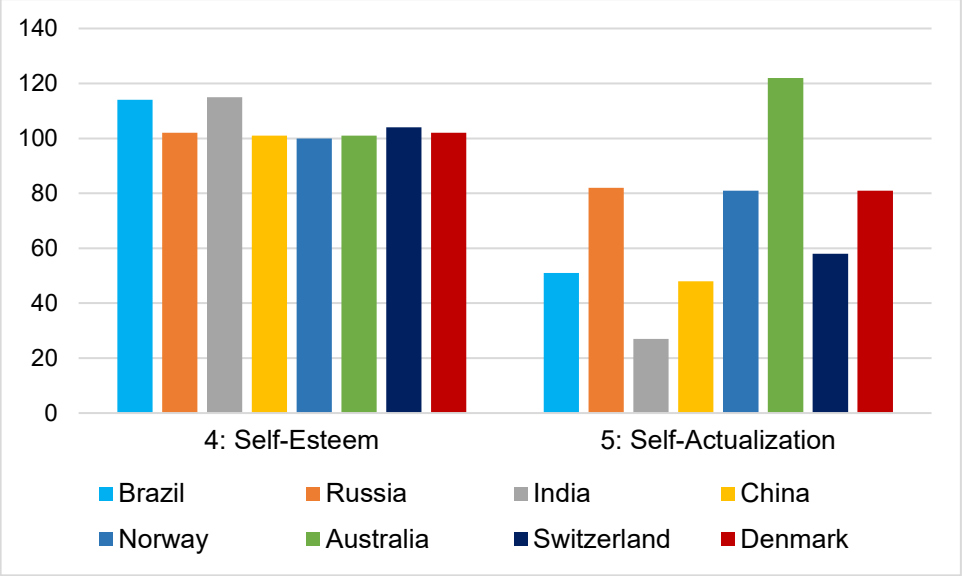


Figure 3.9. Stages 4 and 5 of hierarchy of needs; Stage 4: characteristic: education, parameter: gross enrollment ratio (primary) (Worldbank, 2016a); Stage 5: characteristic: high-level education, parameter: gross enrollment ratio (tertiary) (Worldbank, 2016b); Data represent values in %.

Back to Schumacher and his suggestion that universal prosperity is possible, the correlation between development stages and prosperity cannot be clearly demonstrated. In this respect, his second assumption was that attainment of satisfaction is possible, based on the philosophy of self-enrichment in a different sense than wealth (p. 22). Hence, achieving self-enrichment is not a matter of monetary wealth, but includes other factors, such as education and self-development on other stages.

3.4.5 Part 1: 3.The Role of Economics (p. 38 – 49)

E.F. Schumacher's opinion on economy has developed over time. From a supporter of basic economic principles he rather became a detractor in the later years of his life. The distinction between economic and uneconomic activities in his eyes is wrong and he also included society in the responsibility. According to Schumacher, uneconomic activities are immediately and "energetically denied" (p. 39). Furthermore, he claimed that economy plays a too important role and has become the central concern of modern societies (p. 39). He saw the introduction of political economy as questionable and pointed to the negative aspects of its institutionalization as science had. Economics as such is not "a thing by itself" (p. 39), rather a combination of social philosophy, interconnected with other supporting facts (p. 39). Overall, the economic perception is negative. Criticism includes volitional irresponsibility, indicating that humans mainly base their decisions on personal benefit and do not consider natural or social facts (p. 42). In this respect, it is important to keep in mind that humans make mistakes, and so do economists (p. 40). Economic views are narrow and require a broader insight and consideration of more factors. A classification of products into primary and secondary products must be considered, acknowledging that artificial secondary products can only be created using naturally given primary products. Consequently, the human dependence on nature must not be ignored as depicted in figure 3.10.

In addition to primary and secondary goods, Schumacher also classified into non-renewable and renewable within the primary products as well as artificial products and services (cf. figure 3.10). In a next step, he assumed that for all products, regardless of category, a price is ascertained and consequently, products are measurable in monetary terms. When assessing the economic value by monetary meaning, a distinction is made of the products. If a product is considered more economical, it will have more priority, not taking into account factors such as (non-) renewable.

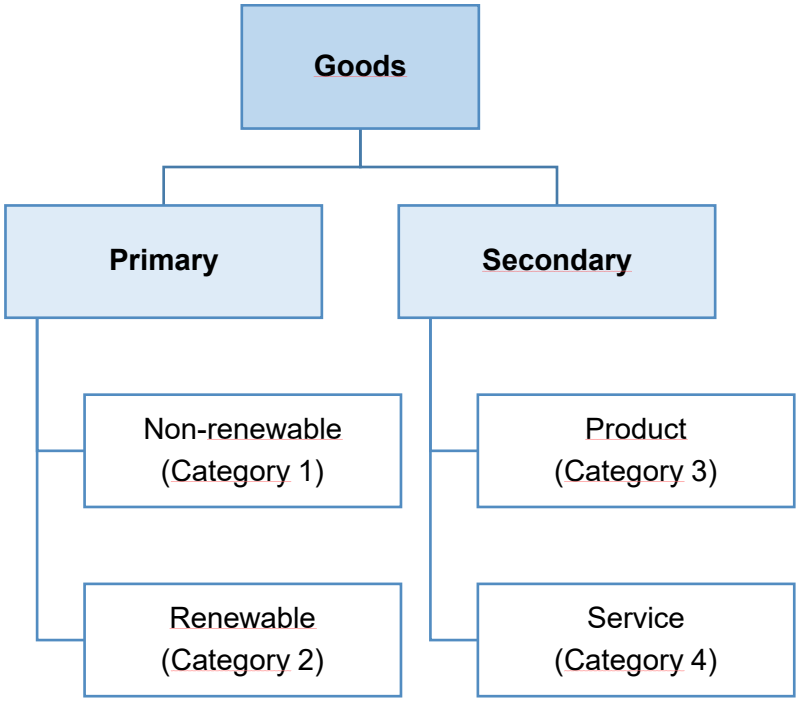
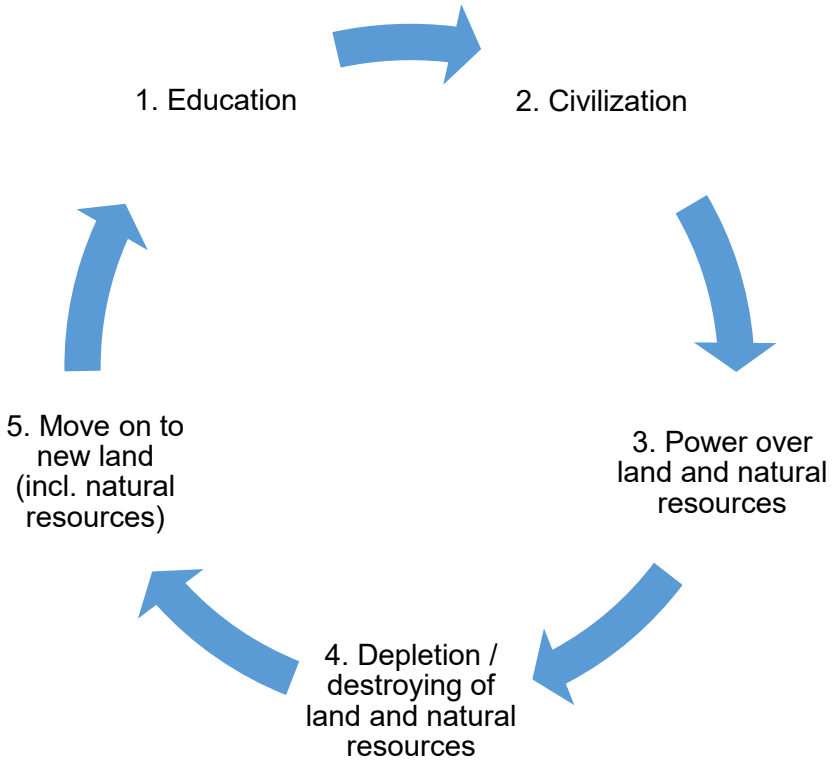


Figure 3.10. Classification of goods, adapted from Schumacher, p. 47.

Besides natural factors, it is furthermore important to consider social factors by taking responsibility for the own actions. This buyer's responsibility should take into account more than just the financial factor, such as the origin or the quality of the product: "Even simple non-economic values like beauty, health, or cleanliness can survive only if they prove to be 'economic'" (p. 43). The consideration of these factors during the decision-making process is designated as enlightened decision, a decision that should not lead to deception of oneself or others. Only such a view combats money as the most important value of all (p. 43). Considering of other factors that are not monetary, Schumacher established the concept of meta-economy. This approach is two-sided and takes humans as well as nature into consideration. Nature plays a significant role in this approach, and industrialization, urbanization and population growth have a great impact on it (p. 44). To consider these problems is the responsibility of economy as a science, and actors such as companies should take actions to reduce the problems. In summary, economy that focuses solely on monetary aspects and growth is surreal and can only work if problems and limiting factors, such as limited natural resources, are not taken into account. Without this important knowledge, economy is "too narrow and too fragmentary to lead to valid insights" (p. 48).

3.4.6 Part 2: 2. The Proper Use of Land (p. 95 – 109)

The importance of land, including the natural resources, is undoubtedly high. Schumacher criticized that these natural resources were utilized for production purposes by saying that there was an imbalance between human use of land and recognition of its finiteness (p. 98). He considered approaches of 1955 in this chapter, developed by Tom Dale and Vernon Gill Carter and described the impact of civilization on natural resources. In scheme 3.2, the correlation is depicted by means of a circle of civilization.



Scheme 3.2. Circle of civilization, information from p. 95 f.

This scheme shows the effect civilization has on natural resources, which is depicted in a circle. Civilization is promoted by education and is interconnected. Humans gain power over land in order to further civilize and to use natural resources for production of secondary goods. The manufacturing process evolves over time and uses more and more primary goods, i.e. natural resources until the land is depleted or even destroyed. This depletion occurs in the form of overgrazing, deforestation and exploitation of animal habitats (p. 96). As human nature and civilization desire further development, civilized humans must move to new land in order to satisfy this desire where the circle begins anew. This fosters the development, which can be seen today by the development of emerging countries where still some land is not exploited. Resources, including human resources, can still be developed there. The circle is influenced by several external factors that have evolved over time and are still valid. Two factors include

the steady increase in population growth as well as the circumstance that land is neither renewable nor infinite. This hinders further development and requires a rethinking in the production process and use of natural resources. This immediately invites the society to develop the ability to distinguish between ends and means-to-end as well as to agree on common standards (p. 98). It is hence important to consider the methods used and the perception of economy in terms of difference between economic and uneconomic. The importance of meta-economy must be highlighted and taken into consideration by treating nature differently than self-produced things, i.e. secondary products (p. 100). The conscious use of natural goods is, according to Schumacher, a God-given task to humanity with *noblesse oblige*: “Man, the highest of his creatures, was given ‘dominion’, not the right to tyrannize, to ruin and exterminate” (p. 100). By acting noble in that sense as Schumacher supposedly intended, meta-economics have to be applied in order to appreciate the importance of a “generous earth” (p. 102). Furthermore, it is the wrong attempt to equate land use (i.e. agriculture) with the principles of industry for the reasons depicted in table 3.2.

Table 3.2. Comparison of agriculture and industry in terms of principles, goods, ideals and goals, according to Schumacher (p. 103).

	Agriculture	**Industry**
Principle	Live-stock and plants	Processes (not living materials)
Goods	Primary goods	Secondary goods
Ideal		Elimination of living substances Elimination of living factor
Goal		Perfect quality control

As described in table 3.2, Schumacher described the problem of equating agriculture with industry, i.e. implementation of agriculture as an industry by defining the ideals and goals of industry. According to this theory, it is the industry’s ideal to eliminate living factors in order to “apply perfect quality control” as well as to achieve measurability (p. 103). As living goods are the main source for agriculture, industrialization is controversial. This dispute is reinforced by civilization, which demands a balanced ratio between industry and agriculture. This reflects the importance of the relationship between humans and nature and is inevitable for the preservation of nature (p. 104). By describing agriculture as sort of land management and use of resources, Schumacher pointed to a method of resource utilization. Supposedly, this can be applied to all methods that involve any use of natural resource, keeping in mind that the environment is God-given and humans rule over its resources to use them sustainably.

3.4.7 Part 2: 3. Resources for Industry (p. 110 – 125)

A recurring proposition made by Schumacher is the fact that developed countries, i.e. those with a high specification of civilization, consume the majority of primary resources. Hence, he criticized this form of economic growth, which is based on an extensive consumption of natural resources, which cannot be renewed or replaced. The question arises whether the resources provided by nature “are likely to be adequate or the further development of an industrial system that consumes so much and accomplishes so little” (p. 112). He also emphasized the fact of a failing energy supply system and pointed to the consequence it might have: “If energy fails, everything fails” (p. 114). On the other hand, the problem is compounded by the fact that non-renewable energy products are still cheap enough to not fully anticipate the extent of this upcoming challenge.

3.4.8 Part 3: The Third World (p. 154 – 208)

As already mentioned by saying that developed countries consume a major part of natural resources to achieve only a few, Schumacher also looked at developing countries, mainly in terms of social aspects. The key point that accompanies the issue of developing countries is the aspect of progress. Progress that develops of a variety of aspects, such as education and other achievements. There is an evolution process involved (p. 156). This development has to be conducted in a way to avoid negative side effects, such as concentration of population in big cities, whereas the “successful industrial development in the cities destroys the economic structure of the hinterland” results in a mass migration of population towards the cities (p. 158). For Schumacher, the main problem of poverty and hunger is a lack of “education, organization, and discipline” (p. 159). Development can neither be bought nor be forced, but must evolve over time and must be an established value in the entire society (p. 159).

3.5 Further Publications

Ernst Friedrich Schumacher's point of view can be found in all his publications. In the following, these publications are briefly described. His critiques in all his books and publications mainly contain criticism of the nature of economics conducted in Western countries, i.e. developed countries. This includes wasteful and inadequate use of natural resources. Regarding source of information, pages of the corresponding book are given in brackets, e.g. (p. 54).

His first notable publication was "Small is Beautiful: Economics as if People Mattered" (1973). Further publications include "The Age of Plenty, A Christian View" (1974), "A Guide for the Perplexed" (1977), "Good Work" (1980) as well as "This I Believe and Other Essays" (1997 by Resurgence).

3.5.1 The Age of Plenty: A Christian View

"The Age of Plenty: A Christian View", a short 23-page booklet, criticizes the wasteful use of resources and the Western system of economics, which he described as wrong. He highlighted the significance of Christianity: "This is meant to indicate the value system which, as I think, rules what I have to say" (p. 6). "A Christian looks at the Future" (p. 8) and consequently, he pointed out that the industrialized society had to focus on alternative concepts in order to preserve the lifestyle, which should be changed according to a new concept (p. 9 ff.). This booklet is, in a sense, a short version of "Small is Beautiful", as it contains central aspects, such as the return "to the Human Scale" (p. 15) as well as the fact that "People Do Matter" (p. 21).

3.5.2 Guide for the Perplexed

The next publication "A Guide for the Perplexed", published in 1977, is a request to humans to realize their (mental) potential in order to reflect differently on fellow men (Janssen 2016). This different reflection should be represented by a more peaceful character. The books serves as proof that Schumacher's metanoia had a significant impact on his beliefs. This includes the reversion of thoughts that a maximum on possessions and extensive professional success are the keys to happiness. Consequently, the question arises whether a turning away is even possible (Janssen, 2016:2).

3.5.3 Good Work

Maybe one of his most complex books deals with a number of different topics. "Good Work" (1980) is dedicated to humans as workers. As in earlier publications, the importance of a technology suitable for humans is emphasized. He expressed his views on the "modern industrial society" and criticized them as follows (p. 29):

1. Its vastly complicated nature.
2. Its continuous stimulation of, and reliance on, the deadly sins of greed, envy, and avarice.
3. Its destruction of the content of most forms of work.
4. Its authoritarian character, owing to organization in excessively large units.

These characteristics would have significant negative impacts on nature and social relationships (p. 35 f.). He described this immoderateness as party by indicating that modern industrial society considers mainly advantages and forgets the consequences. “The Limits to Growth” mark the end of the “party” (p. 97). It is therefore necessary to come back to the basic question: what is important in life or what is the purpose of human’s life? (p. 112). His statement that our “system has been extremely destructive” (p. 139) clearly demonstrated the need to focus on “the metaphysical” issues (p. 19). The book was first published in 1979, two years after his death.

3.5.4 This I Believe and Other Essays

The latest publication of Schumacher’s contribution was published in 1997. It is called “This I Believe and Other Essays” and contains 21 essays published in *Resurgence Magazine*. It contains a variety of texts, including Schumacher’s views on economy, work, industry as well as modern society.

Another noteworthy publication is “Alias Papa: A Life of Fritz Schumacher” (1985), published by Barbara Wood, Schumacher’s daughter. This biography describes important aspects of Schumacher’s life and pays tribute to his work. In summary, Schumacher’s mission was to identify harms to humanity by detecting the limits to nature and humanity. After studying his publications, it becomes clear that it is of utmost importance to find a balance between nature (including all provided resources) and human behavior, i.e. economy in this respect. According to Schumacher, this can be achieved by a metanoia and an associated return to the human scale; in a sense that people ask themselves what is really necessary. This very idealistic approach was not developed in a short time, but was part of a process in which he reflected on natural resources and developed a sense for the impact of human activities on nature. He considered technologies that must be so simple to be used by everyone and indicated the lack of justice in terms of economy. This is still relevant when looking at the situation today where major parts of the world are still undeveloped - almost 50 years later, when Small is Beautiful was published. He pointed to the importance of peace and combined all elements as a necessity to survive.

3.6 Three Facets and Summary

As mentioned at the beginning of this chapter, it was the intention to review Schumacher’s “Small is beautiful” regarding three different aspects. To keep them in mind, they are as follows:

1. Put nature in the strong focus. Look at issues, point out limits and look at industrialization as Schumacher did;

2. Highlight the values that Schumacher is trying to raise in his argumentation, these values can either be applied and / or are recommended to be applied and finally:

3. Evaluate the criticisms that Schumacher raises throughout his book.

1. To give a more detailed view on the three topics, Schumacher could be described as a strong critic of economics, at least his depreciation of gaining profit as the major target. His awareness of a more diverse way of economics was created by his personal transformation from a strictly rational and atheistic person (in the 1950s) to a rather religious human. In this sense, it is crucial to mention that Schumacher called for a metanoia, in which he demanded different and deeper image of the world in a Christian sense. In his opinion, it is the people's duty after birth to develop themselves further and turn to higher goals. Furthermore, the people's goal should be to seek their salvation in something else than material possession. As described in the chapter, human's self-reflection comes with a strong belief in God. Also in this respect, some turning points could be shown. Turning point 1 is that people are the center of attention, they have to respond to God himself. Schumacher is led by the view that every human being is eager to stand on his own feet. Another turning point is the need for modesty. A religious life requires a restraint in economic matters in order to retain the necessary practical independence. This goes in line with a life in of self-limitation and self-liberation and can be directly applied to the use of natural resources as well as industrialization. Limited natural resources, industrialization and the focus on unlimited economic growth is contradictory. A central approach in this regard is that Schumacher's turning away from Western economic habits was influenced by considering Buddhism as a way of life (Janssen, 2017: 1).

2. Schumacher called for a new lifestyle as the main highlight of his views, which can easily be drawn from his statements and beliefs he expressed in all his publications. To be more precise, he called for a development of a new lifestyle and a change in consumption patterns: a lifestyle that is long-term oriented. This is possible in various ways, such as new methods in agriculture, the development of different (smaller-scale) technologies and new forms of corporations.

3. Schumacher's professional career is diverse. His economic achievements are remarkable, e.g. his advisory task for the British Government and his opportunity to evaluate the existing economic system. Later, he converted from an atheist to a Christian with strong beliefs in God and nature. Through several journeys to developing countries, he realized that economics, from a Western point of view, is not favorable due to a number of disadvantages. These include the negative effects on natural resources as well as on humanity. Throughout "Small is

Beautiful" and other publications, he criticized the system of Western economics as inefficient and wasteful in terms of resources. He furthermore called for easy-to-use technologies in order to employ all people and give them meaningful tasks.

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Chapter 4

Brazil – Country Profile

4.1 Brazil and the BRICS

Brazil has reached importance among the emerging countries, as it plays an economic role in the geographic region of South America and its political influence is undeniable. In this chapter, the country is described by means of economic, political and social facts and furthermore, the reason is explained why the country has an increasingly high importance throughout the region.

As one of the five BRICS countries (Brazil, Russia, India, China, South Africa), Brazil has gone through a strong transformation in the past two decades, experiencing a strong development compared to earlier times. All of the five BRICS can be characterized by certain same facts, such as a remarkable economic growth as well as similar development in social and political aspects. Due to foreign direct investments (FDI) by other mainly developed countries (e.g. USA, Germany, UK), the BRICS could benefit from the economic development in those countries and hence prosper accordingly (Radulescu, Panait and Voica, 2014). Although all of these five countries are undergoing an economic rise, the extent of the development is quite different. In particular, it is important to have a close look at the relation between population and area of the region, as population density has a significant impact on the environmental quality. The main contributors for the success of emerging countries are according to Gibley (2012):

- young workers
- lower labour costs, which results in a
- strong export position
- growing individual income per household with a
- low level of debt (consumers) as well as a
- strong depot of natural resources

Within the project, information from several data sources such as the United Nations Data Statistics Division (UN Data) and the World Factbook of the Central Intelligence Agency (CIA) was used for the respective country profiles (UN Data, 2018; Central Intelligence Agency, 2011; 2017; 2018). The countries are compared in a first step concerning economic, social and political facts to see the role Brazil plays. In a second step, Brazil is compared with countries in the region to show the impact there. It is also important to look at the responsibility concerning emerging countries. The impact on natural resources and climate in these countries is significant. The necessity to have a closer look at CR activities results from the fact that all BRICS show an industrialization of a remarkable speed. Consequently, there is an effect on natural resources and other aspects of CR. In a first step, this project shows the development on three fields: the economic, the social and the political field, respectively. Some key facts about the countries are displayed in table 4.1, which shows data acquired in 2015

unless otherwise expressed. As South Africa does not have a great impact compared to other BRICS countries, it is not in focus in further discussions within this project.

Table 4.1. Key information BRICS (UN Data, 2018).

	Brazil	Russia	India	China	South Africa
Area [million km²]	8.5	17.1	3.3	9.6	1.2
Population [million][a]	209	144	1,339	1,410[b]	56
Population density[a] per km²	25	9	450	150[b]	47
Life expectancy [men / women in years]	71 / 78	65 / 76	66 / 69	74 / 77	63 / 56
GDP [million US$]	1,772,591	1,326,016	2,116,239	11,158,457[b]	314,571
GDP growth rate [annual %, const. 2005 prices]	-3.8 (2010: 7.5)	-3.7 (2010: 4.5)	7.6 (2010: 10.3)	6.9[b] (2010: 10.6[b])	1.3 (2010: 3.0)
GDP per capita [US$]	8,528	9,243	1,614	8,109[b]	5,773

[a]Projected estimate (medium fertility variant) for 2017.
[b]Data do not include those for the Hong Kong Special Administrative Region (Hong Kong SAR), Macao Special Administrative Region (Macao SAR), Taiwan Province of China.

Comparing the countries regarding population, Brazil is at third place with a rather low population density of 25 people per km². By contrast, India has a population of more than 450 people per km², followed by China with over 150 people. Last in this ranking is Russia with only 9 people per km². Russia by far exceeds all BRIC countries in terms of land area, which is almost double the area China possesses. This consequently results in different utilization of land and exploitation of resources. Countries with a lower density of population have the advantage that the available resources are less exposed to intense land use. This population pressure is the main cause for exploitation of natural resources and calls for a need to act with responsibility. It is also to be considered that resource capacities and climatic conditions vary among the countries.

Owing to an increasing world population that has more than quadrupled since 1900 (Roser and Ortiz-Ospina, 2017), the standard of living is also increasing steadily and leads to a higher demand for water, food and other natural resources. Another reason for the rising exploitation is the rising life expectancy worldwide. Due to a longer lifetime nowadays, there is a higher need for natural resources. Life expectancy in the BRICs has increased significantly over the

past two decades as depicted in figure 4.1. The growth was proportionally higher than in developed countries such as Germany or the United States, e.g. Women's life expectancy is higher than men's in all depicted countries. Among all countries, Russia has the lowest life expectancy for men with an average age of 64.7 years. Compared to Japan, this is a gap of over 15 years, where men have a life expectancy of 80 years.

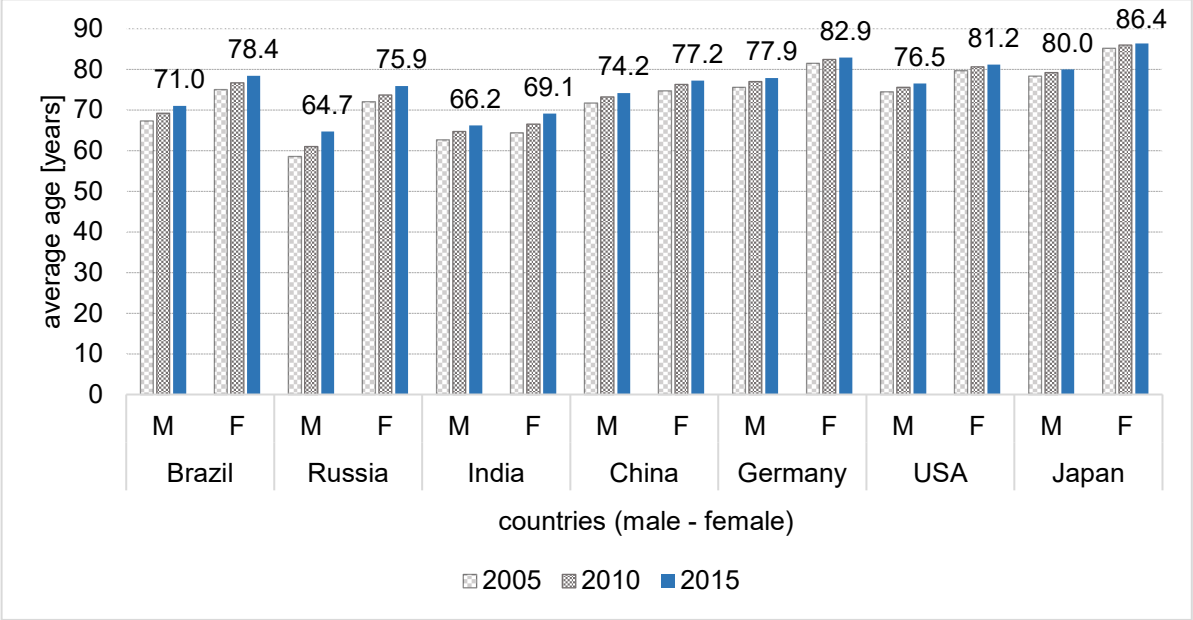


Figure 4.1. Life expectancy in BRIC countries compared to Germany, USA and Japan (UN Data, 2018).

This consequently means that the conservation of natural resources in emerging countries is more jeopardized than in developed nations, where this development took shape in earlier times with much less pressure. Possible reasons are less industrialization and advanced technologies in earlier times. In general, emerging economies can benefit from developed countries with regard to technologies and methods of production that have a less negative effect on the climate and environmental resources.

Advanced technologies and methods are key factors for a rapid economic growth from which the BRICS can benefit. Hence, some stages of development were very short or skipped altogether. With regard to social development, the population in the BRIC countries was able to benefit from strong economic development, which improved lifestyles and called for educated young people to manage the challenges caused by a sudden stronger growth. One key indicator for a positive economic development is the GDP (gross domestic product). Its development is depicted in figure 4.2.

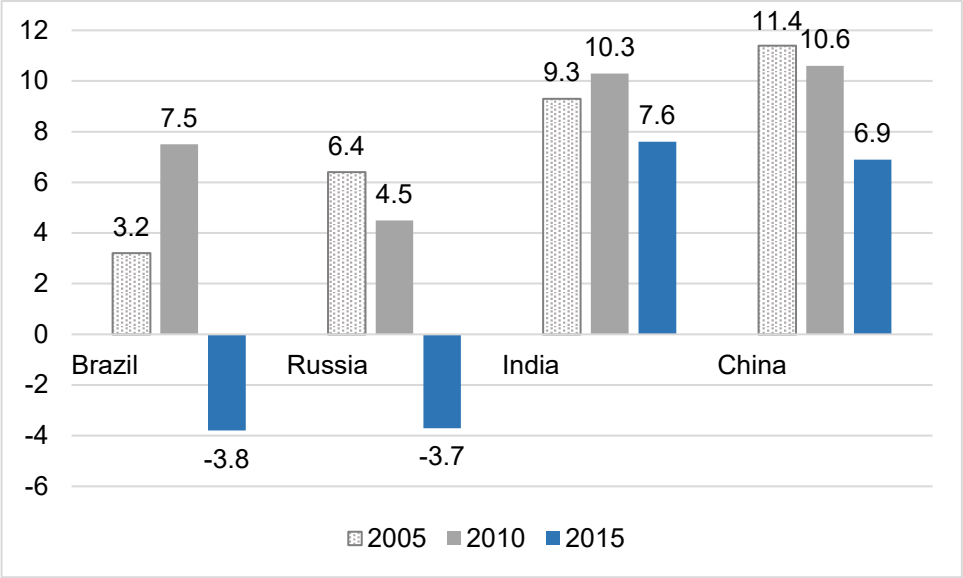


Figure 4.2. GDP growth rates in the BRICS in percentage [%] (UN Data, 2018).

Except Brazil and Russia, India and China maintained a very strong economic growth, partly at a two-digit growth rate. Brazil's decline in growth was due to a major recession that began in 2014 and actually deepened at the end of 2016 (Cascione, 2017). A detailed explanation of the economic development of Brazil is shown in a later section. Russia faced a strong decline of the rouble in 2014. Since the "Black Tuesday" on December 16, 2014, the country has struggled economically which is reflected in the negative development of the GDP.

The natural conditions such as resource capacities and climate play an important role. The countries are partly located in different climatic zones and consequently, the climate has an effect on the (economic) possibilities. Hence, each country has a collection of different natural resources that contribute to the respective country's economy. Table 4.2 gives an overview of the climate and important natural resources in the BRIC countries.

Table 4.2. Climate and natural resources in BRIC countries (Central Intelligence Agency, 2018a; 2018c).

	Climate	Natural resources
Brazil	Mostly topical, temperate in the south	Bauxite, gold, iron ore, manganese, nickel, phosphates as well as rare elements such as uranium. Petroleum, hydropower potential
Russia	Variation from steppes in the south to humid continental, partly subarctic, warm summers as well as cool summers in parts	Oil, natural gas, coal as well as many strategic minerals. Rare earth elements
India	Variation from tropical monsoon (south) to temperate (north)	Fourth largest reserves of coal in the world. Iron ore, manganese, natural gas, petroleum
China	Variation from tropical (south) to subarctic (north)	Coal, iron ore, petroleum, natural gas, uranium, hydropower potential (largest globally)

All of these countries dispose over a huge potential of natural resources and these resources are vulnerably been put to over-exploitation. Reasons for the extensive use of natural resources are the strong economic growth and a significant demand for resources.

4.2 Brazil – Economic, Social and Political Development since 1990

Since the early 1990s, Brazil and other emerging countries (Russia, India and China) have undergone a strong economic transformation, whereas the general impact remains rather low (Stuenkel and Taylor, 2015: 143). Looking at the key facts to describe Brazil (see also table 4.1), they seem quite impressive and theoretically offer great opportunities.

The population of 209 million inhabitants with an average age of only 32 years is young compared to the population in Germany (average age: 47 years). Among the BRIC, Brazil is behind India (28) in second place, followed by China (37) and Russia (40) (Central Intelligence Agency, 2017c). This potential lays the foundation for various opportunities with respect to skilled work force and positive economic development. The life expectancy in Brazil with 71 years for men and 78 years for women is comparable to the Chinese population (74/79). Although the country has a huge potential owing to natural resources, the GDP decreased by 3.8 % in 2015, mainly due to the great economic recession of the country (cf. figure 4.2). The

recession was mainly caused by political turbulence, which also weakened the confidence of investors (BBC News, 2017). Overshadowed and triggered by a series of political scandals, the country still suffers from inequality and a significant unemployment rate (Biller, 2018). The crisis started in 2014 with several corruption scandals involving the mainly state-owned oil company Petrobrás. The Brazilian population accused Dilma Rousseff of being mainly responsible for the scandal. The scandal included bribery involving high political officials to a cartel-like extent (Sotero, 2018). The economic recession was furthermore caused by two factors: a fiscal policy, which strongly focused on expansion in the years between 2012 and 2014 as well as a low-interest strategy. The low-interest policy had a strong government interference, namely Dilma Rousseff, which was justified as a logical consequence to meet challenges caused by the Euro-Zone-Crisis. In summary, the economic crisis was caused by structural (long-term) factors as well as short-term factors. Long-term factors include the deindustrialization caused by the government of Lula da Silva, which had a significant impact in the subsequent period (Nassif, 2017).

The political situation in Brazil remains strained after the start of the great recession in 2015, which was caused by a series of corruption scandals involving both political leaders and companies (Central Intelligence Agency, 2018d). It is still vulnerable and the economic situation is strongly affected by the political situation in Brazil. The social consequences are significant and inequality remains a problem. In the following, the economic situation is described more in detail.

4.2.1 Economy

Brazil is an emerging country and is rather significant when looking at it in total numbers: the GDP amounted to a value of 3.2 trillion US$ in 2017, its exports to 217.2 billion US$. Its labor force amounts to 104.2 million people. With an unemployment rate of 12.8 %, Brazil ranked number 165 in the international comparison and last in comparison within the BRICs in 2017 (China 3.9 %, Russia 5.2 % and India 8.5 %) (Central Intelligence Agency, 2017b). In direct comparison with other emerging countries, Brazil's impact is rather low and the country's economy seems not well connected to the global market (Stuenkel and Taylor, 2015: 145). With a GDP growth of 7.6 % in India and 6.9 % in China, respectively, Brazil's GDP development of -3.8 % showed a clear sign in 2015. Reasons for this negative trend could be the country's focus on national goals rather than positioning itself in the global markets (Stuenkel and Taylor, 2015: 143). Unlike other emerging countries such as India and China, where exports of goods and services largely contribute to the GDP growth, Brazil only exported goods worth 217 billion US$. In comparison, China exported products worth of 2,216 billion US$ and India 304 billion US$ in 2017 (Central Intelligence Agency, 2017a). Another sign for

economic inward focus is that Brazil's exports contain a relatively small share of imported goods, highlighting that Brazil is not well integrated in the global value chain. This leads to disadvantages compared to other countries, which benefit from global networking in terms of technological development and quality improvement (Stuenkel and Taylor, 2015: 145). Brazil's main import partners are China (18.1 %), USA (16.7 %), Argentina (6.3 %) and Germany (6.1 %). In terms of the industrial sector, Brazil produces textiles, shoes, chemicals, motor vehicles and motor parts, and amongst others, machinery and equipment (Central Intelligence Agency, 2017d).

Brazil is currently recovering from its worst recession in history, which was caused by corruption scandals involving politicians and private enterprises (Central Intelligence Agency, 2018d). Due to the relative protection and isolation from other countries, the impact on Brazil's economy was significant. In history, several attempts have been made to open up the country for the private market: with the introduction of the *Política Industrial, Tecnológica e de Comércio Exterior (*Industrial, Technological, and Foreign Trade Policy) as an industrial concept, the administration under President Lula da Silva tried to promote investments and exports. Other attempts to improve the country's internationalization strategy was the implementation of the *Política de Desenvolvimento Produtivo* (Productive Development Policy) in 2008, which should boost the companies' position to become international leaders (Stuenkel and Taylor, 2015: 149).

Brazil ranked 43rd by means of the MGI (Margin Growth Indicator) Connectedness Index on the international scale in 2012 (Germany: 1; USA: 3; Russia: 9; China: 25). This index takes into consideration the connection of countries in a global context by measuring the flow of goods, services, financials, people as well as data and communication (Stuenkel and Taylor, 2015: 149).

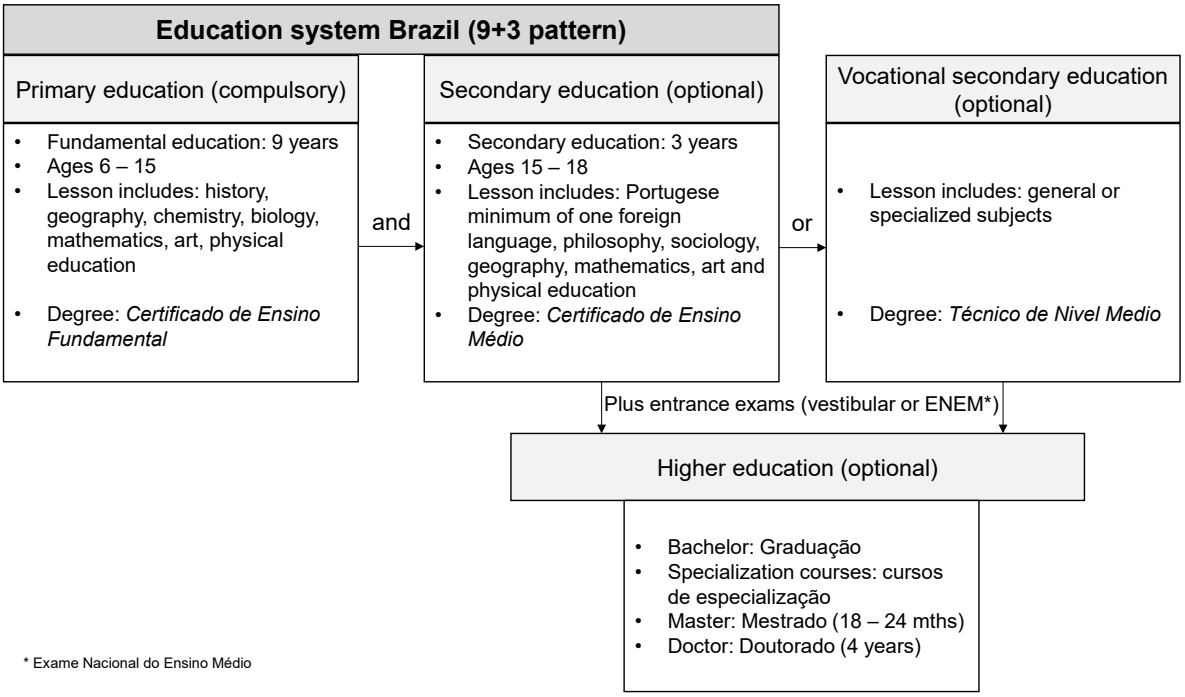
In the next section, the country's development is described in detail by considering following aspects: geography, climate, health and religion.

4.3 Brazil - Geography and Climate

Brazil is one of the largest countries in the world and ranks sixth with 8.5 million km². Within South America, it is the largest nation and comparable to the area of the United States of America (9.8 million km²) (Central Intelligence Agency, 2018b). It has borders with Argentina, Bolivia, Colombia, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela and consequently, Brazil borders all countries of South America except Ecuador and Chile (Central Intelligence Agency, 2018d). The climate is described as mainly tropical with moderate climate in the south of the country. Its natural resources include bauxite, gold, iron ore, manganese, nickel, phosphates as well as rare elements such as uranium (cf. table 4.2). Petroleum and hydropower potential are economically important. Around 33 % are used as land for farming because the agricultural system plays a significant role for the economy of the country (Trading Economics, 2014; Central Intelligence Agency, 2011). Therefore, a major commercial agricultural system was developed in order to promote further growth and contribute to exports. Factors such as good climate, high availability of land, a balanced rain distribution and competitive labor costs contribute to a positive development to “a powerhouse of food, fiber and biofuel production” (Martinelli et al., 2010; Barros, 2008; Gasques et al., 2004; Chaddad and Jank, 2006). Brazil’s key agricultural export commodities include soybeans and coffee, alongside other products like corn, sugarcane, rice and beans. This economic reliance on agriculture comes at a price: negative impacts on natural resources (degradation) and on social aspects (inequality) are significant (Central Intelligence Agency, 2018d). In that regard, section 4.5 gives a further insight in the respective topic.

4.4 Brazil - Education

Based on the 1988 Constitution, the education system of Brazil is described as a universal right and should be encouraged by the government. Further regulations include the National Education Guidelines and Framework Law (1996), which set an additional frame for primary and secondary education considering vocational, special and indigenous education. Scheme 4.1 gives an overview of the education system in Brazil (Stanek, 2013).



Scheme 4.1. Education system in Brazil.

The education system of Brazil follows a 9 + 3 pattern, i.e. the children start school at the age of 6 years and have to complete a minimum of 9 years of primary education as a compulsory school education. During this primary school education, lessons include history, geography and mathematics for example. In addition to the primary education, the schoolchildren have the possibility to attend a 3-year secondary education program, in which lessons include at least one foreign language and further knowledge in subjects like mathematics, geography and philosophy. Instead of attending a secondary education program, the students can also participate in a vocational secondary education program, which can include specialized subjects. Nine compulsory primary school years plus three optional vocational school years are the prerequisite for entrance to higher education. In addition, a university exam has to be passed that differs among the institutions or instead, the national *Exame Nacional do Ensino Médio (ENEM)* has to be passed. The ENEM is a universal exam, which was launched by the Brazilian Ministry of Education. The higher education includes the degrees of a Bachelor (*Graduação*), which can be completed by specialization courses (*cursos de especialização*) and a Master degree (*Mestrado*). In addition, the doctoral degree can be obtained (*Doutorado*).

4.5 Problems of Emerging Countries and Sustainable Growth

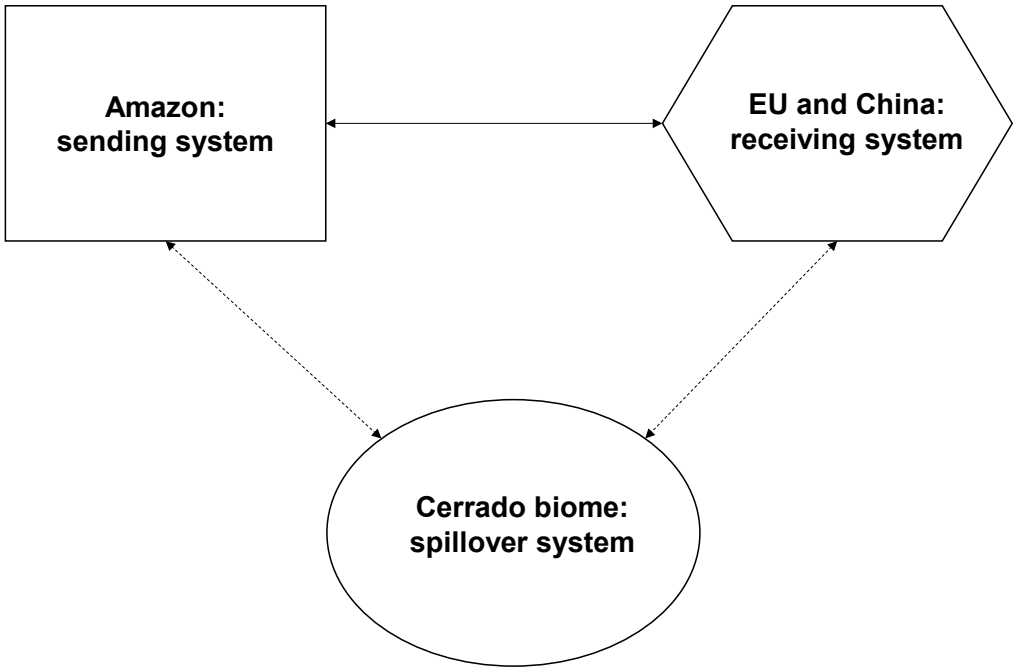
As mentioned before, there is a conflict between a strong economic development and preservation of natural resources. Consequently, following challenges have to be considered: a higher demand for products, a higher living standard throughout the world and a higher life expectancy of people as well as an increasing world population. Developed countries as well as emerging and underdeveloped countries contribute equally to the exploitation of natural resources. The respective triggers and consequences are depicted in table 4.3.

Table 4.3. Triggers and consequences

Triggers	Consequences
• Population growth • Increased demand for products • Increasing living standard • Increasing life expectancy	• Overexploitation of natural resources • Deforestation • Overgrazing • Mismanagement • Social inequality • Unequal distribution • Environmental degradation

4.5.1 Natural Impact in Brazil

In Brazil, economic growth is mainly based on agricultural products and therefore, there are major consequences on natural resources and eco-balance, respectively. One of the main problems is deforestation. The Amazon forest, for example, suffered significant deforestation and destruction in the past decades. Furthermore, the Cerrado as the most biologically rich savanna is also affected by the devastation due to agribusiness (Pearce, 2011). These two cases should serve as extreme examples of human impact on nature in Brazil. The research of Yue Dou described the significant environmental role of the Amazon and the Cerrado and their relation. As depicted in scheme 4.2, the Amazon can be seen as the sending system, the Cerrado biome as the spillover system and the EU and China as the receiving system. A shift in land use from the Amazon to the Cerrado biome can be determined, which does not solve the problem of overexploitation of natural resources, according to Dou. The efforts being made to preserve the Amazon rainforest reduced accordingly the conservation efforts of the Cerrado biome. This shows that ecosystems are interconnected and should not be considered separately.



Scheme 4.2. Illustration of the connection between Amazon, EU/China and the Cerrado biome (Dou et al., 2018).

In a nutshell, there is an interdependence of the impact on the Amazon rainforest and the situation of the Cerrado biome as well as surrounding ecosystems. Changes in regional climatic conditions are influenced by the respective ecosystem and should therefore be considered in particular.

4.5.1.1 Amazon Deforestation in Brazil

The main reason for deforestation is the need for increased area of arable land. The demand has increased significantly, going from smaller needs of local farmers to a deforestation driven by industrialization and large-scale agricultural activities (Butler, 2017a).

The Amazon rainforest is located in eight countries, the biggest part of it is in Brazil (64 %), followed by Peru (10 %), Colombia (6 %), Bolivia (6 %), Venezuela (6 %), Guyana (3 %), Suriname (2 %), Ecuador (2 %) and French Guiana (1 %) (Sawe, 2017). As Brazil has the largest share, its impact on the Amazon rainforest is significant. In the following section, the development of the Brazilian part of the Amazon is described.

As depicted in figure 4.3, there was a total loss of rainforest area of 777,204 km² until 2016 (Butler, 2017b), an area more than twice the size of Germany (Central Intelligence Agency, 2018b). In 1970, the total area of the Amazon was 4,100,000 km² and decreased by 19 % to 3,322,796 km² in 2016.

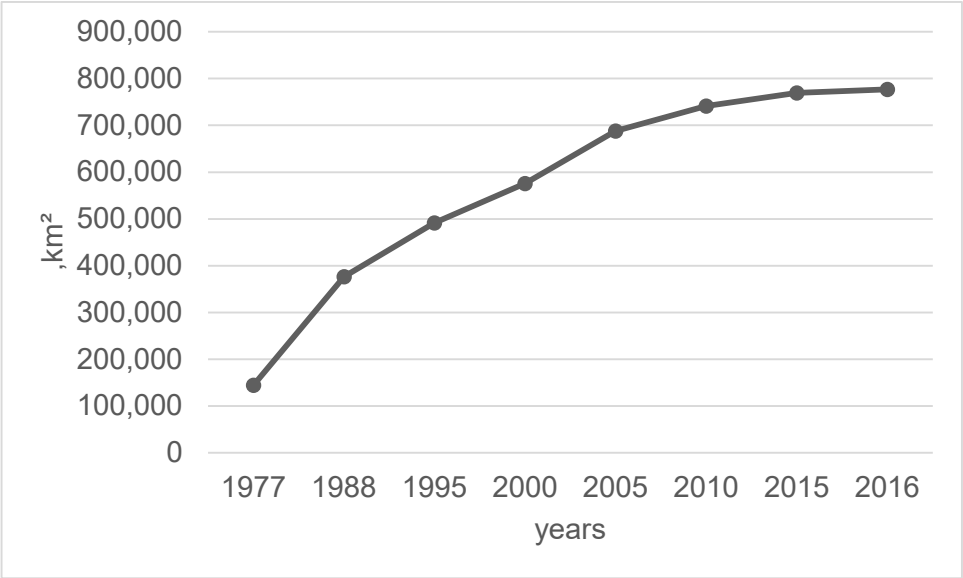


Figure 4.3. Total loss of Amazon rainforest between 1977 and 2016 (Butler, 2017b).

The highest level of deforestation was in 1995 with over 29,000 km². As depicted in figure 4.4, there was a sharp increase from 1988 onwards and peaked in 1995. After that year, a steady decline could be observed until 2000, when the clearance increased slightly again.

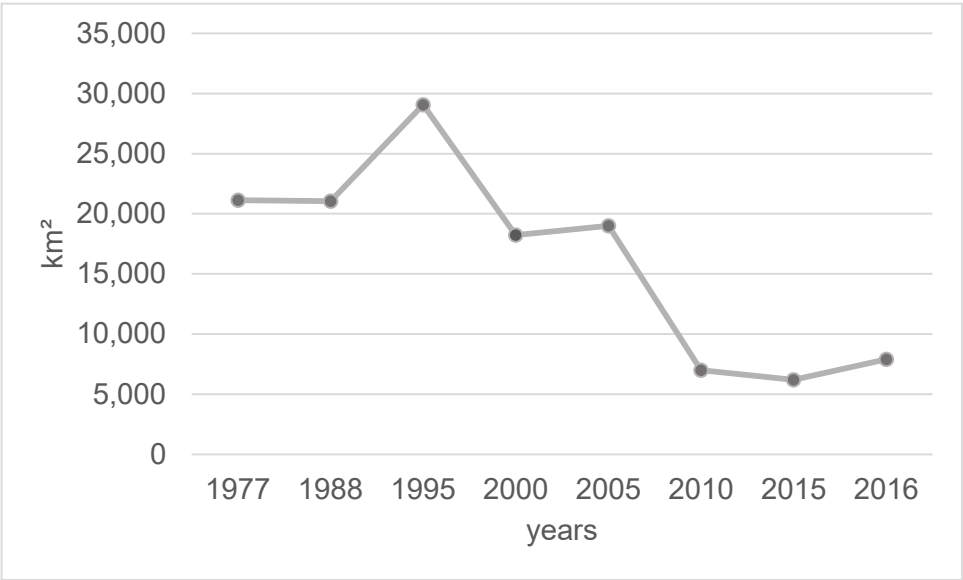


Figure 4.4. Annual loss of Amazon rainforest in Brazil (Butler, 2017b).

In 2010, the annual level of deforestation reached 7,000 km² and slightly increased to 7,893 km² until 2016. Even if the extent is not comparable to the level of 1995, when the forest loss was almost four times higher, the renewed rise in deforestation is a worrying development (Butler, 2017b). From 2015 to 2016, there was an increase of 29 % concerning the loss of Brazil's Amazon area, possibly caused by dry conditions and relaxed environmental regulation in Brazil (Butler, 2016).

4.5.1.2 Deforestation in the Cerrado biomes

In addition to the impact that economic development had on natural resources in the Amazon region, the development in the Cerrado savanna is alarming in a similar way. The Cerrado is a tropical savanna region in the center of the country covering nearly 20 % of Brazil and habitat of 5 % of the planet's animals and plants (Scherer, 2018). According to information provided by the National Institute of Space Research (Instituto Nacional de Pesquisas Espaciais, INPE) and the Brazilian Ministry of Science, Technology, Innovation and Communications, the deforestation of the Cerrado biome has amounted to 277,968.2 km² of area since 2001. The development per year is depicted in figure 4.5. It shows a high level of deforestation (ca. 30,000 km² per year) until 2004, but then decreased over time to 6,657 km² in 2018, along with an increasing awareness of the importance of the rain forest.

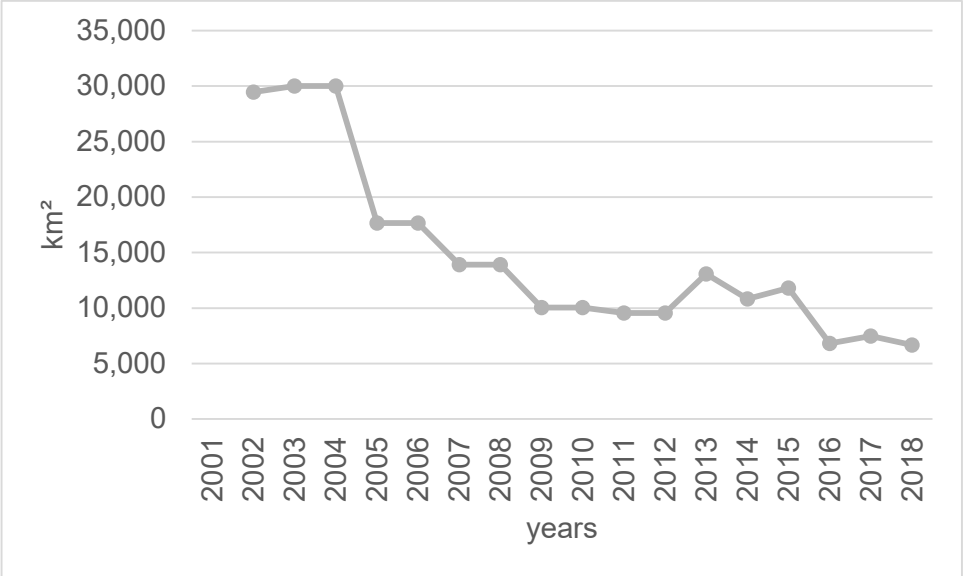
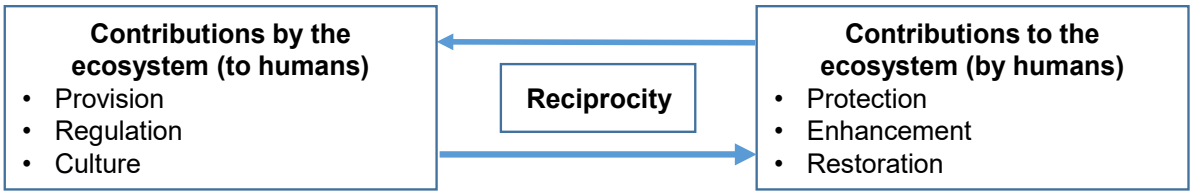


Figure 4.5. Annual forest loss in the Cerrado biomes (TerraBrasilis, 2018).

In the model of Yue Dou, export plays a crucial role and can be considered as the main trigger for the negative impact on both ecosystems (Amazon and Cerrado). The deforestation of the Amazon has attracted more attention, but it is nevertheless important to consider the ecosystem as a whole. Each ecosystem affects the well-being and lives of many people and animals. Therefore, it is important to consider the efforts, which can be done by humans in order to promote ecosystem activities. As shown in scheme 4.3, there is a reciprocal correlation between the ecosystem and humans concerning well-being.



Scheme 4.3. Reciprocity between humans and ecosystem (Comberti et al., 2015).

The ecosystem provides humans with essentials, such as water, food, fiber and biochemical substances. Therefore, humans have to use these resources in a sustainable manner for maintaining the ecosystem's possibility to regulate factors like climate and water availability. Furthermore, the ecosystem provides a cultural service to humans, such as education, sense of place and cultural heritage. In return, humanity must protect, enhance and restore the ecosystem. Tangible protective measures include habitat protection as well as ritual regulations. Humanity can enhance the ecosystem by cultivation of land, waste recycling and trait selection and is also responsible for restoration activities. In the following, different types of ecological degradation in Brazil are examined.

4.5.1.3 Overgrazing

The level of overgrazing in Brazil shows another extreme example caused by mismanagement of natural resources and resulting in an increase of barren land. Overgrazing describes an intensive land use to maximize the output. Nevertheless, intensive agriculture is necessary to a certain extent in order to ensure the supply of food for the population. Therefore, the degree of intensification is the main factor, as it promotes soil deterioration (Carvalho et al., 2018). As Brazil's reliance on agricultural products is significant, overgrazing has become a serious problem.

4.5.1.4 Land Consolidation

In order to increase economic profitability, smaller parts of land can be consolidated in larger units to benefit from synergies, such as combined management. Combining smaller units into a larger entity can lead to positive cost effects by introducing a corporate model dedicated to export and trade and it sets itself apart from a family-run model. It is also considered as a way of modernizing the agricultural sector and would support a maximization of land use (Byerlee and Deininger, 2013). A study conducted in 2010 showed that only 8 % of all agricultural organizations produce 85 % of the total agricultural output, whereas 92 % of all other farms produce only 15 %. The model of export-driven agricultural development also leads to land destruction and degradation of air and water quality (Fernandes, Welch and Gonçalves, 2012:

10 ff). Thus, the exploitation of natural resources and land management regulations are in contradiction, which affects not only Brazil.

4.5.2 Social Inequality

One consequence of mismanagement of natural resources is the significant problem of social inequality in Brazil. Especially in rural areas, where people have to rely on natural resources, the consequences can be serious. As shown in sections 4.5.1.1 and 4.5.1.2, the deforestation of the Amazon and the Cerrado biome have declined, but a certain share of land is no longer available as living environment. Although Brazil is the strongest economic power in Latin America, the level of poverty and social inequality is considerably high (Guedes et al., 2011). This high degree of social inequality has deep regional roots and is linked to the country's historical economic development (World Bank, 2004: XVIII). It is suggested that the unequal distribution of assets such as agricultural land is higher than in other countries and may, inter alia, lead to an unequal distribution of agricultural products (World Bank, 2004: 20). Directly related is the phenomenon of land consolidation and the rapid increase of large farm corporations. They have a significant impact on land, natural resources and social issues, as these companies have power to control development policies, define production technologies as well as monopolize certain markets (Fernandes, Welch and Gonçalves, 2012: 11).

4.6 Conclusion

The example of Brazil as an emerging country and the careless use of natural resources show the impact a strong economic development can have. Besides a number of benefits, such as wealth and progress in certain fields, there are disadvantages: destruction of natural resources and a strong negative impact on social aspects (inequality), only to name a few. This development can be observed not only in Brazil, but in all emerging economies as well as in developing countries, and to a limited extent, in developed regions. Economic growth at the expense of unsustainable management of natural resources is contradictory in terms of *suum esse conservare (Grober, 2012: 54)* and it is an important task for humankind to find solutions. Taking into account the model of a balanced ecosystem (scheme 4.3), clear implications are provided and shall be obtained.

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Chapter 5

Survey on CR

5.1 Introduction to the Survey

In an attempt to achieve a qualitative insight into the topic CR, companies were asked regarding their CR measures in the ecology sector. The survey was conducted by addressing 228 companies in May 2017. In summary, the survey persisted of 29 questions and included single-choice-, input-, as well as score-questions. The tool used was lamapoll[5]. The companies were selected based on the following criteria:

- all of the companies are headquartered in Germany or have operations in Germany;
- all of the companies have a relation to Brazil by either doing business there or have an operation there and
- all companies are active in the manufacturing sector.
-

Of the total number of company contacts, 99 contacts could be reached via telephone before sending the survey. 129 contacts were contacted without personal contact via email, found on the internet (cf. table 5.1).

Table 5.1. Contact statistics of the survey.

	Total
Total contacts	228
Visitors	110 (48.2 %)
Respondents	76 (33.3 %)
Respondents (finished the survey)	58 (25.4 %)

Out of 228 emails sent, the survey had a visitor rate of 110 users, of which 58 users completed the survey. In relation to the contact amount of 228 users, this is a response rate of over a quarter. When setting it into relation with the visitors of the poll, a participation rate of 52.7 % can be determined. The questions including the answers are listed below. In order to contribute to environmental protection and to avoid costs, the survey was only conducted online with zero paper used. The print version was not sent out due to a broad acceptance of the participants to use the online version. The main goal of the survey was to get an overview of the current attitude towards the topic “Corporate Responsibility” in the companies. For this purpose, the set-up of the survey and the questions are explained in more detail. Finally, an evaluation and interpretation of the answers conclude this chapter. Given the fact that surveys are best answered when the subject is addressed in short and clear questions, the survey was narrowed down to its basics, which could still provide an insight into this broad field.

[5] https://www.lamapoll.de/

5.2 Main Topics and Questions

Overall, the survey covered five topics. In the first part of the survey, some basic questions regarding the company itself were covered, such as location, number of employees and annual turnover. The second part focus on the topic CR itself, such as questions towards a dedicated CR-department or a code of conduct and the like. In section three questions were asked to determine the perception of CR. The field of political influence and support by the government to implement CR-measures in the business activities are covered in section four. Finally, every participant was requested to rate several statements on a scale from 1 to 5 (1 = I fully agree, 3 = neutral, 5 = I fully disagree) in section five.

In the following step, the results of the survey are presented in the form of itemized questions.

5.3. Evaluation of Questions

5.3.1 Section 1: Company Information

In section 1, some general information about the company are requested, represented by the participant of the survey. As shown in figure 5.1, the companies questioned here mostly have their headquarters in Europe (94 %) and a majority of them are located in Germany, followed by the Americas with 4 % and Africa (1 %).

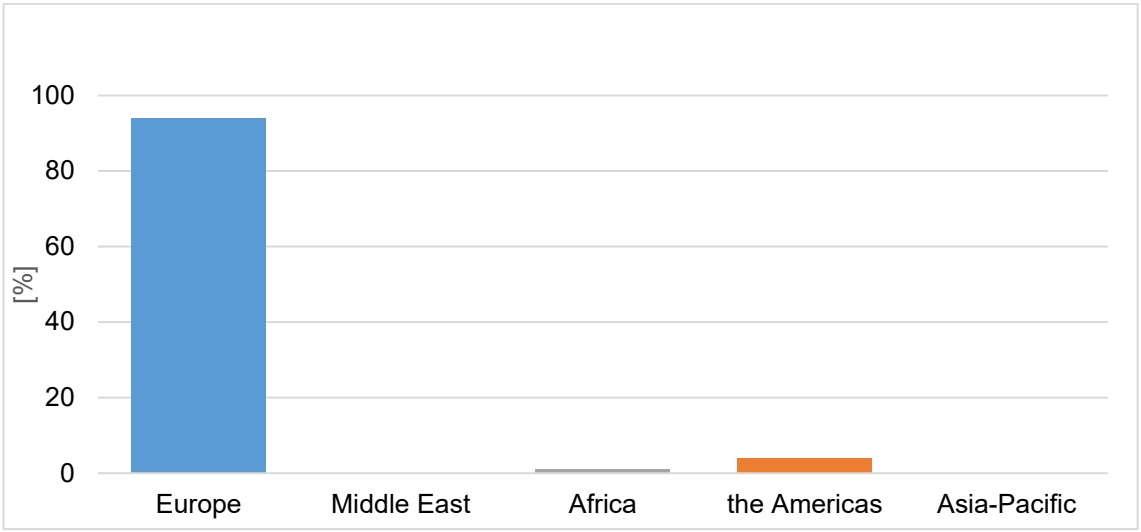

Figure 5.1. Headquarter of the company.

In the next question, the size of the company by number of employees was specified. The range was set to determine the influence of necessary CR actions on smaller companies with up to 250 employees. In general, companies with +250 employees were more willing to support the survey, whereas smaller companies sometimes had restraints to talk about the topic in the direct conversation and were therefore less willing to participate at all. This infers that smaller companies are less or not at all active in the field of CR. 86 % of the participating companies have more than 250 employees, 11 % 50 – 250 employees and 3 % up to 49 employees (cf. figure 5.2).

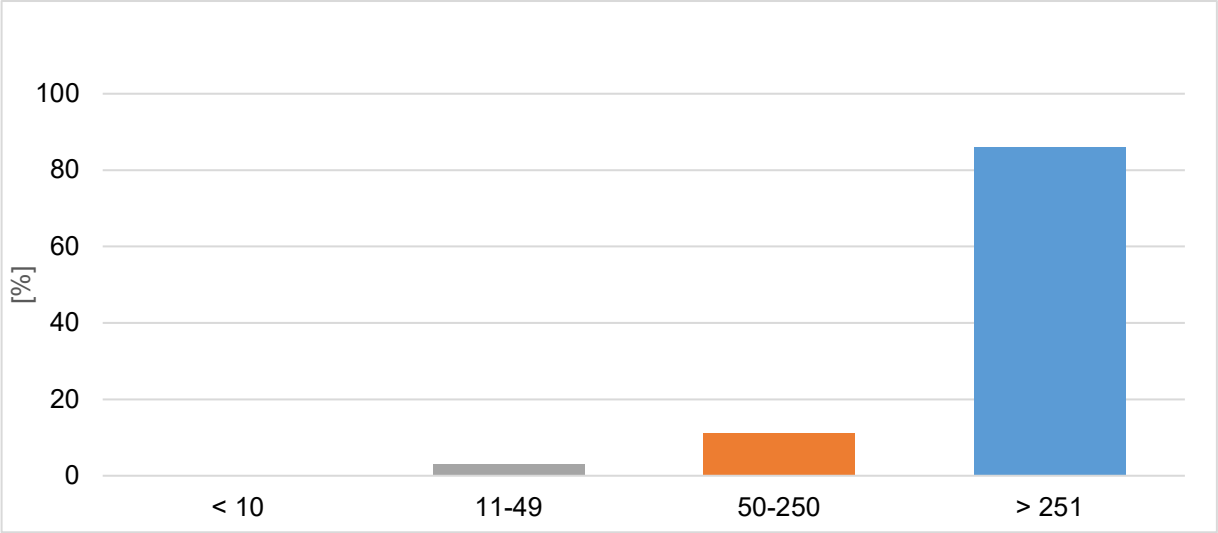

Figure 5.2. Number of employees.

Prerequisite for the survey was that the companies surveyed are active in the manufacturing sector. As shown in figure 5.3, 79 % of the companies are active in the automotive sector and 13 % consider themselves as general manufacturer.

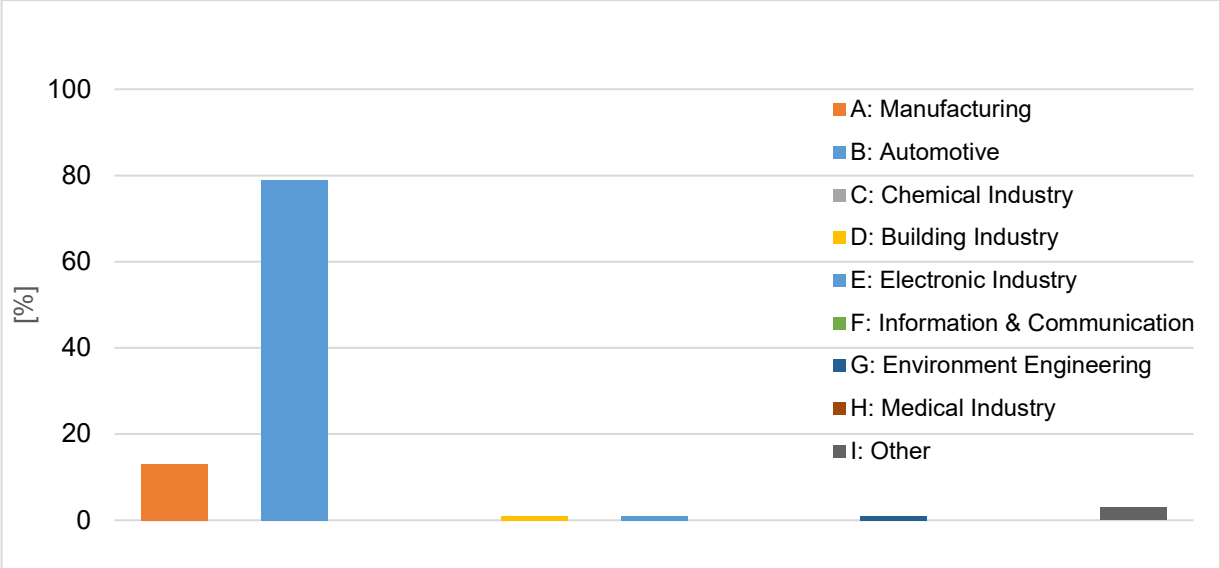

Figure 5.3. Activity per sector.

In terms of turnover, the majority of the companies (70 %) has an annual turnover of more than 50 million € (m €) shown in figure 5.4.

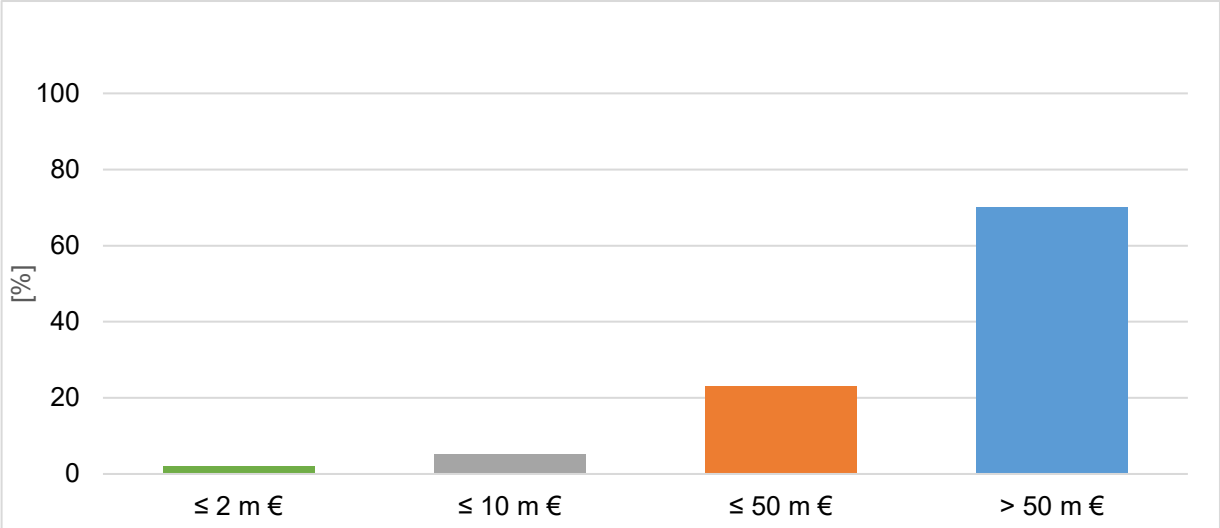

Figure 5.4. Annual turnover of the companies.

The majority of the participating companies are big in terms of employee numbers and annual turnover. In the personal discussions via telephone, the impression was confirmed that bigger companies tend to be more active in the field than smaller firms. As shown in section 2 of the survey, which is dedicated to CR, possible reasons for this fact are explained.

5.3.2 Section 2: Corporate Responsibility (CR)

This section specifically focuses on the topic of this project and starts with some structural questions. Even though most of the companies are rather big in terms of annual turnover and number of employees, 67 % do not support CR actions by having a dedicated CR department (cf. figure 5.5).

Out of those companies where a CR department is in place, 60 % distinguish between social and environmental responsibility, whereas 40 % do not. However, this does not suggest that companies only undertake CR activities when they have a CR department. In contrast, a majority (76 %) of those, who have answered, have a “Code of Conduct” in place (cf. figure 5.5). The code can generally content equal employment opportunities, a safe work place and prevention of conflict of interests.

25 % of the participants replied positively on the question if there was a report specially aimed at CR activities (cf. figure 5.5). The reports include in general: internal sustainability reports, external CR reports (i.e. yearbooks), UN Global Compact Communication on Progress (COP) and environment protection statements. One example by Volkswagen is the annual yearbook, which “*reports all of Volkswagen do Brasil’s economic, social and environmental activities, focusing on corporate responsibility and sustainability initiatives. This document consolidates information regarding production/exports, corporate relationship with target audiences, new releases, projects under development, investments, organizational structure, and support network, among other topics, according to Global Reporting Initiative (GRI) guidelines. The content and relevance of topics were defined based on an extensive survey involving Volkswagen do Brasil’s key stakeholders – companies in the automotive industry, employees from all production units and members of the company’s Board, community members surrounding the company’s production units, individual and corporate customers, Volkswagen dealerships, financial institutions, public agencies, NGOs, Class Entities, vendors, trade unions and associations, and the German headquarters.*”

In general, GRI (Global Reporting Initiative) Standards are the first and most widely adopted global standards for sustainability reporting which are also used by Volkswagen. 93 % of the largest 250 corporations report on their sustainability performance. “The practice of disclosing sustainability information inspires accountability, helps identify and manage risks, and enables organizations to seize new opportunities. Reporting with the GRI Standards supports companies, public and private, large and small, protect the environment and improve society, while at the same time thriving economically by improving governance and stakeholder relations, enhancing reputations and building trust” (GRI, 2018a). Beside the universal standards GRI 101 (foundation), GRI 102 (general disclosures) and GRI 103 (management approach), the initiative additionally provides three topic-specific standards namely GRI 200

(economic), GRI 300 (environmental) and GRI 400 (social) (GRI, 2018b). Consequently, comprehensive reporting can support business to work more efficiently and promote progress towards sustainable process goals.

Some of the above stated documents are used to promote CR actions actively. As shown in figure 5.5, only 35 % of the participating interviewees indicated that their companies undertake such actions, e.g. promotion via flyer, movies, pictures or other marketing material available. 65 % do not promote their activities at all. Specific materials used are pictures and flyers, the web presence for external stakeholder, the intranet presence for internal purposes, trainings, press releases, meeting with stakeholders, videos, social media such as Facebook and image brochures. Further information is provided via sustainability controlling, which directly leads to the next questions: do you review internal CR activities in regular audits? A rather surprisingly high share of the participants (49 %) claimed that their CR activities were audited regularly.

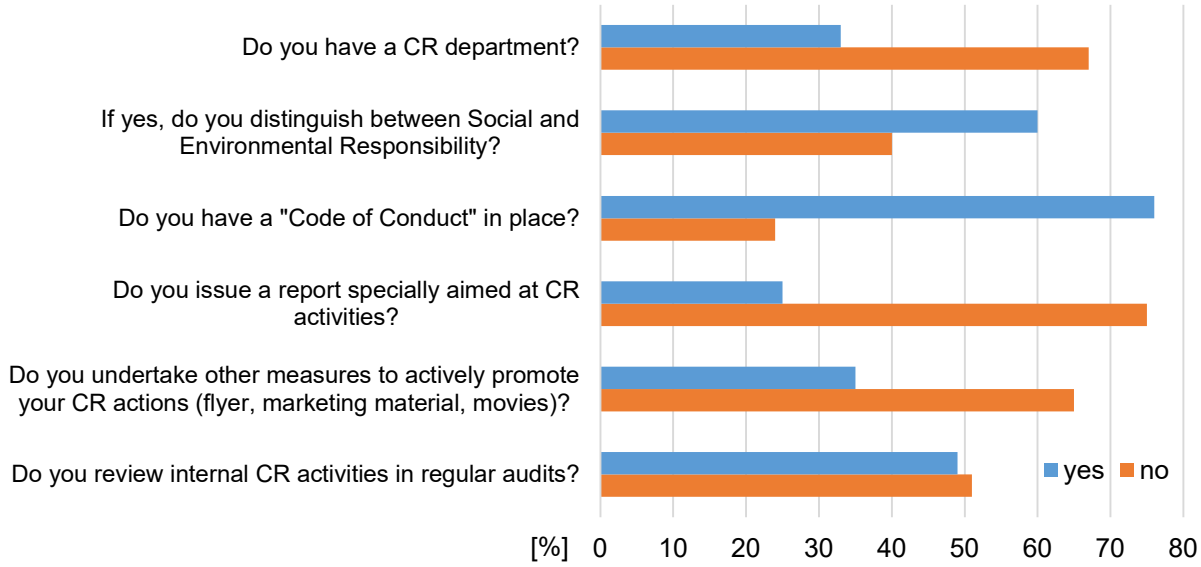

Figure 5.5. Results of questions regarding CR.

5.3.3 Section 3: Impact

In section 3, the impact of CR is analyzed and observed by asking specific questions aimed at the topic. As a general assumption, CR theories suggest that there is a non-negligible impact on shareholders, who have a justified interest that the business goes well in terms of financial performance as well as on stakeholders (internally and externally). Almost half the amount of the interviewees is not sure, whether a possible impact on shareholders is considered. 36 % believe there is an impact on shareholders, whereas only 17 % believe there is no impact at all (cf. figure 5.6).

In contrast, the majority who participated in the survey believes that there is an impact on stakeholders. The term stakeholders generally defines a group of people or other external parties, who have an increased interest in the company's well-being, such as employees who rely on the timely payment of wages or providers who need their bills paid on time. 70 % believe that there is an immediate impact on stakeholders, only 10 % believe there is none at all (cf. figure 5.6). The majority also has the opinion that CR-activities have a general impact on their businesses.

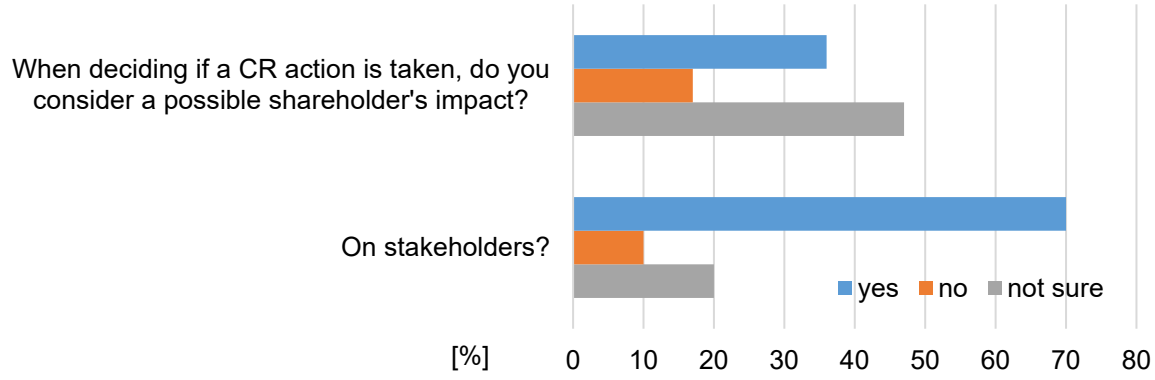

Figure 5.6. Impact on shareholders and stakeholders.

More than 75 % believe that there is a general impact on the respective business, only 7 % believe there is none at all (cf. figure 5.7). This impact is seen dominantly positive (75 %) and nobody believes that there is a negative impact. 25 % of the participants assess, they are not sure about the impact to be positive or negative (cf. figure 5.8).

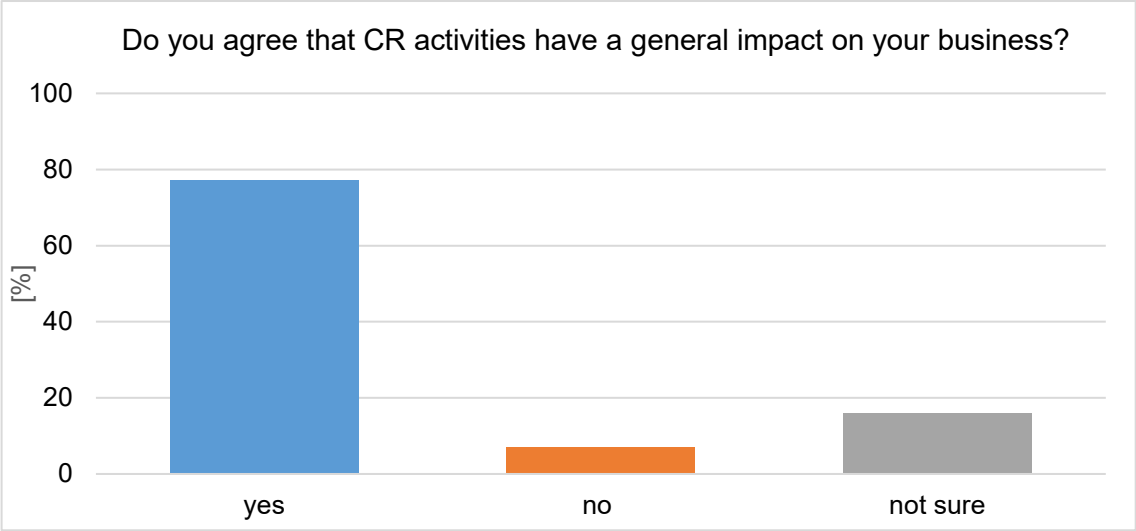

Figure 5.7. General impact on business.

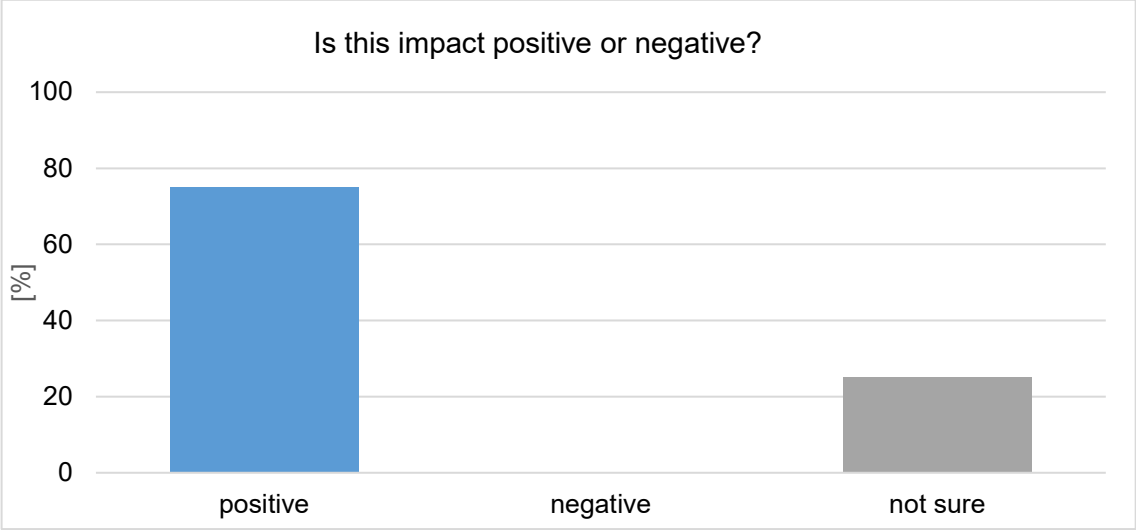

Figure 5.8. Type of impact.

The feedback given by individual companies includes:

- *In 2016, "Geração Emprendedora Paraná" (Entrepreneurial Generation Parana State) project, was developed with the NGO Aliança Empreendedora and the State Government, in which 410 young people were benefited through training and awarding regarding their projects and business ideas developed in the community. The project is funded by part of the tax incentive related to the investment for production of Golf MQB project at São José dos Pinhais plant. The benefit comprises a period of 15 years (started in 2016) and we will continue to develop such initiative, focusing even further on social development, entrepreneurship and innovation bringing aspects of Industry 4.0, Artificial Intelligence and Digital business inclusion for the future generations. In 2017 - We have another objective: To provide specialized technical services architecture and engineering for the development*

of basic designs and architecture executives, restoration and complementary, aiming to restore and upgrade the educational cultural heritage of Paraná State College. Volkswagen do Brasil lent almost forty vehicles in 2016 for vehicle extraction training sessions of the São Paulo State Firefighter Academy. The vehicles were used in rescue simulations during events such as the Rescue Days – addressing victim-rescuing procedures for Firefighters in Brazil and Latin America. The Fire Department's engagement helps prepare and ensure more efficient rescue procedures for potential victims of traffic accidents, to which Brazil is unfortunately world leader. Ten of these cars were used in the World Rescue Challenge (WRC), considered the biggest international rescue event performed in a simulated environment. In October 2016 Brazil held the event. The purpose of this event is to strengthen the topic's discussion within the community, improve professional's techniques and promote knowledge exchange.

- *CR department is currently in creation (CR befindet sich erst im Aufbau)*
- *Consistent appearance to the outside-world (Einheitliches Erscheinungsbild nach außen)*
- *Increased allegiance to the company by employees (Hohes Zugehörigkeitsgefühl von Mitarbeitern zur Firma)*
- *Increase of reputation towards employees or applicants (Reputation steigt, förderlich für Ansehen bei Mitarbeitern und Bewerbern)*
- *Anybody wants to be proud of her/his achievements and work (Wir leben in einer Wertegesellschaft. Jeder Mitarbeiter will doch stolz sein auf sein Tun und damit auf seine Arbeit und deren Umfeld)*

Some of the answers above indicate that the external view on the company is not to be dismissed. In this regard, it is interesting to acknowledge that 59 % see no conflict of interests between economic growth and CR activities, whereas 16 % do see an impact and 25 % are not sure, respectively (cf. figure 5.9).

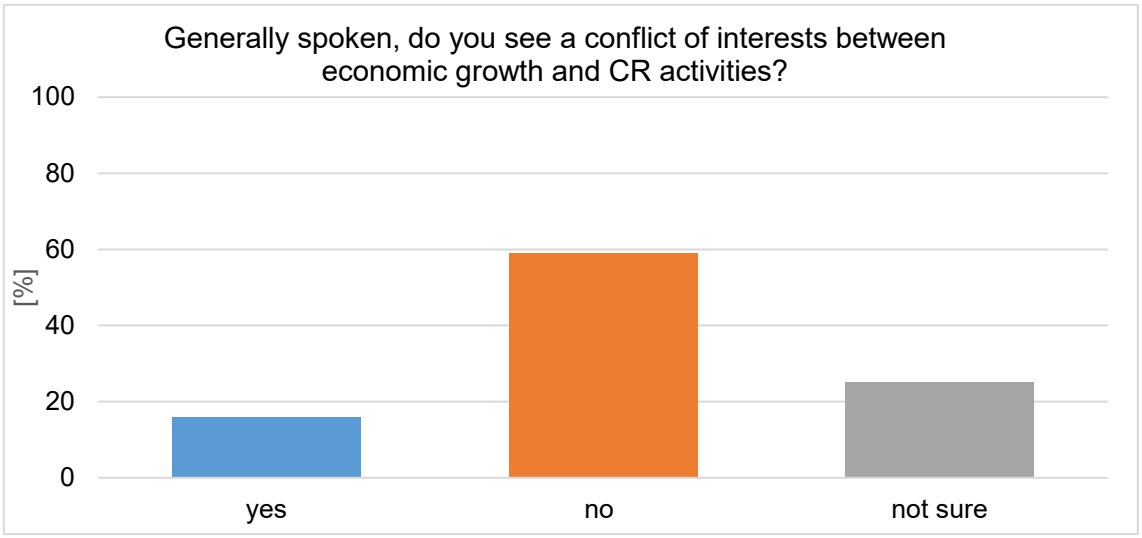

Figure 5.9. Conflict of interests.

5.3.4 Section 4: Political Influence and Governmental Regulations

The purpose of this section is to gather information about the external influence on companies, governmental regulations and the governmental influence in particular. It also serves as a measurement of how the companies see a possible impact. Governments have taken important steps in the past to improve their impact on environmental issues. This was incentivized by public pressure, which denounced the waste of environmental resources for the sake of economic growth. It has been evident for some years that the pollution has increased significantly with an increasing economic development throughout the globe.

Do you believe the topic (CR) is regulated properly by your government (your location)? Almost half of the respondents (43 %) believe the government does not regulate the topic properly. Given the fact that all respondents are located in Germany, the work of the German government is considered insufficient. Nevertheless, 38 % believe that the topic is properly regulated (cf. figure 5.10).

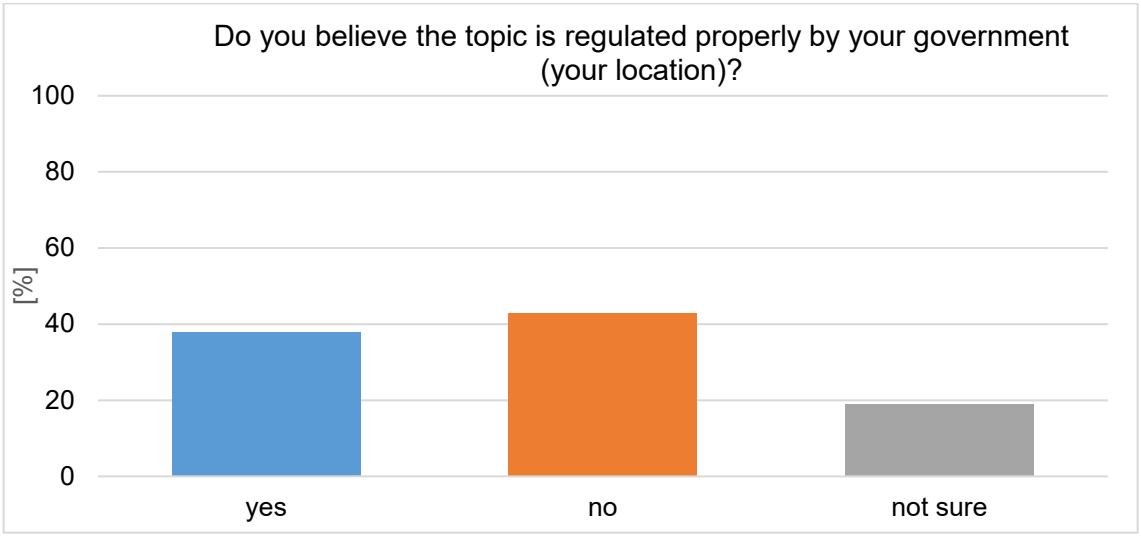

Figure 5.10. CR regulation by government.

One global regulation is the United Nations Global Compact: it is presumably one of the most influential initiatives, which covers the topic as such. Furthermore, it has a strategic partnership with GRI mentioned above. It was introduced in 2000 and includes ten principles. The United Nations Organization (UNO) encourages business to apply those ten principles to ensure sustainability.

5.3.4.1 The United Nations Global Compact

The ten principles are divided into four subcategories and are as follows (UN Global Compact, 2018):

Human Rights

Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and

Principle 2: make sure that they are not complicit in human rights abuses.

Labor

Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

Principle 4: the elimination of all forms of forced and compulsory labor;

Principle 5: the effective abolition of child labor; and

Principle 6: the elimination of discrimination in respect of employment and occupation.

Environment

Principle 7: Businesses should support a precautionary approach to environmental challenges;

Principle 8: undertake initiatives to promote greater environmental responsibility; and

Principle 9: encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption

Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

Companies have the opportunity to commit to these principles and measure the respective progress in a United Nations Global Development Report, which is made available to the public (e.g. website).

In the survey, the question was raised about the general awareness of this initiative. 59 % responded that there was no awareness at all of this initiative. 41 % know the Global Compact. 81 % of the interviewees had no awareness of other initiatives at all (cf. figure 5.11).

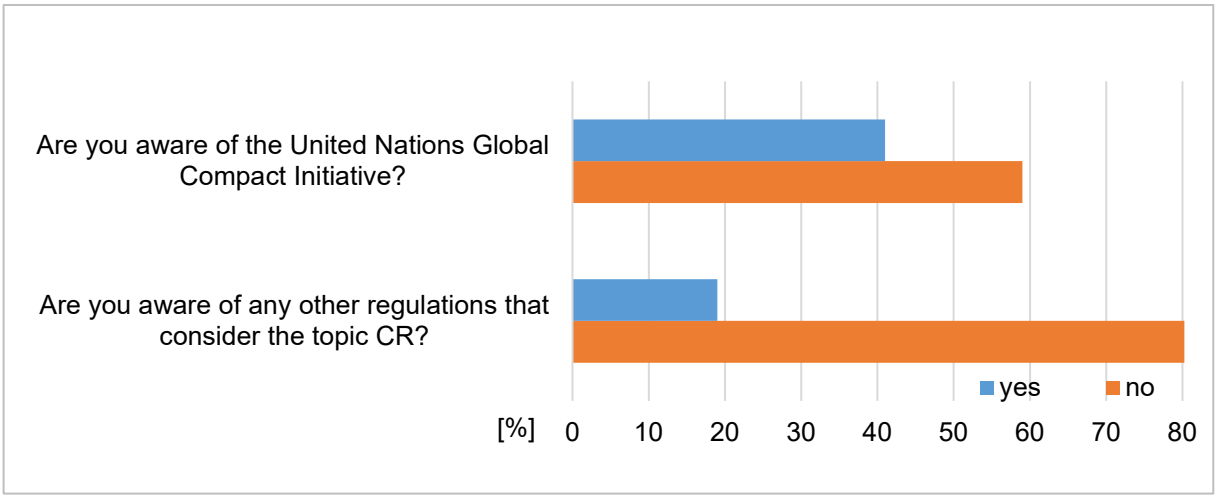

Figure 5.11. Awareness of general CR regulations.

Initiatives that were specified are:

- CDP (Carbon Disclosure Project): CDP is a non-profit organization, running the global disclosure system for investors, companies and public institutions in terms of environmental impact management (CDP, 2018).
- European Automotive Working Group on Supply Chain Sustainability: the European Automotive Working Group on Supply Chain Sustainability coordinated by CSR Europe consists of several automotive manufacturers working together – in addition to their own efforts – to enhance sustainability in their supply chains (CSR Europe, 2018).
- SA8000® Standard: this leading certification standard for factories and organizations was established in 1997 and has evolved over the years as a measurement to help companies show their dedication for fair treatment of employees on a global scale. (Social Accountability International, 2018). This regulation focuses solely on the treatment of employees and workers.
- Others that were mentioned include:
  - UN Guiding Principles on Business and Human Rights
  - Norms regulated through the International Labor Organization (ILO)
  - Sustainable Development Goals (United Nations)
  - Aluminum Stewardship Initiative
  - Econsense

In 2018, the German Global Compact Network (DGCN) and econsense (forum sustainable development of the German economy) carried out a reference study for the implementation of the CSR Directive Implementation Act (CSR-Richtlinien-Umsetzungsgesetz: CSR-RUG) in companies. This law was entered into force in April 2017 and obligates companies to provide

information regarding social and environmental concerns, respect for human rights and efforts to combat corruption.

Core contents of the DGCN/econsense study:

- Which of the implementation options have companies chosen in the first reporting cycle following the entry into force of the law?
- What are the experiences/findings of the companies when implementing the law for the first time?
- How far has the law influenced the dialogue/processes within the company relating to the sustainability issue?

The aim of the study was to examine the initial reporting process, to identify challenges and barriers occurred and to assess the effect of the law on processes and awareness of sustainability in companies. Consequently, the law should give a greater importance to CSR and render assistance in a political way (Deutsches Global Compact Netzwerk and econsense, 2018). Aiming at the political influence, the survey requested the view on the support from authorities. 49 % of the interviewees want more support, 25 % said the support was sufficient and 26 % answered they were not sure if more support is needed. The same question was raised with respect to financial aid. 19 % answered that no further financial support was needed whereas 60 % wanted more financial support (cf. 5.12).

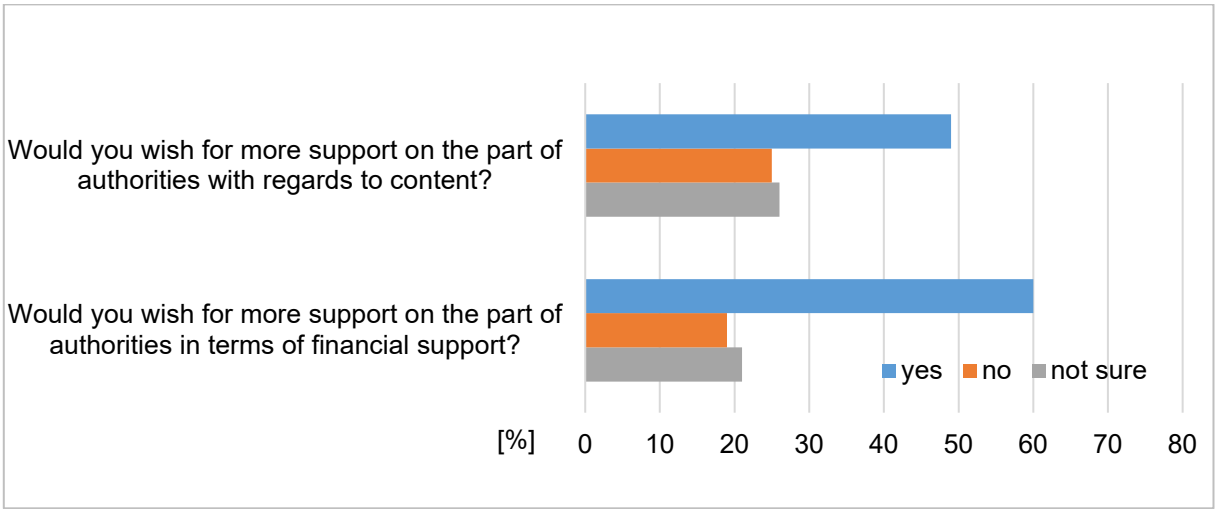

Figure 5.12. Support from authorities.

5.3.5 Section 5: Opinion Poll

The major subject of this chapter was to evaluate personal opinions in the industry. Survey participants were asked to evaluate pre-formulated statements provided from 1 (= agree) to 5 (= disagree; 3 = neutral).

In general, the majority of participants believe that CR activities have a positive impact on business and is definitely a marketing instrument, which improves the companies' perception. Although a share of 41 % (evaluation no. 2) assesses CR activities rather expensive, CR is necessary and trendy for the major share of participants, as depicted in table 5.2.

Table 5.2. Results of evaluated statements in %.

	1 = agree	2	3 = neutral	4	5 = disagree
Business is impacted by CR activities	9	41	30	13	7
The impact is positive	4	39	45	11	2
The impact is negative	0	15	38	36	11
CR is a marketing instrument that improves the perception of our company	22	38	31	7	2
CR is trendy	15	29	38	16	2
CR activities are expensive	7	41	29	21	2
CR is absolutely necessary	22	40	25	7	5

5.4 Conclusion

CR activities have been examined in various surveys, such as the study "Mainstreaming CSR among medium-sized enterprises" with 500 companies in 2007 (CSR-Mittelstand, 2007). This study concluded that CSR would get increasing importance and pay economically for most companies. In view of the experiences made in the last years, the interest in environmental and social responsibility has grown significantly. This concept is often considered as guarantor for success and it said to secure and to improve the companies' competitiveness. Since 2006, this strategy has been still pursued and could be verified by the results of my performed survey. Particularly automotive companies with more than 250 employees stated that CR was a marketing instrument, which improved the perception of their company. Although CR activities are expensive, reflected in a minor existence of dedicated departments (33 %) and low share of promotion e.g. via social media (35 %), CR counts as necessary and positively affects the business. If there is a CR department, the majority of companies distinguishes between environmental and social responsibility, also in regard to different approaches and thematic focus shown in GRI 300 and GRI 400 (GRI, 2018b). With this in view, reporting the values, principles or rules of behavior via the "Code of Conduct" is in widespread use within a company to preserve the business and to communicate the company's expectations. Regarding the strong presence of the Code of Conduct, an accumulatively positive impact on statements and satisfaction of the interviewees could appear, such as "increased allegiance to the company

by employees" and "increase of reputation towards employees or applicants". Moreover, this supports the opinion of the majority of the respondents that CR is trendy and respective activities are not in conflict of interests to economic growth, where motivated employees are an essential part of success.

Nevertheless, almost half of the interviewees' opinion included an improper regulation of the CR activities by the government and the respondents wanted more support, especially financial means. The recent study of the CSR-RUG (see section 4) shows similar traits: For 61 % of the participants the CSR-RUG is not the major force for sustainability in the company compared with customer requirements, rating on the capital market and investors. Moreover, due to the implementation of the CSR reporting obligation, the limited internal resources were regarded as the biggest procedural challenge for affected companies, such as insufficient personnel in the respective department (Deutsches Global Compact Netzwerk and econsense, 2018). This result reflects the lack of financial support in this area where the government can render assistance. Private sector leaders, civil society organizations, trade unions, trade associations, and committed individuals can contribute to the mainstreaming of sustainability reporting that is necessary to achieve a transparent, sustainable global economy, sharing responsibility for this vital transition" (GRI, 2018c). One of the organizations mentioned above is the UN Global Compact, which covers the CR topic globally. Interestingly, 41 % of the interviewees were aware of this regulation and 81 % could not mention any other initiatives such as econsense and SA8000® Standard. Possible reasons for this could be that the low share of existing CR reports (25 %) and promoted activities led to limited knowledge about this complex topic. Furthermore, the survey could be forwarded to a wrong contact person in-house, not being enough familiarized with the subject. Beside the employees as a part of stakeholders, the shareholders are one further organizational element, which have impact on the companies' business. 47 % of the interviewees were not sure if CR activities had an effect on shareholders' interests whereas 70 % saw a clear impact on stakeholders. This result could be caused by following aspects: in large companies, the shareholders are usually not known face-to-face and are not involved in the daily business, so their position in terms of business performance could be insufficiently assessed by the majority of the employees. Therefore, almost half of the respondents could not take a final position concerning the possible impact on shareholders. By contrast, employees as a part of stakeholders notice a change caused by CR activities immediately if the company improves, for example, the working conditions. Social issues should not be disregarded due to the power of work attitude, which was got to the heart by a feedback: "We live in a community of values. Every employee wants to be proud of her/his achievements and thus to her/his work and its environment."[6]

[6] Translation of the feedback; original: „Wir leben in einer Wertegesellschaft. Jeder Mitarbeiter will doch stolz sein auf sein Tun und damit auf seine Arbeit und deren Umfeld."

This statement can act as food for thought that CR activities should be more included in (daily) business to create social, environmental and economic benefits for everybody.

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Chapter 6

Case Studies

Introduction - Nature as capital

To underline the importance of Corporate Responsibility, three case studies should show measures by means of realization. The first case study depicts the example of Knorr-Bremse Brazil Holding, part of the Knorr-Bremse Group. The company is based in Munich (Germany) and is the leading manufacturer of braking systems and system supplier for rail and commercial vehicles. Employing 28,000 people worldwide, Knorr-Bremse generated a profit of EUR 6.24 billion in 2017 (Knorr-Bremse, 2018). The case study about Knorr-Bremse shows a concrete example of how market participants on the microeconomic level can contribute. Knorr-Bremse realized a manufacturing building in Itupeva, using state-of-the-art sustainable methods, such as a self-efficient water system and an electricity supply system from renewable sources. The Brazilian electricity market provides energy supply from public and private sources. In a major reform undertaken by the Brazilian government between the 1990s and 2004, customers have the choice to purchase their electricity from a variety of sources. The second case study explains the reform of the Brazilian electricity market and describes how Knorr-Bremse benefits from this system by introducing Comerc Energia. The São Paulo-based company supports end customers, implements methods and benefits from the advantages of the free market system in the energy purchasing process. Brazil generates a significant part of its electricity demand from renewable sources and is an exception among large economies, as almost 67 % of the total installed capacity is generated from hydroelectric power plants (Leahy, 2017). Exact data are shown in the respective case study. An example for a power plant is Itaipu in western Paranà in the South of Brazil. The world’s second largest dam in terms of installed power is a joint project with neighboring Paraguay. The dam has an installed generating capacity of 14 GW. During a field research in 2017, information about the Itaipu dam was gathered and also provided by the head of the local eco-museum. The issue is described more in detail in the third case study.

6.1 Knorr-Bremse Brazil

The information in this chapter was collected during a visit to São Paulo in May 2017. It is a collection of information obtained from interviews and other information provided by the director of the Knorr-Bremse Brazil Holding, Dr. Rudolf Gerich, and his team, unless otherwise stated. The case shows the transformation of realizing a new manufacturing plant that is state-of-the-art not only in terms of architectural aspects, but also in terms of sustainability and energy supply. The support by Knorr-Bremse Brazil Holding is most appreciated.

As a major contributor to this dissertation project, Knorr-Bremse Brazil offered its support by making data available concerning the construction of the new manufacturing plant in Itupeva. Sustainability was an integral component in designing and constructing the new plant. Experiences with older, outdated buildings have also contributed to an elaborate project that supports green development and sustainability in an ever-changing environment. As previously described in chapter 4 (country profile), the environmental pollution in emerging countries is significantly higher than in developed countries. Knorr-Bremse Brazil with its headquarters in Germany benefits from a strong knowledge base and increased regulations towards environmental protection in other countries. In this regard, the company has established its own regulations and uses its factors as a basis for all newly built sites worldwide. These principles of design and execution are to be applied to all new buildings that are built by Knorr-Bremse and include several aspects, such as an increased form of communication (e.g. Office near production) and considering following issues: demands of employees, such as bright rooms, transparency, high standards of equipment and sustainability in planning by applying the latest technologies in terms of construction methods (e.g. low energy supply). The buildings furthermore should contribute to an efficient process landscape, which can be applied easily and performed in an ideal manner.

Knorr-Bremse Brazil faced significant advantages in realizing such a project. As a new building had to be constructed, its success is mainly characterized by that fact: compared with renovating an older building, the latest state-of-the-art technology was applied. Dr. Gerich, director of Knorr-Bremse Brasil Holding, pointed to the importance of sustainability for such undertakings. He suggests that it would be a failure in its entirety not applying the latest technologies in constructing manufacturing plants that are dependent of a high energy supply. Moreover, it would be the wrong approach when taking environmental change into acknowledgment. The entire matter is probably dependent of the following perception: acknowledgment of a negative transformation of environmental conditions and resources will become less.

During a business travel in May 2017, the new plant was visited and data was collected. The team showed the key points and introduced the agency that supported the transformation of

conventional power supply into green power supply. As this transformation is very extensive, this part of the case study is described in a further study entitled “The Free Energy Market in Brazil and Comerc, a case study”. The information provided below was obtained from internal presentations of the company and interviews.

6.1.1 Background Information and Scope

The project described in this chapter outlines information about the construction of a *green* manufacturing plant considering a variety of aspects. To start from the beginning and to give a brief historical overview, Knorr-Bremse Brazil has its roots in the city of São Paulo, when in 1977 the company entered the market for rail brakes with the name IFK (Indústria Freios Knorr Ltda.) Between 1977 and 2012, the company has expanded its business in Brazil extensively by enlarging its product portfolio. In 1978, Knorr-Bremse started to enter the market of commercial vehicle brakes in Brazil. In 1983, a factory was acquired, which was then renovated and prepared for further growth. In 1986, Knorr-Bremse moved into this building to expand its business in Brazil. Between 1986 and 2012, a phase of consolidation and growth took place: Knorr-Bremse moved into the renovated manufacturing building (1986) and the company was divided into two divisions, rail and commercial vehicle systems (1995). This division is still present throughout the global group. In the mid-2000s, the company reached its capacity limit at the premises within the district. This was mainly caused by tightened regulations in the area, where Knorr-Bremse is located. No further development for industrial companies was allowed there, also caused by the fact that the area around the company developed more and more into a residential area. Another reason was the increasing volume of road traffic in São Paulo and that made it difficult to operate in a timely and efficient manner. In order to ensure continued growth, Knorr-Bremse took the step to look for a new land where a suitable manufacturing plant could be built. In 2007, the company acquired land 80 kilometers outside of São Paulo and there, the present plant was built in 2011 and 2012. From 2013 onwards, the company produces exclusively in Itupeva, where also the administration for South America is located. In order to contribute to the fact that environmental resources are limited and strongly strained by building factories, Knorr-Bremse Brazil is committed to a sustainable way of construction of the newly built manufacturing plant. For a better overview, key figures are summarized in table 6.1.

Table 6.1. Key figures of the plant.
- Land: approx. 150,000 m² - Buildings: approx. 30,700 m² - Utilities include: wastewater treatment and waste removal area as well as a chips and scrap damp - Power demand: approx. 1,500 KW - Power consumption about 6,000 GWh per year - For the earthwork for the new site 320,000 m³ of earth were removed and about the same volume refilled

Figure 6.1 shows an overview of the area including its buildings as well as its surroundings and facilities, such as the three rainwater reservoirs.

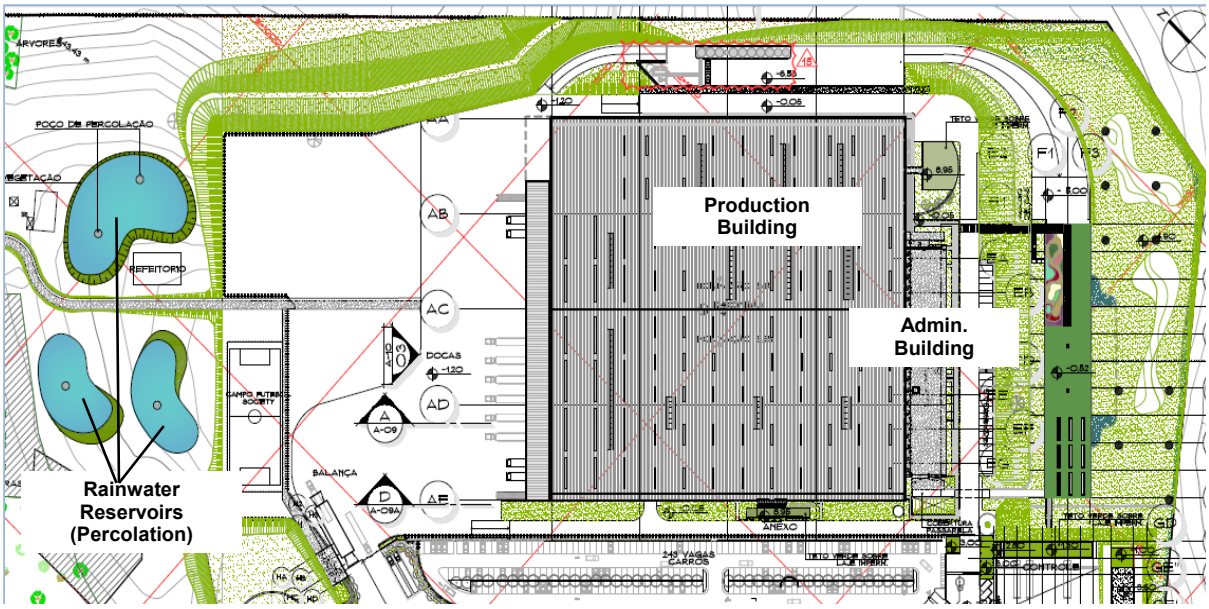

Figure 6.1. Overview of the plant premises.

The plant covers the front part of the area and consists of the production building as well as an administrative building. Detached from the main building is the social building, housing the canteen as well as recreation rooms for employees. Other facilities include the parking area, the material gate and loading area. The buildings cover approximately half of the land, an area of around 153,000 m². The other half includes rainwater reservoirs and a forest area, called the “rainforest”. This part is covered with typical plants and trees and was not touched during construction. Figure 6.2 shows the area before the construction was started on May 11th, 2011, including parts of the forest in the lower right corner. Figure 6.3 shows the converted area. It

includes the main building (production and administration) as well as the social building, which is covered with a natural green roof of grass. It also shows the access roads, parking lots and water reservoirs.

Figure 6.2. Land in May 2011, before start of construction.

Figure 6.3. 3D model of building (2012).

6.1.2 Realization and Overview of Ecological Approaches

Besides the state-of-the-art buildings, the company also pursued modern construction aspects, such as the ONP (office near production) approach with the advantage of a close-up

coordination between the factory and the administration. Other approaches include a strong focus on energy reduction, such as:

- A maximum usage of daylight in the production area, offices and social areas
- Natural ventilation of the production building
- Green roof on different buildings
- Efficient amount and positioning of skylights on the roof of the production building
- Usage of LED lamps
- Eco-friendly use of natural water reserves (see also case study Itaipu Binacional)

The variety of ecological approaches shows the company's strong focus and interest in that topic.

6.1.2.1 Green Roofs and Natural Water Reserves

The primary goal of the so-called green roofs is the reduction of temperature in the buildings. During the hot season, a temperature reduction of 3-5°C can be achieved and ideally makes an electric air condition dispensable. In this case, a green roof is installed at the social building, which hosts the cafeteria, locker- and washrooms, as well as on the main gate. Green roofs furthermore retain rainwater during storms, slowly release it to the rainwater drains and then to the three percolation lakes and 14 percolation wells. Even during heavy rain, the water is absorbed efficiently by the grass preventing the overload of the gutters. Figure 6.4 shows an overview of the green roofs at Knorr-Bremse in Itupeva. The green roof is built on the social rooms as well as on the main gate building.

Figure 6.4. The Knorr-Bremse plant in Itupeva, Brazil (2016).

Green roofs rainwater is not used for drinking water production. It is absorbed by the ground and contributes to the three percolation lakes clean water production. The green roofs have mainly three advantages:

- Natural water storage: storage of rainwater and subsequent delayed release into the sewer system and evaporation, thus relieving the drainage system.
- Thermal insulation: the evaporation capacity of the plant layer provides cooling in the rooms below mainly during the summer. Temperature reduction of up to 5 ºC. Air conditioning can be avoided.
- The lifetime of the roof can be extended by two to three times due to lower temperature differences and subsequently lower tensions in the roof structure.

The factory area furthermore has three rainwater percolation lakes with a volume of 2.500 m³ and 14 percolation wells with a total volume of approx. 560 m³. This increases the groundwater reserves, which enables the company to produce the required amount of clean water without obtaining water from external sources. The potable water is obtained from two own deep wells, which were built because there was no external water supply (municipal or water supply companies). The wells are located at the back of the premises, from which the clean water is supplied. It is used for the preparation of drinking water, which can be applied for different purposes. The water can be categorized into two types: sanitary wastewater from the toilets and washing is used again after treatment for the same purpose. The industrial wastewater is treated chemically and then cleaned from all solid residues. This solid waste is disposed by specialized companies. The treated water is then returned to the process and can be used again. Figure 6.6 illustrates the cycle of the used water.

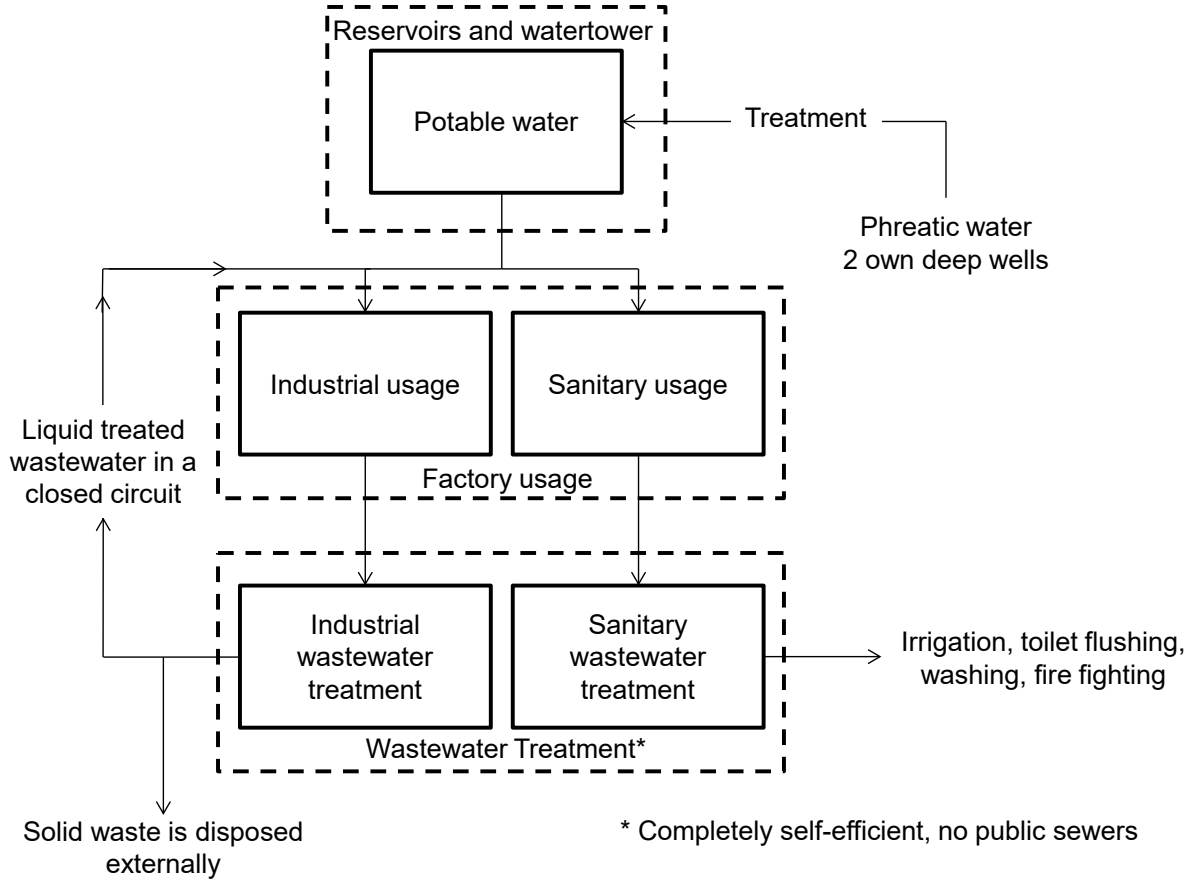

Figure 6.5. Model of water treatment at the Knorr-Bremse plant in Itupeva, Brazil.

The process shown in figure 6.5 ensures an optimal usage of the resource water by using it again. The main benefit of this system is that the entire water supply is self-sufficient and therefore, Knorr-Bremse is not dependent on public sewers. The water is taken from two deep wells on the company premises and treated to drinking water. It is then used for industrial and sanitary purposes. After use, the sanitary wastewater is drained and used for irrigation or toilet flushing. Water used for industrial usage is cleared from solid waste and treated for reuse. Figure 6.6 shows data from the system, such as the volume generated from wells and rainwater, which was 794 m³ in 2012. It also shows the level of reused water (Água de Reuso), drinking water and water stored for fire emergencies.

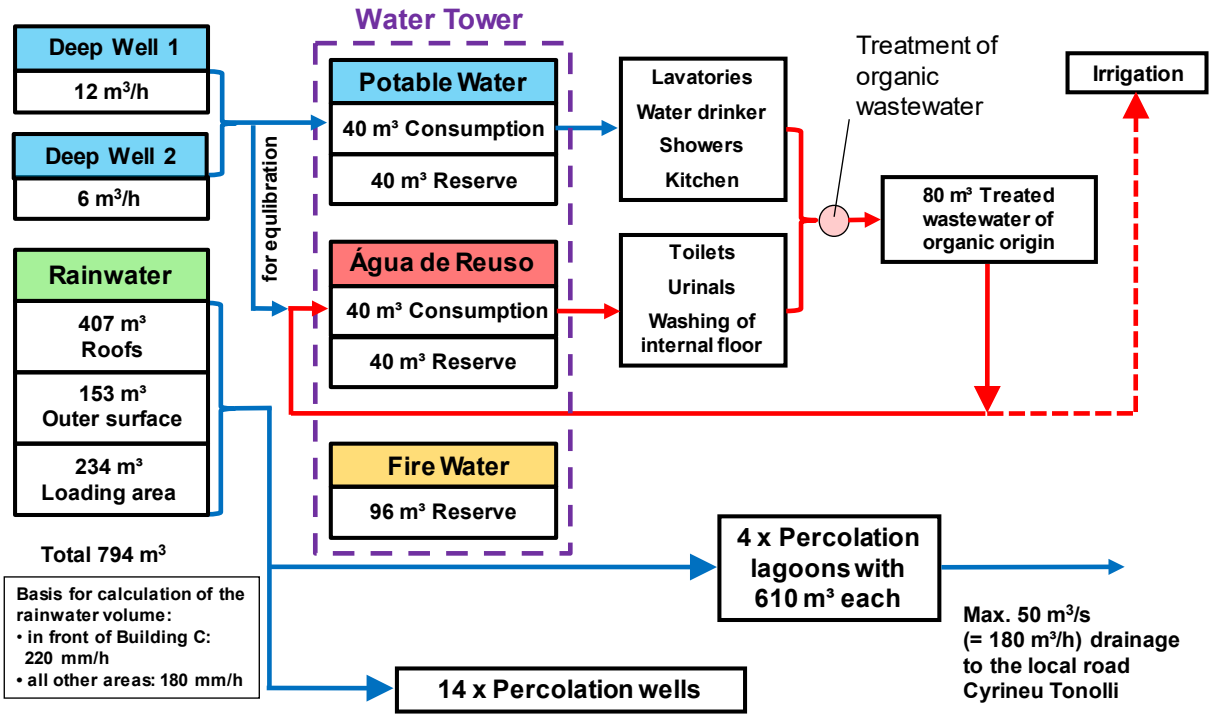

Figure 6.6. Hydrological balance of the Knorr-Bremse plant in Itupeva, Brazil (2012).

6.1.2.2 Natural Illumination and Usage of LED Lights

To achieve a maximum of utilization of natural light, a comprehensive concept for the positioning skylights throughout the production building was executed. The concept considers the local sun path along with other factors, such as latitude, longitude and altitude as well as the point of time of sunrise, sun peak and sunset. DIN EN 12464[7] was taken into consideration as a further standard, which defines the brightness of the different types of weather. A sunny summer day can be as bright as 100,000 lx (illuminance unit), whereas a dull winter day only provides 3,000 lx. The target norm within the building is 300 lx on a regular, clear day. The required illuminance for each building and respective area is shown in figure 6.7. For a better illustration figure 6.8 gives an overview of the position of skylights throughout the roofs of the buildings.

[7] DIN EN 12464: sunny summer day: 100,000 lx; cloudy summer day: 20,000 lx; summer day in the shadow: 10,000 lx; dull winter day: 3,000 lx

Factory

Building	Area		Illuminance (lux)
A	Machining		300
	Assembly		300 – 500
	Stock		200
	Offices	PRO-Ground Fl.	500
		PRO-1. Floor	
B	STC		200 – 300
	Test		300
	Offices	Ground Floor	500
		1. Stock	
C	Utilities		200

Vehicle Test Building

D	Vehicle Test	300
	Auditorium (1. Floor)	300

External	External Areas	15

Administration Building

Building	Area		Illuminance (lux)
E	Offices	Ground Floor	300 – 500
		1. Stock	
	Corridors	Ground Floor	150
		1. Stock	

Social Building

F	Kitchen	250
	Social Room	300
	Locker Rooms	150

Gate (Personnel)

G	Gate	250
	Busstop	200
	Ramp	150

Gate (Material)

H	Gate	250

Figure 6.7. Required illuminance levels at Knorr-Bremse plant in Itupeva, Brazil (2012).

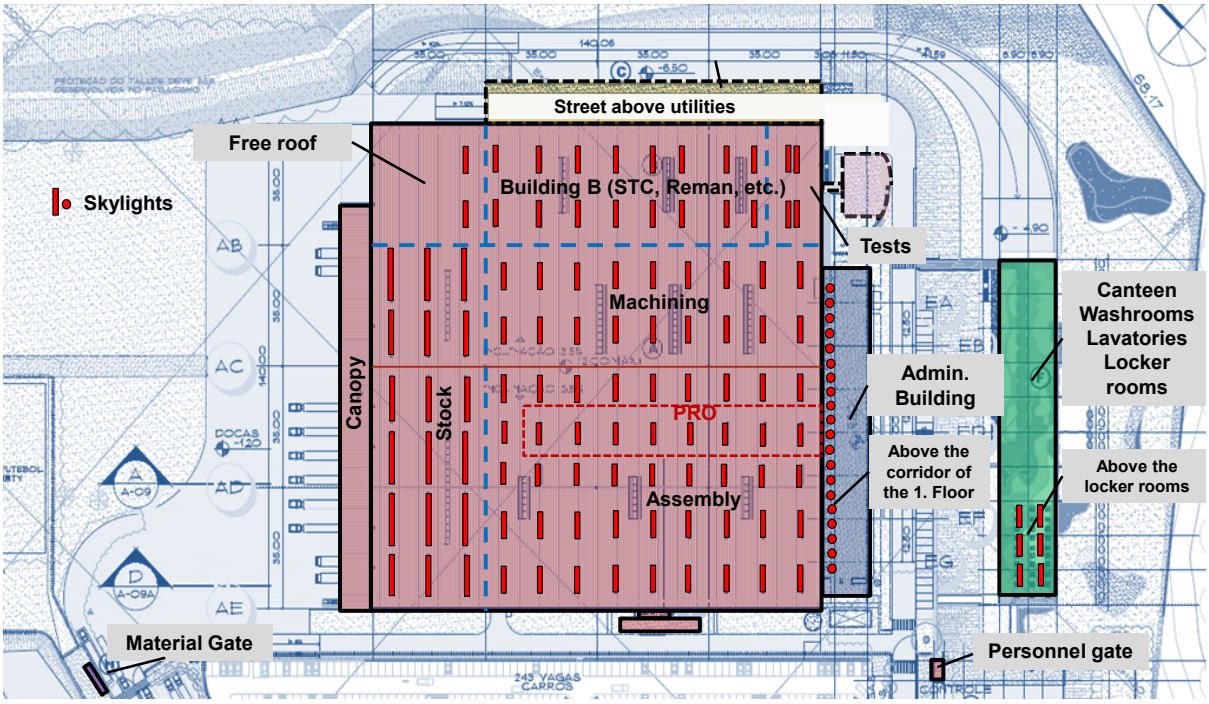

Figure 6.8. Plan of skylights in the factory building Knorr-Bremse in Itupeva, Brazil (2012).

The current set-up of skylights ensures a maximal utilization of daylight in the production areas as well as in the offices and in the social areas. In some areas of the building, no artificial light is needed during the day.

Therefore, the provision of skylights over the entire roof of the production building is a major contributor to a decreased demand of power supply. A close-up view of the building shown in figure 6.10 gives a good insight in the realization. The skylights have a 3 mm acrylic plate with thousands of prismatic lenses. This results in a uniform and highly efficient supply of natural light in the factory. In this way, the light appears diffuse and there is no shadow or too bright light. The percentage of skylights in the roof is 2.6 % of the entire roof area. If there were more skylights, the risk of getting too hot would increase. Figure 6.9 shows the skylights, which are installed on the roof of the production building of the Itupeva plant. For a better illustration, figures 6.10 and 6.11 give an insight in the structure of the design of the skylight. The surface of the skylight is convex, which also contributes to the optimal incidence of light.

Figure 6.9. Real-life picture of skylights on the roof of the production building of the Knorr-Bremse plant in Itupeva, Brazil (2016).

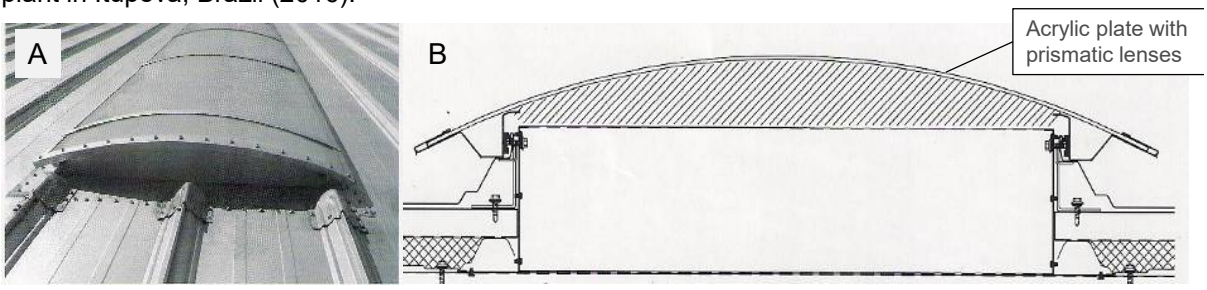

Figure 6.10. (A) Skylight (real-life picture); (B) skylight (drawing) (2014).

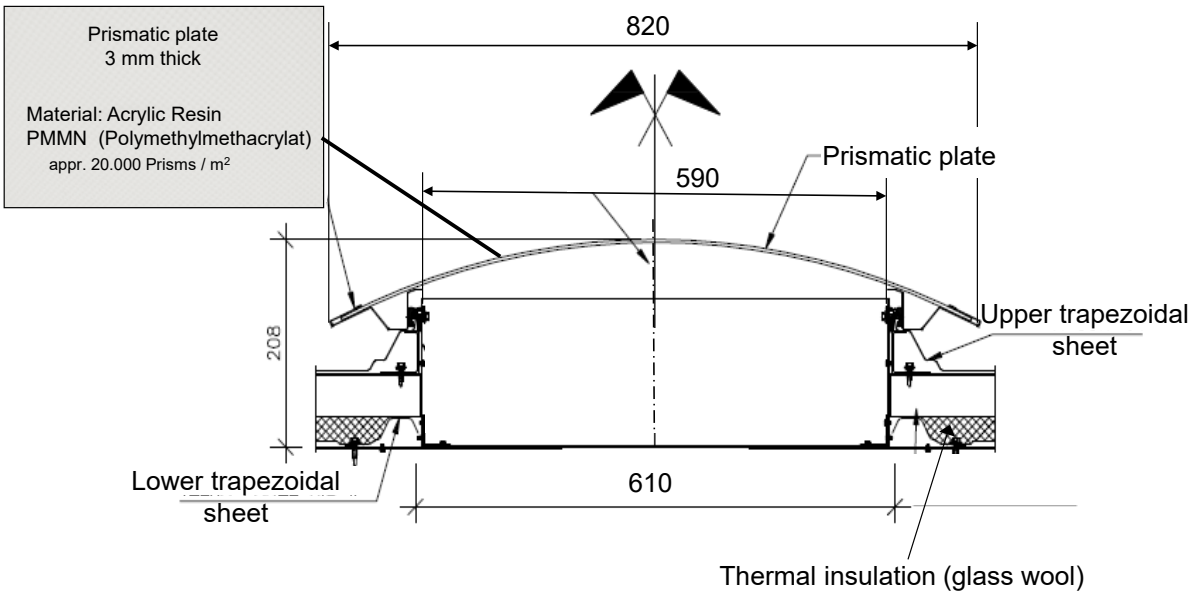

Figure 6.11. Section of the prismatic skylight of Medabil[8] (2012).

The installation of prismatic skylights throughout the roof of the building leads to the best possible use of natural sunlight and achieves several goals: it does not only reduce the consumption of electrical energy, but also contributes to pleasant surroundings, as the visual performance can be influenced by bright light and causes glaring (Petherbridge and Hopkinson, 1950). Moreover, it increases the efficiency of workers' performance during the day. This knowledge was already drawn in 1950 and it certainly indicates that visual efficiency also affects other aspects such as work productivity. With a building area of 30,700 m², the topic of energy savings plays a crucial role and supports a decreased amount of follow-up costs. A careful planning from the beginning ensured the optimal situation in terms of cost-efficiency considering the topic of environmental protection. Compared to windows, skylights are three to five times more effective at providing natural illumination. One aspect of using light as efficiently as possible was the decision to install glass walls between the offices on the first floor and the production site on the ground floor. Consequently, administration and manufacturing benefit from natural light and it supports visual communication.

[8] *The system in place is provided by Medabil, a business started in 1967, providing steel constructions, roof systems, natural illumination systems, ventilation systems and others.*

Benefits of skylight solutions (Knorr-Bremse):

- Sustainable carbon free natural lighting in all buildings
- Daylight is correlated with an improvement in human work performance
- Consumption of electricity is reduced and results in significant reduction of energy costs. Consequently, direct impact on sustainability (reduction of greenhouse gases, pollution of water and air)
- Uniform and fully diffused natural light in all buildings
- Long lifetime and low maintenance costs

In addition to the installation of skylights, all metal halide lamps, which are located throughout the building, are gradually replaced by LED lights. According to Dr. Gerich, the energy reduction results in savings of 50 % compared to the energy consumption of metal halide lamps. In addition to that, LED lamps last approximately five times longer than metal halide lamps.

6.1.2.3 Natural Ventilation (vs. Mechanical Ventilation)

The ventilation of a building is essential for several aspects: the employees need to be in pleasant surroundings in order to be able to fulfil their tasks. Furthermore, the machinery and other equipment must be located in rooms with suitable climatic conditions for working reliably and being protected from factors like heat. Consequently, the main purpose is an acceptable climate in the room, which is achieved by a ventilation system. This is important to ensure well-being for workers and employees in order to increase performance (Awbi, 2008: 6 ff.). Generally indicated, a developer of a building has a choice between a mechanical ventilation system and a natural ventilation system apart from the expensive air conditioning system. David Etheridge did some extensive research on that topic and provided the following model of choices (figure 6.12), which found application in the choice of Knorr-Bremse.

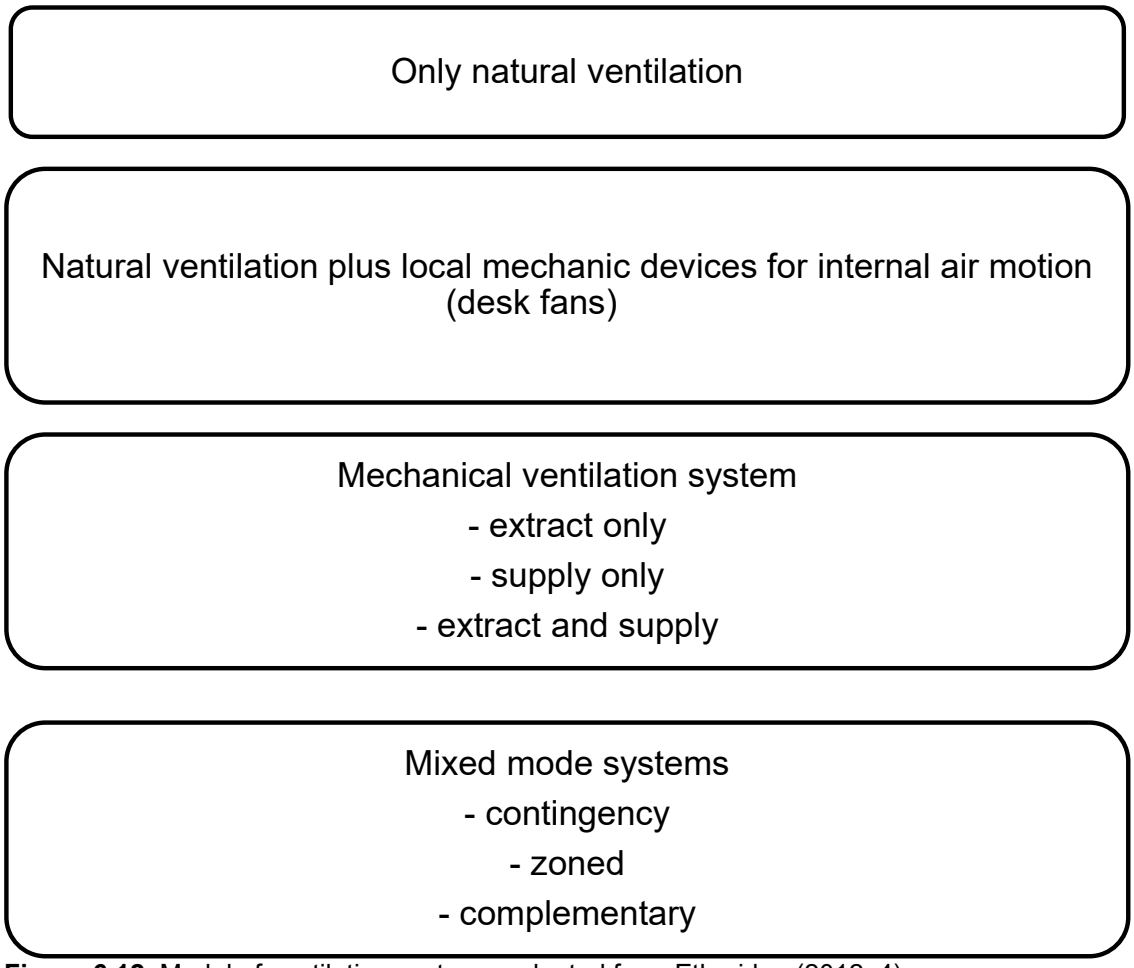

Figure 6.12. Model of ventilation systems, adapted from Etheridge (2012: 4).

Etheridge explained different types of combination of either natural or mechanical ventilation or a mixture of both types. He also pointed to the significant differences between the two systems: the flow rate of air, which is quite unpredictable in the case of a natural system (Etheridge, 2012: 6). It is not the scope of this project to go into detail in the operation modes of ventilation systems, but it is crucial to emphasize other factors that affect decision making. As a first conclusion, according to Etheridge, a mechanical ventilation system can be better organized to fulfil its potential benefits, also pointing out that the location of the building and the purpose of the installed ventilation system affect the system's functioning (Etheridge, 2012: 5). The difficulties with a natural ventilation system are mainly caused by two factors: weather (wind, temperature and condition of the building) as well as occupant behavior (Etheridge, 2012: 6). Etheridge proposed the decision model depicted in figure 6.13. Based on this model, following factors should be considered. In the first stage, it must be checked whether it is technically possible to install a natural ventilation system. For Knorr-Bremse a mechanical solution was not considered, as the plant of Knorr-Bremse Brazil was to be planned from scratch. Therefore, no old or outdated building had to be refurbished or taken into account, but the planning team had a rare chance to design the entire building in accordance with modern

standards. In the next stage, there was an agreement on the basic ventilation system. A major stage is the third, where the openings to the air were positioned (see figure 6.13).

In a fourth stage, the internal environment had to be calculated (e.g. machines, people, etc.). According to Knorr-Bremse, a mechanical system would work more efficient in terms of a guaranteed air circulation, it would though be more expensive to run.

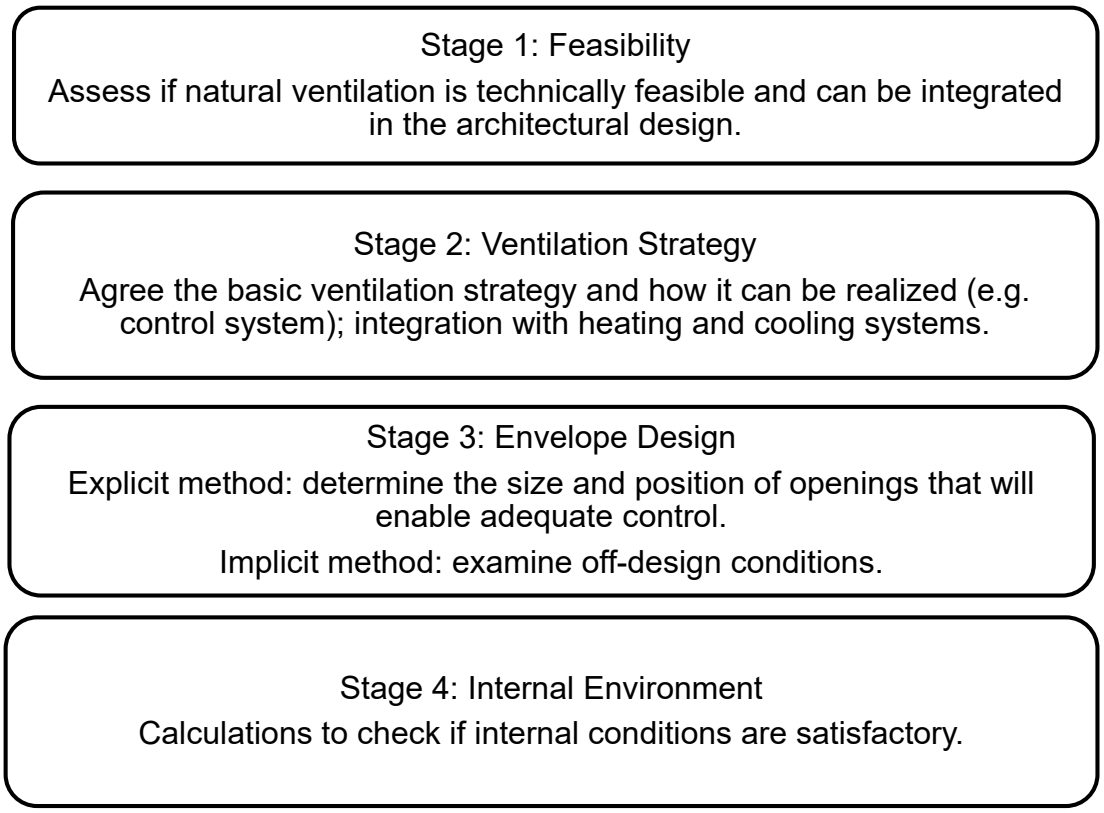

Figure 6.13. Model of implementation, adapted from Etheridge (2012: 4 f.).

Therefore, Knorr-Bremse Brazil has decided that the manufacturing site only uses the natural system. A mechanical system was not considered.

A very cost-intensive and energy-profligate factor is the ventilation of manufacturing buildings. In the Itupeva building, Knorr-Bremse uses the ventilation unit shown in figure 6.14. The system works with a chimney effect for the ventilation of the entire building. Given the fact that Brazil benefits from rather high temperatures throughout the year, the system can contribute to huge cost savings and the environment can be protected at the same time.

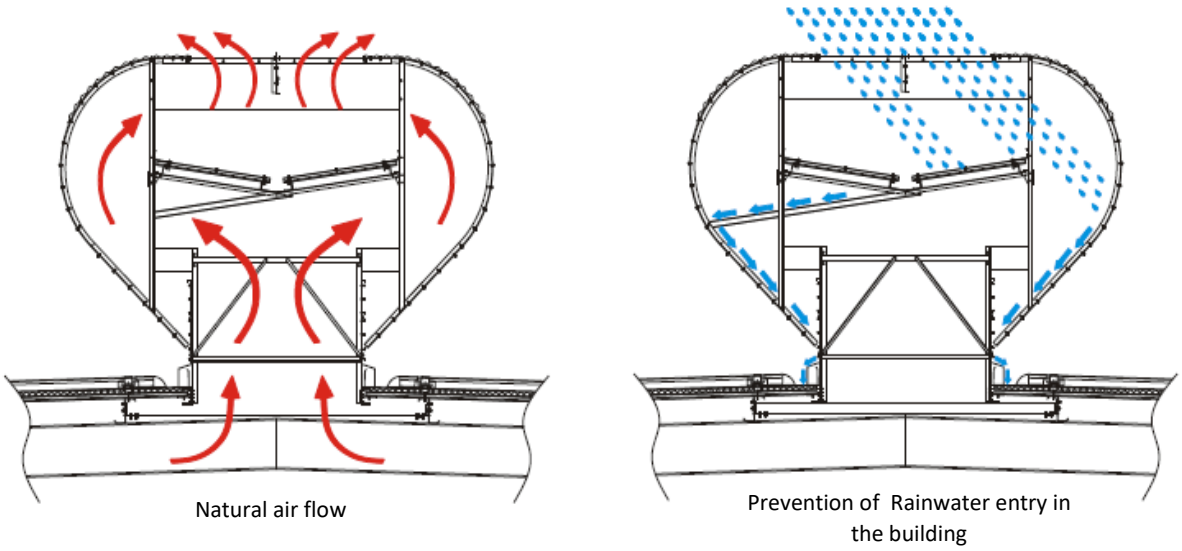

Figure 6.14. Natural ventilation system by Medabil (2011).

The target of the ventilation system is to ensure thermal comfort, which contributes to ideal working conditions in the manufacturing site as well as in the offices. The approach considers several factors according to Dr. Gerich:

1. Generation of heat and humidity by persons
2. Heat generation by machines and equipment
3. Heat generation by processes (work)
4. Heat generation by lamps and other electronic devices
5. Heat transfer through the walls
6. Heat transfer through the roof

Figure 6.15 gives detailed information on the heat balance of the building. The building is split in four units, whereas building A is the biggest and most energy-intensive part of the site, housing the manufacturing unit on the ground floor. The figure shows the respective share of produced heat within the building.

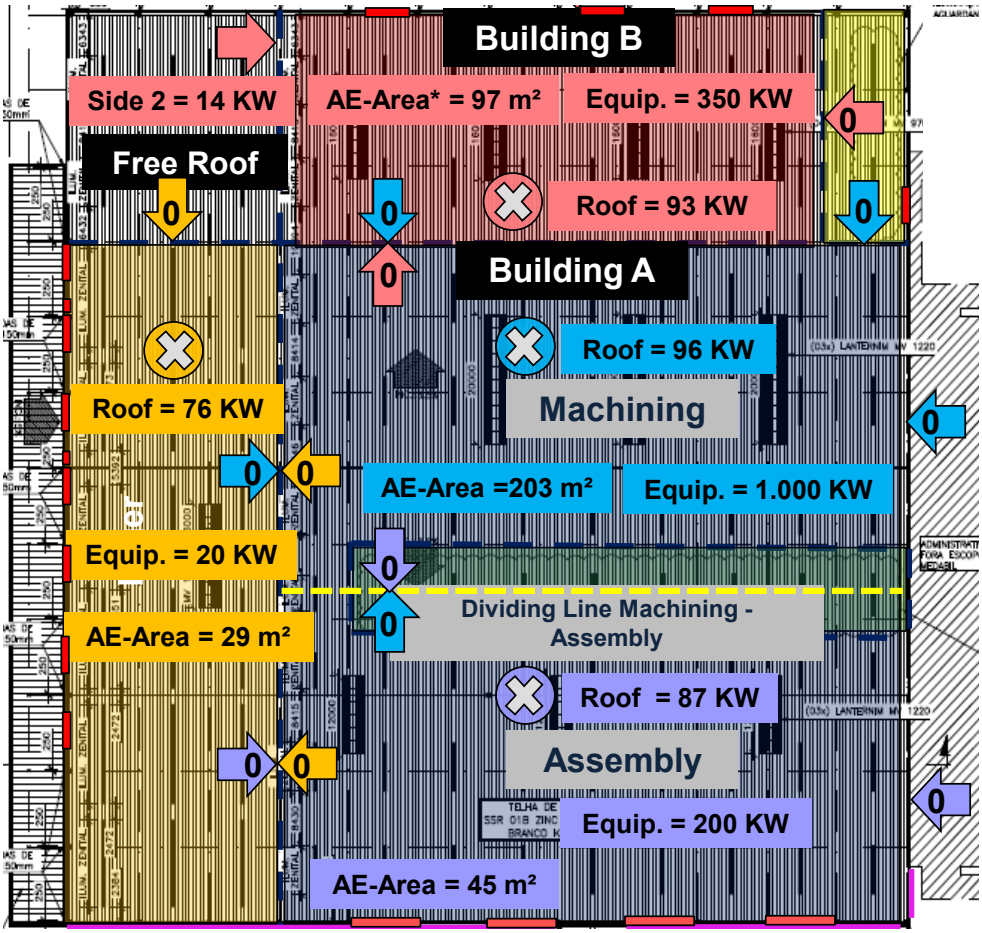

Figure 6.15. Split-up of factory building including overview of heat balance. AE-Area: necessary air inlet area for the air circulation. The arrows illustrate the circulation flow and air exchange within the buildings (2016).

6.1.3 The Transformation of Electrical Power Supply

The annual power demand of Knorr-Bremse Brazil in Itupeva is contracted with an amount of 1.5 MW, which makes the company a special customer with regard to the definition in the Brazilian market. The classification of customers is described in the next case study. In an attempt of modernization and engaging business throughout the country, a model was introduced under the government of President Cardoso (Melo et al., 2009). Since then the approach has been reformed several times to provide incentives and to establish a thriving power market. The transformation process from conventional power supply to a sustainable one is explained in detail in the next case study by describing the transformation of the Brazilian electricity market and introducing the energy agency Comerc Energia. The company is the intermediary between Knorr-Bremse and the electricity market.

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6.2 Comerc Energia and Brazilian Electricity Power Market

6.2.1 Introduction

The Brazilian electricity power market in its form differs from any model in Europe. The possibility to select the provider is also given in Germany, but the decision-making power of customers in the respective countries a different one. The Brazilian institutional customer is able to choose the source of energy generation. This case study aims to look at two aspects. In a first step, the development of the Brazilian electricity market and its major highlights are described, such as opening up the regulated market to investors. The current model is a combination of free and regulated actors, defined by Law 10,848[9]. Further details are given in this chapter. In another attempt, this case study explains Comerc Energia, a free market player. Access to this energy agency was given by Knorr-Bremse Brazil, as the company has been supported by Comerc Energia for several years. Therefore, this chapter gives an insight into the organizational structure and further information concerning the role Comerc Energia has on the market. Information was provided by Comerc Energia, unless otherwise stated.

6.2.2 The Brazilian Electricity Market

The electricity market is divided into two sections: the captive market (RCE: Regulated Contracting Environment) and the free market (FCE: Free Contracting Environment). The latter consists of agencies that independently acquire the energy demand for their customers on the energy market. The major advantage for institutional end customers is the free choice of a model of energy supply, which fits best. It enables the customer to optimize costs based on their own energy strategy. The principle of the free market was introduced in the 1990s and aimed to enhance competition and development in the energy sector. This demand was probably caused by the fact that Brazil expierenced a strong economic development and faced new opportunities and challenges. The monopolistic model has been replaced by a new system of free pricing, competition and separation of production, transmission, distribution and marketing (Melo et al., 2009).

[9] Law No 10,848/2004: consolidation of the restructuring of the energy sector, establishment of two energy markets (Schmidt et al., 2018)

6.2.3 Development of the Electricity Market

In the 1990s, Brazil's electricity market experienced a transformation with the aim of reforming the outdated structure by drawing investors' attention to the market and hence increasing the competition. In general, the state-run system was rarely profitable and has become even more unprofitable business due to the introduction of the private sector. The reorganization of the system should also have contributed to the decision to refrain from maintaining exclusively a public system. With this reform, the entire market has changed: the consumers have now the possibility to select the supplier and the source from which the individual electricity demand is generated. The private power supplier is in contrast to the state's energy generator.

The reform of the electricity sector can be divided into three stages. The model described below is slightly different from the model that ex-President Cardoso intended. In a first stage, the transformation of the state-run system (generation and distribution) started in order to promote the free market. Therefore, the system was presented to potential investors to make it an attractive investment target. In a second phase, the current models were introduced, which mainly described the two trading environments RCE and FCE. The content of these models can be easily concluded from the terms. Whereas in the FCE, the relation of all participants is mainly characterized by a free negotiation of all aspects of the contract, the distribution within the RCE is defined and tied to a five-year auction system. A challenge in creating this model was to establish enough independent entities to initiate a competition what is common for a free market environment (Melo et al., 2009). By dividing the sector into its main components (generation, distribution and transmission), a step was taken to promote the free market under the motto "competition where possible, regulation where necessary" (da Nóbrega, 2006).

The following section gives a detailed description of the Brazilian electricity sector and the models including its development from 1995 to 2004. The model is still in place today, which was introduced in 2004. The overview was provided by the Chamber of Electric Energy Commercialization (CCEE) and the Government of Brazil (Ministry of Mines and Energy – MME). Table 6.2 provides an overview of all models.

Table 6.2. Overview of the Brazilian electricity models, adapted from Melo et al. (2009).

Model (until 1995)	Free Market Model (1995 – 2003)	Model (since 2004)
Vertical companies, state-run	Companies driven by activity: generation, transmission, distribution and marketing	Companies driven by activity: generation, transmission, distribution and marketing
State-run	Market opened to private companies	Both, state-run and private companies established
Monopolistic structure	Competition (generation and commercialization)	Competition (generation and commercialization)
Regulated prices for electricity	Free negotiation of prices (generation and marketing)	FCE: free negotiation of prices (generation and marketing) RCE: auctions
Regulated market	Free market	Regulated and free markets

Key elements of the reform included aspects of privatization of the monopolistic system, especially freedom of pricing and marketing. This ambitious undertaking was unique and contributed to several effects, such as a sharp increase in investment in the energy market by independent sources. The main goal was to achieve fair prices for consumers and to stimulate the power generation markets (Melo et al., 2009).

Milestones in the development of the Brazilian electricity industry are shown in figure 6.16 including the most important laws, which were developed between 1995 and 2004. Since 2004, the institutional model of regulated and free market is in place.

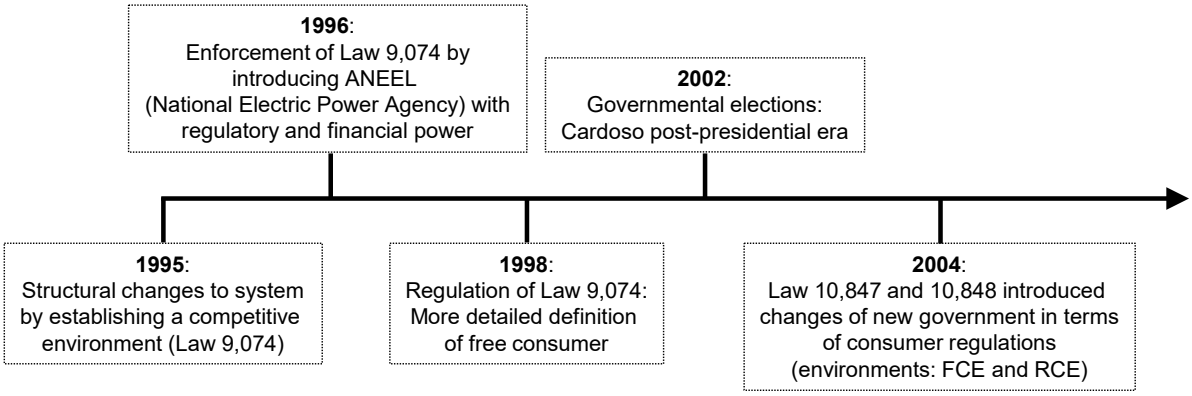

Figure 6.16. Development of the electricity market in Brazil (Melo et al., 2009).

After the first attempts to restructure the electricity sector in Brazil, several federal laws were enacted in order to open up the vertical market. In 1995, Law 9,074 was passed, which regulates structural changes to the system. This law sets rules for the concession management of services in the public sector. In the following year, ANEEL (National Electric Energy Agency) as an independent body was established with Law 9,427 and is responsible for the regulation and supervision of activities regarding the energy sector (Schmidt et al., 2018). In 1998, the law was enforced by deepening the definition of a free consumer, enacting law 9,648 and strengthened by ANEEL's resolution 264/1998. Both regulations allowed a certain group of consumers (based on the annual consumption) to purchase electricity directly from suppliers (Melo et al., 2009). After the presidential elections in 2002, Luiz Inácio Lula da Silva succeeded Fernando Henrique Cardoso and subsequently, his model was partially revised in 2004. By passing Law 10,847, the EPE (Energy Research Company) was established with the task of conducting research and studies in terms of energy. Law 10,848 consolidated the changes and an energy market with two parts (public and private) was established (Schmidt et al., 2018).

6.2.4 Targets of the New Model

The reform had great impact on the Brazilian energy market and following major goals were defined by the Ministry of Mines and Energy (MME): boosting investment, increase production, promote competition and provide consumers with better prices. As these keywords already show a clear direction, they are additionally explained more in detail.

Target 1: Increase investment, competition and price optimization for end consumers

Each year, the Government issues an investment plan, which has to meet the energy expansion plan (PDE: Brazilian Energy Expansion Plan) with a 10-year forecast. It shows the planned investments in electricity generation. The MME provides detailed information on the projects to be financed and it is required by law that all concessions for large energy services must be granted through a public tender procedure. This ensures the main aim of involved law to open up the energy market (Schmidt et al., 2018). For example, the stipulated capacity for wind power has increased significantly since it was introduced into the auction system, whereas consumers prices have decreased (Barroso, 2017: 12).

Target 2: Increase production

Energy production in Brazil has increased significantly, i.e. from 100 MTOE (millions of tons of oil equivalent) to 275 MTOE between 1995 and 2016 (IEA, 2018). The share of oil but also renewable sources increased, especially biofuels and hydropower. The reform discussed in this chapter focusses mainly on electricity production, as Brazil has the third largest electricity sector in the Americas, according to the IEA (International Energy Agency). Hydropower has the largest generation capacity, followed by fossil fuels, biomass, nuclear and renewable energy. More than 70 % of Brazil's electricity production comes from hydroelectric plants (Johnson, 2017). This fact makes the country very dependent on a constant water supply, which could lead to problems in the future. Therefore, the focus on diverse energy sources should be promoted. The increase of electricity production in Brazil was as follows (Enerdata, 2018): in the global rank, Brazil's production accounted for 585 TWh in 2017, the highest producer was China with 6,529 TWh in the same year. In 2011, China overtook the United States with a sharp increase in power production. Brazil ranked number 8th worldwide in 2017. The development between 1990 and 2016 showed that Brazil could increase its global rank from eleven in 1990 to eight in 2016. Figure 6.17 gives an insight into the shares of respective energy sources in Brazil, determined in 2015. The largest amount of energy is generated from hydropower (67 %), followed by biomass (9 %) and natural gas (9 %). The energy supply in Brazil can be classified in renewable (81.7 %), fossil (15.7 %) and nuclear (2.6 %) energy.

Consequently, the Brazilian energy market receives most of the energy from renewable sources.

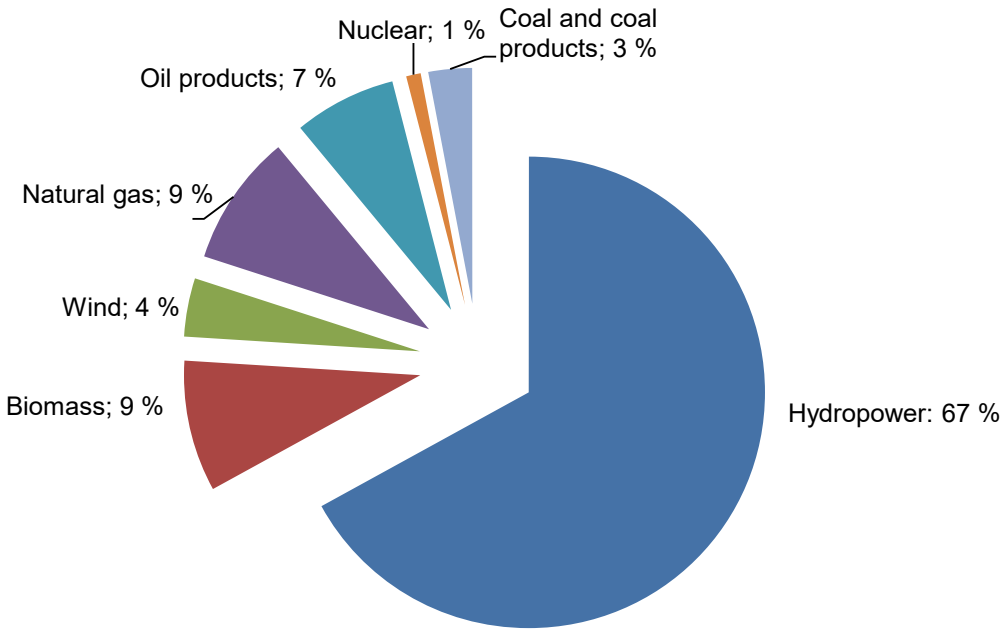

Figure 6.17. Share of different energy sources in Brazil; Data determined in 2015 and presented by Luis Barroso, CEO of Energy Research Company (2017).

6.2.5 Regulatory Framework of Institutions

The institutional framework of Brazil's energy sector is diverse and considers the work of eight organizations. In table 6.3 the institutions are listed and their contribution is explained.

Table 6.3. Institutions and the respective contribution to the energy sector (SPE/MME, 2015).

Institution	Contribution
CNPE National Council on Energy Policy (Conselho Nacional de Politica Energética)	Advisory board of the President. Formulation of policies and guidelines in terms of power and securing of supply of raw materials.
MME Ministry of Mines and Energy (Ministério de Minas e Energia)	Implementation of energy-related policies according to guidelines issues by CNPE, including inventory management and auctions.
ANEEL National Electricity Regulatory Agency (Agência Nacional de Energia Elétrica)	Inspection and regulation of production, transmission, distribution and marketing of electricity to ensure quality. Link between end consumers and industry.
CMSE Power Sector Monitoring Committee (Comitê de Monitoramento do Setor Elétrico)	Responsible for assuring power supply continuity in the country.
ONS National Power System Operator (Operador Nacional do Sistema Elétrico)	Non-profit private entity composed by several agents of the electricity sector. Coordination and control of facilities involved in the Brazilian Interconnected Power System.
CCEE Electricity Commercialization Chamber (Câmara de Comercialização de Energia Elétrica)	Non-profit private entity composed by several agents of the electricity sector. Performance of the marketing as well as involved transactions of electricity with the Brazilian Interconnected Power System.
EPE Energy Research Company (Empresa de Pesquisa Energética)	Research institute for the MME. Supply of all studies and researches for the MME.
Eletrobras	Biggest electric power company in Brasil. Partly state-owned, partly private.

6.2.6 Comerc Energia: Power supply (electricity) from Renewable Resources

This section shows more detailed information on the Brazilian electricity system and describes the realization for companies. Comerc Energia, the pioneer in the Free Energy Market, has

different business models that are explained in the following. The topic is complemented by an interview with a team of specialists from Comerc Energia. The information in this section is provided by Comerc Energia (interview), unless otherwise stated.

Brazil is among the leading nations in the renewable energy sector. As mentioned above and shown in figure 6.17, hydropower has the largest share of energy supply (67 %). The dependence on hydropower can also have disadvantages. In years with low rainfall, this strong focus on energy from water has proven to be detrimental. In general, hydropower has always played the major role for the international energy market. In 2012, hydropower accounted for nearly 80 % of the total renewable energy. Until 2040, the world energy outlook of the Energy Information Administration (EIA) projects a share of hydropower of only 52.4 %. This trend is caused one major factor: an increasing influence of renewable energies along with a strong development of other sources, such as wind, solar, and geothermal energy (EIA, 2016: 84 ff.). The philosophy of *"running green"* should also be transferred to the new manufacturing site in Itupeva. The high electricity demand (84 % of the entire power supply of the plant) shows a great potential for saving costs. In addition to the fact that energy is generated at three quarters of the national supply from renewable sources, Brazil offers a proactive approach to encourage consumers to purchase green energy. For special consumers with a high demand, such as a manufacturer, there is the choice of consuming from the captive market or from the free energy market. The differences are depicted in table 6.4.

Table 6.4. Overview of Captive and Free Energy Generation Market.

Captive Energy Generation Market	Free Energy Generation Market
• No price-negotiation • Sole supply from hydro plants • Regular taxation and higher prices	• Full negotiation of prices and deadlines • A range of suppliers: wind, solar, smaller hydro plants • Alternative taxation and lower prices

The approach of the free energy market is similar to any other free market; it is price-driven. The consumer is involved in every step from the start of generation to the transmission and distribution of the power. As a crucial influencer, the consumer can negotiate prices and is no longer bound to the prices specified by the government of the electricity supplier. The two possibilities for the consumer are depicted in scheme 6.1. There is either a captive consumer or a free consumer.

Captive Consumer	Free Consumer
Generation of power ↓ Power auction ↓ Power is sold to distributor ↓ Distributors sell to end consumers at the given rates (no price-negotiation)	Generation of power ↓ The power is offered to free marketers (negotiation) ↓ Marketers sell to end customer (negotiation)

Scheme 6.1. The economic way of power for a captive and free consumer, respectively.

The advantages are obvious, the end consumer can benefit twice: he can choose the right marketer, who has negotiated a favorable starting price, and he can enter into final negotiations with the marketer. This gives the consumer the freedom to choose between several options and to promote sustainability by choosing power from renewable sources. This also increases the predictability of financial decisions. Nevertheless, the prospect has to meet some requirements to become a free consumer, which is dependent on the planned power supply. Figure 6.18 shows three classifications of the consumer regarding power consumption.

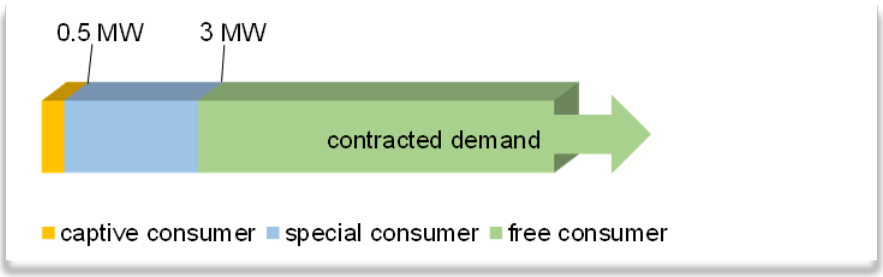

Figure 6.18. Classification model of a customer in the energy sector, adapted from Comerc Energia.

There are three possibilities, which are explained more in detail in the following.

- Possibility 1: a customer has an annual demand of less than 0.5 MW (Megawatt). This customer is bound to the captive market. There is no choice of resources and no negotiations.
- Possibility 2: a customer has an annual demand between 0.5 MW and 3 MW. In this case, the customer can switch to the free market. If there is the decision for a transformation, an acquisition of renewable energy is necessary.

- Possibility 3: a customer exceeds an annual demand of 3 MW and is declared a free customer, who can decide the energy supplier.

In general, a customer has the free choice when the annual consumption exceeds 3 MW and consequently, the respective energy source and provider have to be selected. If the annual consumption does not exceed 0.5 MW, the customer must purchase the power supply from the captive market. Between a demand of 0.5 and 3 MW, the customer can choose under restrictions. In 2016, the consumers purchasing from the free market account for a quarter of all electricity customers throughout Brazil. The main source of renewable energy is hydropower with a share of 67 % (cf. figure 6.19). Solar energy is not in widespread use in the country, but it is expected to increase significantly until 2025.

Knorr-Bremse Brazil has a power demand of 1.5 MW and is therefore a special customer (cf. figure 6.18). Special customers are allowed to purchase energy from renewable energy sources. According to Knorr-Bremse, the savings compared to the purchase of energy from the captive market accounted for 30 % between December 2016 and July 2018. Consequently, the savings amounted to EUR 338,674, equivalent to a monthly saving of EUR 16,934.

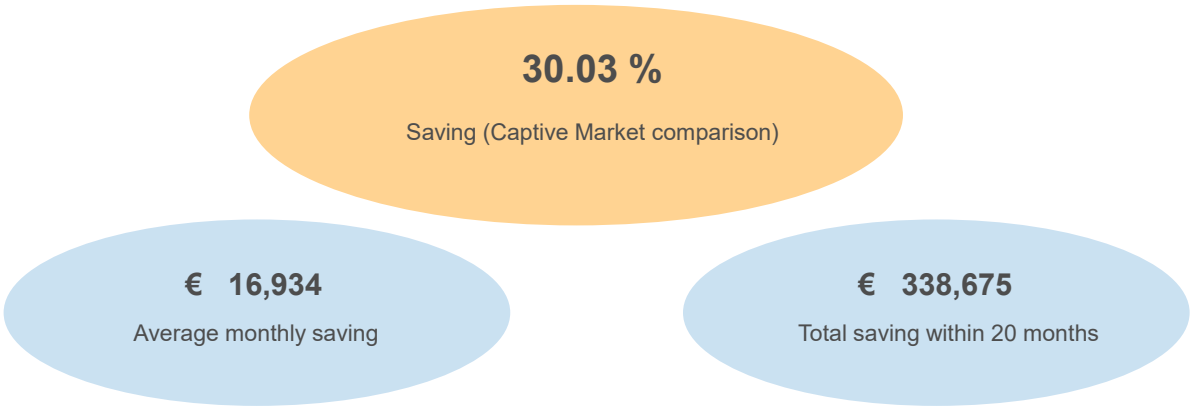

Figure 6.19. Cost savings Knorr-Bremse Itupeva, Brazil.

6.2.7 Interview with Comerc Energia

The selected service marketer by Knorr-Bremse is Comerc, a energy marketer located in São Paolo. The company employs around 200 people and has more than 700 Brazilian and multinational clients. Comerc has alliances with companies in other parts of the world and has more than 100 energy generation units under its management (Comerc, 2017). In the following interview with Georges Jereissati from Comerc in November 2017, some more information could be obtained.

1. In Brazil, the power market is divided into the captive and the free market. Could you briefly give some information about this model?

The Free Market was created in 1995 to promote competitiveness in the energy sector. In this market, the consumer can negotiate energy contracts directly with traders and generators (providers), reducing costs when compared to the captive market.

2. What was the main cause for the free market to emerge?

The need to increase competitiveness in the energy sector in Brazil.

3. Is this a unique global model, which is only in place in Brazil or are you aware of similar markets elsewhere in the world?

The Free Energy Market model is adopted in several countries. For instance, the European Union market is 100 % free, whereas the share is 30 % in Brazil. This model is also present in the United States, Australia and in some Asian countries.

4. Is the service provided by Comerc only available for companies or can this model also be used by private households?

Only companies. According to the Brazilian legislation, you can only become part of this market if you have a contracted demand of at least 500 kW. That equates to approximately R$ 80,000 (US$ 20,000) in energy expenses.

5. On your website it is stated, that the customer is able to choose their own strategy in terms of energy supply. Are there pre-defined models in place or are there individualized strategies?

The strategy is customized for each client.

6. What are the decision criteria for a strategy? What is your experience?

A strategy is based on several factors. Some of the most important are the customer's risk profile and the consumption rate.

7. When is a customer free?

A consumer can be free if the company has a contracted demand of at least 500 kW. That equates to approximately R$ 80,000 (US$ 20,000) in energy expenses.

8. When is a customer captive?

If the contracted demand is less than 500 kW, the participation in the regulated market is mandatory.

9. Comerc is not the only company providing these services. How big is the market in Brazil? Is Comerc the market leader?

The Free Market represents 30 % of national consumption. Currently, Comerc is the market leader in terms of number of clients with a market share of 15 %. There are nearly 100 companies providing the same service.

10. When was Comerc founded?

The name Comerc is registered since 1987, but it was a company with a different focus. At that time, we traded commodities such as coffee and gold. In 2001, Comerc entered the energy market as Comerc Energia.

11. Who are the founders? Are they still involved?

Comerc was founded by Cristopher Vlavianos, who is also the company's CEO.

12. Was Comerc established from scratch or were there any earlier developments (another company, another business)?

The first company of the Comerc group was the trading company. The business started during electric power rationing in 2001. We started to trade energy contracts from companies that had a surplus of power to companies with shortage. After that, we developed our energy management and other business units.

14. How many customers do you currently serve?

We currently serve 800 clients.

15. How many employees do you engage and what are their backgrounds?

230 employees with various backgrounds. The first employees started their careers in banks. We have a very young team and most of them come directly from university (via our internship programs) or from other industries. Majors vary among business, economics and engineering.

16. A classical day at Comerc? How does it look like? What is your daily business?

We have an open-office environment, so everyone is accessible to everyone. Each area is strategically placed to facilitate the flow of information and processes.

17. What were the major hurdles that you had to overcome when starting the business?

The energy sector was still unknown for me; also the free market was still in the very beginning. The challenge was to understand the market's regulation and present the solution to our clients and prospects.

18. What were the major fears that you had, when establishing Comerc?

The energy sector was new to me; I had no previous experience in the sector. In addition, the free market was just starting to develop, there were insecurities from potential clients to stop buying from traditional distributors and start negotiating with other suppliers.

19. Was the main intention to enter this market solely based on the reform introduced by Cardoso? How long was the preparation time and who supported your business? Were there public funds available?

The free market did not start to develop immediately due to its attractiveness (the possibility to negotiate energy contracts), but due to the need for electricity caused by power rationing in 2001. We sold energy contracts from companies with surplus to companies with shortage. With the end of the rationing, the free market started to develop and attracted more consumers. There was a one-year preparation for structuring the company and all the capital was owned by the founders.

The interview confirms that the newly introduced model of free market participation has not been without hurdles. There establishment of the company was associated with a certain risk, as the model did not succeed immediately. When entering the market as Comerc Energia in 2001, several risks were accepted, such as the lack of expertise in the sector. However, the model has proven successful and today, Comerc Energia employs more than 200 people as has around 800 customers.

6.2.8 Sources and Pricing of Energy in Brazil

As already mentioned, the “energy mix” in Brazil is diverse and more than 80 % of the energy are from renewable sources. To focus on these sources, it is important to take a closer look at the capacity per region. It is noteworthy that the Southeast and Northeast of Brazil have 88 % of total storage capacity, mainly hydropower plants and thermal power plants, followed by wind power. Biomass, nuclear and photovoltaic sources do not play such an important role in terms of capacity.

The pricing of energy in the free market differs significantly from the system in the captive market. Whereas prices in the captive market are set, the captive market offers the distributors a margin between the buying and the selling price. In principle, there are two systems: the short-term and the long-term model. Based on the respective model the influences on the pricing vary as shown in table 6.5.

Table 6.5. Influencing factors on the pricing grouped into two models.

Model	
Short-term	**Long-term**
Water Inflow	Expansion cost
Reservoirs	Energy cost in the regulated market
Supply	Consumption
Consumption	Supply
Energy exchange	Short-term pricing

Hydropower contributes with 67 % to the total energy production in Brazil. The largest power generator using this type of natural power is the Itaipu dam in Western Paranà. In the following section, this electricity producer and its impact on the energy market are described more in detail.

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6.3 Itaipu Binacional

Itaipu ("the rock that sings")[10]

In this chapter, "the world's largest generator of renewable clean energy" (Itaipu Binaconial, 2018a) is described. The information was gathered during a visit of the *Itaipu Binacional* dam in May 2017 and was conducted by field research including the exhibition of the Eco-museum (Eco-museum of Itaipu, 2017) and personal conversations with the head of the Eco-museum, Mr. Irio Valdemir Lupschinsky, unless otherwise expressed. This case study describes the historical development of the dam as well as its mode of operation and its impacts.

The project is dedicated to be a generator of renewable and clean energy, enhancing state-of-the-art operational performance and ensuring sustainability in a global and local context (Itaipu Binaconial, 2018c). It sees itself as contributor to the Sustainable Developments Goals established by the United Nations (Itaipu Binaconial, 2018a).

6.3.1 Area

The Brazilian part of Itaipu Binacional is located in Western Paraná, which is in the southern part of Brazil. It is located on the Paraná River along the border of Brazil and Paraguay in close proximity to the Bridge of Friendship. This bridge has become a landmark of high symbolism, overcoming a long-lasting territorial dispute between Brazil and Paraguay over the border region. The area extends from Foz do Iguaçu in Brazil and Ciudad del Este in Paraguay, in the North to Salto del Guairá in Paraguay and Guairá (Brazil) in the South as depicted in figure 6.20.

[10] Tupi language

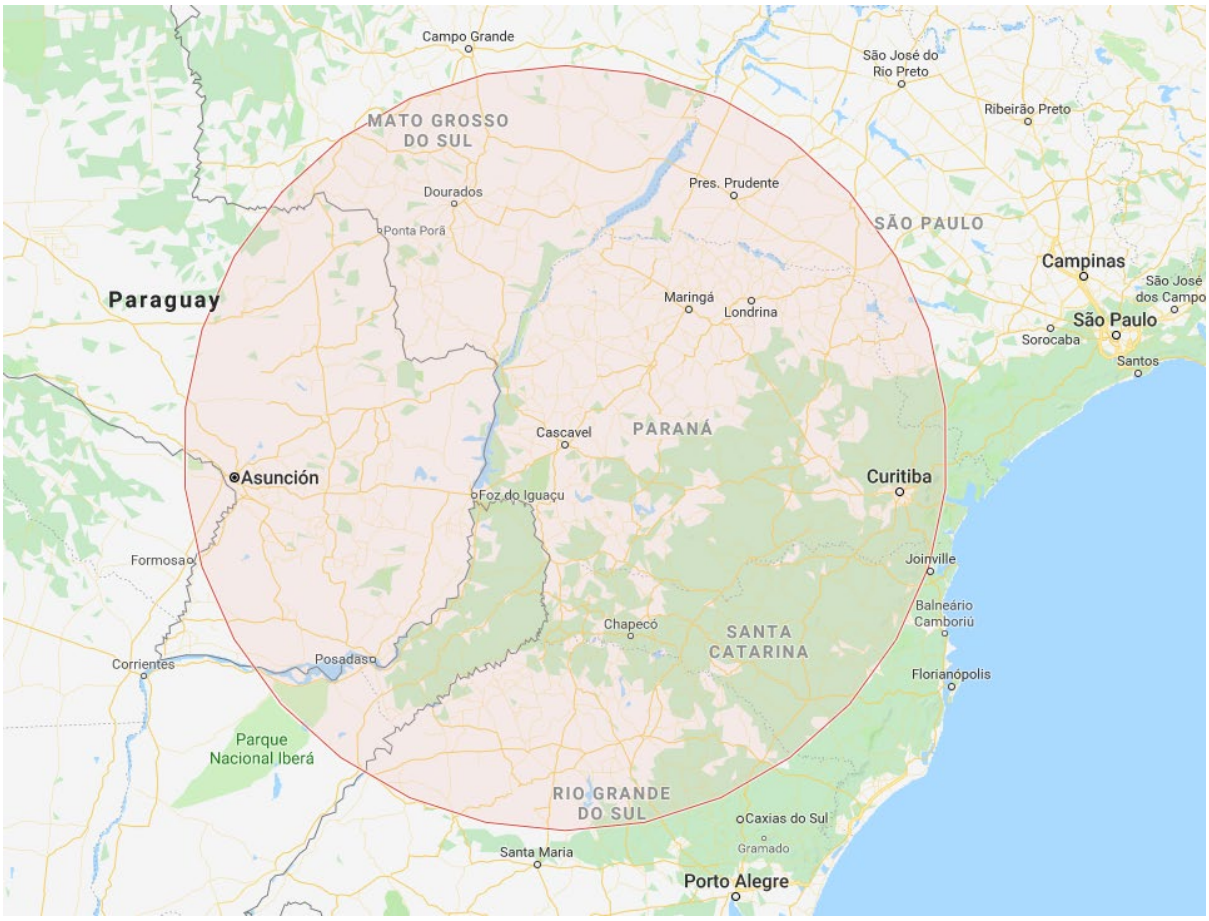

Figure 6.20. Area of Western Paraná (Google Maps, 2018).

The region was occupied by human groups (general hunters and gatherers) in 6,000 B.C. Connected to the Itararé tradition[11], the settling of ceramic-making as well as the creation of food-growing groups took place in around 1,000 B.C. By 300 A.D., the Tupi-guarani tradition appeared in that region. In later history, the treaty of Tordesillas and the settling of the Spanish and Portuguese shaped the region. In 1608, the Province del Guairá was created and significantly impacted by Jesuit Missions that lasted from 1610 to 1631. In the 18th century, the entire region was shaped by the treaty of Madrid (1750) as well as the treaty of San Ildefonso (1777), in which the Spanish and the Portuguese empires regulated the structural power in the region. In the 19th century, Western Paraná emancipated from Paranà (1853) and the Iguaçu military colony was established (1889). Western Paraná definitely settled via private colonization companies between 1920 and 1970. Other important events for the area include the signature of the Iguaçu minutes in 1966, which originated and regulated the Itaipu Binacional (Itaipu Binational, 2017) dam amongst other actions, and the 1973 signed Itaipu treaty, which defines that Paraguay would sell excess power exclusively to Brazil. The treaty

[11] Itararé is a South Brazilian ceramic tradition. Sites consist mainly of large villages with around 40 houses or less. Elements of the houses include hearths and are circularly shaped. Groups were hunters of deer, peccary and armadillo, amongst others. Itararè groups also gathered and fished. Tools used include scrapers, choppers as well as ground tools. Ceramic products were produced in four colors and objects were only little decorated. (Giesso, 2018: 111)

was of particular importance by the outbreak of the world crisis, provoked by increasing oil prices that resulted in greater importance of renewable energy sources. The project should also support both countries to ensure vigorous development. In general, the power plant doubled Brazil's ability to generate power. The construction of the dam began one year later in 1974. Before the flooding, the area was highly diverse and covered by forests and plantations as depicted in figure 6.21.

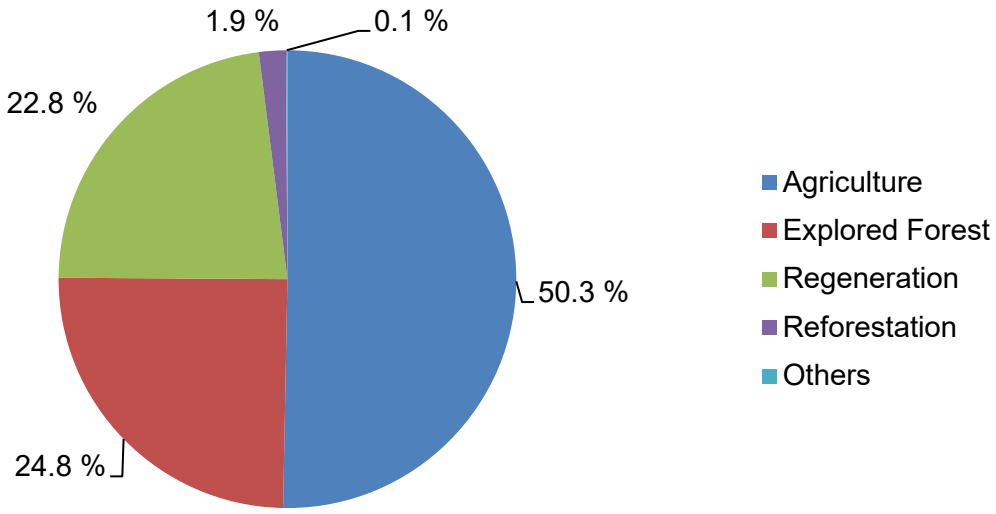

Figure 6.21. Structure of land before flooding in 1982, Brazil.

The figure shows that most of the land was used for agricultural purposes (50.3 %) and around 25 % were used as explored forest. The strong land use was stimulated by a significant agricultural progress in Brazil in the 1960s and 70s. The region's economic performance significantly depended on agriculture. When the area was flooded, more than 900 botanical species were determined.

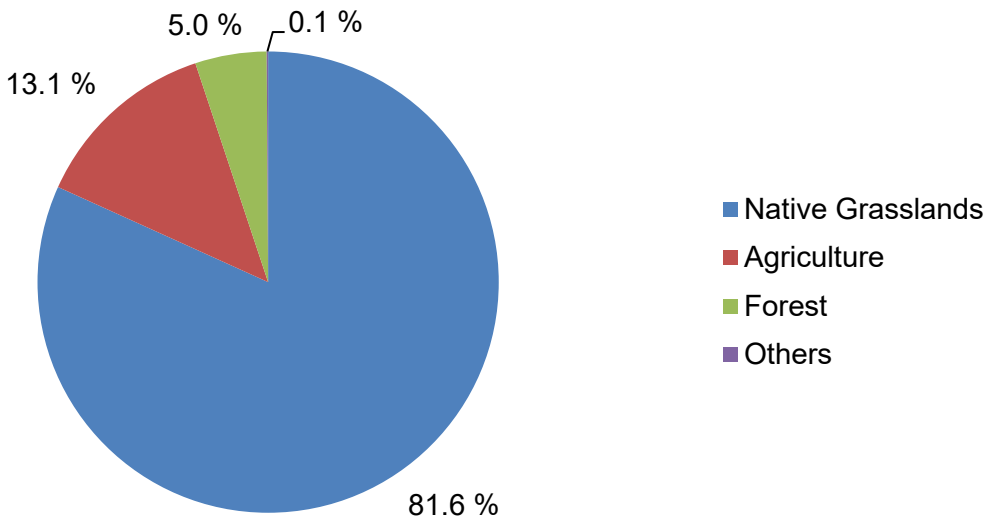

Figure 6.22. Structure of land before flooding in 1982, Paraguay.

As depicted in figure 6.22, the set-up of land in Paraguay was less developed and therefore, the area was less cultivated than in Brazil. More than 80 % of the land were native grasslands and only 13.1 % were used for agricultural purposes. There was a high diversity of flora and fauna on both sides of the border and the efforts to preserve it were tremendous. In 1982, more than 30,000 animals were rescued and relocated. The relocation of animals and local people resulted in conflicts, which is described in section 6.3.7 of this chapter. As shown in figure 6.25 (see section 6.3.8 Photographs), the dam is located in lush vegetation caused by good climatic conditions and water supply from the Paraná River. The area of Itaipu is also used for controlled cultivation of plants and animal farming (see figure 6.25).

6.3.2 History

Several developments had to be considered, before the actual construction started. In September 1965, negotiations began between the chancellors of the participating countries Brazil and Paraguay, and negotiations were concluded with signing the Iguaçu minutes in June 1966. Thus, a conflict between the two countries was resolved after 15 months and marked the first official step towards Itaipu dam. The document was signed by Juracy Magalhães, Brazilian Minister of Foreign Relations and Sapena Pastor, who had the same position in Paraguay and paved the way to the possibility of such a major project. Brazil was advanced in political and economic terms: Brazil was supported by the United States and gained control over Paraguay and also marginalized Argentina's importance. It must be pointed out that the region around the Paraná River was a contested frontier region for almost a hundred years (Blanc, 2017). Therefore, the binational project between Brazil and Paraguay was challenging and had many difficulties to overcome. There were discussions about the ownership of land between Paraguay and Brazil, more precisely the Salto de Sete Quedas (Seven Lakes), starting in the 18th century. Although the delineation of the border was defined in the treaty of Madrid[12], the wording was ambiguous and triggered a new dispute. The political turbulences were further ignited by the Paraguayan war (1865 – 1870). In 1872, a peace treaty ending this war officially could not clarify the question of territory and defined the border 20 km away from the waterfalls. In February 1967, the Brazilian-Paraguayan Mixed Technical Committee was established between *Centrais Eléctricas Brasileiras S.A.*, better known as *Eletrobras* and *Administración Nacional de Electricidad* (*ANDE)*, from Brasil and Paraguay. The decision to work together and use the region jointly was necessary to initiate the project. A symbol for this joint cooperation was the Bridge of Friendship, which was built in this region and allowed the trade of Paraguayan products through Brazil. The construction of the dam included significant historical highlights not only for the relation between Brazil and Paraguay, as the area also has borders with Argentina. Nevertheless, the treaty of Itaipu in 1973 and the Iguaçu minutes in 1966 are of great diplomatic and historical importance, as it marks the beginning of the largest powerhouse in the world, involving tremendous engineering capabilities and efforts to complete the project. The Itaipu Treaty provided the legal basis for the project: the use of the Paraná River for hydroelectric generation by both countries was determined. The region was chosen, as studies showed an exceptional energetic yield caused by the formation of the river and the surrounding land. In general, Itaipu Binacional has become a benchmark for other hydropower plant projects, which engaged around 40,000 people in operational work as well as planning at its peak of construction between 1978 and 1981. Emotionally captured, one worker stated: "I was one of your warriors. I fought to protect my queen. Today you are a debutant who has brought forth light to brighten up my country with your beauty, which dazzles

[12] Document signed of Spain and Portugal in 1750

the eyes of those who see you."[13] Almost the entire area under dispute was flooded, only a small part remained and was transformed into a binational ecological reserve. In that respect, the unity of Brazil and Paraguay weakened the relation with Argentina. Argentina saw its rights endangered regarding the water supply of the Paraná River. Therefore, the topic was also subject of discussion in a General Assembly of the UN in 1972. In 1979, the dispute was resolved by a Tripartite Agreement, regulating the interest of all countries involved.

[13] Translated from Portuguese: "Eu fui um dos teus guerreiros. Lutei para proteger a minha rainha. Tu hoje és debutante que já destes a luz para iluminar o meu país com a tua beleza que encanta os olhos de quem a vê..." by Tio Bahia, who worked on the site between 1979 and 1991.

6.3.3 Construction of the Dam

The first signs of the project appeared in 1974 with erection of the first supporting buildings, such as storage rooms, offices, refectory, housing and gas stations. In that year, the excavation of the diversion channel of the Paraná River started, which took three years in total. This was a necessary measure in order to create a bypass for the river and to allow the beginning of construction of the Itaipu dam (Krystek, 2011). In 1977, after the bypass of the river was finished, a service bridge was constructed, which allowed the workers to access the area and to work on the project. In 1978, a massive arch cofferdam was blasted and the construction of one of the main dam blocks began. In 1979, the powerhouse was constructed and the first turbine runner was installed in 1982. In the same year, the final formation of the Itaipu reservoir was completed, which allowed the barrier lake to be filled. Between 1983 and 1991, major interior developments took place, such as the descent of the generator rotor in 1983 and the assembly of the penstocks. On May 5th, 1984, the generation of energy marked the official opening of the project. Nevertheless, major parts of the project ran until 1991, when the plant was officially complete with 18 generating units and 12,600 MW of installed power. In 2000, the power generated amounted to 93.4 million MWh, which marked the first record year after the completion in 1991. The dam was expanded by two more units (unit 9A and 18A) in 2006. By 2007, the power plant had 20 generators with an installed power of 14.000 MW. The record in terms of power creation was exceeded in 2008: 94.6 million MWh were generated. From a technical point of view, a hydroelectric plant is considered as operative, when all elements of the energy transformation chain are working, which consists of the turbine and the generator. Its functionality is simple: the natural energy, contained in river flows and waterfalls, is converted into rotary kinetic energy by the turbine. This is realized by the motion of the turbine, which starts to spin as soon as it receives water. The second element in the transformation chain is the generator. Generator and turbine are interconnected and the generator converts the turbine's rotary movement into electric power. The supply of material and its handling was precisely planned during construction, keeping in mind the effects of poor planning, such as idle equipment and workers. The construction of the power plant provided employment for thousands of people. Therefore, an appropriate infrastructure had to be developed, such as residences for workers. In the early years of construction, over 9,000 houses were built in that area and the population of Foz do Iguaçu grew from 20,000 to over 101,000 inhabitants within only ten years.

6.3.4 Five Consecutive Phases of the Construction

The first stage of construction was executed between 1975 and 1979 and consisted of excavation of a diversion channel and spillway. The purpose of the diversion channel was to bypass the Paraná River out of its natural riverbed. It is 2 km long, 80 meters deep and 150 meters wide and required an excavation of roughly 22 million m³ of soil and rock. During that time, the rock-filled dam was constructed and the implementation of the industrial plant and the diversion control structure took place. On October 28th, 1978, a contract was signed which guaranteed the purchase of turbines and generators worth 800 million US$.

In the following second phase between 1980 and 1982, the right wing dam (main dam) was constructed by using earth and rock-fill and major interior installations were made, such as first main electromechanical assemblies and the riverbed powerhouse. The transport of material to the construction area involved 20,113 trucks and 6,648 rail cars. One big challenge was the transportation from the generator units from the manufacturer to the plant. The first wheel of the turbine with a weight of 300 tons left the manufacturer's company in São Paulo on December 4th, 1981, and reached Itaipu in March of 1982, a distance of 450 km today. Due to the infrastructure in the 1980s and the high weight, the transport had to be done via a longer distance (1,350 km). Over time, transport conditions improved and the fastest transportation time recorded was 26 days.

Phase 3 (1982 – 1986) was a significant time for Itaipu Binacional, as major progress allowed the power plant to start operating. The downstream cofferdams, which were protecting the deviation, were removed and the reservoirs were filled with water. 58 tons of dynamite were used to explode the two cofferdams. All main structures necessary for operation were completed, such as the spillway and the main dam. The power plant's official operation started on May 5th, 1984, by setting unit 1 into operation, which was a 50 Hz generator. Although the dam has started operating, it was not completed yet and two more construction phases followed.

In the next phase, between 1987 and 1991, the powerhouse of the diversion channel was constructed and the remaining 17 units were completed. On April 9th, 1991, all 18 units were put to full operation and the power plant was running at full capacity.

In 1997, a decision was taken to install two more generators, which marked the beginning of the fifth and final construction phase. Generators 9A and 18A completed the today's layout of the plant totaling 20 generators. The construction of the two generators started in 2001 and they went into operation in 2007.

As the project exceeded in many ways, such as size, the costs for material and planning were significant. The overall project is managed by consortiums, which also control the costs. The

Itaipu civil construction projects are managed by Unicom and Conempa consortiums, the electromechanical assembly is managed by the Itamon and CIE consortiums. The costs involved are 849 US$ per kilowatt installed, totaling 11.9 billion US$. The direct investment until each generated unit that began to operate amounted to 17.5 US$. The return on investment started on March 1st, 1985, ten months after the power plant went officially into operation. In this first year of activity, 277 megawatts were generated. In 1997, the power generation of Itaipu Binacional reached a first peak by meeting 26 % of the Brazilian electricity sector. In the following years, the project successfully marked other milestones: in 1999, Itaipu generated 90 billion kilowatts / hour (kWh). In 2004, 20 years after the official opening, Itaipu has produced enough energy to supply the entire globe for 36 days. Three years later, the power plant had enough capacity to generate 100 billion kWh and surpassed Guri plant in Venezuela. Nowadays, Itaipu ranks number 2 in terms of installed capacity (14,000 MW). Number one is the Three Gorges Dam in China with an installed capacity of 22,500 MW, which was completed in 2012. Guri plant in Venezuela ranks number 3 and has an installed capacity of 10,200 MW (Duddu, 2013). In terms of annual generation, Itaipu ranked number 1 with a volume of 103,098,366 MWh in 2016 and surpassed China's Three Gorges Dam generating a volume of 98.8 million MWh. As Itaipu has been in operation since 1984, it has generated an accumulated power volume of 2.6 billion MWh until 2018 (Itaipu Binaconial, 2018a).

6.3.5 Functioning of the Dam

The entire facility comprises 20 generators. The main dam has 18 double blocks, which are 34 meters wide and have a maximum height of 196 meters. On the inside it is hollow. The functioning of every dam is the same: its main purpose is to block water flow to create a basin. Since the 19th century, this idea has been used to create energy in terms of electricity. Itaipu dam is considered as a large dam. The dimensions are defined by the WCD, the World Commission of Dams and are as follows: a large dam has a minimum height of 5 meters and has the capacity to store a volume of more than 3 million m³ of water in its reservoirs. All dams, which do not meet these dimensions are considered as small dams. Another standard is set by ANEEL (Agência Nacional de Energia), which defines a large dam according to its level of energy production. All dams producing more than 30 MW are considered as large, all others as small (Leturcq, 2019: 2).

The concept of the Itaipu dam consists of five main elements: hydrology, energy, the dam itself, transmission and the spillway. Each part is necessary for the efficient functionality of the concept. The hydrology element is the Paraná River basin (see figure 6.29) and provides the basis of hydropower: water. For the calculation of the ideal use of the dam it is necessary to take the weather and inflow forecasts into consideration. The energy elements are the 20 generators in the plant, which account for 14,000 MW of installed power (figures 6.31, 6.32 and 6.33). The third element is the dam construction, which is made of concrete and has the purpose to control the water (see figures 6.33 and 6.34). A central element and the basic idea of a hydro-generating power plant is the transmission into the power systems. In this case, it is the transmission of power into the Brazilian and Paraguayan systems. This is done via connection points between the power generators and the used systems of power distribution. In the last step of the concept, the spillway serves to drain all the water, which was not used for generation of power (see figures 6.27 and 6.28).

6.3.6 Impact - Energy Creation

Itaipu Binacional creates 86 % of the energy demand of Paraguay and 14 % of Brazil. Its energy supply is depicted in figure 6.23. The level of annual energy production reached a record in 2016 with over 103 TWh of production. Since 2010, Itaipu has never fallen below 86 TWh.

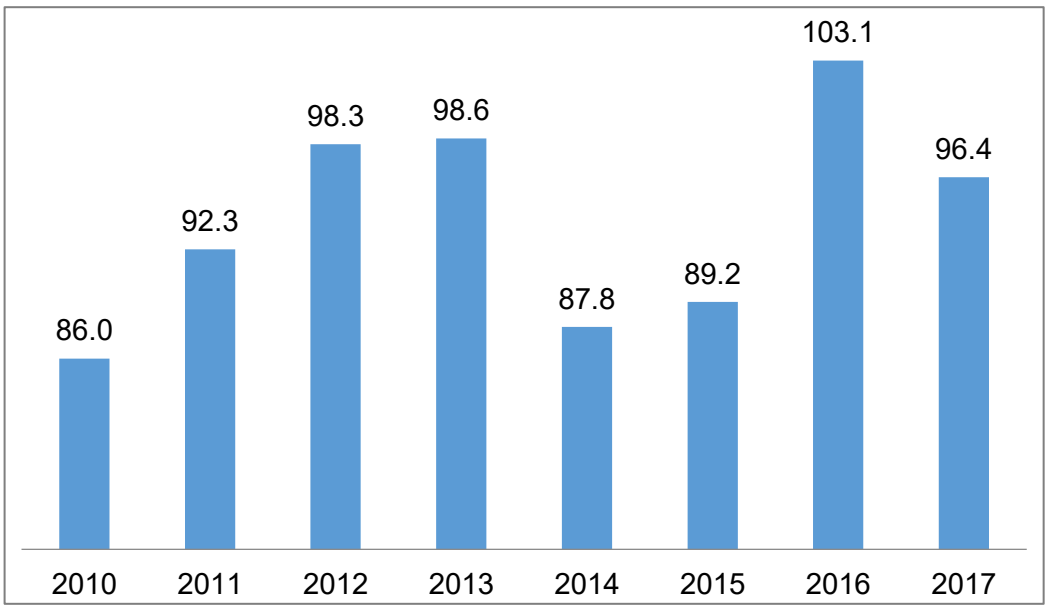

Figure 6.23. Annual energy production in TWh between 2010 and 2017 (Itaipu Binaconial, 2018b).

In international comparison with other dams, Itaipu ranks number 2 in terms of installed capacity as depicted in figure 6.24.

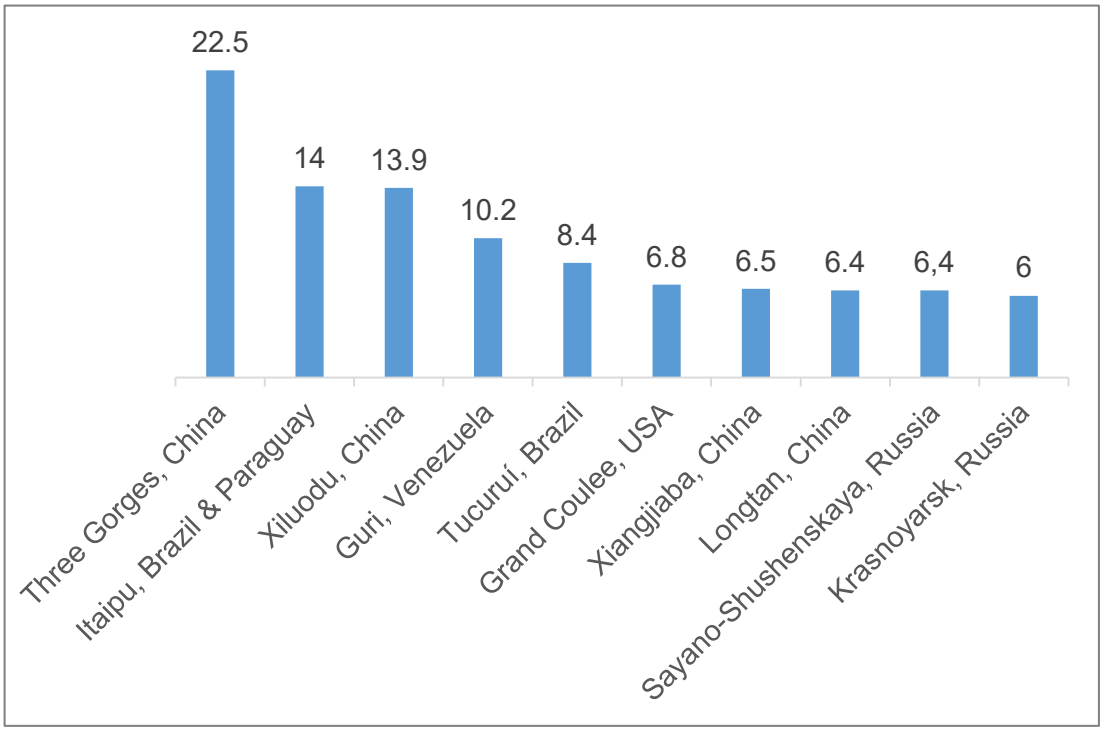

Figure 6.24. International comparison of hydropower plants, installed capacity in GW (Nag, 2017).

Until the Three Gorges plant was erected and completed in 2012, Itaipu ranked number 1 in terms of installed capacity, as well as in terms of energy generation. Xiloudu dam with nearly the same capacity was recently opened in 2013.

6.3.7 Social and Environmental Impact - Criticism

The project was a significant intervention in nature. The area to be flooded was huge with 135,000 hectares and the initial flooding of the area took 14 days. During the time of construction, records show that 36,450 animals had to be relocated and saved from the flooding. Due to the significant impact on people and nature by building dams much larger than the natural riverbed, constructors of dams are now obliged to limit the projects within the natural riverbed and a respective reservoir lake for accumulation of water, so called run-river dams (Leturcq, 2019: 2). Itaipu is not a run-river dam. Until the 1980s, there were no concerns for environment and social aspects in that extent as nowadays (Leturcq, 2019: 6). Some measures were taken by the government, such as the National Environmental Policy in 1981 as well as the SISNAMA, the National Environmental System (Sistema Nacional do Meio Ambiente no Brasil), which bring together all organizations dealing with environment at a government level. Later, CONAMA, the National Council for Environment (Conselho Nacional do Meio Ambiente)

as well as the MMA, the Ministry of the Environment (Ministério do Meio Ambiente) were established to regulate environmental impacts. As mentioned above, the impacts on humans and nature in that area were considerable. Critiques include the resettlement of 42,444 people from their land. Moreover, these locals were not involved in the project and were simply relocated. This relocation took place in three stages:

- **Stage 1, 1973 until 1977**

There was still some confidence from the locals during that time. As compensations were not fair and the decision-making persons did not take the opinion of locals into account, this trust diminished.

- **Stage 2, 1978 – 1979**

In this time, the locals started to organize themselves to build a unit against the construction company and other involved parties. Important opportunities to involve the locals were also missed. A first initiative in 1978, in which around 1,000 signatures were collected as measure of protest and handed over to President Ernesto Geisel, was not satisfactory for the locals. A second initiative involving 2,000 farmers was launched to fight for equitable compensation.

- **Stage 3, 1980 and onwards**

Due to the unsatisfying results of preceded demonstrations, the protest emerged and resulted in several camps, which were set up by local farmers and other supporters from across Brazil. The main objective of the protests was access to land, providing a livelihood for the local farmers.

The resettlement of farmers resulted in problems with the indigenous people (Guarani tribe) occupying that area by two thirds (Leturcq, 2019: 17).

6.3.8 Photographs

During the visit of the Itaipu Binacional dam in May 2017, photographs were taken for illustrating the predominant landscape and the structure of the dam.

Figure 6.25. Cultivation of land in Itaipu.

Figure 6.26. Utilization of land for animal farming.

Figure 6.27. View of the spillway, front view (without water).

Figure 6.28. View of the spillway, view from the dam (without water).

Figure 6.29. View of the hydrology element of Itaipu, the Paraná Basin.

Figure 6.30. Tubes containing the generator units. Eleven out of 20 generator units are shown in the picture.

Figure 6.31. Tubes containing the generator units, close-up view.

Figure 6.32. Spinning turbine, inside the generation unit.

Figure 6.33. Concrete dam with road.

Figure 6.34. View from the dam on to hydrology element (Paraná River basin).

6.3.9 References

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Chapter 7

Conclusion and Outlook

At the beginning of this project, the question was raised whether CR is a method to present a company or organization better than they really are. In a first step, several theoretical matters were researched and a first conclusion can be drawn: all of them serve mainly as reporting method aiming at a specific target group. All of these methods consider especially social and environmental aspects with the main focus on stakeholders and shareholders. The stimulus to initiate CR activities and to integrate them into daily business can be attributed to the fact that there is a mismatch of priorities in the current model of doing business, i.e. the economic model does not consider natural resources and social aspects to a necessary extent. This thesis was underlined by the theories of E.F. Schumacher, who made a relevant criticism in the 1970s. Supported by current developments, such as a new record in global warming with temperatures averaging 1.10°C higher than in the pre-industrial period from 1850 to 1900 (Met Office, 2018), the challenge remains high. An important role plays the development on the global scale with countries that emerge socially, economically and politically. The emerging countries (BRICS) consume a large amount of natural resources to continue their economic growth as shown in chapter 4 (Brazil) of this project. In terms of renewable energy, Brazil has a high share of the national power balance. One of the largest electricity power generators in the world was initiated in Brazil in 1975 due to the high level of natural resources available there. Itaipu Binacional was described in chapter 6 of this project and shows the impact the dam still has today. In times of limited resources, the importance of renewable resources becomes increasingly higher. Companies have also adapted to that situation as shown in chapter 6. The case study about Knorr-Bremse Brazil shows methods to adapt to changing surroundings. The construction of the new manufacturing plant shows that sustainable methods were considered and realized. This example shows that there is a general awareness and that adaptation measures are necessary in the interests of sustainability. This was confirmed by the survey conducted with representatives of manufacturing companies with operations in both industrialized and emerging countries (cf. chapter 5). In summary, CR has experienced strong development and acceptance in the business world and society in general. It has been transformed from a method of public relations to an instrument of environmental contribution.

Over time, CR has become an accepted way to make activities more responsible and sustainable and its position within companies, governments and organizations has changed. Moreover, it plays a vital societal role. Current research considers an increasingly stabilized role of businesses as a part of society. There are new approaches that link the ancillary activities of CR to the core business. A current approach, developed by the Boston Consulting Group BCG, defines the general claim towards companies to act responsibly as total societal impact (TSI). This is in contrast to the main aim of maximizing total shareholder return (TSR)

(Beal et al., 2017). The awareness to act more responsibly in a wider set of principles increases among managers. The terms TSI and TSR describe the shift of priorities in a suitable manner. Whereas TSR mainly consists of shareholder profit maximization, TSI aims at a broader set of principles including other target groups. The study points to a trend towards an increasingly informed society and business that are subject to closer scrutiny and are influenced by a changing society in general. This takes into account the role of millennials, who are generally better informed due to the Internet age. This changing generation demands that businesses become more involved in societal responsibility and this requires methods away from TSR, where the focus is on shareholders. Furthermore, societal responsibility becomes increasingly important for investors, as there is a stronger focus on socially responsible investments (SRI). This calls for companies to become more transparent and to communicate differently. TSI should describe new ways of integrating CR into the business, indicating that the current way of doing CR is separate from the core business and financially isolated. This proposes forms to integrate responsibility actions into the core business and separate them from philanthropic actions. This suggested development would make relevant actions more scalable. In the long term, it is furthermore necessary to engage in societal responsibility in order to prosper in the future. According to BCG, long-term strategies are necessary to survive in a changing business society and will positively influence the company. Hence, acting responsibly can no longer be separated from its core business, but has to be implemented beyond the intrinsic contribution of the company. An intrinsic contribution is given in many products and defines the value created for society as described in chapter 2. A brake manufacturer contributes to society by producing brakes, which can save lives. The TSI approach goes beyond this intrinsic contribution and calls for a deeper implementation, combining the core business with acting responsibly. BCG points to major benefits for business if TSI is properly implemented. These benefits include (Beal et al., 2017):

- Access to new markets by exploring new locations
- Boosting innovation by identifying new opportunities
- Strengthening the brand by inspiring loyalty and trust
- Strengthen relationships by enabling cooperation with influencers

With regard to CR, it is important to consider factors like a changing society, access to information and most importantly, a changing environment in terms of nature. As described at the beginning of this project, it must be avoided to limit the opportunities for future generations by wasting natural resources. Moreover, it is the moral obligation to future generations (Brundtland, 1987).

"We won't have a society if we destroy our environment." *Margaret Mead*

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