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The impact of the Mexican energy reform on investment strategies of U.S. energy organizations

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Sammendrag

Mexico har nylig innført nye reformer omhandlende landets energisektor. Denne sektoren har inntil nylig vært under tett statlig kontroll og utenlandske investeringer har vært fraværende i stor grad da sektoren var nasjonalisert i flere tiår. Nasjonaliseringen bar preg av å beskytte meksikanske interesser, det samme kan sies om de nye reformene siden de har som mål å øke elektrisk kapasitet, utvikle fornybar energi samtidig forbedre den meksikanske økonomien; dette skal gjennomføres med utenlandske investeringer. Det moderne Mexico er på randen til sterk utvikling i både økonomisksektoren og energisektoren, dog begge sektorene er avhengig av den operative implementeringen til reformene. Hvor vellykket reformene blir gjenspeilet i de overnevnte sektorene. Denne oppgaven er bygget på deskriptiv forskningsdesign og er en kvantitativ studie, den har som mål å fange opp et bredt spekter av ulike virksomheter som alle er engasjert i energisektoren. Totalt leverte 112 respondenter valide data som denne oppgaven er basert på hvor målet er å illustrere hvordan de nylig innførte reformene påvirker investeringsavgjørelsene til amerikanske organisasjoner i det meksikanske energimarkedet. Den helhetlige evalueringen av reformen viser en enorm optimisme og sterk interesse fra amerikanske virksomheter for å investere i Mexico. Funnene viser også at reformen ikke bare er av interesse for organisasjoner engasjert i fornybare energi eller energiprodusenter, som en helhet, men en stor vilje til å investere eller å øke investeringene. Selv om resultatene gir en positiv indikasjon behøves det ytterligere testing. Tester som går mer i dybden og analyserer i større grad korrelasjoner for variablene brukt i denne oppgaven, dog dette er utenfor omfanget til denne oppgaven. Denne forskningen leverer et godt grunnlag for en første oversikt for utviklingen, og viser at Mexico er på god vei til å oppnå hovedmålene til reformen og det understrekes av amerikanske virksomheters interesse for å investere i det meksikanske energimarkedet gjennom at respondentene konsekvent og konsist evaluerer effekten av reformen positivt på investeringsstrategier.

Abstract

Mexico has recently imposed reforms for the Mexican energy sector, which has been under tight state-control and been isolated from foreign investment for decades. These reforms aim to stimulate foreign investment to overcome the lack of electricity generation capacity, renewable energy development and to boost the Mexican economy. Mexico today is on the verge of strong economic and energy sector development and the operational implementation of the reforms will show how successful they will be. This thesis is built on a descriptive research design and a quantitative study addressed to respondents by U.S. organizations engaged in the energy sector. In total, 112 respondents delivered valid data on which this study is based. The aim is to illustrate how the newly imposed reforms affect the investment decisions of U.S. organizations in the Mexican energy market. The overall evaluation of the reform shows enormous optimism towards the reform and a strong interest from U.S. organizations to invest in Mexico. The findings also show that the reformation is not only interesting for organizations engaged in renewable energies or energy producers, but an overall great willingness to invest or increase investments. However, the results require further in-depth testing of the inter-correlation of the variables of this actual topic, as this is simply beyond the scope of this research. The research herein delivers a profound basis for a first overview of the development, showing that Mexico is on a very promising way to achieve the reformations' goals, as underlined by the great interest of U.S. organizations to invest in the Mexican energy market and the consistently positive evaluation of the impact of the reform on investment strategies.

Preface

The Mexican energy reform was of special interest for us and was chosen as research topic due to several reasons: it is a very actual topic, where no in-depth research has been done so far and little has been said about the further effects of the reform. Additionally, the reform aims to push the development of renewable energies forward, which is also of great interest to us and global energy development.

The research conducted within this thesis means a lot to us, as we have spent a great amount of time, efforts and financial resources to create this thesis. We truly enjoyed our journey, where we dug deeper and deeper to discover more and more of the implications this reform brings with it.

Through our journey, we were surprised by the great interest our respondents had in our research, no matter if educational institution, governmental organization or private enterprise. The feedback was throughout positive and the great interest shown also encouraged us. Apart from gaining new knowledge about energy-related topics, we also underwent a great learning process, in the first place of how to work independently and self-responsibly in a research project of this comprehensive scope.

We deeply hope that you as the reader, whoever you might be, will enjoy reading the thesis and get a thorough understanding of how the energy reform, the Mexican renewable energy development and the U.S. companies' investment plans build a symbiosis and influence each other.

Creating this thesis was an exciting and challenging task, into which we put the most efforts possible to reach our aim of developing a thesis of high quality. We truly hope that you as the reader will find our research useful and after reading it, will find yourself more enlightened than before.

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Table of Abbreviations

CEE	Center for Energy Economics, University of Texas at Austin
CENACE	Centro Nacional de Control de Energía, National Centre of Energy Control
CENAGAS	Centro Nacional de Control de Gas Natural, National Center of Natural Gas Control
CFE	Comisión Federal de Electricidad, Federal Electricity Commission
CNH	Comisión Nacional de Hidrocarburos, National Hydrocarbons Commission
EIA	U.S. Energy Information Administration
FDI	Foreign Direct Investment
GW	Gigawatt
HFDI	Horizontal Foreign Direct Investment
IMF	International Monetary Fund
IPP	Independent Power Producer
kWh	Kilo-watt hours
LSPEE	Ley del Servicio Público de Energía Eléctrica, Public Electricity Service Law
MW	Megawatt
NAFTA	North American Free Trade Agreement
OECD	The Organisation for Economic Co-operation and Development
PAU	Pan American Union
SENER	Secretaría de Energía, Secretariat of Energy
SER	Secretaría De Relaciones Exteriores, Ministry of Foreign Affairs
TW	Terawatt
U.S.	United States (of America)
VFDI	Vertical Foreign Direct Investment
WTO	World Trade Organization

1 Introduction

The topic of the Mexican energy market reformation offers great many new research possibilities due its actuality. To analyse the impact on investment strategies, a thorough definition of the scope of research, including delimitations and description of the purpose, is needed. The research question, which derives from the research topic, needs to be specifically stated, as the research model, the hypothesis for statistical analyses and the research design are based on it. To provide new knowledge in connection to the examined topic, a profound research review needs to be conducted. Obviously, these factors require a thorough understanding to assess the impact of the reformation on the investment strategies examined later. It is a complex interplay of all of them and each single one is as important for a reliable research result as the other. This study and the analysis of the impact of the energy reform are based on the gathered data of 112 respondents. The three core parts of this research, consisting of the research question, the theoretical background and the gathered data, then provide the basis for the analysis. The analysis shows a great interest of U.S. organizations engaged in the energy sector to invest in Mexico, with 27.4% planning to make investments with the start of the reformation or later and 69% planning to increase business in the Mexican energy sector. The evaluation of different investment strategies, the time periods for planned investments and the detailed impact analysis including the hypothesis testing is based on the aforementioned core parts of the research.

1.1 The research topic: delimitations, purpose and currency

The Mexican energy market has been under tight state-control and been nationalized for decades, not permitting any foreign party to invest. Due to the slow development of renewable energies and the lack of electricity production capacity, foreign investment and technology is needed to get back on track. In 1992, independent power producers were granted access to the electricity sector to increase generation capacity, which leavened the restrictions partly. Only by 2008, the first efforts were made to boost renewable energy development when

the Renewable Energies Law was imposed. The energy reform referred to in this thesis was initiated by the Mexican government and formally came into effect in December 2013. It is the first fundamental and structural reform that targets both, the hydrocarbons and the electricity sector. The goals of the imposed reforms aim to reduce electricity prices in the country, due to the little production capacity, modernize the state-owned electricity- and hydrocarbons-companies and to ensure state control over resources. This reform changes the structure of the Mexican energy market substantially and for the first time allows foreign parties to participate in the energy sector.

The topic of the research offers delimitations in itself, as it is an actual topic, limited to the Mexican energy market and also limited to U.S. organizations planning to invest in the Mexican energy market in renewable energies after the reform. The focus on U.S. organizations offers great insight, as the U.S. is a neighbouring country, Mexico's biggest trading partner and is the country in the world with the highest energy consumption (BP, 2014).

Yet, the impacts of the reformation have not been examined in great detail, which is mainly due to its actuality. The reforms have just been implemented and it takes time until the first broad effects on the business sectors will become visible. So far, the majority of research has focused on the changes in Mexico's FDI inflows in the next years to come, which underlines the importance of the reforms for the country's economy. Several well-known institutions and authors have stated a variety of different figures in this respect:

Bloomberg (2013) - possibility of \$20 billion in additional FDI per year; Forbes (2013) – possibility of \$20 billion in Mexico's oil sector only per year; the UK Department of Energy & Climate Change (2015) - \$50 billion in investments until 2018; Oxford Analytica (2014) – FDI will increase annually by \$15 billion. These figures would make up a substantial increase and emphasize the high expectations, as Mexico's total FDI inflows on average amounted to \$23 billion per year between 2000 and 2012 (Reuters, 2014).

The topic to be examined is composed of three main aspects and their interplay: investment strategies of U.S. organizations engaged in the energy sector, the research area of the reforms in the Mexican energy market and their impact and a

focus on renewable energy development in Mexico. This combination provides the limitation of the research topic in addition to the already made limitations.

The first research aspect is already examined in chapter 2 and comprises the investment forms and strategies of companies. It is important to mention that, as reviewed in chapter 2, these terms are often used in the same context and are sometimes also described as market entry strategies. The research topic of investment forms has already been examined in detail and now has little room left for discussion. The research of this topic has additionally been narrowed down in several ways, as the research is relying on data from:

- i. Organizations that are operating in the U.S.
- ii. Organizations that are engaged in the energy sector; however are covering a broad scope of business areas as consultancy, production, trading, construction, interest representation etc.
- iii. Limitation to only relevant investment strategies that require direct presence in the Mexican energy market

The research scope of organizations in the U.S. that are engaged in the energy sector and are following investment strategies that require direct presence in a foreign market is still very wide and requires further delimitations. A gap in the literature review could be discovered, which is related to the analyses of the situation after the reform in the Mexican energy market. A great lot of attention has been paid to Mexico's hydrocarbon resources, especially in the U.S., the world's biggest oil consumer who today consumes approximately 80% more than is produced domestically and ten times as much as Mexico, although having only three times its population (BP, 2014), the Mexican oil is at a premium.

For this research, a limitation to U.S. companies is vital due to several reasons. The U.S. has historically been Mexico's biggest trading partner and additionally, the country's resources are crucial for the U.S. economic development. As addressed later, there is a direct correlation between the U.S. ratio of oil production to consumption and exports from Mexico – meaning, that whenever the U.S. consumed more oil than was produced, this gap was filled with imports from Mexico¹. According to the EIA (2014), in 2013 the U.S. received 71% of all oil

¹ See also chapter 3.3 -The nationalization's impact on U.S. investment and Mexican development

exports from Mexico, underlying the strong energy-related ties between those countries. Furthermore, the Mexican FDI inflows underline again the dominant role the U.S. play not only in energy issues, but also in investment spheres. In this context, it needs to be said that the following graph illustrates general FDI inflows and not energy sector FDI. This is simply due to the reason that until recently, FDI in the Mexican energy sector was almost non-existent, thus reliable and sensible data is not available. The FDI inflows below still illustrate the strong interest of the U.S. in the Mexican economy.

Yearly average FDI in Mexico (2003-2012)

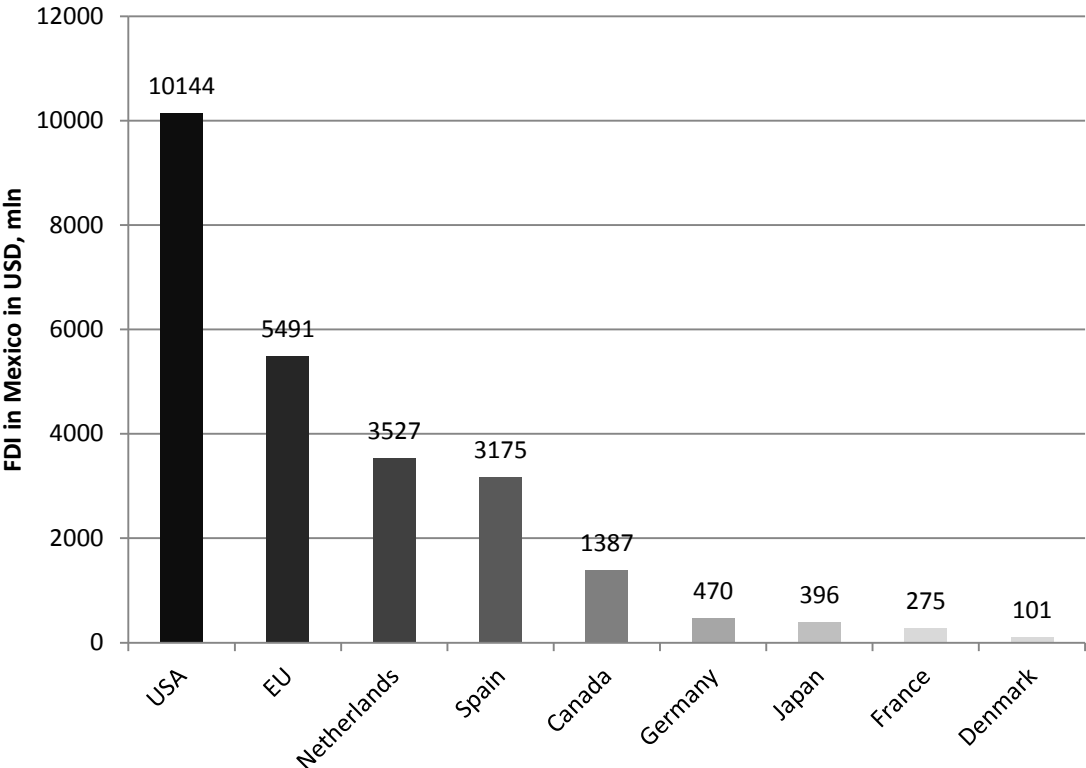


Figure 1 – Average yearly FDI (2003-2012) in Mexico by country
Data source: OECD (2014)

Additionally, the U.S. have a long history in economic cooperation with Mexico, not at least because of Mexico’s richness in natural resources, especially oil and gas. Mexico as a bordering state with great development possibilities and great possibilities for energy related development therefore offers the best possibilities for investments from the U.S. The geographical proximity and their partly

intertwined cultures, especially in the South of the U.S., also facilitate U.S. investment and clearly make the U.S. the strongest investment partner for Mexico. However, little attention has been paid to the renewable energy sources that offer great potential to overcome one of Mexico's biggest problems: the lack of capacity for electricity generation. Therefore the research topic is gaining an even greater emphasis on actuality and distinctiveness from research already having been done, through limiting the topic through:

- i. Focus on renewable energy forms and technologies

This provides new insights in various topics: Firstly, the Mexican energy market has just experienced the first phase of its reformation and others are still to follow, which makes the topic very actual. Secondly, through the limitations within the investment strategies, we can generate more reliable outcome as only data from companies, that will be directly present in the Mexican market is considered. This makes sure that the engagement in the Mexican energy sector is measurable and cannot be given via indirect and therefore possibly irrelevant investment forms, as they don't require efforts in direct presence in the Mexican energy market. Thirdly, through focusing on the renewable energies sector, a topic of growing global importance is addressed, that also has been of growing importance in Mexico. Through the combination of these topics, the research gap can be addressed in a comprehensive matter and offers first insights of the impact of the reforms in the Mexican energy market on this particular energy sphere in Mexico.

The research purpose is to address two aspects that have only experienced little research focus so far: the impact of the energy reform in Mexico on U.S. companies from the energy sphere and renewable energies development in Mexico. In the research preview, an overview about these two aspects and their research so far can be found. The purpose of this research is to bring the two mentioned aspects together and to create new knowledge in this very specific research gap. Both topics will have a long-term actuality, as renewable energies are steadily rising in global importance and also in importance in Mexico, whilst the reforms in the Mexican market will have a long-term impact on Mexico's economy and the trade relations to the United States. The combination of these two actual topics therefore generates valuable knowledge for the years to come, as first

trends and overall developments will be visible before long-term studies will be carried out to deliver data in the next few years.

1.2 The research question

The research question is aimed to be the fundamental basis for research, as research is aimed to answer this very specific question – on the other hand, the research questions defines the scope of the research and this thesis (Sampson, 2012). The question to be addressed by this research is the following:

How does the recent reform of the Mexican energy market affect the investment strategies of U.S. companies engaged in the energy sector in the field of renewable energy investments in Mexico?

This descriptive research question constitutes the basic knowledge this thesis is aiming to create. However, there are several other questions to be asked in this context that need to be addressed to generate comprehensive in-depth knowledge: Does the reform have different impacts on companies engaged in different spheres of the energy sector? Do the energy forms a company is already engaged in have an influence on its likelihood to invest in renewable energies in Mexico? Do the reforms, aimed at energy producers, have the same effect on energy producers and other organizations?

These additional questions also serve as a basis for the creation of hypotheses, the research aims to test. They will be addressed in the analysis chapter of this thesis.

1.3 Research review

The research on the topic has only been partly covered in the literature so far. The Mexican energy market has just been reformed recently and the final steps for the effective implementation of all stated changes still need to be followed up. The topic consists of three main aspects: the energy reform in Mexico, its impact on investment strategies and renewable energies.

The single topics have already gained attention to certain degrees. The literature connected to the Mexican energy reform has been closer linked to economic theory instead of investment theory. The literature so far, mostly economic journals and predictions from economic newspapers, covers the estimated impact of FDI inflows and Bloomberg, Forbes, Reuters and others have come up with financial impacts and other expected benefits, but the reformation has not been linked to U.S. companies' investment strategies efforts so far. The literature however covered similar topics, like the cases in Chile and Argentina. In both of these countries there has occurred reformation of the electricity sector. The Chilean electricity sector has had a long history of being publicly owned. After a process of nationalization of companies, the country was hit hard by high fuel prices in the 1970s. To increase investments in the electric utilities the sitting military dictatorship decided to reform the electricity sector. The Cambridge economist Michael Pollitt (2004) discusses how Chile managed to successfully to reform the electricity sector, increase investments, increase capacity in both the grid and generation, while bringing cheaper electricity to more people – he calls it a lesson for other developing countries.

These are all goals of the Mexican reform. In another paper, Pollitt (2008) discusses the Argentinian electricity reform, how it managed to attract foreign investments and at the same time lower governmental debt and financial support to the energy sector, but other reasons has interfered with the success of the reform. Similarly to Mexico, both of these countries are developing and located in Latin America. They have managed to attract significant sums of foreign direct investments into their electricity sectors after unbundling state owned companies. Furthermore, Kyle S. Herman (2013) from Rutgers University argues that attracting foreign direct investments in renewable energy power plants could not only reduce the electricity price in rural areas, but also increase the energy security in general. The major issue when comparing these cases to the Mexican sector is firstly the population - Argentina is merely one third of the population of Mexico and Chile is approximately one eighth – secondly – none of these countries were close to a financial superpower (e.g. the United States) at the time of their reforms.

The investment strategies - also referred to as market entry strategies - on their own have been discussed greatly in the literature. Companies often use them as the basis for market entries and are also common business among all leading international energy companies such as ExxonMobil, BP, Shell, Iberdrola and others². Today, the investment strategies of this research are taught in universities around the globe and therefore offer a vital basis for examining the energy reforms' impacts on them. A more detailed discussion of other forms of investment strategies is addressed in chapter 2.

The renewable energy development in Mexico has been addressed in a less extensive manner, but has gained attention within the last years. This is especially due to the increased importance of renewable energy globally and the announcement of Mexico's energy reforms. Starting from 2012, a great variety of publications have been made. In 2012, the Center for Clean Air Policy published a comprehensive report on Mexico's renewable energy program, already considering the potential implications of the energy reform and the historic development (Davis et. al, 2012). In the same year, ProMéxico and the Mexican government published a report about the development and challenges for the Mexican renewable energy sector in the years to come with different perspectives of the industry. Here, also imported issues that the industry will face on an operational level were addressed (ProMéxico, 2012).

Additionally, a great number of articles with a more specialized focus has been published, such as "Clean energy and water: assessment of Mexico for improved water services and renewable energy" by Sanders et. al (2012), articles focusing on how research in the renewable sector in Mexico is done by Alemán-Nava et. al (2013) and publications solely dedicated to the electricity sector, as "Mexico-building a renewable energy market without conventional feed-in-tariffs" by Schierenbeck (2014). The diversity of this literature also illustrates, to which extent the literature on renewable energy topics improved.

In 2012, a cooperation between the U.S. Agency for International Development (USAID), the Wilson Center and other universities published an in-depth report about "Renewable Energy in Mexico: Policy and Technologies for a Sustainable Future". As not only USAID but also U.S. universities were involved in the creation

² The referring history can be found on the referring company's webpage.

process, it is evident that the Mexican renewable energy programmes also are of rising interest for the U.S., as already addressed in earlier chapters. However, none of these documents provide a linkage of the development of renewables in Mexico and how U.S. companies' investment strategies are affected by it. Therefore, the combination of these two topics provides a great deal of newly developed knowledge throughout the conducted research.

1.4 Research model and hypotheses

The research model and the hypotheses derived from examined factors and dimensions constitute the framework of this research. Therefore special attention needs to be paid to both – to define all factors part of the research but also to consciously omit factors not relevant for the research.

1.4.1 The research model

In this research, the research model aims to identify, in which respect the reforms of the energy market can have an impact on the investment strategies. It is important to underline that the reforms themselves are directly causing the impact, as illustrated below. The impact therefore is the critical linkage between the independent topic of the reformation of the energy market and the investment strategies.



Figure 2 – Impact as critical linkage of two concepts: market reforms and investment strategies

In the research conducted, it is important to pay specific attention to the impact as linkage of the concepts. The following depiction illustrates the relations between different factors that influence the impact of the energy reforms and investment strategy dimensions, in which the impact of the energy reform will be visible. As a sum, these factors help to create an overall understanding of the impact, as the focus on only one factor group would deliver an incomplete picture.

In this research, three main factors were discovered that are considered to have the biggest influence on the impact of the energy reforms. These are the energy

forms companies are engaged in, the investment strategies that have already been applied, the business engaged in and the engagement in the Mexican energy market. On the other hand, the impact on investment strategies will be especially visible in three dimensions: the eventual plans or willingness of organizations to increase business in Mexico, the time frame for planned investments, the preference of single investment forms and the participants' evaluation of the energy reform's prosperity. The factors of each section certainly do not cover all conceivable factors that might be identifiable, however we consider these to be the most relevant factors and dimensions that enable us to see in a most indisputable manner where impact takes place and which factors determine the impact for organizations engaged in the energy sector.

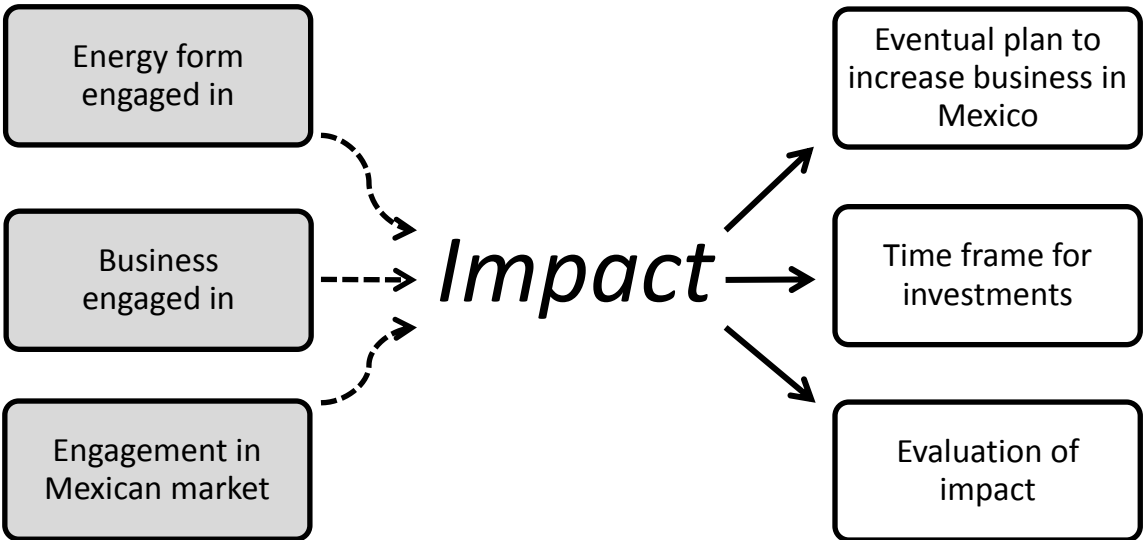


Figure 3 – Influential factors & investment strategy dimensions influenced

In the context of these factors it is important to mention that the research does not assume that there necessarily *is* a change in these factors, but the research will show *if* there is one. The overall goal is to get an understanding, in which dimensions organizations evaluate the energy reforms to be influential and which factors determine the impact.

The dimensions of the investment strategies are constituted by the answers received from the respondents. The questions addressed to the respondents

asked them to provide answers on all factors influencing the impact and on all dimensions of investment strategies where an impact is expected. The above stated factors and dimensions furthermore define the overall direction and set up hypotheses, which will help to generate the desired knowledge.

1.4.2 The research hypotheses

The hypotheses are testable propositions or statements that provide the basis for the knowledge created by research. These assumptions usually establish relationships between two variables or show differences between different groups (Kalaian & Kasim, 2008).

In this research, three hypotheses have been established that link the different concepts of the research topic and will facilitate the generation of new knowledge connected to the energy reforms in the Mexican energy market. After decades of tight state-control and nationalization of the Mexican energy market, new legislations have been published that allow foreign companies to take part in the energy sector. These include private parties being permitted to participate in exploration and production of hydrocarbons and being permitted to participate in electricity generation and trading, which is especially important for the development of the renewable energy sector in Mexico. Although the Mexican state remains the main force, foreign investment is now permitted and will allow foreign companies to benefit from Mexico's rich natural resources in terms of hydrocarbons as well as renewable energies³.

The three hypotheses build the basis for the research and determine the overall direction, but the conducted research, however, is not only limited to them. Besides this overall frame constituted by H1, H2 and H3, several other aspects have been examined that will contribute to answering the research question stated before.

Hypothesis 1 (H1): Organizations already engaged in the Mexican energy market are more likely to increase business in Mexico after the reforms than organizations not yet engaged.

³ This topic is addressed in great detail in chapter 4.

Independent variable: Engagement in the Mexican energy market

Dependent variable: Increasing business in Mexico

Operational definitions

The term “engagement” in the energy sector in this research refers to the different types of investment forms the examined organizations are already engaged in, in the Mexican energy market. These investment forms are based on the investment strategies examined in the theoretical background chapter.

The increase in business is defined as the respondents’ evaluations, if their organization’s strategy foresees to increase the investment within a certain period of time or not. The business to be increased or not is again based on the different investment strategies.

Hypothesis 2 (H2): Organizations engaged in renewable energies are more likely to invest in Mexico after the reform than organizations not engaged.

Independent variable: Engagement in renewable energies

Dependent variable: Investment plans in Mexico

Operational definitions

The independent variable in this thesis is defined as the energy forms, a company is engaged in or making business with. In the broader sense, the companies themselves need to deliver the data if a company is engaged in renewable energies or not. The field of renewable energies is clearly defined (see also chapter about renewable energies) in terms of energy forms; however the definition is consciously kept broad not to exclude companies that are not directly involved in renewable energies, but make most of their business due to renewable energies business, as for example consultancies for renewable energy producers or construction companies specialized in solar installations.

The investment plans in Mexico again refer to the investment strategies examined as theoretical background - it can be seen as the overall sum of and comprises all investment forms.

Hypothesis 3 (H3): Organizations engaged in energy production consider the impact of the energy reform on investment strategies to be more positive than organizations engaged in other business spheres.

Independent variable: Engagement in energy production

Dependent variable: Impact on investment forms

The operational definition of the independent variable and of the business spheres is connected to the different businesses, not business *forms*, the examined organizations are engaged in. The business spheres comprise consultancy, energy production, electricity production, representation of interests, technology and construction and so forth. As electricity producers are a sub-category of energy producers, they have been combined in this hypothesis and the referring statistics. The reforms imposed provide the greatest benefits for energy producers and are mainly aimed to attract their investments, which makes a comparison of energy producers and the group of organizations engaged in other spheres a valuable hypothesis.

The dependent variable however is defined as the evaluation of the impact of the reforms on different investment strategies in context of investing in the Mexican energy market in renewable energies. Respondents evaluated how advantageous or disadvantageous the energy reforms affected single investment strategies. In this respect, the respondents were asked *how* they evaluate the impact, neglecting the fact *why* they did so. This however offers a broad new perspective on the topic and could be used as the basis for following studies. The involvement of this new perspective however would be beyond the scope of this present study, as this study firstly examines if and where there is an impact of the reformation. This is due to the research's interest to capture the energy industry's broad diversity, without examining the possible underlying reasons of observed behaviour and factors.

1.4.3 Consideration of factors

The factors considered to be examined in the research and in the hypotheses compose the core of the research. To provide proper validity of the selected factors and make a legitimate selection, the reason for the selection of each single factor needs to be addressed. In this research, validity consistently refers to internal validity. Although in social sciences several mostly consistent definitions can be found, the one from Krishnaswamy et al. (2009) is used in this research as it focuses on a critical success factor that is dominant in this research and furthermore defines the success of the hypotheses-testing conducted: Internal validity "...is the extent to which differences found with a measuring tool reflect true differences among those being tested." In the case of this research, this refers to the different groups being tested to eventually falsify the hypotheses stated.

Some of the examined factors in the analysis are exchangeable and the research itself does not claim completeness of relevant factors. But as mentioned before, the selected factors are considered to be the most relevant for the pursuit of answering the research question and testing the hypotheses.

The question concerning the energy form an organization is already engaged in, was chosen to demonstrate the presumably high influence of already existing businesses connected to different energy forms. Following the logic of economic theories as economies of scope and scale, division of labour and expertise generation, it seems natural that companies already having expertise, knowledge and competitive advantages in one energy form, are also more interested in expanding business in this field of energy. However, this is an assumption that also needs to be proven in context with the Mexican market reformation and therefore makes up H2. Additionally, the theoretical basis of this research is based on renewable energies and their different developments. Addressing the different types of energy organizations are engaged in is therefore in line with the framework built so far of different theories and the research topic itself.

The business an organization is already engaged in was chosen to examine how engagements in different businesses, e.g. consulting, production etc., influence the impact of the energy reforms. This is necessary to provide consistency with the research design of descriptive statistics, which is also aimed to capture the broad variety of businesses that constitute the energy sector. Spoken differently,

research that would neglect the fact that there are fundamental differences between the different types of businesses would not be representative for the energy sector as a whole but only for organizations engaged in specific business forms, depending on the gathered data and the organizations' representation in it.

The already given engagement in the Mexican energy sector is crucial for addressing differences between organizations that are newly interested in the Mexican energy market and those, who have already been engaged. The reform provides great new possibilities for U.S. companies and as examined in the research preview, it is assumed that it will create new inflows of FDI for the country. This assumption is based on the findings in the literature review, which show that economists expect high FDI inflows due to the great development and profit potential of Mexican energy resources. However, the impact is likely to be different between these two groups of organizations, as they have different prerequisites. To elaborate further on this factor, this factor also constitutes the independent variable in H1.

The investment strategy dimensions identified as important for this research are connected on the areas, in which the impact of the reformation will have the strongest visibility. In principle, the main goal is to find different aspects of investment strategies that the reformation will have an impact on, to create sophisticated answers to the research question.

The eventual plan to increase business in Mexico was chosen, as it is the cornerstone of answering the research question. It addresses the question if organizations consider increasing their business activities in the Mexican energy market as a result of the market reformation. As mentioned before, the "*if*" is addressed here rather than the "*why*".

The time frame for investments in the Mexican energy market was selected to answer *when* investments will be made. Logically, it would not be sufficient to only know if there was an impact and how, but also if there was an impact of the time factor related to investment strategies. Investments in this research refer to processes that require great amount of commitment, financial resources and time. This factor is also important to make predictions for the future development as well

as for comparison between current development predictions and actual data gathered from the research population.

The evaluation of the impact of the reformation serves as an overall overview and a kind of control variable. To make sensible conclusions that not only show consistencies but also contradictions to the made predictions, the representatives of the research were asked to evaluate the impact on single investment strategies and the overall impact of the reformation. This is important to show differences between their evaluation of the overall situation and the examined aspects, to see whether other factors that were not considered have an influence as well. This dimension provides us with great insights, as respondents, who are not planning to engage in the Mexican energy market, can still evaluate the impact. As each respondents stated to possess knowledge about the reformation, valuable results can be drawn from their evaluations.

2 Theoretical Background

The Mexican energy market is facing a significant transition after around 80 years of nationalization: reforms have recently been imposed to open up the market and above all, to attract foreign investment. The investments are needed for the development of natural resources, development of renewable energies and the enhancement of the electricity sector. Energy companies from the U.S. have had a strong interest in the Mexican energy market due to several reasons as its geographical proximity and its natural resources⁴.

To be able to draw sensible conclusions about which opportunities the reformation of the energy market offers for U.S. businesses, it is important to understand how U.S. companies invest or plan to invest in the Mexican energy market. The investment strategies of U.S. companies in that respect can be seen as market entry strategies – referring to how the organization plans to enter the market and which investment form is used. Additionally, it is important to take a closer look at the Foreign Direct Investment (FDI) forms, the companies choose. Market entry strategies have greatly been discussed in the literature; however, in investment strategies, authors mostly refer to FDI in general, not distinguishing between the two main forms of horizontal or vertical FDI.

2.1 Investment Strategies

The Mexican energy market has recently been reformed and been opened up for foreign investment. Businesses have a great deal of options on how to enter the Mexican market, which defines their investment strategies. As investments need to be made to enter the market, investment strategies to enter the Mexican energy market in this thesis are closely linked to market entry strategies. The literature provides in-depth examinations of the different strategies and offers great possibilities to compare the different investment strategies that are suitable for U.S. energy companies. These strategies need to be examined in the context of the reformation of the energy market, as not all investment strategies are equally relevant for research of this thesis.

⁴ See also chapter 5

Exporting

Exporting is the most common strategy to enter another market and is connected to comparable limited costs for a company. The advantages are obvious, as there is no need for setting up operational facilities and the country can use economies of scale created in the home country for its exported products. Historically, there has always been importing and exporting from the U.S. and Mexico, these relations however have not been affected by the reformation as much as the U.S. companies investment strategies. The only relevance exporting would gain as strategy if it was applied to Mexican companies that are exporting electricity generated by renewable energy to the U.S. Since 2014, Energía Sierra Juarez (ESJ), a major wind farm in Baja California, is in operation and delivers electricity from the wind farm in Mexico to the South of California (EIA, 2014). Exporting, as it does not require a market reformation, is therefore not relevant for the examination of the impact on investment strategies.

Joint Ventures (JV)

In this market entry or investment strategy, a third company is created that is usually equally controlled by the two parenting companies. Both companies bring in their knowledge, capital, workforce or other capabilities to set up a new company in a particular market. This market in our case is Mexico; therefore a U.S. energy producer could set up a JV with a Mexican partner to jointly operate. In normal circumstances, profit or loss and risks are shared equally, making this investment form especially interesting for a U.S. company that is entering the Mexican market without having operated there before. If partnering with an already experienced company, this would give great benefits to the U.S. company and reduce the risk significantly.

On the other hand, a Mexican company could experience the technological know-how of the partner company. This, however, is the ideal case, in practical terms it is very difficult to find a suitable, trustworthy partner, especially when cultural differences are huge. This can also make integration as well as coordination very difficult for both companies. The Joint Venture would also be suitable for a market-entry as it can be set to a limited time, until, for example, goals or long-term strategies change, one partner wants to operate on its own risk and profit or it is

simply not that profitable any more. But exactly this is also the JV's Achilles' tendon: a separation or termination of the JV is very difficult and requires both parenting companies to be willing contribute to the liquidation of the business, which can have major financial implications for the company willing to terminate the JV (Johnson et al., 2011). Therefore a JV is usually the appropriate solution if both companies are willing to put effort and input factors into the JV, additionally both companies can maintain their business secrets to a certain extent, as they do not have to be part of the JV – bringing in core competencies might be a wise decision though, to positively contribute to the success of the JV.

Merger and Acquisition (M&A)

M&A activities of a company speak for themselves: either, the company merges with another target company to become a new company, losing its initial independence, or it acquires another target company, which then becomes part of the already existing company. Mergers or acquisitions offer great possibilities for those, wanting to engage themselves in a previously unknown market: a merger can facilitate the growth of market share, if both companies participate in the same market. In the case of the Mexican reformation, it will be more likely to participate in the market growth and gaining new market share, as only now investments in the Mexican market are permitted. Additionally, companies can diversify their risks, which is also a very precious factor when entering the Mexican energy market and the company wanting to do so has no experience in the market yet (Deloitte, 2015). If this is the case, then the U.S. energy company might also profit from new competencies, although this is probably more likely to be true the other way round: Mexican energy companies, due to state-interventions, are hardly able to develop need the know-how and competence of foreign companies to make the best use of their resources; this is true for both fossil energies as well as the growing renewable energy sector. The concept of an acquisition is the more likely scenario: as there are only little and small companies existing that a foreign company could merge with, an acquisition of an independent power producer (IPP) seems to be much more likely, especially in the light of the financial power of U.S. companies. Additionally due to the fact that the big companies in Mexico are state-owned. However, also with M&A activities there are some risks involved: finding a suitable company is difficult, integrating it or both parts is even more challenging –

especially, if the companies are of the same structure as in the Mexican market, with a few dominant state-owned companies and a handful of small, regionally operating and not highly developed companies. Additionally, cultural differences may occur and the companies might face regulatory restrictions due to increased market power.

Cooperation and alliances

Cooperation between two companies, or as an even broader term “partnering”, can take a variety of different forms - from loose cooperation with a local company to strategic alliances, where companies are dependent upon each other for their success. Cooperation usually starts with two companies sharing ideas and resources for business purposes. Cooperation can take place in any part of the value chain, such as marketing, contracting, external consultancy, production or others. There are almost no limitations in terms of existing contract forms; therefore cooperation can be established from a short-term contractual basis to an infinite length long-term contract. The content is also up to the degree of cooperation: from single business units and cost centres to core competencies and entire value chains – every part of the company’s value chain can be comprised by cooperation. This underlines the need for a more precise and limited definition of the term. Cooperation is usually defined as two or more companies or business units working together on a contractual basis, which offers a broad room for interpretation. For the research of this thesis, transnational cooperation is the most relevant form of cooperation, as it involves international firms, in this case from the U.S. and Mexico. The European Commission offers a comprehensive definition of the term (European Commission, 2014):

“Transnational business cooperation is a set of business alliances or agreements between entities / business organisations or companies in different countries, applied as a strategy for dealing with internationalisation, or for developing joint activities with an international focus.”

This definition offers a vital limitation for the term used in this thesis, as it underlines the importance of internationalization. At the same time, the method of cooperation cannot be defined in more detail, as this would exclude unusually cooperating businesses.

Alliances are another form of cooperation between two or more business. However, alliances are often referred to as strategic alliances, in which case an alliance is cooperation between businesses to achieve strategic goals that neither would be able to meet without the alliance. Similarly to the transnational cooperation, businesses stay independent but share control and benefits of the alliance. Alliances are mainly formed in an international context, the duration and the time period is determined freely by the involved parties but usually has underlying contracts for the mid- or long-term perspective, as shorter time periods would hardly justify the efforts put into a strategic alliance. Forming alliances or cooperation can bear major benefits for both sides, among which learning effects from core competencies from the other part, reducing and distributing costs, joined economies of scale and securing market share the most important ones. Some countries require alliances with local businesses to permit the foreign country access to the local market. The danger on the other side lies within the sharing of knowledge and the little effort requiring termination of the alliance by each partner. Additionally, it can be challenging to find a suitable alliance partner and additionally, trade commissions and regulatory authorities often impose special regulations on alliances to prevent them from terminating competition (*Yushino & Srinivasa Rangan, 1995*).

Subsidiaries

Another strategy of how to invest in a new market is setting up a subsidiary in the foreign market without any involvement of other companies. In relation to subsidiaries, the term “green field investment” is often used, as the market in is still green, hence undeveloped, for the interested company. The company sets up a new subsidiary in the desired market, via operating it fully owned and receiving all the profits from the subsidiary. Greenfield investments are also often described as setting up wholly owned subsidiaries in the new market. Green field investments require the greatest commitment and involvement of the home company in respect to the international business (Tradestart, 2015). Due to lack of knowledge and expertise in the foreign market, this strategy requires the most effort and can get very cost-intensive. Additionally, a slower start-up of the subsidiary is a risk, as unforeseeable events are likely to occur when operating independently in a foreign market. Nevertheless, setting up a subsidiary via green field investment has great

upsides, such as the already in-house given feasibility due to the same company structure and the possibility of creating the business in the best suitable way. Furthermore there is no risk of overpayment, which is usually given with acquisitions, and the home company is in full control of the subsidiary. It is therefore the most appropriate when there is a lack of acquisition targets and then the company has some in-house local expertise. In the case of the Mexican energy market, this would be a viable option, as the number of promising companies for acquisition might still be limited due to the very recent opening of the market (Aguilera, unknown).

Licensing

This form of entry is usually taken on when the home company is not willing to physically engage in a market, but the market offers good possibilities for profit creation. Additionally, investment levels can be very low and the access to local knowledge is given through the company that is awarded the license. In return for the permission of usage of technology or know-how, the foreign company is paying a royalty or fee to the home company. In licensing agreements, the home company usually has little control over the licensee and in some cases could even create a potential competitor. In the case of the reformation of Mexico's energy market, a technological license for the building of renewable energy power plants would be the most prone type, but it seems unlikely that U.S. companies would transfer their advanced technology to Mexican energy and construction companies. Additionally, the U.S. business would neither directly nor physically be engaged in the Mexican market and Mexico is lacking a sufficient number of suitable companies to support the decision of a license being awarded. Therefore this type of investment strategy is not relevant for the research of this thesis.

Alongside the aforementioned investment strategies to access new markets, a handful of more specific strategies exist, that comprise for example franchising, piggybacking or turnkey projects. In particular situations, these strategies can provide greater benefits than the strategies mentioned, however they have no relevance for the research connected to this research as they involve physical product-related strategies, product portfolios or the service sector. Investment

strategies all involve foreign direct investment (FDI), which is discussed in detail in the following. The different forms of FDI are examined through their relatedness, whereas the herein mentioned investment strategies are distinct through ownership.

2.2 Foreign direct investment

Foreign direct investment (FDI) is one of the key factors of globalization and enables businesses and organizations to overleap boundaries of national or domestic markets, benefitting the investor - if properly implemented - and creating strong ties between countries' economies.

In business literature and international organizations, FDI is usually defined as cross-border investment from a business residing in one country and investing in a business residing in another country. It is also important that the investor is aiming to acquire lasting interest in the enterprise residing in the foreign country and to establish a long-term relationship (IMF, 1993; OECD, 2013; Al Bawaba, 2013). In terms of FDI, the literature shows a very consistent picture of the definitions used with only marginal deviations, if any. Furthermore, the OECD as well as Al Bawaba and others speak about a stake of at least 10% of the voting power in the entity residing in the foreign country to be able to define the investment as FDI. This is due to the fact that FDI requires noteworthy influence of the investor and as this is subject to some vagueness in definition, the 10% threshold is commonly used as representing the investors' influence. In this context it needs to be mentioned that an "investor" needs to be seen as an entity, a business, an organization or the like with interest in a long-lasting relationship, rather than a person or businesses such as investment companies, without short- to mid-term profit as mayor interests.

The reasons, why FDI is a key factor of globalization is obvious: it grants great benefits to the investor and the country the investments apply to. The country in which investments are being made, encounters a boost in its economic development due to the financial inflow. Another possible benefit for the foreign country is therefore an increase of the employment rate in regions with high numbers of unemployed (Graham 2004). Lahiri and Ono (1998) describe the benefits in similar terms: speaking about FDI facilitating government policies, they state that this will have "two effects on the host country's welfare". These two

effects comprise the employment effect - generally increasing employment - and the price-lowering effect, creating more competition and therefore decreasing local prices. Graham additionally states that the economic development might prosper from a transfer of technological or production knowledge from the investor to the entity of the foreign country, if sufficient technology transfer channels are established. On an overall perspective, it can be said that FDI creates economic and welfare development as such.

When taking a look at the benefits for the investor, the gains are even more striking. For the investor, FDI facilitates the capability of overcoming trade barriers and to reduce governmental pressure on local production. At the same time, FDI furthermore offers the highly valued advantage of granting access to natural, labour and technological resources whilst still being able to keep intellectual property within the company (Chandra Jha & Ghosh 2012). FDI offers the possibility of investing in well-run companies around the globe, neglecting national restrictions for foreign investors or other country specifics and thus, investments can be applied to the best possible prospects (Amadeo, 2014). Furthermore FDI facilitates the avoidance of all kind of costs that are involved in trading with the foreign country of interest, thus FDI attractiveness is also evaluated on a cost basis (Glass 2008). According to Amadeo, U.S. Economy Expert, the critical success factor however is that FDI can be applied unrestrictedly. This is especially important for the examination part of this thesis, as the applied restrictions in the Mexican energy market had fundamental implications for the FDI inflows of the country and its business sectors.

2.2.1 Horizontal foreign direct investment (HFDI)

Foreign direct investment as driver for international business can mainly be divided into two specific types or directions, horizontal and vertical FDI. There are different approaches of how to differentiate between these two forms of FDI, but firstly a clear understanding of horizontal and vertical FDI is needed.

HFDI aims to duplicate the exact same activities as being done in the home country at the same stage of the value creation process in at least one other country, while the headquarters still remain in the countries of origin. Companies engaging in HFDI produce the same good or service in at least two locations, the

home country and the foreign country. The main goal of these production plants, sites or service locations is not to serve the home market of the originator of the investment, but the local markets of wherever these plants are located (Protsenko, 2003). Although there might be several reasons for engaging in HFDI (consistent with the benefits of FDI in 2.2), the main motivation in the referring literature for this type of FDI is of “market-seeking” nature, thus concerned about market access (Guerin & Manzocchi, 2007; Yokota & Tomohara, 2009). The major benefit of the horizontal approach is the avoidance of costs that are associated with trading, including tariffs and all kinds of transportation costs (Yokota & Tomohara, 2009). This also underlines clearly, why companies or investors engage in HFDI: they are interested in market access while searching for a way to avoid transportation or other trading costs. Traditionally, the vast majority of FDI decisions are in favour of the HFDI approach. The reason for this imbalance between HFDI and VFDI is that FDI is usually attracted by bulky, promising markets rather than by factors related to production, such as wages or technological standards (see Glass, 2008). Protsenko (2003) again identified three features of HFDI, which is consistent with the literature about this topic and offers a comprehensive summary of the benefits and underlying assumptions aforementioned: Firstly, HFDI serves a local market and thus curtails exports to the country from which the investment was initiated. Secondly and logically following up, HFDI is more likely to occur if importing costs are high and investment costs are low. If this would not be the case, simple exporting would be more profitable for the investing entity. Thirdly, HFDI is more likely to take place if the foreign market is large and therefore investment costs in production plants or service facilities can be distributed among a bigger number of products or services. All these three factors are fundamentals of today’s global business environment and again underline the importance of FDI in business internationalization and the globalization process.

2.2.2 Vertical foreign direct investment (VFDI)

VFDI takes place when the organization moves from a specific stage in the value creation process to another level, thus locating different production stages in different countries. The term “vertical” refers to the value chain or the value

creation process of an organization, in which the stages are usually displayed on a vertical axis as they are carried out one after another. In the area of VFDI, the production process is usually split up into more than two locations, while – similar to the HFDI – the headquarter stays in the investment initiating country. For that very reason of a split production chain, the main motivation for VFDI is to select suitable markets on the basis of input costs (Yokota & Tomohara, 2009). Chandra Jha & Ghosh (2012) however are also writing about “upstream or downstream” movements in different value chains and state, that not entire parts of the value chain need to be located in another country, but any value-adding activity.

The literature offers consistency about the main aim of VFDI: in opposition to HFDI, it is not entering (big and profitable) markets, but to minimize input costs (Glass, 2008; Guerin & Manzocchi, 2007; Aizenman & Marion, 2001). Unlike the horizontal form, organizations pursuing VFDI engage in exports as well as FDI, which is due to the cost minimization aim and the consequent export from the invested country to the country of investment initiation. In this respect, VFDI is also often called outsourcing or offshoring (Glass, 2008). This is a fundamental difference in the two types and emphasizes that the suitability of the selection of HFDI or VFDI is given by the strategic fit. Therefore, a profound understanding of the organization’s strategy is required to make a sensible and in the end effective choice between those two forms of FDI.⁵

2.2.3 Differentiation approaches and distinction

The two forms of HFDI and VFDI are of different aim and motivation. However, it is not always possible to draw a clear line between those two forms and find criteria for the differentiation. The literature provides three possible approaches for the differentiation between those two forms: Differentiation through the input-output relationship, differentiation through market-orientation and differentiation through output export (Protsenko, 2003).

Differentiation through the input-output relationship is based on the examinations of Helpman (1984) and defines investments as VFDI in respect of the possible

⁵ In this respect, we are assuming that the organizations fulfil the FDI requirement of a long-term interest in the investment country (see 2.2). Thus, investment banks or other investors, who might solely have a short-term interest in the foreign market and the profit generated by FDI and are not involved in the strategic decisions of the organizations, do not have the strategic necessity to make this choice.

cases: (1) the organization, in which the investor invested in, receives a fundamental share of input factors from the investor or (2) said organization exports any output to the investing organization. If neither of these criteria are met, the investment is classified as HFDI.

Differentiation through market-orientation focuses on the degree, to which the organization in the foreign country also serves the foreign market. This type of differentiation defines HFDI as investments in an organization, which purely serves the foreign market and thus does not have any ties connected to serving the home market of the investor. Again, this type is based on the method of elimination: each FDI, which does not meet the aforementioned requirement, is defined as VFDI (Lankes & Venables, 1997).

Differentiation through output export is a combination of the two already mentioned types of differentiations. An investment in an organization, that exports less than the half of its output, is classified as HFDI. In every other case, where this requirement is not met, the investment is classified as VFDI (Protsenko, 2003). This type of differentiation offers more swing and clearly identifies a much greater portion of FDIs as HFDI, which is due to the high threshold of 50% of output exported.

The three types of differentiation are grounded on the main underlying definition-based distinctions between HFDI and VFDI. Nevertheless, there are other factors involved that entail different implications for the investor. These factors are of political nature and are especially important, if the investment is made in a developing or transition country, where political systems have historically proven to be less stable.

Interestingly, Aizenman (1991) and thereof evolving Guerin and Manzocchi (2007) draw the attention to a very different factor – the possibility of expropriation. They state that VFDI is connected to stronger trade dependency than HFDI, as VFDI provides a greater share of output for exporting purposes (see differentiation approaches). The costs for the foreign country are higher for an expropriation of VFDI, as it will probably face retaliation by the trading partner. Therefore, VFDI is less likely to be exposed to this risk compared to HFDI.

Another factor is connected to political and economic uncertainty, based on Aizenman and Marion (2004). In their model, they illustrate that the expected

return on VFDI is significantly smaller than the expected return of HFDI, when the foreign country is exposed to political and economic uncertainty. This is due to the fact that VFDI usually consists of an entire part of the investor's value chain or a crucial value-adding activity. Logically, the described instability can lead to a convulsion of the investor's entire value chain. Again, this factor is especially important when talking about transition or developing countries, where political and economic uncertainties occur more often.

2.3 Renewable energy development

Renewable energy is often referred to as “new” types of energy, but most of what we consider renewable energy today was for a long time the only sources of energy we had access to. Bound by the period's given technology level, humans were simply limited to these forms of energy. It was not until the industrial revolution that the fossil fuels were starting to be used in large scale. During this time, the first-generation technologies of renewables appeared. These consist of biomass combustion, hydropower and geothermal power and heat, where some of them are still in widespread use. Second-generation technologies consist of solar and wind power and modern forms of bioenergy. The third-generation technologies are still being developed and mainly include oceanic energy, enhanced geothermal systems and integrated bioenergy systems (IEA, 2007).

Mexico in itself has an abundance of natural renewable resources that could be harvested. The country is located between two oceans, has a great share of coastline and is located close to the equator, providing it with great possibilities for solar, wind, oceanic and other renewable energies development. In the Northern part of Mexico the hydropower potential has been exploited to a large degree, but the Southern part still has a large percentage of untapped potential. The historical development can provide an indication for future development. The historical development is important to be addressed, as the several different energy forms are not developed to the same extent. While some still require great efforts for making them an economically feasible option, others are already efficient and affordable today. With the exception of hydropower renewable energy still are based of technology that can undergo significant improvements, though the needed investment and research needed varies from type to type. An

understanding of in which phase the single developments are located right now, it is inevitable to look at the development undergone so far. With this knowledge, a required understanding about the feasibility of single investments in the various energy forms can be provided.

2.3.1 First-generation renewables – Hydro, geothermal power & biomass

Long before hydropower was used to produce electricity it was used in China to perform simple labour intensive tasks dated back about 2000 years ago when the waterwheel was used (J.Raabe, 1987). Hydropower has undergone tremendous change, not only from the early regional reach in its infancy to its global spread, but also regarding the technological changes. The major change towards developing hydropower under today's understanding would not occur until the late 1800s, when the hydraulic turbines were introduced. This was the first time electric power could be produced from hydropower. Since the world's first commercial scale hydroelectric plant opened in 1882, the world adopted this technology quickly and already by the end of the 1880s the U.S. had about 200 hydroelectric plants (Government of Alberta, 2015^A). Today, hydroelectric power still plays a hugely important role by generating more than 16 % of worldwide electricity and about 85 % of global renewable electricity (IEA, 2015^B). At the end of 2008, more than 160 countries global had installed hydropower resources capacity, more than 11,000 hydro power plants were installed which had a capacity of 874 GW. By 2015, the total installed capacity has already reached 1.31 TW, which shows the rapid growth of hydropower use (WEC, 2015).

When it comes to geothermal energy, archaeological evidence shows this form of energy has been in use since the early Neolithic period (ca. 10000 BC) by native North Americans (Cataldi, 1993). The first time however, geothermal power was used to produce electricity was in the early 1900s, in Larderello, Italy (Tiwari, 2005). Larderello was also the site of the world's first commercially useable geothermal power plant (Government of Alberta, 2015^A). By 2013, global geothermal electricity generation capacity reached 12 GW, of which Larderello and surrounding areas contributed massive 769 MW, approximately producing enough

energy for 2 million families in Italy (REN21, 2014; Enel, 2013). Compared to hydropower, geothermal power plays a smaller role but has been developed significantly within the decade, making it an economically feasible alternative for electricity generation.

Biomass as energy form is a broad term given to a comprehensive list of different organic material, where plants, wood products, crops and dung are usually referred to as traditional biomass. It is defined as following:

“Biomass is any organic i.e. decomposable, matter derived from plants or animals available on a renewable basis. Biomass includes wood and agricultural crops, herbaceous and woody energy crops, municipal organic wastes as well as manure” (IEA, 2015^C).

The claims for first controlled use of fire by humans have a range of approximately 1,5 million years ago (James, 1989). Biomass, a major factor for the development of mankind, later helped to bolster the production of tools and weapons in the Middle Ages. Today, 10 % of the world’s primary supply is covered by bioenergy, where most of it is used for cooking and heating which again is mainly true for third-world countries. Apart from this traditional use, modern bioenergy has newly been developed and has experienced steady growth the last decade. There are several technologies for heat- and power generation, but today’s probably most important role of bioenergy is electricity generation. In 2012, bioenergy electricity generation was responsible for 1,5% of the world’s electricity generation, equivalent to 370 TWh (IEA, 2015^C).

To sum up, the first-generation technologies have already been in use for several millennia and have proven to be important for humanity’s development. They are also used in great variety in the electricity sector. Until today, hydropower, geothermal and biomass energy still provide some potential for further development, which is especially true for the two latter ones. A certain degree of technological maturity has only been reached by hydropower, which is also an important energy source in Mexico and can already be implemented efficiently. This maturity makes hydropower investments in Mexico also interesting for foreign investors.

2.3.2 Second-generation renewables – Wind & solar power

While the first-generation technologies of renewables could easily be adapted to produce electrical energy, the second-generation technologies would prove to demand more economic support and technological development. Even though the technology for producing electricity from solar- and wind power has been around from the mid to late 1800s, they did not manage to be competitive until recently (Cardwell, 2014). This newfound competitiveness is partly due to the oil crisis in the 1970s, after which the OECD countries started to fund more research in, and give tax incentives to, alternative energy sources, which is addressed in detail below (Middlebury College, unknown).

The first documented usage of wind power occurred about 7000 years ago when wind power was used for sailing and further on transportation (Carter, 2006). Wind power was not only used for transportation, it was also used for grinding grain and pumping water in ancient times and played an important role for economic and cultural development until steam power was introduced in the late 1800s (Shepherd, 1990). Today's development of wind power, however, has accelerated immensely: The global wind power capacity has grown by a factor of 16 from 2000 to 2012 and in the U.S. alone by a factor of 25 (U.S. D.o.E., 2013). The member countries of the IEA Wind organization alone, which includes Mexico, in 2013 had an installed wind capacity of 268,8 GW of wind power of which 6,6 GW was offshore wind (IEA Wind, 2014). Compared to the total world capacity, which was 318 GW (REN21, 2014), the great majority of the wind power investments have come from IEA Wind members.

Solar power on the other hand took much longer to develop technological maturity. Except sundials being used thousands of years ago, solar technology underwent the first modern development in the beginning of the 1800s when researchers used focused sunlight with lenses and the use of mirrors to bundle energy. This technology made it possible to manufacture for example solar powered steam engines, which marks the first effective usage of solar power as alternative and green energy source (Government of Alberta, 2015^C). Today, solar power is used in sophisticated technologies as solar photovoltaics (PV) and Concentrating Solar

Power (CSP), while it was not until 1894 that the first “modern” solar cell was created. This solar cell had only 1% efficiency and it took 60 years to create a solar cell that had an efficiency rate of 4% - but it had the cost of \$8,800 in today's terms⁶ (Lund, et. al., 2008). In 1973 the rapid commercial development started, as 80% less costly solar cells were developed. This, in addition to the 1973 energy crisis, lead governments to invest heavily in alternative energy sources (The Government of Alberta, 2015^C). Only in 1985, solar cells reached 20% efficiency – the same efficiency rate is used in today's solar panels, which indicates that technological development of solar power took almost 30 years to make this efficiency rate commercially usable (Lund, et. al, 2008). Today, global solar energy capacity has increased by 136 GW within ten years (2004-2014), making the total installed capacity approximately 140 GW, of which Europe holds 81 GW (REN21, 2014). Solar power is one of the energy sources with the highest growth rates and due to its reached economical soundness, is predicted to increase greatly within the next years (EPIA, 2008).

In many regions of the world, solar and wind power today are developed further, which is not only true for already developed but also newly industrialized countries like Mexico. For Mexico, these possibilities for further development are plentiful, which is due to two reasons: solar and wind power can be used in a financially feasible matter and Mexico, with an abundance of sun light and steady wind due to its location, has great natural resources. The current technological maturity of both make investments in those energy forms in Mexico a vital option towards the goal of a greener energy use in the future.

2.3.3 Third-generation renewables – Wave & tidal power

Third-generation technologies are the most recent forms of generation technologies and are being implemented in several places, from Australia to Norway and Scotland (Hammerfest Strøm, 2012). Both energy forms are experiencing technical and financial challenges, making a number of wave power companies' defaulting recently (Bloomberg New Energy Finance, 2014).

Tidal energy use in mills dates back to 787 A.D. and was in use in Britain, Spain and France (The Ocean Energy Council, 2014). Tidal power is one of very few

⁶ Estimated with the U.S. Inflation Calculator to \$8800 corresponding to \$1000 in 1954 (Original figure Lund, et. al., 2008)

energy sources that does not derive from the sun directly or indirectly, but instead is derived from the Earth-Moon system. This makes tidal power much more predictable than many of its fellow renewable energy sources, e.g. solar and wind. Although harnessing oceanic power was initially examined in the late 1700s, it was not properly materialized until the 1970s oil crisis (Ross, 1995). While the world's first commercial wave power station was starting operation recently, experts seem to agree that wave power lacks decades worth of research and financial support, to catch up with other types of renewables (Russia Today, 2015; Levitan, 2014). In 2008, an international wind farm had to be closed in the same year it was opened and until today remains closed, as the wave energy converters (WEC's) had to be removed due to technical issues. This illustrates that the technology for tidal and wave power currently has not reached economical soundness or a mature efficiency standard (Postelwait, 2010). The world's oceans however, cover about 71 % of the world's surface with waves rippling across it fairly continuously, making it a huge and largely untapped energy resource. It seems obvious that especially countries with a big share of shore will be able to exploit these resources, as for example Mexico, directly located between the North Pacific Ocean and the Mexican Gulf.

In general respect to the renewable energies developments, we can see the differences between the different technologies and their technological advancement: while some technologies have made huge improvements and are already efficiently usable (especially hydro and wind power, as well as solar power), other technologies will still have to go through a process of further development (especially tidal and wave power) to be financially feasible. This is important to notice, as this makes the evaluation of renewable energy developments in Mexico easier understandable and at the same time offers insights, of how the future energy types might develop. However, there is no doubt that Mexico, being located so closely to the equator and between two oceans, will have great possibilities to invest in the majority of these forms of renewable energies. The development of renewable energy sources in Mexico is also addressed in later chapters, which offer greater insights about which energy forms the Mexican government favours and where investments have already been made.

3 Mexico's energy market development – restrictions, renewables and reformation

The Mexican energy market has undergone tremendous change within the last 20 years and is facing the shift from a nationalized energy market to an open market welcoming foreign investments. To understand what the later addressed reformation means for the country, it is necessary to take a look at the energy market development, as a great many laws, decrees and mechanisms are still in force today. Naturally, the imposed restrictions had the gravest impact on the development of the energy sector and renewable energies. At the same time however, they also highly influenced the role of the U.S. and the country's overall development, which made a market reformation inevitable.

3.1 The development of Mexico's energy market structure

The Mexican energy market had faced tight regulation for almost 80 years, already beginning in the 1930s and lasting until 2013. The causes of this felt need to protect the Mexican energy market - and back then the entire Mexican economy - dates back to even earlier times, starting around 1910. This year marks the beginning of the Mexican revolution, which should last for the next 10 years until 1920. During the revolution, foreign presences in Mexico were attacked for the first time, which also greatly influenced the public opinion and in further consequence was one of the reasons for the establishment of the Mexican Constitution of 1917. This document set the cornerstone for the nationalization, also called "mexicanization" ⁷, of the Mexican economy, which also implied strict interventionism of the Mexican state (Parra, 1988).

However, it would take 20 more years until the nationalization of the Mexican energy market became effective. No further legislation specifically aiming at the electricity sector was passed until 1926, when the first major legislative change took place (Herrera y Lasso, 1926). In this year, the "Código Nacional Eléctrico", a national code for electricity, was enforced. The outcome of the legislative change

⁷ NB: translated from the Spanish word "mexicanización" (Parra, 1988)

was also a change in the constitution: from now on, the electricity industry in Mexico was a public service⁸ (Parra, 1988).

In 1937, the Federal Electricity Commission (CFE)⁹ was founded: Mexico's biggest state-owned electricity company, which can be seen as the effective beginning of the nationalization of the Mexican energy sector. CFE as of today is the second-biggest state-owned company in Mexico after PEMEX, with a net income of more than \$680 bln, employing more than 80.000 people (Rivera, 2014). Furthermore, CFE is Mexico's biggest electricity generating company and thus has been in control of a major part of the electricity sector since its foundation. The U.S. Energy Information Administration (EIA) today describes CFE's market power as "controlling over three-quarters of the country's installed generating capacity" (EIA, 2014).

The imposition of the Código Nacional Electrico and the later foundations of the CFE and PEMEX initialized the market nationalization, strongly opposing to free market competition. However, this development was also seen as a big success of the Mexican revolution by socialist movements: the state had managed to obtain ownership of Mexico's mineral rights, while ruling out any privatization (and therefore capitalization as such) of its natural resources and had secured its own energy sovereignty (Rivera, 2014).

The nationalization and the implied low tariffs for many regions in Mexico led to a minimized private investment in the electricity sector for the next decades. The lack of private investment in the expansion of the capacity and the sharply increasing electricity demand growth in Mexico lead to an even more intensified situation, as even more governmental interventions were required to cope with the tense situation of meeting demand with supply (Davis et al., 2012). CFE, the dominant player and state-owned electricity supplier, was mainly financed through public investments as direct taxes, federal investments and small shares of local and foreign debt (Carreón & Jiménez, 2005) – again underlining the degree of nationalization of the electricity market.

In 1960, the next fundamental change took place, as the nationalization was now constitutionally formalized, stating:

⁸ NB: translated from the Spanish "utilidad pública", meaning public utilization, public use or service (Parra, 1988)

⁹ NB: originally in Spanish called "Comisión Federal de Electricidad" (CFE)

“Only Mexicans by birth or naturalization and Mexican companies have the right to acquire ownership of lands, waters, and their appurtenances, or to obtain concessions for the exploitation of mines or of waters.[...] Under no circumstances may foreigners acquire direct ownership of lands or waters within a zone of one hundred kilometers along the frontiers and of fifty kilometers along the shores of the country.” (PAU, 1968)

Additionally, this situation was amplified by the incorporation of the company LFC (Luz y Fuerza del Centro), which was the second electricity company owned by the state. From a diversified market structure with small, regional monopolies supplying local regions and a variety of independent electricity producers, the electricity supply industry had converted into a “vertically integrated state owned monopoly” (Carreón & Jiménez, 2005), consisting of two companies: CFE and LFC, which until today are the main players in the country’s electricity sector.

In 1975, the nationalization was about to reach its final stage: the Law of Public Service of Electricity was imposed, claiming that CFE and LFC would be the exclusive public suppliers of electricity. This was especially critical as CFE was more and more struggling to meet the high and steadily growing energy demand (Davis et al. 2012). The electricity demand doubled within 13 years, from 500 kWh per capita in 1970 to almost 1,000 kWh in the year of 1983 and was growing with equal pace until the year 1989 (see following figure). The yearly needed capacity could only be met with difficulties, as there were no private investments being made to facilitate the installed electricity capacity.

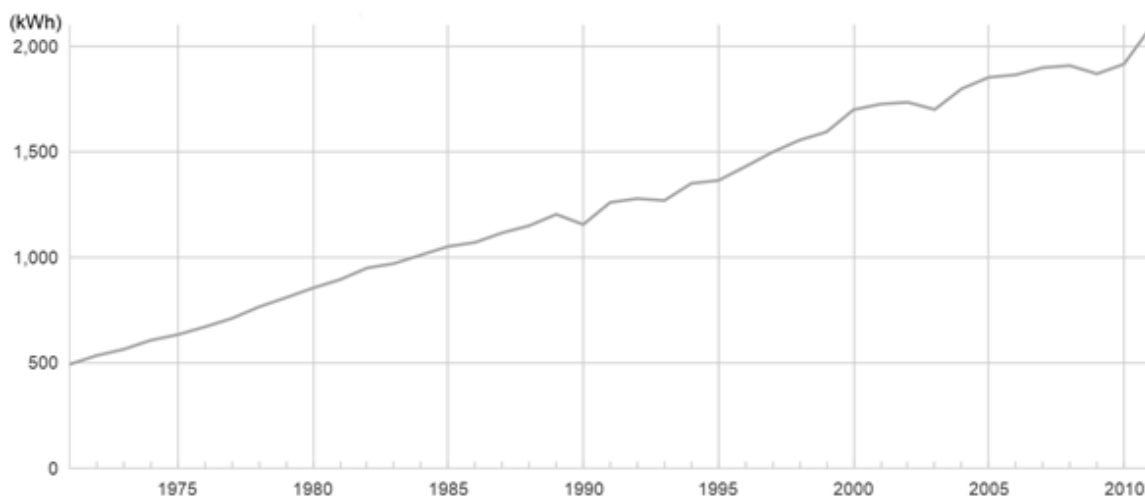


Figure 4 – Mexican demand growth in electricity consumption per capita

Source: World Bank (2015)

The nationalized market and the exclusion of private persons from concessions for electricity generation and a deficit of 7.5% of the domestic GDP in 1980 (Carreón-Rodríguez et al, 2003) took a heavy toll on Mexico's financial situation: in 1982, Mexico defaulted on the re-payment of its foreign debt as the first Latin American economies – with several other Latin American countries to follow within the next decade. The financial crisis and the default of the Mexican state lead to a period of stagnation: between 1982 and 1988, there was no economic growth at all and Mexico's foreign debt in 1987 had risen to 78% of the GDP (Brinke, 2013).

To fully understand the fundamental need for changes, this financial crisis needs to be seen in the context of the nationalization of the energy sector in the decades before. By the mid-80s, the Mexican government had acquired and outstanding amount of almost 1,000 businesses, covering almost every business sector and including airlines, metal foundries, distilleries, restaurants and night clubs. Additionally, the market power of the state-owned companies was enormous: it was estimated, that in 1985 and the years before, the effective market power of state-owned or partly state-owned companies enabled the government to control between 65% and 70% of all economic activity in Mexico (Los Angeles Times, 1985). The crisis showed that the nationalized market, in combination with a high degree of state interventionism, was not able to cope with the financial burdens the Mexican government had created in the years before. It was evident, that fundamental changes in the market structure were inevitable – this paved the way for the structural reforms in 1990s.

3.1.1 Partial reforms and leavening of restrictions

The financial crisis and the default of the Mexican government lead to the gradual reduction of the governmental interventionism and a wave of privatization in the following 20 years. The crisis can be seen as a wake-up call, being the cornerstone of the market and regulatory reforms in the 1990s. Mexico was undergoing a fundamental shift from preventing any foreign investment to seeking it. This happened after the crisis had proven that the country will not be able to nationalize the market while simultaneously meeting the increasing energy demand.

The first big step was made in 1992, when the Mexican government allowed IPPs (Independent Power Producers) to enter the electricity sector and to participate in the electricity production (Gaylord, 2015). IPPs are privately owned companies that were granted access to the electricity production market by the Mexican authorities. However, these IPPs were obliged to sell their generated electricity to CFE, thus did not experience free market competition, but served as instrument to extend the desperately needed electricity generation capacity. To allow IPP access, the LSPEE (Ley del Servicio Público de Energía Eléctrica, translated to Public Electricity Service Law), regulating the entire Mexican electricity market, was amended.

Despite the first reforms after decades of tight regulation, the Mexican economy was hit by another financial crisis in 1994 and the following year. With LFC and CFE not being allowed by the state's creditors to take on new debt, there was only one gateway for the Mexican government, which was the promotion of private sector investments (through IPP access to the market) to increase the installed capacity for electricity generation (Davis et al., 2012).

Emphasizing the need for investments in the electricity sector, the Mexican government in 1999 estimated the volume of investments required to maintain the electricity grid and to meet the future demand: within 10 years, investments of \$48.7 billion and a generation of 22,248 megawatts (MW) would have been needed. To accentuate the significance of this numbers, it needs to be outlined that the needed investments amounted to one fourth of the Mexican budget in the same year (Carreón & Jimenez, 2005). The capacity figure becomes even more dramatic when comparing it to other countries' total installed electricity generation capacity at that time: the amount needed of 22,248 MW nearly equalled to half of Spain's total installed capacity, amounted to Argentina's total installed capacity and equalled to the combined electricity generation capacity of Algeria, Morocco, Nigeria, Tunisia, Ivory Coast, Mozambique and Cameroon (TSP, 2015)¹⁰.

CFE was financially not in the situation to easily invest in renewable energy projects, and also needed the capacity for electricity production from IPPs. At the same time, it was a major goal to decrease dependency on oil and gas prices, which were the main sources for electricity generation in that period. However, to

¹⁰ All data retrieved from TSP represents the referring figures from 1999 for comparison purposes.

promote renewable energy for electricity production, the Secretariat of Energy (Secretaría de Energía) issued a directive in 2002, in which CFE was requested to establish wind power generation that needed to be financed by the company itself. With this complimentary ticket for investments, CFE could invest without having to justify the arising costs. Operation of the first wind plant started in 2007 and by 2008, CFE had built its plans for expansion of renewable energies around four more wind plants, of 100 MW each. This was a milestone, as at that time, it was the first large-scale wind energy investment in Mexico (Davis et al., 2012).

Before, by 2006, Mexico had a total installed capacity of electricity production of 54,460 MW, with a share of 25% deriving from renewable energies but a total amount of only 85 MW installed capacity from wind power (compared to 11,372 MW in hydropower, 960 MW in geothermal power and 485 MW in biomass). As examined in the previous chapter, wind power was already a commercially usable option at that time and needed no further development. The renewables sector needed investments from the private sector, as the installed electricity capacity at that time was still heavily influenced by the nationalization and practically the entire capacity was provided by CFE or LFC (Barnés, 2006).

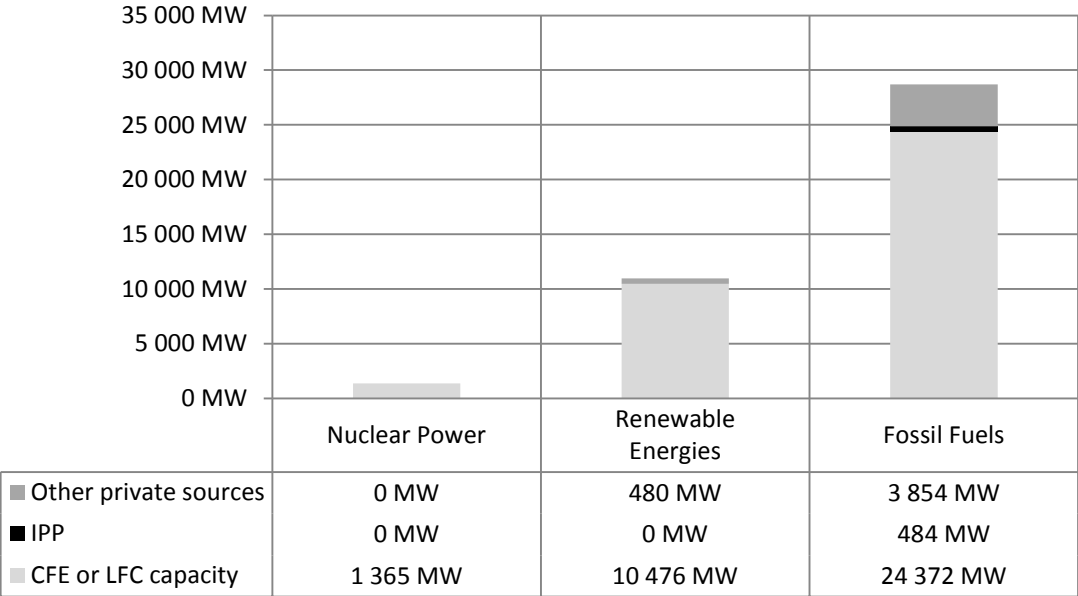


Figure 5 – Installed power capacity in Mexico by type – 2006

Data Source: Barnés (2009)

It would take until the year 2008 for the Mexican government to introduce new regulatory reforms in the electricity sector. The first legislation, that solely target

renewable energies, was enforced in 2008 by the Mexican Congress. The REL (Renewable Energies Law)¹¹ can be seen as the first major document to pave the way for the promotion of profound usage of renewable energies, at the same time the law was aimed to decrease Mexico's dependency on fossil fuels (CEE, 2013).

By 2012, the structural reforms for private investment and the focus on renewable energies visibly started to bear fruits: for wind energy, the improvements of the projects led by the government were enormous: by 2012, 6 years after the first bidding for wind capacity and a total installed power capacity from wind of 85 MW, the number had risen to 1240 MW, 15 times the amount of the capacity in 2006 (Masullo & Brown, 2014).

All in all, the permission for IPP investments and the regulatory changes seemed to pay off, although the first was mainly due to overcoming the lack of electricity generation capacity. The regulatory changes paved the way for the development of renewable energies in the country, enabling it to gradually reduce its dependence on fossil fuels for electricity production, while still meeting the rapidly growing demand. However, further changes in legislation, regulations and administration were required to ensure prosperous future development of the Mexican energy and electricity sector. It is important to bear in mind, how the different renewable energy forms developed in Mexico and where investments have been made, as this provides the basic understanding of the investments made or planned by companies today.

3.1.2 The Mexican business environment for U.S. investment

The historical business environment in Mexico is a crucial factor influencing the success of the implementation of the energy reforms. A reform can be strong on paper, but without creating an interesting business environment, the most effective reform will come to grief. Having a poor reputation of how business is or can be conducted can deter companies from investing or impede them from undertaking any form of business with or in a country. To illustrate the most important characteristics of Mexican business environment, a combination of the corruption index and the ease of doing business is used. Comparing this environment with the business environment in the U.S. provides a perspective of how smooth and

¹¹ Originally, the imposed law is translated to Law for the Use of Renewable Energies and the Financing of the Energy Transition, but is commonly referred to the "Renewable Energies Law" (Lopez-Velarde & Valdez, 2010).

barrier-free U.S. organizations can conduct business in Mexico and if this may be a deterrent for investments. Reviewing a short historical development for corruption and ease of doing business for the given countries facilitates to shed some light on the business situation.

Historically, the U.S. has been viewed as one of the best places to do business, which is not only due to the language and the enormous size of the market. The question is to which extent business be done with ease in the U.S. compared to the Mexican business environment. The World Bank Group (2015) set up several indicators and measurements to provide an indication of how easy it is to conduct business in a country. The indicators have changed slightly and more have been added over time, but the overall ranking still provides a very good overview of the marked conditions. As these are country rankings it follows that the lower the number, the better the ranking.

	2007		2010		2014	
	Mexico	U.S.	Mexico	U.S.	Mexico	U.S.
Ease of doing business	43	3	51	4	39	7
Starting a business	61	3	90	8	67	46
Registering Property	79	10	99	12	29	110
Getting Credit	65	7	61	4	12	2
Paying Taxes	126	63	106	61	105	47
Trading Across Borders	86	11	74	18	44	16
Enforcing Contracts	87	6	81	8	57	41

Table 1 – Business environment comparison
Sources: World Bank Group (2015)

The U.S. is comparably high-ranked in almost every category the World Bank Group has provided indicators for. The U.S. are consistently in the top 7 for the main category of “Ease of doing business”, though with a slightly falling trend. Mexico on the other hand climbed in this ranking over time which is a proof of its economic development (including the development of the energy sector). There is a clear positive trend for businesses in Mexico, which is also consistent with the

leavening of restrictions in its energy sector addressed earlier. This trend can also be seen as an important factor to enhance the environment for investments made in the country.

On the other hand, corruption is also to be considered one of the most important factors to be considered, as corruption can not only slow down economic development but also cause major damage to a country’s national economy (Corruptionwatch, 2014). Following, a strong presence of corruption in a country is a major deterrent and strong hindrance when investing in another country. The following table illustrates the development of the corruption index comparing the U.S. and Mexico:

Corruption Index Ranking	2007	2010	2014
<i>Mexico</i>	72	98	103
<i>U.S.</i>	20	22	17

Table 2 – Corruption index comparison
Sources: Transparency International (2015)

Considering the development of the corruption index above, there appears to be a progressively worse development of the situation in Mexico, while the U.S. has a slightly fluctuating but consistent development. Out of 179 countries ranked in the index, Mexico rates in the lower half the later years. The U.S. managed to improve their corruption development, which is a contrary development to Mexico. This fact may have several major implications for U.S. companies conducting business in Mexico or planning to. Firstly, the high corruption rates may simply function as deterrence for foreign investments. Additionally, the general business reputation may suffer, which is due to wide use of corruption as a symbol for a mal-functioning national economy.

However, there is also a clear trend in Mexico opposing the trend of the Corruption Index Ranking: in the most important spheres for U.S. investments in the energy sector, substantial progress has been made: the ease of doing business, the registration of property, the trade across borders, the enforcement of contracts and the payment of taxes have all experienced significant improvements and now

provide a significantly better business environment for U.S. organizations than before. Additionally, it needs to be mentioned that these development all took place within seven years, from 2007 until 2014. Combining these factors in combination with the improvements in the energy sector, the business environment now allows the energy reform to be implemented more effectively than it would have only a few years ago.

3.1.3 The role of U.S. investments in the Mexican energy market

The nationalization of the Mexican energy market was the most defining political and economic decision for the Mexican market in more than 100 years. For decades, the natural resources were only developed by state-owned companies, not permitting any private entity to participate in electricity generation or resource development, not permitting market competition.

Due to its proximity and its size, the Mexican market however has always been attractive for the U.S. and vice versa. Due to the strict nationalization of the Mexican energy market, historically there has only been limited energy trade with the U.S. The nationalization had important implications for U.S. investments in the Mexican energy market: a country, without investment freedom and a very high degree of governmental interventionism in its financial sector, is highly unattractive due to the high unpredictability of business and corresponding investment risks (Miller & Kim, 2015). Aizenman and Marion (2001) also argue that NAFTA facilitated economic integration, whence a stronger mutual dependency of its members arose. This furthermore reduced sovereign risk and could have increased horizontal FDI and vertical FDI in further developments. The U.S., as the world's leading economic power, would have been able to invest greatly in the Mexican markets, especially the energy market, presumably facilitating economic, financial and technological development. In that sense it is very likely, that the nationalization, aimed to prevent exploitation, not only restricted easy access to resources from the U.S., but also Mexico's economic and technological development of the energy sector.

The non-existent FDI inflows in Mexico's oil and gas sector and the very limited inflows in its electricity sector until 2012, both due to restrictions, made any engagement in the Mexican energy sector almost impossible¹². The U.S., having

¹² Data about FDI inflows and outflows by sector are provided by the OECD:

had a negative energy-consumption to -production ratio for decades (see next figure), received substantial energy imports from Mexico, mainly in the form of crude oil. The figure impressively underlines the importance of Mexico’s energy resources for the U.S., especially when it comes to oil. The U.S. consumed significantly more energy than was domestically produced and at the same time, crude oil exports from Mexico to the U.S. rose substantially. It is noteworthy that this development took off in 1993, after Mexico had joined NAFTA. The Mexican energy resources were clearly important for the U.S.; not being able to invest in the Mexican energy market and gaining access to resources only via import, was truly an obstacle for the U.S. economy.

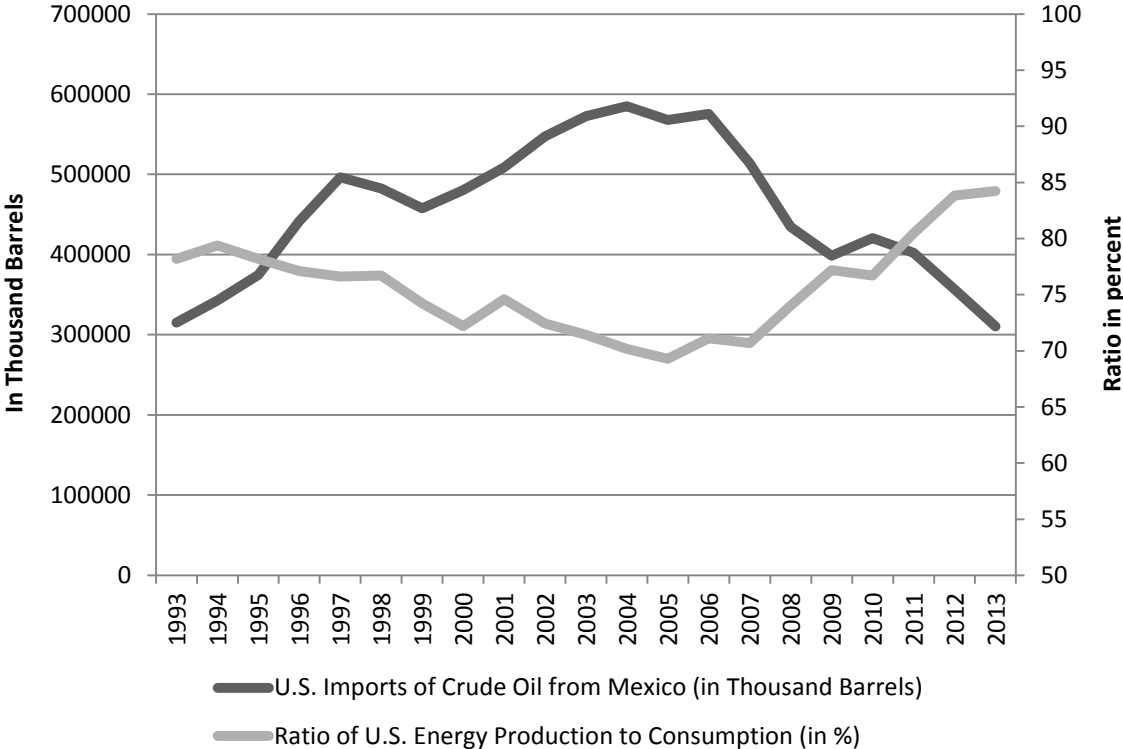


Figure 6 – Importance of Mexican oil for the U.S. (1993-2015)

Sources: EIA (2015)

Considering that only Canada and Mexico are proximate energy suppliers and only latter is not located in the world’s highest per capita energy consumption spheres, it can be assumed to which extent the U.S. economy would have been able to extract and exploit Mexican resources without the energy market nationalization.

On an overall picture we can see that the nationalization had major impacts: on U.S. investments, as investments in the oil and gas sector were rigorously restricted and investments in the electricity sector were only permitted to a notable extent in the beginning of the 1990s (CEE, 2013). These restrictions were aimed to protect the Mexican energy resources and the energy sector from foreign investors that were feared to exploit the resources but also had hampering effects for the development of the Mexican economy and especially the energy sector. Examining the above mentioned factors, it seems clear that although Mexico protected its energy sector, it missed out on the possibility of using financial resources, which certainly would have been provided by the U.S. through FDI, to further develop its energy sector. Mexico has now made the change, introducing new reforms to open up the market and attract FDI. It is obvious, that the U.S. play a key role in the development of the Mexican market, while Mexico is also important to the U.S. These factors, as stated before, also constitute the basis of this research and explain why the focus lies on U.S. organizations' investment strategies.

3.2 Renewable energies development in Mexico

Following the nationalization of the Mexican energy market, Mexico has only slowly developed its renewable energy sources, which is mainly due to the lack of financing. The next figure illustrates the slow change of the energy mix. Starting from the 1950s, in which renewables were already present, the renewables' share was constantly growing. This is also what the later discussed reformation of the energy market tries to stimulate.

Due to Mexico's natural resources, renewable energies were already present in 1889, 124 years before the Mexican energy market would be reformed to pave the way for a bigger share of renewable energies.

Already in 1889, 125 years before the reform was imposed, the first hydro generation plant was installed and should mark the beginning of Mexico's engagement in hydropower. According to EIA, Mexico has had a majority share of hydroelectric power in its electricity generation mix. In 1985, the share of hydroelectric power was outstanding 27.9% of total electricity consumption, until

the end of 2000, Mexico could still provide an average of about 18.7% of electricity generation dedicated purely to hydroelectric power.

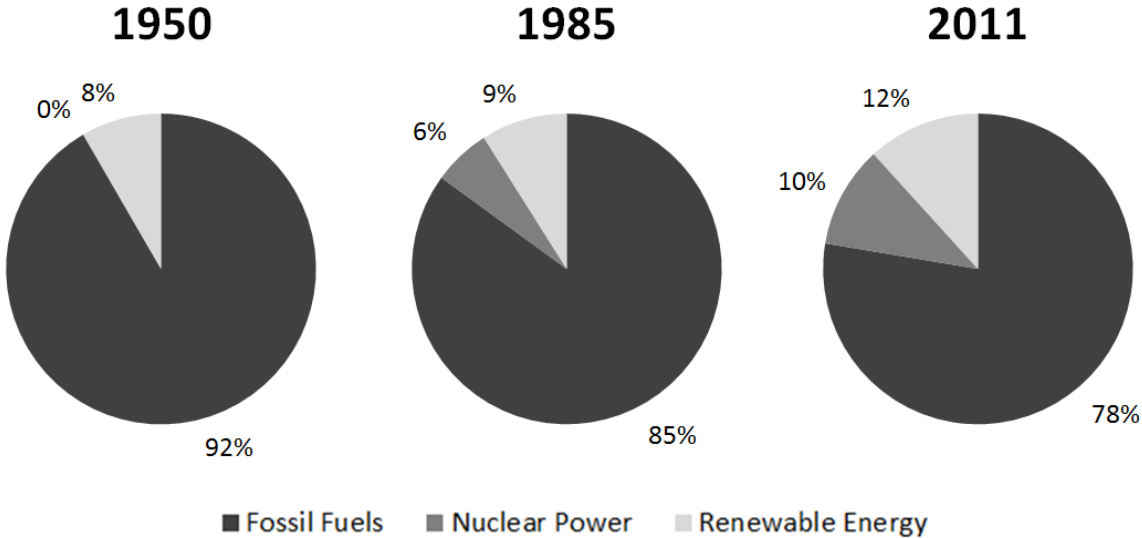


Figure 7 – Mexico’s energy production mix
Data Sources: EIA (2015)

The detailed historical listing of renewable energies in Mexico delivers a very interesting picture when it comes to different energy types. Geothermal energy, globally only number 5 in electricity production with a minor share, historically has a major share in Mexico’s renewable energies for electricity production, ranking second after hydroelectric power until recently. Another country-specific in the Mexican electricity production is the development of wind power. Until 2006, wind power made up less than 0.16% of renewable energies, was almost non-existent. The regulatory changes discussed in chapter 4.2 lead to a substantial increase: within 6 years, until 2012, wind power increased to a share of 8.3% in renewable energies in Mexico. Interestingly, the Mexican energy mix is strongly dominated by hydropower (72% of renewables in 2012), followed by a minor share of geothermal and a rapidly growing share of wind power. However, solar, tidal and wave power together amounted to a share of only 0.15% of renewables in the year 2012. Surprisingly, Mexico, one of the countries with the highest amount of sunshine hours per year (Vaisala, 2014), has not made use of its resources so far and has a highly underdeveloped solar energy sector. This has mainly been due to the historically high production costs of solar power and the focus on wind energy production.

When examining the situation for total share of renewable energies, the picture looks not as promising as expected: an average of 23.3% share between 1985 and 2000, whereas a share of only 16.4% in the period 2001-2012. On the other hand, fossil fuels gained in share over time with an overall average of 73.9% from 1985-2000, but 79.7% in the period 2001-2012 (EIA, 2015). The reason for this development was among others, that PEMEX, the state-owned oil company, supported the electricity sector with cheap fuel oil for electricity generation. In addition, it also shows that the first reforms of the 1990s and early 2000s were not yet sufficient to promote renewable energies, as from the planning phase of for example a wind or hydro plant to getting on grid, under normal circumstances 5-8 years are needed. Furthermore, it is a normal situation for the energy mix of any country to change slowly; usually developments just become significant for the structure of the energy mix after a decade¹³.

3.3 Reformation of the energy market – from restrictions to riches?

The hydrocarbons law and the hydrocarbons revenues law became effective on August 12, 2014. The so-called electricity law also became effective on August 12, 2014 – all three of them are part of the energy reform initiated by the Mexican government and formally came into effect December 21, 2013 (Mayer Brown, 2014).

3.3.1 Goals of the reformation

2013, on December 20, the Mexican President Peña Nieto paved the way for Mexico's energy future and amended the Mexican constitution, with one major goal: opening the market for foreign access and following foreign investment. The significant changes to the constitution touch the two most important spheres of the energy sector, the struggling Mexican electricity market and the declining Mexican hydrocarbons market. The overall goal of the reformation was opening up the markets for electricity and hydrocarbons and to abolish the strict protection of the energy sector to create attractiveness for foreign investment. The goals and intents of the reformation have logically been different for both markets;

¹³ An example for the slow change in an energy mix is the energy transition in Germany, where investments have been made since the early 2000s but the energy mix has only started changing significantly in recent years (Heinrich Böll Stiftung, <http://energytransition.de/>)

nevertheless they all can be comprised under the goal of attracting foreign investments. The SRE (Secretaría De Relaciones Exteriores, Ministry of Foreign Affairs) has also published the overall goals of the energy reform (SRE, 2013):

- Reduction of gas and electricity prices: this will make fertilizer production cheaper and therefore food as well
- Increasing investment and new companies will create new employment of 2.5 million jobs by 2025
- PEMEX and CFE will “have greater freedom to make decisions”, will modernize and remain 100% state-owned
- The state’s leadership role will be strengthened

These targets for the reform might sound ambitious, but they are rather of political nature than of economic. These goals underline the direction, in which the government wants Mexico to develop: a strong country, that is attractive to foreign investors, converts the investments into the best for the population and at the same time remains the master of its economy. Just to recall: Mexico initiated its nationalization of the Mexican energy market to protect its own resources, as the oil price started rising in the 1930s and Mexico was the world’s second biggest oil producer. The reform touches both, the hydrocarbons as well as the electricity sector and different sub-targets for those two need to be made.

The hydrocarbons market

The changes in the hydrocarbons sector are very comprehensive, as the hydrocarbons market is of special importance for Mexico. Mexico historically was the world’s second-biggest oil producer after the U.S. – this was the case in the 1930s and can be seen as one of the reasons, the Mexican energy market had been nationalized. Today, Mexico ranks tenth in global oil production. The share of the state revenues also illustrates the importance of the hydrocarbons and especially the oil sector. In 2013, the earnings from the oil industry amounted to approximately 32% of the total state revenues. This implies that if oil production or oil prices go down, the state budget will face a significant cut and following, this will affect the entire economy of the country (EIA, 2014).

Mexico is in possession of easily accessible fossil resources as well as more demanding offshore resources. Additionally, Mexico has unused shale deposits

which are of similar composition as the U.S. resources that created the shale oil and gas boom, created plenty of employment and transformed the U.S. from a gas importer to an exporter. PEMEX, the state-owned oil producer, has struggled to increase the output from the existing oil fields and is also not capable of efficiently developing oil fields off shore as well as extracting the oil in this region. This was due to two reasons already previously discussed, the lack of technological know-how and the financial restraints, as the company has not been working profitable. These two factors also play a major role in the hydrocarbon development of the country, as oil and gas output have been declining for the last ten consecutive years¹⁴ (Mills, 2014). The goals of the energy form in the hydrocarbons market can therefore be summarized as the following:

- Attract FDI for financial strength and exploration possibilities
- Acquire technological know-how and technological investments
- Drive hydrocarbon production levels to previous levels

Mexico is rich of natural resources, has easily accessible oil resources and is craving for FDI and technological know-how. The overall blessing and success of reaching the above mentioned goals however will rely on the effectiveness of the regulatory changes of the Mexican energy market to effectively attract foreign investments. But with its hydrocarbon resources, which until today cannot be completely substituted, and a newly opened market with little competition, Mexico has strong arguments.

The electricity market

As previously mentioned, its great share of fossil fuel power plants characterizes the Mexican electricity market in its electricity production capacity. As examined in the previous chapter, the renewable energies account for an increasing share in electricity production capacity. According to the EIA, in 2013 11% of Mexico's generated electricity was attributable to hydropower, as hydropower is still the main driving force of the renewables sector in Mexico. Additionally, other renewables accounted for 3% in electricity generation. To decrease the dependence of the electricity sector on fossil fuels and therefore oil prices, the

¹⁴ For further oil production figures also see EIA (2015).

market is looking for diversification and an increased share of renewable energies and gas-powered plants.

The electricity sector is still dominated by the inefficient CFE, today controlling approximately three quarters of the electricity generation capacity. The situation addressed earlier has improved, but still Mexico will need further investments to increase capacity. Additionally, electricity prices are significantly higher compared to other countries: the Mexican industrial sector pays between 175%-200% of the price for electricity that the U.S. industrial sector pays (Viscidi & Shortell, 2014 and Lajous, 2014). Therefore, the Mexican government is strongly trying to increase competition and reduce electricity prices, which would be to the benefit of the industrial sector and would increase competitiveness.

Hand in hand with the increased capacity in the electricity generation sector goes the improvement of the grid and the increased efficiency while generating electricity. As LFC was mainly operating inefficiently for decades, with losses in efficiency of equalling to almost a third of the total generated electricity, new, more sufficient technologies and generation methods are needed (CEE, 2013). The attracted FDI as well as the increased share of Mexican IPPs (Independent Power Producers) could greatly contribute to solving this efficiency problem. Summing up, the goals for electricity sector comprise:

- Attract FDI to increase installed electricity production capacity
- Promotion of renewable energies for electricity production to become less dependent on oil and oil prices
- Creating more competition and decrease electricity prices
- Increasing operating efficiency for electricity production

The first efforts to partly realize these goals have already been made with the first reforms in 1992, however, purely having Mexican IPPs contributing to the national electricity sector that desperately needs more investments, is not sufficient. Through the opening for FDI, the Mexican government can expect to create significantly more competition in the electricity sector, which could be the answer to several of the above-mentioned goals at one time.

3.3.2 Main changes in energy regulations

The reform in the Mexican energy market has undoubtedly changed the framework, bringing structural amendments to the electricity and the hydrocarbons market. The changes for the hydrocarbons market are of maybe even greater importance than the changes in the electricity market; however, the goal of this research is to examine the impacts on investment strategies for renewable energies, therefore the spot-light is on the electricity market and use of renewable energies for electricity production. The context of this regulation needs to be understood to the fullest and this makes also touching upon the reform of the hydrocarbons market inevitable. The reform and its implications within this chapter are based on the original Executive Summary, published by the Ministry of Foreign Affairs (SER, 2013) and the original decrees regarding the hydrocarbons law and the electricity law enforced by the Congress of Mexico (2014). The structure is additionally inspired by analyses from Mayer Brown (2014) and Lajous (2014) for Goldman Sachs for the hydrocarbons market, as well as by analyses from Mayer Brown (2014), Miller (2014) and PwC (2014) for the electricity sector. These documents are all based on the official decrees, but their analyses contribute greatly to the comprehensiveness of the understanding of the Mexican energy reform.

3.3.3 Reform in the hydrocarbons market

According to the Ministry of Foreign Affairs (SER, 2013), Mexico is facing to major challenges in the oil and gas sector, which are permitting private companies to invest in the market, as Mexico is lacking expertise and technological know-how to extract its deep-water resources, and to provide enough affordable energy to facilitate the development of the country, as Mexico is a newly industrialized country.

The reform that touches the hydrocarbons market is very comprehensive and initiates fundamental changes of the market structure and organization. The reform comprises two main sectors: the upstream sector and the midstream sector in combination with the downstream sector.

The upstream sector

The upstream sector underwent the greatest reformation. PEMEX, the state-owned company was entitled to send an official request concerning its current exploration and production rights on hydrocarbon fields and was granted the rights to all requested fields it was already operating in (extraction as well as exploration) and 21% of Mexico's prospective resources. (Mayer Brown, 2014).

The greatest change provided by the hydrocarbons law, that is relevant for foreign investment, is the regulation concerning international cooperation. PEMEX is thereby entitled to enter JVs with private parties if an entitlement is transformed to a contract. However, the CNH, the National Hydrocarbons Commission (Comisión Nacional de Hidrocarburos, CNH), will conduct a tender process and choose the company partnering with PEMEX, if PEMEX wants to establish a contract for a JV with a private party.

The new hydrocarbons law allows SENER - supported by the opinions of CNH and the Secretariat of Finance - "to select the contractual arrangement that best benefits" the underlying project. However, the variables that will be evaluated for the awarding of exploration or production contracts are evaluated on an economic nature, "aiming to maximize the State's revenues" (SENER, 2014). This is part of the newly introduced Hydrocarbons Revenues Law, which is also a fundamental constituent of Mexico's energy reform. The Mexican government still wants to maintain its strong position in the domestic energy market and to maintain the dominant role of state-owned PEMEX in the exploration and production of hydrocarbons. For this very reason, the SENER may establish a contract participation of PEMEX, when private parties are bidding for extraction and production contracts, to guarantee state-involvement. This again emphasizes the strong role the Mexican government will still play in the hydrocarbons market after the reforms were established.

The midstream and downstream sectors

These two sectors were subject to reformation as comprehensive as the upstream sector and fundamental structural changes have been imposed. Firstly, SENER or the Energy Regulatory Commission may award permits to private parties for all activities in the midstream and downstream sectors. Secondly, CENAGAS, the

National Center of Natural Gas Control (Centro Nacional de Control de Gas Natural) is to be established no later than twelve months after the date on which the hydrocarbons law was enforced. This institution is required to take over PEMEX gas business, such as owning and operating gas transmission pipelines and storage facilities (Mayer Brown, 2014). This is another fundamental change; however it is of significantly less impact on the country's energy sector and the therewith implied attraction of foreign investment.

Concerning solely the retail section of the downstream sector, the hydrocarbons law also enforced new regulations in the fuel sector. The fuel retail sector will experience a period of transition, from state interventionism to free market competition. From 2015 onwards, gasoline and diesel prices will be set from the government institutions until 2018, when fuel prices will be freely determined by market forces (Lajous, 2014; Mayer Brown 2014; Congress of Mexico, 2014).

3.3.4 Reform in the electricity market

According to the SRE (2014), the electricity sector is facing four major problems:

- High electricity prices that hamper job creation due to strong impacts on households and SMEs (small and medium-sized enterprises)
- Limitations on electricity generation for private parties
- Absence of an arbitrator to decide, which electricity is sold. This role is taken on by CFE right that has to choose between its own generated electricity and the one from private entities
- Barriers to renewable energy development and the application of (cheaper) gas for electricity generation than fuel oil or coal

Especially the third problem draws the light to the inefficiency of the Mexican electricity sector under the nationalized market structure. The new electricity law provides changes in the (i) generation sector, in the (ii) transmission and distribution sector and in the (iii) power trading sector. The greatest structural change is the foundation of CENACE (Centro Nacional de Control de Energía), the National Centre of Energy Control. CENACE will operate as a public, decentralised institution that will operate the wholesale market for electricity and the power grid (Mayer Brown, 2014; General Congress of Mexico, 2014).

The generation sector

In the electricity generation sector, the new regulation provides greater portions of openness for investors: since the reforms, open competition is permitted for electricity generation with several incentives for companies to take part in generation. They can participate in the market through selling the electricity in the wholesale market or sell it to other electricity producers. These other producers will be required to buy electricity from other producers, if they cannot meet the energy demand stated in their contract, which will guarantee that the increasing demand is met.

Additionally to these changes, the renewable energies will be facilitated further: companies that are generating electricity through the usage of renewable energies will be awarded tradable clean energy certificates. The Mexican Oil Fund for Stabilisation and Development will at the same time be eligible to invest in renewable energy sources, which additionally will help to boost renewable energy sources. Also facilitating the growth of renewable energy sources is the implementation of the objective of achieving a share of 35% of non-fossil sources in power generation by 2024. Today's percentage is estimated to amount to 20% - this at the same time implies, that more capacity in renewable energy sources will be required until this period, than are currently planned by the government (PwC, 2014).

The transmission and distribution sector

In 2013, when the constitutional changes were established, it was clearly ruled that the transmission as well as the distribution sector will solely remain under state control. The same is true for the planning and control of the electricity sector. The new electricity law allows the government to contract with private parties in several areas as financing, installation, maintenance, management, operation, expansion, modernization, monitoring and conservation of the infrastructure needed for transmission and distribution, which gives a great amount of new possibilities to private companies (Miller, 2014). It is obvious, that this also causes great interest from U.S. companies. CFE will be able to contract with private parties, which then will be able to participate in the new development of transmission and distribution networks (PwC, 2014). At the same time, CFE will

operate together with its affiliates to be present in every sector of the market. As mentioned above, CFE will be obliged to compete with other companies in the electricity generation sector but will remain the sole company providing services in the transmission and distribution sector (Mayer Brown, 2014).

The power-trading sector

As examined in the previous chapter, the electricity prices in Mexico are significantly higher than in other countries, as almost twice the prices compared to U.S. average prices. According to PwC (2014), the electric power public service additionally applies more than 40 different consumer fees. The new power industry law now permits private parties to participate in electricity trading and to buy and sell electricity. This is done via the spot market or via long-term contracts, which have prices underlying that can be negotiated freely. The participation of private parties is aimed to increase diversity and is also aimed to boost the share of renewable energies used for electricity generation and following electricity trade (Miller, 2014). The new possibility of negotiating long-term contracts is also meant to reduce high electricity prices for the industrial sector, which has been a problem for decades.

On an overall picture, we can see that fundamental changes have been made: private parties and private internationals are now allowed to participate in exploration and production of hydrocarbons and in electricity generation and trading. However, the Mexican state still maintains its dominant role in the energy sector, by granting open competition but still keeping foreign investment restricted in the transmission and distribution sector or by being able to bind exploration and production agreements to an active participation of PEMEX. These changes, as well as the interconnections between Mexico and the U.S. create great opportunities for U.S. companies wanting to invest in Mexico. At the same time, the strong focus on renewable energy development facilitates the further increase of the share of green energy. All these facts, which are highly interlinked and dependent on each other, also constitute the research question of this research and require profound understanding of each of them to draw sensible conclusions.

4 Methodology of the research

The methodology of a research is the core of any research; at it is essential for the reliability, validity and sensibility of the findings. In essence, the methodology has to fit to the topic and vice versa, although the methodology has a great impact on the findings through a corrective method. The methodology chosen also reflects the researchers' assumptions, backgrounds and interpretative positioning. This is the cornerstone of understanding the presented findings, as the statements and assumptions made in the methodology have a crucial impact on the question of which conclusions are drawn from the findings.

4.1 Research design and data sources

To answer certain research questions associated with a determined analytical purpose, it is necessary to use a variety of approaches. Research design entails a description of how the planned analytical process will help to answer the actual research question. It could be concluded to be the logical structure of the query (Gipsrud et. al, 2011). The research design is supposed to answer three questions:

- i. What kind of data is required?
- ii. From whom is the data required?
- iii. How does the data help to answer the research question?

The questions mentioned are the ones that constitute the core of the research, but can vary depending on the research topic. In general, three distinct research design concepts can be distinguished.

Explorative design

Explorative design is used, when a certain problem is not defined yet or only provides inconsistent definitions. This design's aspirations are not to provide conclusive evidence, but to firstly examine what exactly the problem is about (Özgen, unkown). Additionally, the focus lies on variables that are already known to the researcher. The intention is to gather information so that one acquires a better understanding of the topic at hand. This is normally a flexible and unstructured process that demands literature studies and use of secondary data. A

natural start would be to look into what has previously been written on the topic and conduct a literature review (Gipsrud et. al, 2011).

The advantages of this approach are that relationships can easily be detected. This is due to the fact, that in explorative designs, the independent variable is manipulated to determine the relationship between the two variables, dependent and independent. Additionally, the results are repeatable and will lead to the same results again, which is not true for all research designs. On the other hand side, this design also offers disadvantages, for example this research design may deliver results that are not generalizable to the population, which is due to the manipulative nature of the design (Occupytheory, 2014). The probably biggest drawback however is due to aspiration not to provide conclusive evidence. As they are not conclusive, the interpretation of the findings can experience a great bias caused by judgmental interpretations of the researcher. Additionally, as stated above, secondary data is required for developing better understanding. The use of this design, therefore, only promises to generate value, when secondary data is already available for the research.

Descriptive design

In general, every study involves descriptive research to a certain extent. The main use of this approach is to generate data for different groups at a given point of time, which allows to establish a first overview and to draw conclusions of the topic, but at the same time provides the basis for more complex study designs in future research. Additionally, it is aimed at capturing a broad scope of an already defined problem and is conclusive, unlike the exploratory design (Ebrahim & Sullivan, 1995; Bajpai, 2011). Descriptive design comprises three main techniques for data collection: questionnaire, observation and the diary method, whereof the first one is the basis for this research (Gipsrud et. al, 2011).

This design form offers advantages, which are especially crucial for this research. Firstly, the subject can be observed in an unchanged and natural manner. While other research designs might influence the environment of the subject to be studied, this is not the case in this design. Additionally, through a conducted survey, a certain distance between researcher and subject is given, which minimizes the researchers influence. Secondly, the descriptive design and its

nature to observe in a natural manner, provide a great basis for further analysis with quantitative means. Through observations and the received answers, a lot of information can already be gathered that provides a detailed overview of the subject and lets the researcher draw first conclusions (Shuttleworth, 2008). The gathered is additionally useful to identify variables and constructs. As mentioned above, this again provides a great basis for further studies (Ebrahim & Sullivan, 1995).

However, there also some disadvantages involved: Due to the un-manipulative nature of the research design, it is difficult to analyse the data, as the variables constantly stay the same. This leads to the disadvantage, that the cause of the identified relationships cannot be determined, as the relationships are solely depicted. Additionally, it is often difficult or impossible to repeat the research and to achieve exactly the same observations again, which is connected to the lesser depth of the conducted research (Shuttleworth, 2008). In general, this research design is useful for first analyses rather than in-depth examination of already observed phenomena.

Causal design

The design approach is based on causality, which is the relationship between two separate events where the second event is a consequence of the first event, generally known as cause-and-effect relationships. A causal design is usually applied to identify relationships and to analyse them, but unlike descriptive design, the causal design is narrower in its scope but more in-depth (Özgen, unkown). Furthermore, for this design, only raw data can be used to uncover covariance and experiments are used (Gipsrud et. al, 2011)

There are several benefits and drawbacks involved in this design. The causal design, similar to the descriptive design, is usually well-structured but offers a great advantage: it additionally also answers the *why* question, through establishment of cause-and-effect relationships. This is done through the manipulation of variables and the environment to identify any changes. Additionally, it provides the researcher with in-depth conclusions and deep understanding of the relationships between variables (Bajpai, 2011). One of the disadvantages is that coincidences in the gathered data may be seen as cause-

and-effect relationship, which causes invalid conclusions. Separate events that happened simultaneously in the observed past would establish such a relationship, although there might only be coincidence involved. Additionally, the variables, between which a relationship was established, can sometimes not clearly be identified as cause or effect, which could also lead to wrong conclusions (Fraenkel & Norman, 1993). Additionally, the knowledge in this method is generated with manipulation of variables, as the relationships between variables are tested with experiments. This makes causal research design not suitable for studies solely conducted with surveys or observations (Bajpai, 2011).

For this research, clearly the descriptive design offers the best benefits for generating valuable research conclusions. This is due to several facts: Firstly, due to the actuality of the events, a descriptive design is suitable to gather data, which can be used for more complex studies in the future. As there is no overview of the subject and the influence of the reformation yet, the newly gathered data provides this first important research overview. Secondly, this research is focusing on *if*, *where* and *how* there are observable impacts of the recent reformation, neglecting the question *why*. The *why* question is, as stated in the delimitations of the research topic, beyond the defined scope of this research. The *why*, however, could be addressed in future studies using causal design, which would be more appropriate for this kind of question. Lastly, this research's aspiration is to document the influence of the reformation in a natural manner, without manipulating the research environment or variables – this is due to the fact, that there is no detailed knowledge about the influence and variables yet, which is required for further experiments. To conclude, solely the application of a descriptive approach provides the greatest benefits for the research, while being aware that for a further and effective in-depth examination of the variables, constructs and their relationships, other designs are needed.

4.2 Data sources

To answer the problem statement in this thesis it is essential to not only gather the necessary information about the Mexican energy market before and after the reformation, but also American views about the topic. Both raw (also known as

primary) data and “secondary data” is used in this thesis (Gipsrud et. al, 2011). The primary data will facilitate the creation of new knowledge and the testing of the hypotheses, while the secondary data is used as a basic construct, providing the theoretical background and the required understanding of the development of Mexican regulations and the market structure.

Primary data

Primary data is data that was firstly collected by the research / the researcher and is new, thus has not been collected in that manner or to that extent before. This data is collected to answer one particular analytical purpose, which is determined by the topic. In this research, the analytical purpose is answering the question about the impact of the reformation on investment strategies. Sources for this type of information are usually direct communication with persons of interest or one’s own observations and surveys (Gipsrud et. al, 2011). For this research, the tool of a questionnaire was used. This is firstly due to the geographical distance between researchers and the sample, but also due to the great suitability provided by this tool: as it offers a great personal distance between the researcher and the survey respondents, subjective judgements and therefore bias can be reduced.

Primary data in general offers a great advantage, which is that the collected data is tailor-made for the purpose of the research and sufficient data can be gathered on all factors of interest (IWH, 2008). Additionally, it is often the only way to gather a relevant amount of suitable data for a research, which is especially true if the examined topic implies great actuality. On the other hand, it is obvious that primary data collection requires significantly more time and resources than the usage of secondary data, which is a major drawback of this type of data. Primary data can also be too unidimensional, as there often has been no discussion or comparisons by other researches, which could have offered a new perspective on the topic.

Secondary data

While primary data is data collected for one’s own analytical purpose, secondary data is other researchers’ primary data. This means, that someone can usually easily access the data needed, without spending a tremendous amount of effort to collect data. The great advantage of secondary data is that it is inexpensive and

easily obtainable. Additionally, it often provides the researcher with enough data to draw conclusions over time, as for example changes within factors or behaviour through a period of several years (IWH, 2008). On the other hand, secondary data was gathered by another research, which often implies gathering for a different purpose. This could be the basis for great drawbacks, as for example data might be incomplete or focused on aspects irrelevant for the current research. It is therefore important to be critical towards this type of data, as uncertainty and bias may be present (Gipsrud et. al, 2011). Lastly, and following logic, secondary data can only be used if it has already been collected before, which often is an obstacle for research focusing on very actual developments or occurring phenomena.

The herein conducted research uses a vital combination of both, primary and secondary data. Firstly, the research topic involves a great extent of actuality, with no studies available having examined the same factors and behaviour before. Additionally, it is inevitable to use primary data to guarantee that the collected data fits the purposes of the research. Therefore, the primary data used in this research is the core of the analysis which grants new insights in the examined topic.

The secondary data used in this research is manifold, especially when it comes to the theoretical background. The theory used in this research has partly been present for decades and is shared by leading researchers and educational institutes; therefore using secondary data provides great benefits in this respect. It is easily accessible and at the same time covers a broad range of different aspects, as investment strategies and renewable energy developments are based on common economic theories that are in wide-spread use. Furthermore, the development of the Mexican energy market, for which secondary data was used as well, is a process evolving over more than 100 years, making the use of secondary data inevitable to draw conclusions about historical long-term developments.

On overall, the relationship between those types can be seen as primary data making up the core part of the research, while being strongly facilitated by the secondary data used. Through this combination, new outcomes based on data that perfectly fits the research topic can be generated, while supporting the topic with economic theories that have already been examined in great detail - with a

variety of different perspectives on the topics available, which the research benefits from.

4.3 Quantitative and qualitative approach

Quantitative data collection methods usually consist of frequencies, rates, percentages or other numerical data or information that can be converted into numbers. This data can be derived from surveys, observation checklists or archival records, e.g. governmental databases. Solely the measurable data are collected, followed by analyzing and explained how quantitative approach targets on statistical models and figures. When conducting quantitative research, the researcher tries to find universal truths about reality, and attempts to separate him- or herself from the topic of study. A researcher does this by carrying out objective analyses that are aimed to answer the research question.

Qualitative approach involves generation and analysis of descriptive data through various modalities. This type of research aims at discovering the underlying motives and desires. The researcher can use language data, often gathered through the means of an in-depth interview. The main aim is to provide a complete and detailed description of the research topic. Depending on the research topic, usually topics that examine very distinct situations rather than conclusions that represent a great number of individuals are suitable for qualitative approaches (Easterby-Smith et al., 2012). In the table below, a basic overview of drawbacks and advantages of the single methods can be found.

	Quantitative	Qualitative
Advantages	<ul style="list-style-type: none"> • Relatively easy to administer, • Can include large number of questions, • Can yield large samples, • Emphasizes reliability 	<ul style="list-style-type: none"> • Captures more depth and provide insights as to “why” and “how”, • Emphasize validity, • Easier to develop

Disadvantages	<ul style="list-style-type: none"> • Data may not be as rich or as detailed as qualitative methods, • Usually are harder to develop, • May not provide sufficient information for interpretation 	<ul style="list-style-type: none"> • Time consuming to capture and analyse, • More subjective and may be difficult to summarize and compare systematically, • Difficult to have large sample, • Very demanding to administer
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Table 3 – Quantitative and qualitative approaches
Source: Jalil, 2013

The herein examined research topic relies solely on quantitative methods, as the findings represent a comparably big number of individuals to generalize to, which is aimed to get a sense of the general attitude across all of the individuals of the population, thus U.S. companies engaged in the energy sector. This requires quantitative research to generate reliable and valid results. With qualitative methods, collecting data from a similarly big number of individuals would not be possible, additionally one would have to capture and analyse the data afterwards that is connected to great and inefficient efforts. Also, the research conducted is based on the descriptive research design. Through the focus on descriptive statistics, the broad diversity given in the energy industry can be captured, which is the overall aim of this research. The focus on primary data goes hand in hand with the use of a descriptive research design and the quantitative approach. The combination of these three provides a consistent way of conducting research, including the possibility of a generalization to a great number of individuals and capturing the great variety and diversity given in the energy sector.

4.4 Population and sample: definition and parameters

This chapter is aimed to provide a clear understand of the relatedness of population and sample. The main goal is to address the specifics of the population, how the sample was drawn and which differences between the sample and the final respondents can be drawn.

The theoretical population

To generate the most valuable outcome, this research topic requires a sophisticated approach towards its population. The population is defined as “the group of individuals to which the findings, discussion of the findings and the implications of the research are to be generalized” (Sampson, 2012). For this research, the population is constituted by several aspects:

- Firstly, the research addresses organizations and therefore employees in the U.S.
- Secondly, the organization, they are employed by, needs to be engaged in the energy sector (see exact definition below)
- Thirdly, employees who possess knowledge about the reforms of the Mexican energy market
- Fourthly, employees who possess knowledge about the investment strategies of the organizations

The first aspect refers to companies or organizations being situated in the U.S. and employing people in the U.S. As already defined earlier, this is important as the focus of this research lies on the U.S. and through contacting employees from the U.S. that are currently or have last been employed by organizations in the U.S., this criterion can be fulfilled.

The second aspect comprises the focus on business related to the energy sector. The chapter about data collection explains in detail, how this data was gathered to provide reliable results. It is important to mention that engaged in the energy sector, in this respect, in this research is defined as companies or organizations that spend resources, such as financial resources, labour or time while pursuing their goals in the energy sector or with companies being engaged in the energy sector. This is due to the aim of reflecting the great variety of stakeholders and business types in the very diverse energy sector and not to discriminate business or engagement types. One for example can assume that the reforms of the Mexican energy market have different effects on small solar panel producers than on consultancies engaged in the hydrocarbons sector or representations of interests, advising expanding electricity generators that are engaging in the Mexican energy market.

Thirdly, it is important to generate data from people, who actually possess knowledge of the reforms in the Mexican energy market. The importance of this cannot be understated - it is essential that only people with knowledge of the topic answers the survey to avoid data from respondents with no knowledge about the research topic and to minimize the possibility of qualified guesses¹⁵.

Fourthly, knowledge about the investment forms and the planned investments of the organization or company are necessary. The people, who usually have the best knowledge about investment strategies, are the ones higher in the hierarchy of an organization. The data collection method offers greater insight of how people with knowledge about the investment strategies were addressed.

The theoretical population of this research is therefore comprised of employees of organizations that are (i) located in the U.S. in bordering states of Mexico, that are (ii) employed by organizations that are engaged in the energy sector, that (iii) possess knowledge about the energy reforms in Mexico and that (iv) possess knowledge about the investment strategies of the organization or company they are employed by.

The accessible population

This 'refined' population addresses the population that is actually tangible and can be addressed by us (Trochim, 2006). In our case, the accessible population equals to the entire theoretical population, subtracting those who are not reachable via e-mail, phone or mail, as these are unknown, not available for public or are not registered.

4.4.1 The sampling frame

The sampling frame explains which people or respondents can actually be addressed by the chosen data collection method (Neill, 2003). The chosen data collection method, which is comprised of mainly contacting respondents via LinkedIn survey sent to them personally or to a small part of sending personal e-mails, allows only those to be contacted, that actually are registered on LinkedIn or whose e-mail addresses were available through business contacts and

¹⁵ More on this can be found in the chapter of research design

representations of interests. This sampling frame leads to the exclusion of a certain share of the population; however, used properly, it can be a suitable method: firstly, a great number of people can be contacted where it can be seen via their personal accounts, if they are employed by organizations companies engaged in the energy sector. Secondly, the people with the best knowledge about investment strategies are usually employees from the higher management spheres – as LinkedIn to a great extent offers the possibility to see the position of a person in an organization, it enables us to address people of relevance directly and efficiently. This again keeps the number of undesired responses low and ensures responses from a professional and relevant background. In total, slightly above 1,500 individuals were contacted via LinkedIn, while around 35 people were contacted directly via e-mail.

LinkedIn is a social network for business professionals that has been used to a very limited extent so far for addressing business professionals for research purposes. LinkedIn has mainly been used for market research or journalism, but not for social science or greater studies. Cube (2014) however describes that LinkedIn is an important resource for journalists and is used for research and reporting in this field. Guericke (2013) on the other hand states that LinkedIn can be used successfully for market research but also refers to the difficulty of receiving responses. This is exactly why LinkedIn is not widely used for research: firstly, researchers have to use several tricks to be able to contact a bigger number of people of interest due to the nature and privacy settings of the network. Secondly, people might be reluctant to deliver input, as LinkedIn is still a social network that people mostly use in private spheres rather than during working time and cannot be compared with for example an e-mail address within a business. In this research, LinkedIn still offers the best opportunities, due to the reasons mentioned in the paragraph above.

4.4.2 The sample and sampling method

The focus relies on drawing a sample that is representative for the population. In this research, the sample was drawn on basis of random sampling. In this sampling method, every individual is chosen by chance; therefore, every individual from the population has a known chance of getting selected (Easton & McColl,

1997). However, these chances might not be of equal nature, which causes bias in the sampling. The sampling chosen offers the best possibilities, as the actual size of the population is hard to estimate and other sampling forms would make it more difficult to capture the diversity in this industry. To remember, companies engaged in the energy sector comprise a variety of different businesses, from construction to legal advising to hydropower generation.

The captured diversity of the industry may also lead to several biases in the sample. The quality of the sample is fundamentally influenced by the biases present, among other factors like the size of the sample in relation to the size of the population. The biases present in the sample are caused by a combination of the research topic, the structures encountered in contacting methods and the sampling method of random sampling. The biases comprise a strong presence of companies engaged in the renewable energy sector in the sample. This is due to two reasons: the nature of the topic that focuses on renewable energies and the referring groups on LinkedIn that were used for contacting respondents. When talking about renewable energies in Mexico, a close connection to companies that are already engaged in renewable energies is given, as they naturally are more interested in renewable energies and their development as companies engaged in for example fossil fuels. Additionally, LinkedIn groups that were dedicated to the energy reforms in Mexico provided a great share of renewable companies and the same is true for groups that were dedicated to renewable energies development in Mexico. This can be the cause for bias, as there is no possibility to contact every person of interest from the population – here, the structure of LinkedIn groups is the main source for this bias.

Bias might furthermore have been caused due to the great variety of organizations that are engaged in the energy sector. With a lot of different organizations it is very difficult to obtain a sample that represents each business type accordingly, especially if the exact segmentation of the population is not known. This disqualifies quota sampling and additionally cuts short on the randomness of the sample. However, the bias in this case could be reduced through choosing the stratified sampling method, where the different business forms would have been represented in smaller sub groups of the population, from which then random samples are drawn. On paper, it is a superior sampling method than random sampling, as it can reduce the mentioned sampling errors. However, it offers a

great drawback: companies that are engaged in several sub-groups cannot be included or would not be able to be captured in the formed sub-groups. This research focuses on the overall impact of the energy reforms and aims to create valuable outcome on the energy sector in general, which is the reason why random sampling was chosen. Responses from companies engaged in multiple spheres (e.g. consultancies, energy producers that also trade energy, construction companies that also transport etc.) are highly valuable, which is the reason why random sampling appears to be the most suitable sampling method to capture the diversity, while being aware of possibly caused sampling biases.

4.5 Data collection

The methods of data collection refer to the operational steps of collecting the data required. Accuracy and preciseness are crucial in this phase to ensure reliable and valid results. Therefore, a ten-step process was developed:

1. Construction of the questionnaire
2. Realization with Questback
3. Pilot-testing the questionnaire
4. Distribution of the questionnaire to the respondents
5. Preview of the recipients responses
6. Correction of errors and anomalies among the respondents
7. Conducting of tests in statistical analysis programme
8. Analysing the result

These steps ensure that a certain research framework is followed while conducting research. As each of these steps is examined in the methodology chapter, they are self-explanatory. Still, it is important to assess on which basis the data was collected and which methods were used to guarantee a flawless collection process.

Level of analysis

The level of analysis refers to the level, on which basis the research is conducted. This level or area varies from topic to topic and can comprise any possible and suitable way of grouping – as for example geographical grouping comprising districts, cities or states or organizational grouping, defining the possible level of analysis as subsidiaries or companies. In general, the levels can be described as micro or macro levels (Liao, 2008).

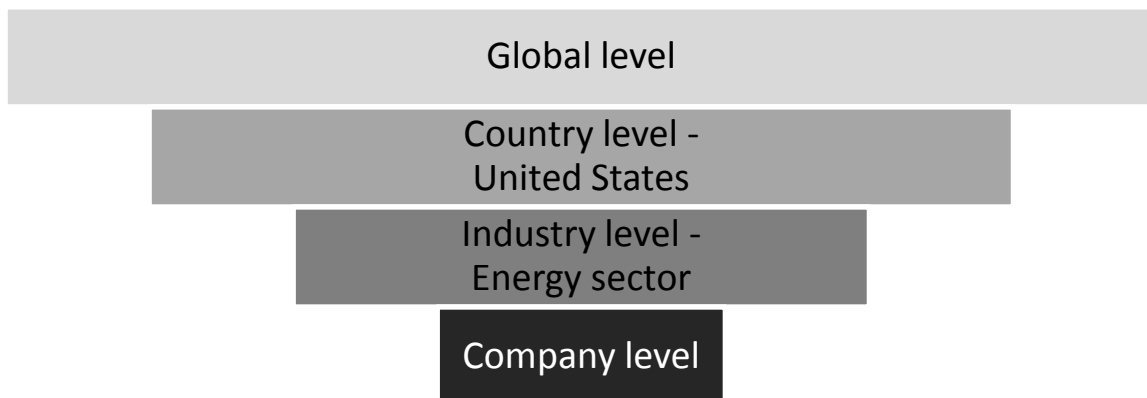


Figure 8 – Level of analysis

This research revolves around companies, small to large, and their willingness to invest in renewable energy in another country, which is Mexico. Therefore, and speaking generalized, the level of analysis is defined as a company level, as the research units are separate organizations or companies. Studying the phenomenon on a global level would neglect the limitation to a country, the country level would involve research in only one but the entire country and the industry level would comprise every person involved in the energy sector, including private people without businesses. As the analysis is made on the company level and the companies' behaviour is studied in relation to another country, the herein used level of analysis could also be classified as inter-state company level: U.S. organizations operating in Mexico.

Methods of data collection

Primarily the research process was initiated through the analysis of secondary sources, mostly consisting of articles and publications on the potential for

renewable energy before and after the reformation of the Mexican energy market. With the exception of hydropower and some geothermal energy development, there was only a small market for renewable energy up until a few years ago when wind power made its initial penetration to the market. This offered great new possibilities for research connected to renewable energy development in Mexico.

The defined population limited, naturally, the number of individuals that could be contacted. The focus of the contacting method relied on LinkedIn to efficiently contact people of interest for the research. In order to increase the chances of encountering a person of interest, albeit not guaranteeing, LinkedIn was used to search for groups of interest and interest groups, e.g. Reforma Energética de México (The Mexican Energy Reform). After joining these groups, the number of possible candidates could be limited to our population via going through the membership lists, manually filtering people not employed in positions meeting our criteria set, location and/or business. This was done because the groups could only indicate an interest in the content of the groups, not necessarily the prerequisites we deemed vital. While a high position in a company was not given as a requirement, knowledge about the company's investment strategies and the reformation of the Mexican market is essential. People with the best and most knowledge about a market are usually the ones in the higher spheres of management, normally starting from middle management to executive management, which therefore are the positions of interest to the study. Exceptions from this group of managerial positions were occasionally done, founded in or by their job descriptions, positions that led to the assumption that they have knowledge of the organizational investment strategies. After going through every considerable group and contacting every person individually with a short introductory message¹⁶ and the link to the questionnaire, it could be guaranteed that people fulfil our given criteria and the recipients were approximately given six weeks' time to answer the questionnaire and provide data.

4.6 Reliability, validity and sources of errors

Reliability and validity are two concepts that determine the quality of research. The need to be seen as intertwined with each other instead of different concepts. The

¹⁶ The introductory message can be found in the appendix

understanding of them will also enable the researchers to draw sensible conclusions for possible sources of errors.

4.6.1 Reliability and validity

To make sure our results will be trustworthy, they have to be reliable. If we repeat the surveys using the same methods and receive stable and consistent results, we can conclude that our results are reliable. Said differently, reliability is the consistency of the results we have received. Although reliability might be high on what we measure, it does not imply that the referring validity is high as well. Validity should give an indication of the authenticity of our study. In essence, if we measure what we actually intended to measure (Gripsrud et. al, 2011). The rather complex relationship between those two concepts is illustrated below. The research results are both reliable and valid, when the measures achieve to target the centre. Every dot in the figure describes a single individual being measured.

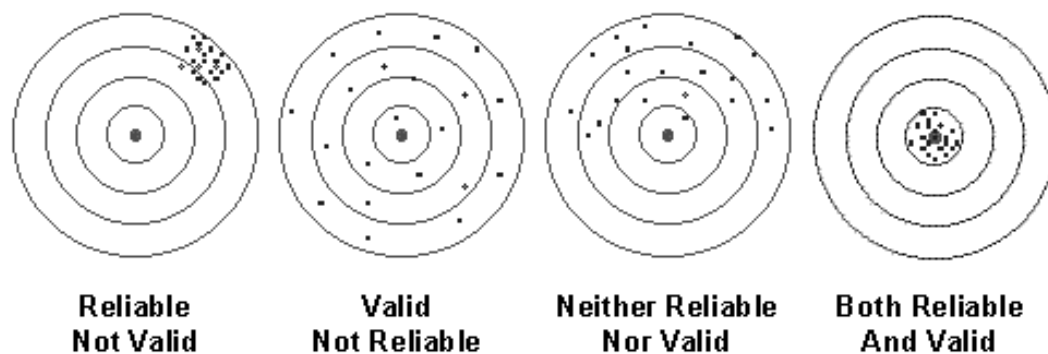


Figure 9 – Relationship between reliability and validity

Source: Research Methods Knowledge Base

In this figure, we can see that in the first approach, consistent and proper measurements were taken, but through missing the centre, the wrong values have been measured. In the second example, the target is hit seldom, but on average basis, the correct results are achieved. The best result is the last example, where for every single individual (reliability) the target was hit *in the centre* (validity).

As mentioned before, reliability in this research refers to the testability. Human judgements are one of the main causes for reliability errors – they often occur when interpreting data. As this research is based on quantitative research, this risk

is less than in for example interviews in qualitative research, where a lot of interpretation goes along with the atmosphere, the mood, the background and other social and environmental factors. Through the use of a questionnaire, that does not involve body language, voice or other factors, this risk is reduced. On the other hand, validity is ensured to a greater extent through the randomization of the sampling process. The internal validity refers to the consistency of the research design, while external validity refers to the examination of the gathered data and the established relationships. With external validity, there is always a chance of unknown factors or circumstances influencing the findings; however, through randomization, this possibility can be lessened (Shuttleworth, 2008). These concepts are vital for the understanding of the sources of errors that are determinants of the research quality.

4.6.2 Sources of errors

When we collect large amounts of primary and secondary data, there is a risk that these are interpreted incorrectly. To avoid incorrect perceptions, subjective opinions and attitudes of generating primary data, e.g. by interviews, it is important that there is good interaction between interviewer and respondent. Interpretation of secondary data can also be done on the wrong basis, which may be due to lack of knowledge about the industry or topic, as well as indiscriminate use of bad sources (Gripsrud et. al, 2011).

Additionally, errors can be caused by the measurement methods, in that respect errors can be systematic or random. While a random error cannot affect the average outcome of a finding, a systematic error does. Random errors are caused by random affects across the sample, which would include factors such as the mood of a person while responding to the questionnaire. These errors do not have consistent effects across the sample and only change the variability around the average of the findings. On the other hand, systematic errors solely affect the average and cause bias – this was already addressed earlier in this chapter. These errors occur if there are factors that are artificially influencing all respondents of the questionnaire, such as misleading wording. The effect caused can either be consistently positive or negative, depending on the factor causing systematic errors. Both types of errors can be reduced through pilot testing the

questionnaire and evaluating the respondents' feedback. Additional methods include double-checking the data received when editing or copying it in computer analysis programmes and the use of multiple measure to measure the same effect. In this research, these "effects" are constituted by the measured influences on the investment strategies and their dimensions, as examined before.

In this research, all the mentioned steps for the reduction of errors were applied. The pilot testing showed that several questions were too narrow to capture the broad scope of the industry and required re-wording. Additionally, the short introductory message was enhanced to provide a smoother start into the questionnaire. The double-checking procedure was carried out via the use of two programmes, Questback and SPSS, for statistical findings. Comparing the findings in two separate programmes minimized errors occurring while editing or copying data. Furthermore, after setting up the questionnaire, questions were added to measure the same effect as already existing questions, which is the evaluation of the reform. This provided greater detail in which respects respondents expect or experience a change. The results thereof can be found in the analysis chapter.

5 Impact analysis and statistical findings

The impact of the energy reform is measured in the given framework presented in the methodology chapter. It is important to understand how the core items of this research work together and are inter-linked to make sense of the statistical findings and be able to draw a sensible conclusion. The core items are the research question, the hypotheses derived from it, the theoretical background and the gathered data. In general terms, these items are both based on each other and influencing each other, which is especially true for the influence of the research question, the hypotheses and the theory on the gathered data.

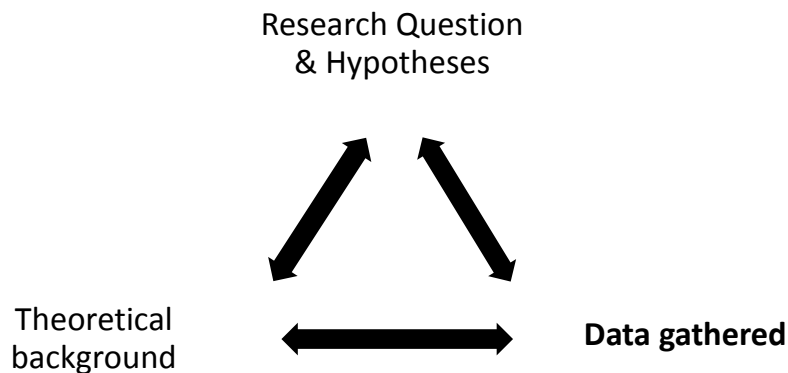


Figure 10 – Interplay of research core factors

The research question and the theoretical background have already been addressed in great detail - the missing linkage is examined in this chapter. The data is also the crucial part of the research and transforms the hypotheses, assumptions and expected results into a tangible concept. As the data provides a great variety of different insights, firstly general findings are addressed to provide the basis for the results connected to eventual falsification of the hypotheses. These parts together answer the research question and constitute the conclusion of this thesis. For all statistical findings and statistical tests applied, especially in the hypothesis testing, SPSS software was used in combination with statistical data being provided via Questback, with which the questionnaire was set up. The usage of data from both programmes is aimed to decrease errors via double-checking as addressed earlier.

5.1 Respondent characteristics and business background

Addressing the characteristics of the respondents is an important procedure to understand the provided data in the context of the respondents' backgrounds to avoid misinterpretations. In total, over 1,500 individuals from the sample were contacted to provide data, with a total number of respondents of 148. To receive only valuable data from people in the examined organizations, that also have knowledge about the Mexican energy market reformation, the following question was included in the beginning of the questionnaire to filter the responses:

“The Mexican energy market has recently been reformed and opened for foreign investment. How would you describe your knowledge about the reformation?”

This filter provides the following distribution of the respondents' knowledge:

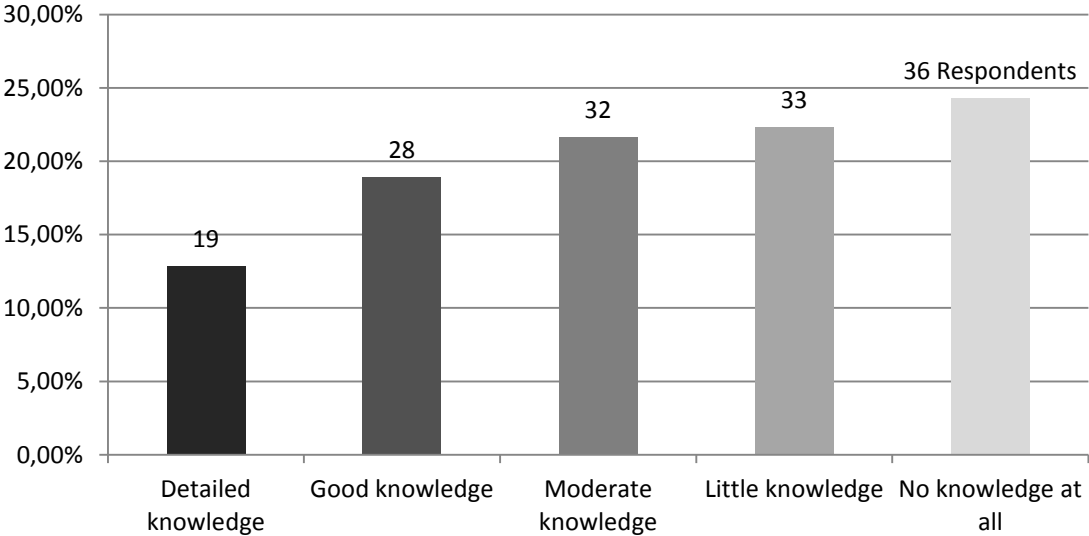


Figure 11 – Distribution of knowledge among respondents

To minimize the bias caused in the answers, due to respondents providing answers that actually lack knowledge to do so, the questionnaire automatically ended for respondents with no knowledge at all. This leaves an amount of 112 answers that provide value for the research (corresponding to 75.68% of total respondents, which is 148), which make up the basis for all further analysis. As for a small share of respondents the organization is not clearly identifiable, potentially

a minor share might be employed by the same organization which would slightly lower the validity of results. However, this is only the case for six respondents, which still would provide unique data from 106 respondents and therefore only has little influence on the research’s validity.

The respondents with knowledge about the reformation have a great variety of backgrounds and are engaged in a great number of different business and organizations of different sizes. However, to make basic sense, it is crucial to firstly analyse what kind of respondents provided their data. As stated earlier, the data that is the most valuable for the research stems from respondents that have knowledge about the investment decisions of the company and knowledge about the Mexican energy reform. Naturally, the higher the person of interest is situated in a company’s hierarchy, the better the knowledge about the company’s investment forms, expansion plans and strategic decisions will be. It is therefore vital to analyse the data gathered from the company size in respect to the company level the respondents are employed in, to get a first overview:

	Low company level	Lower Management	Middle Management	Executive Management	Not steadily employed / external	Total
1-50 employees	0.9%	2.7%	2.7%	38.4%	1.8%	46.4%
51-200 employees	0.9%	0%	5.4%	8.0%	0%	14.3%
201-500 employees	1.8%	0%	1.8%	4.5%	0%	8.0%
>500 employees	3.6%	8.0%	13.4%	4.5%	1.8%	31.3%
Total	7.1%	10.7%	23.2%	55.4%	3.6%	100%

Table 4 – Company size and company level

A great amount of respondents, in total 87.6%, are employed in the Middle Management or the Executive Management of the organization. At the same time, more than 31% of respondents are employed in companies with more than 500 employees.

This data looks promising, leaving the impression that a great number of respondents are employed on a high company level in big companies. Statistically, there is positive a correlation between company size, level of capital intensity and investment activity – leading to the fact that bigger companies also have more intensive investment activities (Hunya, 2000). However, due to the shared high number of small companies and of Executive Managers, caution should be exercised. For example, every sole proprietor automatically becomes the Executive Management in the referring company. The aforementioned relationship between company size and investment activity could then potentially lead to the bias of a comparably little share of respondents planning or desiring to invest in Mexico, which might not be representative. To minimize this bias, respondents were also asked how they would evaluate the prosperity of certain investment forms for companies in general, even if they themselves do not invest. This question is addressed later and in the section dedicated to the hypotheses. Nevertheless, the picture of the distribution of respondents is still satisfying - more than 37% of them derive from companies with more than 50 employees and the Middle or Executive Management levels therein.

When it comes to the background of the organizations the respondents are employed in, the great variety of the energy sector becomes visible. Although the research topic was narrowed through the delimitations addressed earlier, the scope of different groups is still very broad. Naturally, the more different groups that are involved in the knowledge-creation process, the more difficult it is to draw sensible conclusions. Knowing that the research sample is big enough for statistically significant conclusions, it still needs to be said that for the great variety in the sector, a sample of bigger size would deliver better and more reliable results. At the same time, it is important to understand that the overall goal of this research is to create a first overview of the topic while capturing the broad variety given in the energy sector, which is consistent with the choice of a descriptive research design.

The variety of the companies engaged in the energy sector is visible in the following figure. The shares provided are not based on respondents, but on answers, which is due to the possibility of multiple selection. The number of answers (here: 158) was chosen in this case, as it is more suitable for illustration and comparison purposes. In general, a share of more than 25% is engaged in consultancy, while around 23% and 22% are engaged in electricity (combining generation, trade, retail, transformation etc.) and technology or construction respectively.

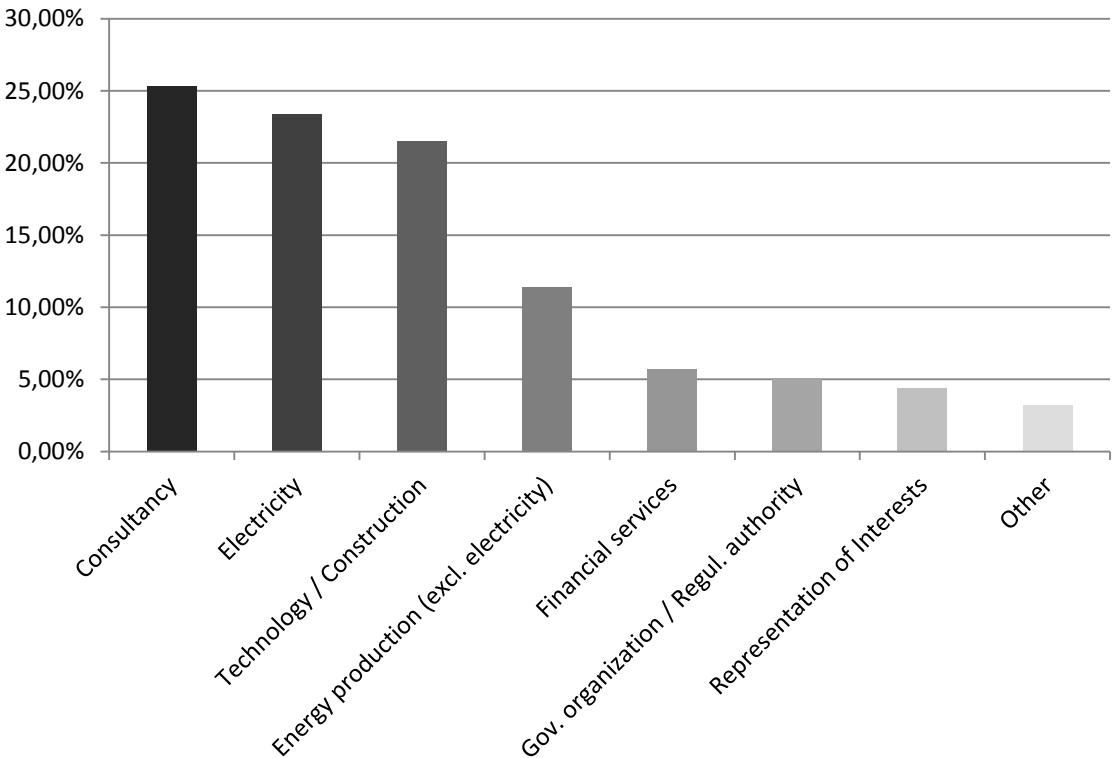


Figure 12 – Energy sector business variety of respondents

The sample furthermore includes shares of approximately 6%, 5% and 4% for financial services, governmental organizations and regulatory authorities (combined in one section) and representations of interests. The category of other answers is contributed to logistics, academic organizations and marketing activities. Addressing the different business forms does not only provide a understanding of who the respondents are but is also crucial for the testing of H3 in later sections, as it is one of the main aspects contributing to new knowledge generation.

Alongside the businesses and investment strategies respondents' organizations are engaged in, it is especially important to consider the energy form they are engaged in. This consideration plays an important role for the understanding of the relationship between energy form engaged in and likelihood to invest in Mexico, which is addressed in the H2.

Fossil Energy (Oil, Gas, Coal etc.)	27.3%
Solar Power	26.9%
Wind Power	16.7%
Biomass (including Biofuel and Biogas)	7.8%
Hydro Power	7.3%
Geothermal Power	5.7%
Tidal Power / Wave Power	4.1%
Other (Nuclear Power and energy storage)	4.1%

Table 5 – Distribution of energy forms

Again, a multiple selection of answers was possible to ensure that no data is excluded. The comparably big number of responses, which is 245, gives an average of about two answers per respondent. This number however is easily explainable. Firstly, a lot of consultancies and organizations within for example financial services are engaged in a variety of energy forms. From respondents engaged in electricity, 83 answers on energy forms were given, which makes a third of the total number. This means that they are engaged in a great variety of different energy forms

5.2 Investment strategies in the context of the reformation

This thesis aims to answer the question about the impact of the Mexican energy reformation on the investment strategies of U.S. companies engaged in the energy sector. The overview of the statistical distribution of the referring factors paves the way for the later examination of factors in the hypotheses testing. The gathered data about the investment and business plans offers a twofold picture:

- 41.9% of the answers gathered state that the referring organizations have not made investments in the Mexican energy market and do not plan to do so
- 11.3% have already made investments before the reformation was imposed
- 27.4% plan to make investments in the Mexican energy market starting with the reformation or later (combined total)
- 19.4% make up the section for respondents, who have no knowledge

To add another perspective, the questionnaire also included the time frame for increasing business in Mexico. This is due to the fact that organizations might want to increase their business in Mexico after the reform, but do not consider to make any investments. Efforts, that are not considered investments as presented in our theoretical background, are captured through this question.

Time period for increasing business in the Mexican energy sector

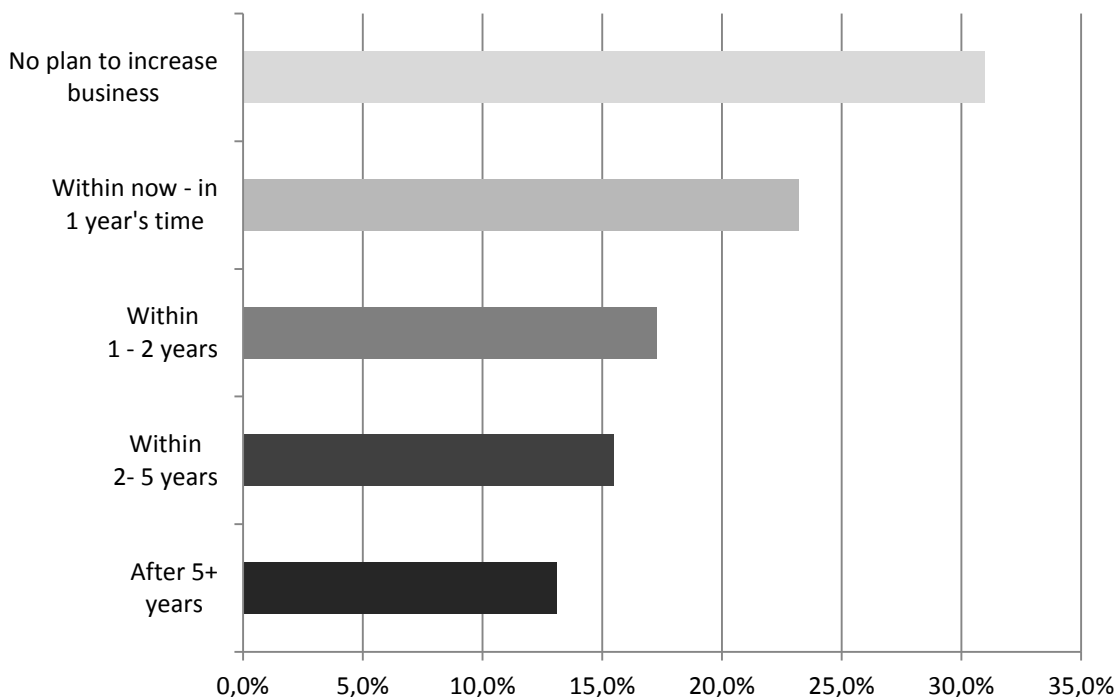


Figure 13 – Time period for increasing business in Mexico

The results deriving from this question show, that an overall of 69% are planning to increase business in the Mexican energy sector. Interestingly, this number is

significantly bigger than the referring share for planning to invest in the Mexican market. It is even larger than the combined number for investments made before the reformation, after the reformation was imposed and respondents with no knowledge. On a total basis, there are significantly more U.S. organizations planning to increase business in the Mexican energy sector than U.S. organizations planning to invest. A reason for this distribution was addressed earlier. As there are relatively many respondents from consultancies, they could want to increase the business solely on contracting basis, which does not require investment strategies as defined in this research. Addressing the question why the results are this way is beyond the scope of this thesis, but provides great possibilities for follow-up studies.

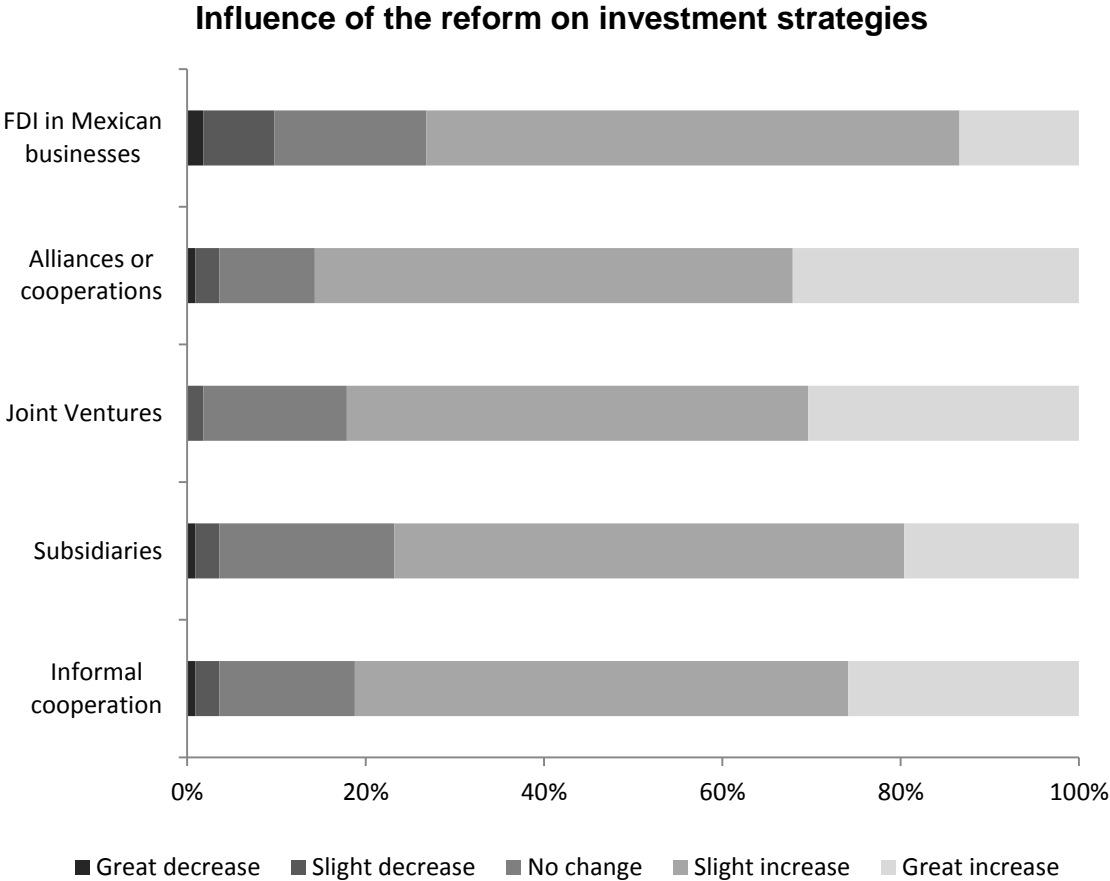


Figure 14 – Influence on investment strategies

The respondents also deliver insightful information, about how they evaluate the impact of the reformation, while neglecting the fact that they might not invest

themselves through their referring companies. Interestingly, the influence of the reform was evaluated to be highly positive and stimulating for the different investment strategies and investment forms, as shown in the figures above and below. For the figure above, we can see that at least 75% of the respondents evaluated each business form used in investment strategies to be expected to increase or increase greatly, with only marginal shares of negative evaluations. This logically implies a great expansion in investments strategies of the U.S. organizations. Although the differences in the single investment strategies are small, alliances and cooperations with Mexican companies are expected to increase to the greatest extent. To make sense of the distribution of answers, several factors should be considered. This highly positive rating might be due to the only little knowledge about the reformation, where the respondents evaluated the impact positive due to the general knowledge about market reforms, lacking in-depth knowledge about the specifics in this case. Additionally, the evaluation might be influenced by the assumed positive affect on foreign investments, as reformation is often understood as liberalization, which has a clearly positive meaning. One way to exclude at least the bias of too little in-depth knowledge could be to present an overview of the reform to the respondents, before answering the questionnaire. However, due to the respondents' time and complexity of the reform, this is not practically applicable in this research.

Concerning the evaluation of the impact on investment forms addressed above, a similar picture is drawn. Each investment form, relating to the investment forms of FDI examined earlier, is evaluated to be stimulated or strongly stimulated. For each of the first three categories (investing through FDI, Setting up subsidiaries and setting up value chains) around 80% of respondents state this impact.

Evaluation of impact on investment forms

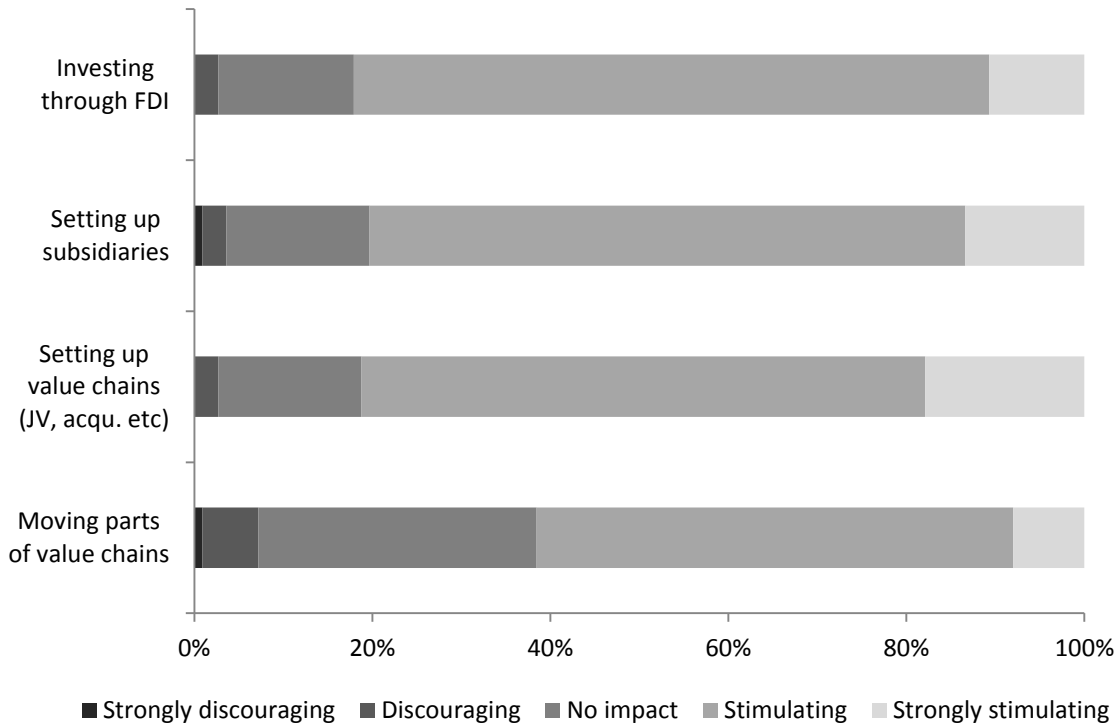


Figure 15 – Impact on investment forms

Interestingly, the respondents employed by organisations from the U.S. state this, with an exception of moving parts of the value chain to Mexico. While this information might be based on advanced understanding of the Mexican energy reform as well as of investment forms applied by U.S. organizations, it might at the same time be based on the general protective view of issues related to the U.S. economy. Moving parts of the value chain to another country - especially one constantly being involved in immigration issues - would cause a loss of employment in the U.S. This factor could have led to this answer, as it is the only option that involves increasing investment in Mexico while decreasing it in the U.S. at the same time. The motivation for the evaluation of the investment forms and strategies could also be addressed in further research.

5.3 Hypotheses – statistical findings¹⁷

For a more multidimensional result, it is important to address several aspects of an impact, as stated before. The described factors make up the hypotheses being tested, which are constituted by the following factors:

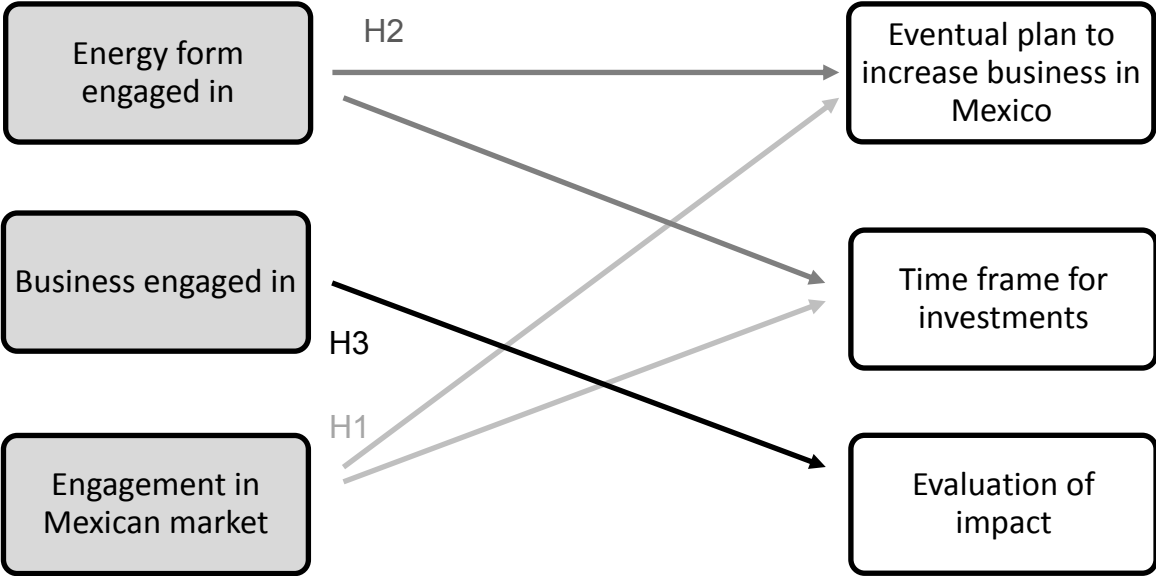


Figure 16 – Constitution of hypotheses

To be able to cover a broad spectrum of factors, all factors identified to be influential and all dimensions to be impacted are used for the hypotheses. The hypotheses in this context will be used for the creation of advanced knowledge, based on the general findings and the findings related to the impact of the reform addressed earlier. Although the data gathered from the respondents and the descriptive research design together limit the expressiveness of the findings, the hypotheses still provide great information about observable trends and patterns.

5.3.1 Hypothesis 1 – findings

The H1 hypothesis establishes a relationship between the pre-existing engagement in the Mexican energy market and the likelihood of increasing business. Logically, any organization already being present in the Mexican energy market will experience a lower threshold for making business in Mexico than companies lacking the experience from former operations. The reform aims to

¹⁷ Statistics used for the hypotheses testing can be found in the appendices

attract new investors to the Mexican market that have not made investments before, which makes H1 an important statement to examine for this research.

Hypothesis 1 (H1): Organizations already engaged in the Mexican energy market are more likely to increase business in Mexico after the reforms than organizations not yet engaged.

Independent variable: Engagement in the Mexican energy market

Dependent variable: Increasing business in Mexico

Firstly, it is important to state that the sample size for the first examination has been reduced from originally 112 to 88 respondents. This was due to the goal of delivering valuable insights and due to 24 respondents of the population having claimed to have no knowledge about the investment plans of the company they are employed in. Logically, a further examination of those responses would not have been expedient for this research. Additionally, the dimension connected to the plans for investments has been examined. While this is not straight targeting the hypothesis, it is still closely connected as often investments and increasing business go hand in hand. In other words, these two dimensions are being examined to provide a more multidimensional view on the H1 statement.

In the targeted population a group of 39.8% identified themselves as not engaged in the Mexican market, displaying that 60.2% are engaged in the market at the same time. Of these 39.8% of respondents, merely 22.9% again stated that they plan to invest in Mexico¹⁸. Also, 60% of respondents for organizations already engaged state that investments are planned. Herein it is important to notice, that answers were re-grouped to deliver a more sensible picture. As it is of minor importance in which time frame investments are planned, the several time periods introduced earlier in this chapter were re-grouped to a positive answer on if investments were made or planned. It is visible that organizations that are already engaged in the Mexican market are more likely to invest in the Mexican energy market than organizations not engaged. Due to the size of the difference in the

¹⁸ The referring questions and statistics can be found in the appendix

group comparison, which is around 35%, the difference can be seen as statistically significant.

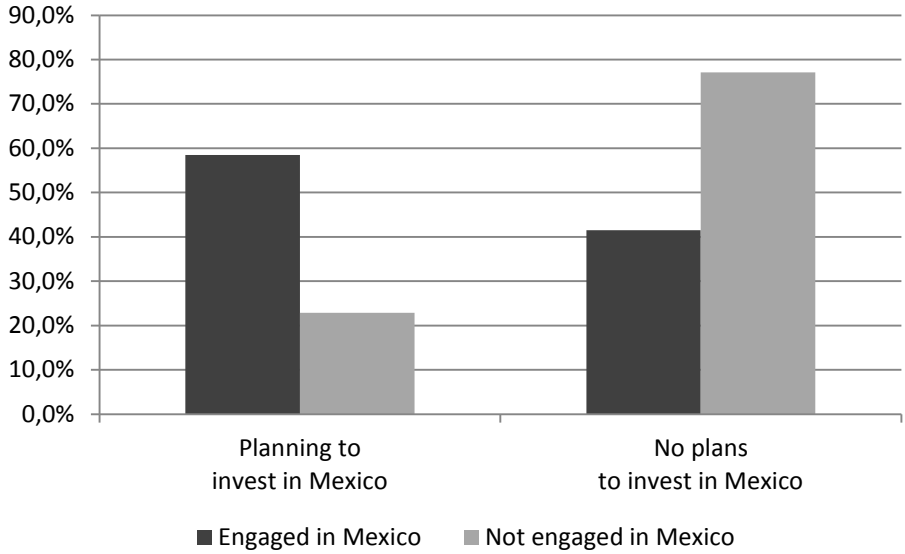


Figure 17 – H1: Group comparison 1

Looking at another dimension being influenced by the reform, the examined dimension consists of a ranking of the likelihood of organizations to invest in Mexico. For organizations engaged in Mexico, nearly 19% of respondents evaluate their likelihood to be neutral and only around 14% of the groups' respondents consider it to be unlikely, that business in Mexico will be increased.

This leaves a great share of 67.7% of the respondents stating that they are likely to increase business in the Mexican energy market. When comparing the groups of organizations already engaged in Mexico and organizations not engaged in Mexico, the observable difference is distinct referring to being likely to increase business in Mexico, the difference is almost 20% (the shares make up 67.7% versus 48.9%). The companies already engaged clearly show a greater likelihood to increase business in Mexico, which is also coherent with findings before. Also the overall trend, which is observable in the first graph, is straightforward applicable to this examined dimension and due to the great differences in shares, coincidence in findings is very unlikely. However, it needs to be considered that the number of respondents was reduced to exclude invalid data in the first case – therefore, bias due to the smaller sample size could be caused.

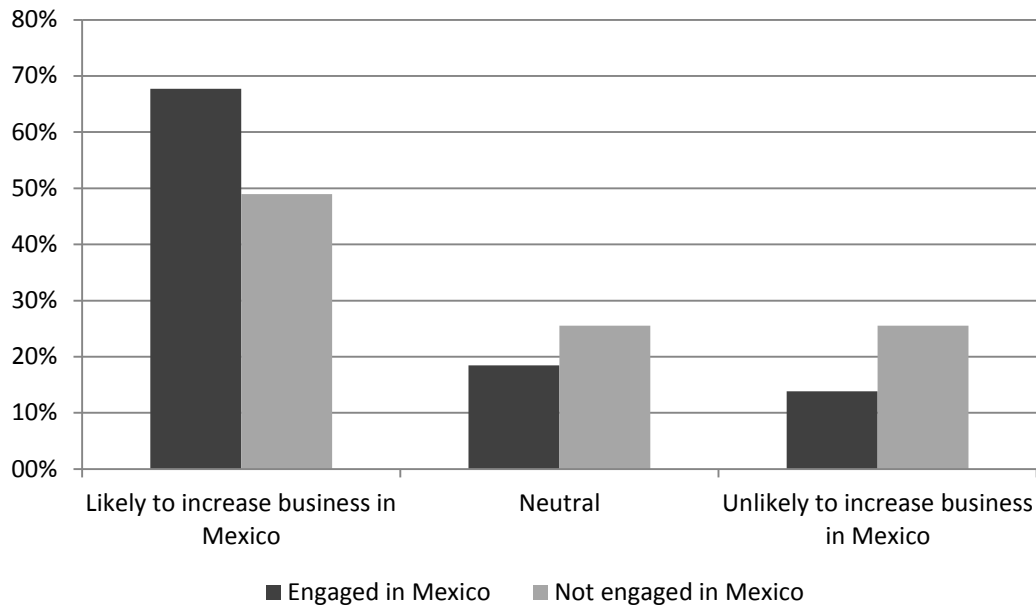


Figure 18 – H1: Group comparison 2

Further testing

To increase the validity of the findings, chi-square tests were performed with the same two dimensions already mentioned. The chi-square tests aim to explore the relationship between two variables and provide a greater in-depth knowledge of the relationship. In the first test, comprising the engagement in Mexico and the plans of investing in Mexico, the significance level proved to be 0.002, significance is given with a value below 0.05. This result means that it is statistically proven that dependence between the engagement of the organization in Mexico and the plans to invest in Mexico is given. The relationship, as seen in the figure, is positive, implying that being already engaged in the Mexican energy market also relates to being more likely to plan to invest in the market.

For the examination of the other dimension, the test provided a figure which indicates that the results therein are not significant. This might mainly be due to the more equal distribution of answers, although still a clear trend could be observed.

Summary

Within our sample, a distinct difference in investment plans in Mexico appears to be between the two groups: already engaged in the Mexican energy market and

the group that is not engaged. The group that is already engaged is to a bigger extent planning to invest in Mexico and is also more likely to increase business in Mexico than the organizations currently not engaged in Mexico. The chi-square tests at least partly support the findings addressed before. Combining these results with the consistent trend observable and the sample size, which is big enough to create valid findings, the hypothesis H1 is supported by our findings and can therefore not be falsified.

5.3.2 Hypothesis 2 – findings

For H2, a relationship between the energy forms engaged of the examined organizations and the likelihood to invest in Mexico was established. As examined earlier, Mexico is following one major goal: attracting foreign investment and at the same time boosting renewable energy development. A great many regulations are now aiming to facilitate the renewable energy growth after the reform, which makes this factor interesting for examination.

Hypothesis 2 (H2): Organizations engaged in renewable energies are more likely to invest in Mexico after the reform than organizations not engaged.

Independent variable: Engagement in renewable energies

Dependent variable: Investment plans in Mexico

Similarly as in H1, for the first dimension being examined the respondents without knowledge were consciously excluded from the analysis to avoid bias. By removing the 24 respondents without knowledge, the basis again is 88 respondents. In the sample of 88 respondents, a share of 37.5% is solely engaged in renewable energies, 30.7% are solely engaged in non-renewable energies and 31.8% are engaged in both renewable and non-renewable energies. H2 is constituted by dividing all respondents into two groups, renewable and non-renewable energies. For this matter, all energy forms not being related to renewables (including fossil fuels, nuclear power etc.) have been grouped together.

As the hypothesis assumes differences between organizations engaged and not engaged in renewable energies, organizations that are engaged in both are counted in for the group of renewable energies. This ensures that the respondents are grouped according to the hypothesis and to avoid bias, which would be caused by a third group. The distribution of groups now is 69% to 31% between renewable energies and non-renewable energies. Interestingly, although there is a different group size, the difference between those two groups only amounts to 0.1%.

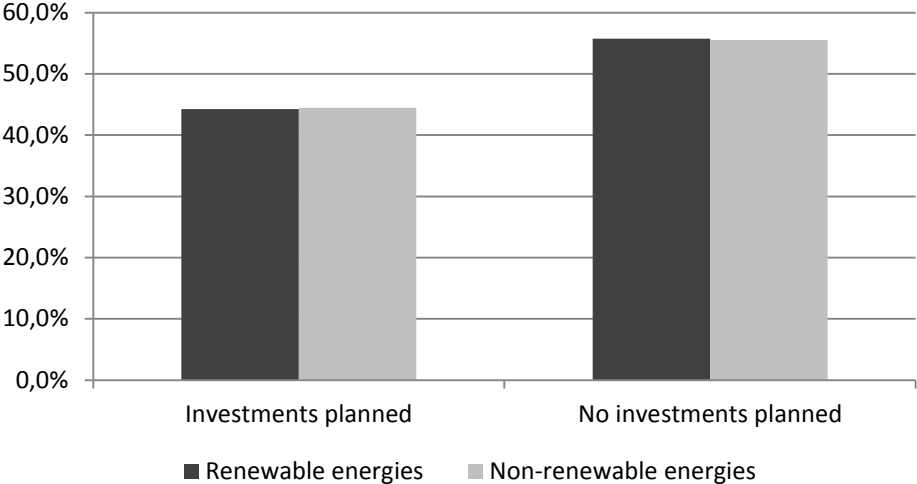


Figure 19 – H2: Group comparison 1

Comparing engagement in renewable energy and the likeliness to increase business in Mexico with the entire sample, there are only minor differences observable. 60.0% of all non-renewable energy respondents state they are likely to increase business in Mexico, while for renewable energy organizations 59.7% state the same. The biggest observable difference in these categories can be found in the category comprising organizations in general being *unlikely* to increase business. 19.5% of the renewable energy organizations are unlikely to increase business, while non-renewable energy organizations have a share of 17.1%. In total, the differences between the groups are only marginal.

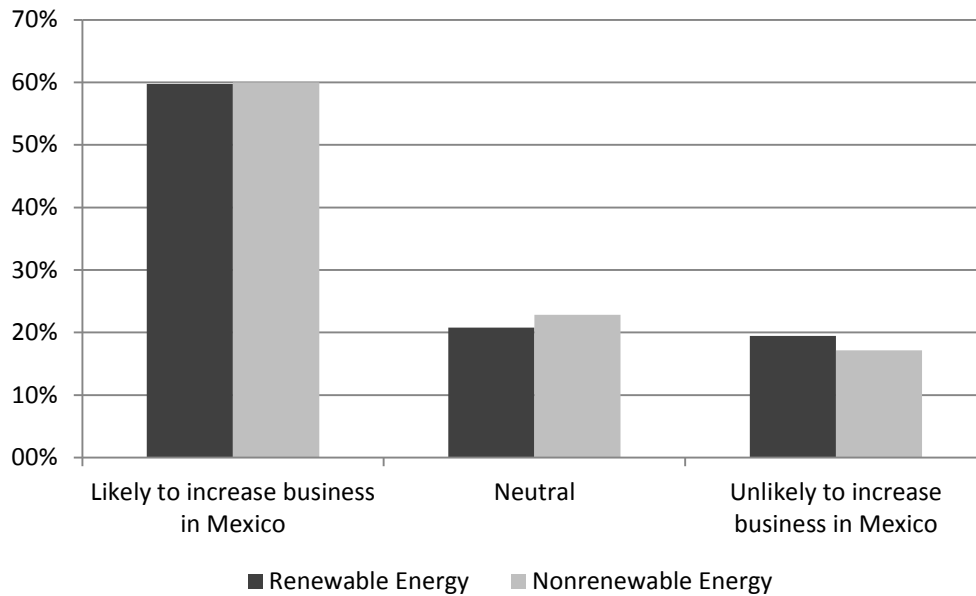


Figure 20 – H2: Group comparison 2

In both dimensions tested, there is no major difference between organizations engaged in renewable energy and the ones engaged in non-renewable energy when it comes to business in Mexico.

Other tests

Again, chi-square tests were performed on the aforementioned variables. In the first of these, group comparison 1, a significance value of 1.0 was given which clearly indicates that there are no differences between the groups. Little surprisingly, in the second test, the variables used provided a significance level of 0.942. As stated before, the findings are considered to be significant with a value below 0.05, which also supports the findings above.

Summary

When examining organizations engaged in renewable energy in opposition to organizations not engaged in renewable energy, solely marginal differences could be found. As presented in the two figures above, respondents from either group scored almost the same in all examined areas and the found differences, if any were found, are far beyond significance. The chi-square tests support these findings. The hypothesis H2 can therefore not be supported. However, due to the

nature of the applied tests, the hypothesis cannot clearly be falsified, for which further tests would be necessary. Still, an overall trend already indicates, that there are no differences between those two groups.

5.3.3 Hypothesis 3 – findings

This hypothesis aims to find a clear relationship between two factors: the business a company is engaged in and their evaluation of the reform. The background, as examined in earlier chapters, is that the regulation is mainly aimed at attracting new investments from energy producing companies, engaged in both fossil and renewable energy production, i.e. electricity. For this reason and following logic, energy producers and its sub-group of electricity producers have been grouped together and been analysed in a group comparisons against all organizations comprising other spheres (e.g. consulting, construction and technology, representations of interests etc.). The total number of energy producers comprises 53 respondents, while the group “Other” consists of 59 respondents. These similarly-sized numbers provide great validity for a comparison. As energy producing companies are the ones to benefit the most from the reform, a logical consequence would be that they also evaluate the reformation to be more positive. This assumption provides the following hypotheses:

Hypothesis 3 (H3): Organizations engaged in energy production consider the impact of the energy reform on investment strategies to be more positive than organizations engaged in other business spheres.

Independent variable: Engagement in energy production

Dependent variable: Impact on investment forms

For testing H3, the independent variable was tested in connection to the dependent variable, which consists of two factors presented in the following tables.

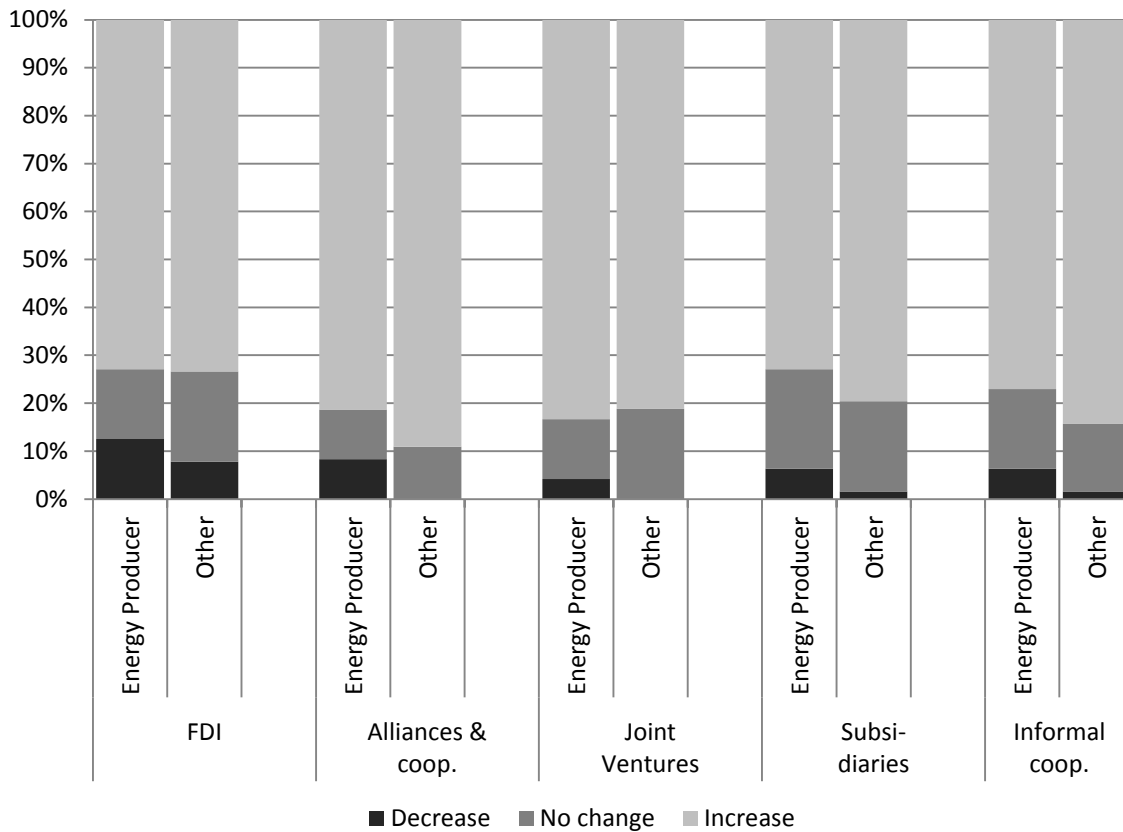


Figure 21 – H3: Group comparison 1

The table above provides a group comparison of energy producers and non-energy producers, how they evaluate the impact on different investment strategies. In general, it is observable that there are small differences between the groups and how they evaluate the investment forms, but they are consistent. In this case, it is assumed that a positive effect of the reform, as stated in the hypothesis, will also increase the number of the mentioned investment strategies, as this is precisely what the reform aims to achieve. When taking a look at the distributions, a reverse trend to what H3 assumes is observable. Although there are relatively small differences, in every category except investments through Joint Ventures, energy producers evaluate the effects to be less positive, i.e. less increasing, than others. These differences are not only to be found within positive evaluations, i.e. increasing, but also between neutral and negative evaluations, i.e. decreasing. Recalling that the sample size in general is big enough to provide significance of the findings, there is a visible trend opposed to the relationship assumed by H3.

The next graph, evaluating the differences in investment forms, shows a coherent picture.

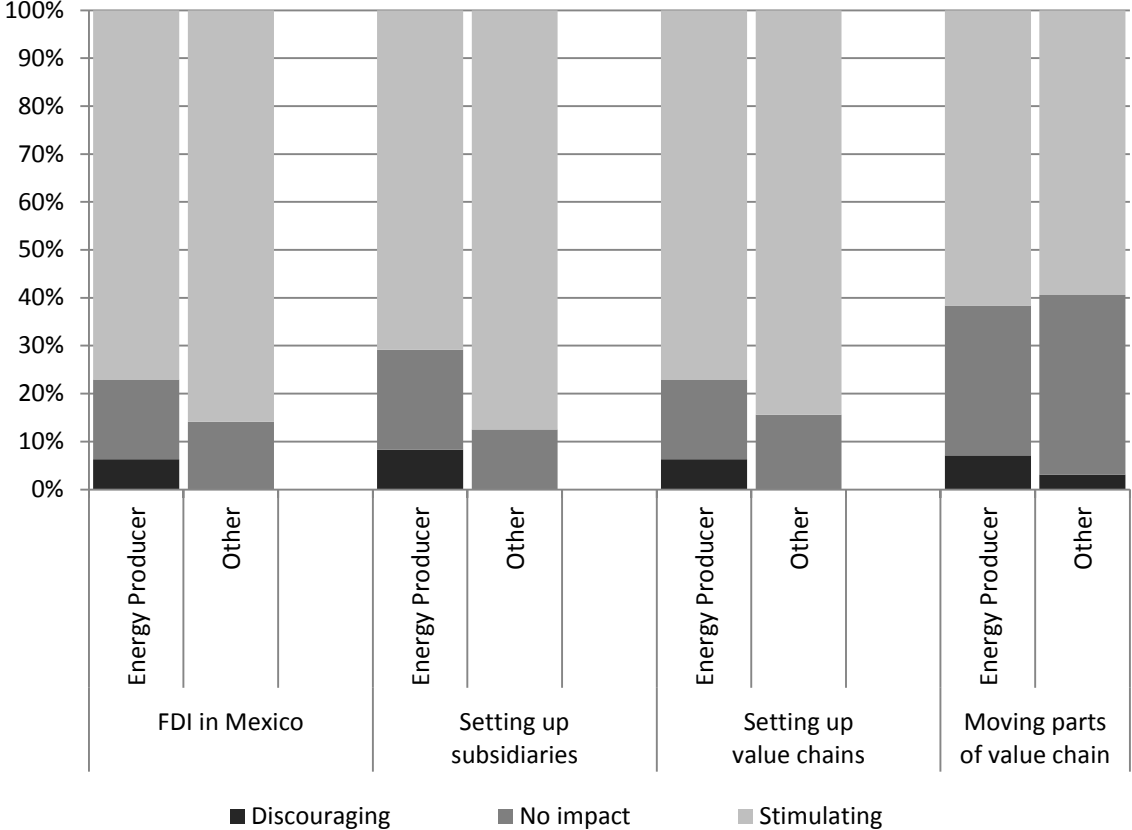


Figure 22 – H3: Group comparison 2

Again, there are visible differences between the two groups. Except for moving parts of the value chain to Mexico, energy producers repeatedly evaluate the impact to be less positive than others. Although in general, the impact is evaluated to have a highly positive influence by both groups, the differences are still noteworthy: the differences existing reach around 10% between the three investment forms opposing H3.

On a general basis, the trend visible in the graph before is also continued in this graph, which naturally reduces the risk of a coincidental observation. As the trend is also coherent and partly presents rather significant differences between the groups, a coincidental observation is very unlikely, although it cannot be ruled out.

Summary

Although the reformation provides the best possibilities for energy producers, the evaluation shows a trend opposing this hypothesis, which can be statistically proven to a great extent. The great majority of energy producers evaluate the reform to be highly positive but at the same time, the “Other” group evaluates the reforms to be even more positive than the energy producers. The hypothesis states that energy producers evaluate the reform to be more positive than the other group, but the findings show the opposite. As the groups are of similar size (53 respondents from energy production and 59 respondents from other spheres), the results possess stronger validity as with a greater difference in group sizes.

One reason for this might be the knowledge energy producers possess. They simply might possess more detailed knowledge about the reform, proving companies, at which the reform is not primarily aimed, to be too optimistic. If a reform is for example strongly promoted and advertised, respondents without detailed knowledge might evaluate the reform on this information, instead of the reform’s actual implications. Another reason might be that energy producers are simply more sceptical towards the future outcome. The reforms were already imposed, but it will take a significant period of time until the reform will start to bear fruits.

It needs to be mentioned that for this hypothesis, no further valuable testing was possible due to the type of data gathered from the questionnaire. Overall, and considering the evaluations found before in this chapter and the findings specifically connected to H3, the hypothesis H3 cannot be supported. This is due to the sample size, which is big enough to deliver valid results, some significant differences existing between the examined groups and the trend observed in the different evaluations being clearly opposed to the statement made within H3.

5.4 Discussion of results

The statistical findings within this chapter provide great insights connected to the research design, the research method and the sampling method. The respondents from the questionnaire prove to be from high company levels and representing all different company sizes, businesses and energy forms to a reasonable extent. This is important, as it also influences the validity of the results. On a general

basis, we can see that the respondents evaluated the energy reform to be very positive and a great majority is planning to invest in the Mexican energy market in the near future.

The hypotheses testing delivered more in-depth results in comparing different groups, which is necessary to evaluate if the reform only successfully targets a certain spectrum of the broad energy sector. Here, H1 is the only hypothesis that can clearly be supported by the findings, which means that organizations already engaged in the Mexican energy market are more likely to invest in the Mexican energy market in the future. This seems reasonable, as newly entering organizations are usually facing significantly more obstacles in a new market.

H2 delivered a very coherent picture, examining if renewable energy organizations are more likely to invest in Mexico than others. Surprisingly, there are almost no differences between the groups, even less than expected before the testing of the hypothesis. As the further testing also shows the same trend, this hypothesis cannot be supported by the findings.

The last hypothesis, H3, established a relationship between energy producers and the evaluation of the reform. As the reform targets energy producers mainly, the assumptions that they also evaluate the reform more positive seems natural. However, the testing showed only small differences between the groups, although those in some cases are big enough to be of significance. Interestingly, the overall observable trend was not supporting the hypothesis, showing energy producers evaluating the reform to be slightly less positive in most cases. However, the results still show a very optimistic evaluation of the energy reform on a general basis from energy producers.

One of the major findings of the analysis chapter is that there is almost no difference in the evaluation of different investment strategies or different investment forms. Although there are differences being found - especially in testing H3 - these differences are not significant enough to ensure that they are not based on coincidence in observation. As addressed later, the statistical tests in the research could greatly benefit from more and different kind of data.

To conclude, the findings from this chapter show a strong overall trend and a highly positive evaluation of the reform – the impact on the investment strategies is indisputably positive. However, the differences in aforementioned investment

strategies and investment forms are not significant enough to undoubtedly state that there are intra-industry differences caused by the reformation of the Mexican energy market.

6 Conclusion

This research uses a few highly interlinked research areas that were combined to answer the research question: investment strategies and the focus on renewable energy development provide the first area, the development and reformation of the Mexican energy market the second and the statistical findings connected to both the third. Although a combination of those three is complex and therefore offers room for errors within creation of data and analysis, the interplay of those three research areas provided great insights in the topic.

Mexico today is on the verge to strong economic and energy sector development: the first steps have been made to release the shackles of the tight nationalization of the energy sector. This is already overdue, as Mexico has been facing three major problems that need to be solved for a prosperous energy future of the country: a lack of electricity capacity and technological development, an underdeveloped renewable energy sector and regulations, which did not permit foreign investments to overcome the first two obstacles.

The energy reform has paved the way for further development and foreign investment. The U.S., as the most important investor and trading partner until today, will play a key role in the future development, as they possess not only the resources, but also the interest in investing in the Mexican energy market. Mexico offers great possibilities for renewable energy development and the U.S., as net energy importer, will highly welcome the new investment possibilities in the resource-rich country. Mexico on the other hand will gladly welcome U.S. and foreign investment, not only due to the above mentioned facts, but also due to the desire to strengthen Mexican economy in general, as today's economy is still highly dependent on revenues made from energy production. The Mexican government at the same time still ensures to remain the dominant player in the future development to maintain control and to ensure that the reforms are to the greatest possible benefit for the country.

The essential part of any research alongside gathering new knowledge is to provide an answer for the research question, as it is a compact version of the research topic and defines the scope and direction of the research. Firstly, it needs to be said that the research question as such cannot be answered to the fullest

extent, but it can be answered partly with the gathered data and the overall findings also provide some valuable indications. To recall, the research question is:

How does the recent reform of the Mexican energy market affect the investment strategies of U.S. companies engaged in the energy sector in the field of renewable energy investments in Mexico?

The imposed reform highly impacts the strategic decisions of U.S. companies engaged in the energy sector and their investment strategies. The U.S. energy industry, comprising a great variety of different businesses from different spheres, in this sample evaluates the measures to be highly stimulating for foreign investments and as visible through the quantitative findings, they show a great interest in investing in Mexico in the future. Although the very current developments and the kind of data obtainable through descriptive research design do not allow further findings yet that show a more in-depth examination of U.S. organizations' investment strategies, a clear overall trend is visible: the reform caused a strong spirit of optimism in Mexico, created prosperous new possibilities for U.S. organizations and sparked great investment interest.

Within the hypotheses testing, this trend was emphasized again although there is no significant difference between renewable energy organizations and others or energy producers and others, still the reform seems to be highly attractive for investment from the U.S. In the statistical findings of this research there were no observable differences between different investment strategies or investment forms that allow the drawing of conclusions without any doubt, although it is visible that some investment strategies are evaluated to be slightly more beneficial than others. If the question was about to be answered in a more distinct manner, it could be stated that the impact on investment strategies is highly positive, stimulating the interest in investing and the willingness to increase business in the Mexican energy market. To define the underlying motivations and to statistically provide stronger proofs of the relationships between different variables, further research will be needed.

On paper, the reforms seem very promising, which also can be seen as one of the main reasons for the highly positive evaluation by the sample used for this

research. However, it should be recalled that there is still a long way to go as a lot of reforms and newly imposed regulations will still have to prove their efficiency and effectiveness on a day-to-day basis. The basis to overcome the in-house created obstacles for the energy market development has now been provided with the reforms and the future manner of implementing the reforms will be decisive for the success of the reform, and the plan to modernize the Mexican energy sector and the state economy. Only if the energy reform and its future efficient execution also positively impact U.S. organizations' investment strategies on an *operative* basis, foreign investment can be attracted to enable Mexico to transform from restrictions to riches.

7 Research enhancement possibilities

In this research on the impact of the Mexican energy reform on investment strategies of U.S. organizations engaged in renewable energy, simplifications were inevitable due to the complexity of the research topic. Although great efforts have been put into analysing the impact in accurate, reliable and valid manners, there is a natural room for enhancement of the research, which comprises several areas of the research:

Scope of the research

The scope on which this research has been based on is undoubtedly very challenging because ambitious. The broad scope was set in order to capture the great variety of different businesses, which has proven to be a successful. In retrospect, narrowing down the scope to for example energy producers only might have enhanced the quality of the gathered data as well as the representativeness of the sample of the population. Clearly, it is significantly easier to generalize to a smaller population than big one. Additionally, by narrowing the research scope to a smaller sample, fewer respondents would be needed to obtain statistical valid results. This factor, however, did not prove to be any obstacle in this research but could have benefitted the data gathering process.

The dilemma of the scope and sample size is a critical factor that has been dealt with in a reasonable manner within this research, but logically this area has offered room for further improvements.

Sample size and response rate

The sample size in this thesis was sufficient to draw sensible conclusions – but a bigger sample size would have enabled us to draw conclusions with a higher degree of validity, especially as in some cases of analysis the number of respondents was narrowed down further. Furthermore, the matter of data collection using LinkedIn on one hand made it possible to reach a large number of people involved in the energy business. On the other hand, it possibly increased the distance between us and the respondents and they thereby could feel less obliged to respond to the questionnaire, which also explains the relative low response rate.

Research design

For this research, descriptive design has been chosen because it was the most suitable for the planned analysis conducted. With choosing a descriptive research method, possibilities to conduct a more in-depth analysis were also missed out on, as other research designs would have permitted to test the variables to greater extent. As mentioned, for this research the chosen design proved to be right, but the analysis would have delivered more expressive results with different research designs.

Data

The data collected for this research has to a large extent been collected from the questionnaire. Different questions and/or phrasing might have changed the data accumulated. Naturally, the questionnaire designed and used has its weaknesses and to be precise, there might have been an opportunity to gather more continuous data. Continuous data could have made it possible to conduct more and other statistical tests, though the same can be said about having more respondents in general. In retrospect again, the questionnaire could have been structured differently to better facilitate further statistical tests. When speaking about the data sources, the best was done to only make use of reliable and well-known data, but still there might be unreliable data, which is especially true in connection with LinkedIn profiles. As there is no possibility to counter-check if the respondents really are who they claim to be in the LinkedIn-network, a small amount of data is probably biased by wrongly given information from the respondents, which cannot be proven or ruled out.

Exact population size

The exact population size can be used to increase the validity of a study – this is the case, when the population a study aims to generalize to, is rather small. The bigger the population, the bigger the needed sample size needs to be. For this research, no exact number of the population was available and contacting Ministries of both, U.S. and Mexico, did not provide the desired result of an exact number of organizations that represent the population. Additionally, statistical institutes only offered data connected to businesses from the referring country and their operations in the same. This is due to several reasons: generally, private companies are not required to reveal which country they are making business with

and often, no clear border between being only in contact with or doing business with another country can be drawn. A clear population size would allow further conclusions towards the representativeness of the sample and would have increased the validity of results. However, it needs to be said that a sample size of more than 100-110 respondents who provide valid data is usually regarded as sufficient to allow valid conclusions. In this respect a clear definition of the population and the sample could be made but the size of the population could not be put down in numbers.

Summary

All of the aforementioned factors are intertwined and a change in one of the elements would cause a change in another. The factors, except the unknown exact population size, are all subject to discussion and the appropriate way of doing it 'right' is subjective. In general, there have been several trade-offs being made, comprising the depth of analysis, the sample size and the scope of the research. It should be understood that changing one of the factors would also imply a great extent of other changes. Solely the questionnaire could have been amended separately to serve other purposes and at the same could have gathered more data usable for further statistical analysis.

8 Research outlook

This research offers a first overview of the impact of the reform on U.S. organizations' investment strategies. The actuality of the events only permits research to target the surface, which is also facilitated by the descriptive research design.

These limitations by the research design and actuality on the other hand offer great possibilities for further research. As this research focuses on *how* respondents evaluate the impact, the choice of another research design, that also addresses the *why*, can generate comprehensive new knowledge. There hereby conducted research additionally can function as the research basis for upcoming studies. Logically, addressing the *why*-question would be the next step, which would also include the examination of motivational backgrounds.

Another possibility for further research is given by the delimitations. The research focus could be shifted from renewable energy development to enhanced fossil fuel efficiency to create more specific knowledge in this area. The same is true for the chosen investment strategies. Adding several new dimensions, for example contracting types, would also help to create a broader in-depth knowledge in this spheres. Furthermore, a whole new focus could be placed on the reform of the energy market when examining the relations to other countries, e.g. the Caribbean. It is very likely, that the opened energy market also attracts interest from Middle- and Southern-American organizations and governments, which again offers a vast possibility for research.

Future research could furthermore add a whole new perspective to the topic of market reformation with a focus on the U.S. economy instead of U.S. organizations. This macro-economic view offers possibilities for research on how the reformation will affect employment rates, foreign investment levels (which partly has been estimated already), exporting and importing structures and others. Additionally, through adding a cultural dimension, research examining how successful the cooperation of U.S. organizations with Mexican companies will be can be conducted.

On a broader spectrum, the Mexican energy market reformation can also be seen and compared in the context of other countries' energy development and their

undertaken steps to facilitate the growth of renewable energy development. As there are many operational regulations still to come, a cross-country comparison would take the reform to a higher research level. In this case, research connected to for example China's recently started shift away from coal or Germany's "Energiewende" (strong financial and legislative support of renewable energies) would create new knowledge while still sticking to the topic of renewable energy development in Mexico.

Apart from the mentioned possibilities, future research could also be based on the business climate in Mexico and any changes following the reformation of the market. This could include a study connected to the analysis of the implementation of the reform, i.e. if it was implemented effectively to prove the reform "on paper" to be effective and efficient. A focus on the business climate in Mexico and its changes could then illustrate the greatest differences between the "paper" and the "operational" reform. A company survey and the use of interviews would furthermore provide a great comparative follow-up study, which could still make use of the methodological approach used in this research. In this respect, the future research would be more an evolvement of this study, rather than a new, separate study.

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Appendices

Appendix 1 – Introductory message & Questionnaire

Introductory message

Dear Mr. / Ms.,

I can see that you are member of [specific group name on LinkedIn] and therefore your opinion is of high interest to us. We are two Graduate students from Norway (Uwe and Bjarne) conducting research about U.S. energy companies and their investment strategies in Mexico, after the Mexican energy market has recently been reformed.

We would like to ask you to answer the questionnaire at the link below. It will take approximately 5 minutes and will highly contribute to the outcome of our research.

<https://response.questback.com/bjarneve/bqmxwvbluv/>

Thank you very much in advance for your contribution!

With best regards,

Uwe and Bjarne

Questionnaire

Q1. In which of the following regions are you employed or have already been employed?

- USA - States bordering Mexico (TX, AZ, CA, NM)
- USA - Other states
- Mexico
- Europe
- Central or South America
- Others (please specify)

Q2. The Mexican energy market has recently been reformed and opened for foreign investment. How would you describe your knowledge about the reformation?

- Detailed knowledge
- Good knowledge
- Moderate knowledge
- Little knowledge
- No knowledge at all

Q3. What is the size of the company / organization you are currently working for or have last been working for?

- 1-50 employees
- 50-200 employees
- 200-500 employees
- >500 employees

Q4. At which level would you describe your position at the company / organization you are currently working for or have last been working for?

- Low company level / No personnel responsibility
- Lower Management
- Middle Management
- Executive Management
- Not steadily employed / freelancer / external advisor etc.
- Other

Q5. In which respect is the company / organization you are working for (or have last been working for) engaged in the energy sector?

- Consultancy
- Financial services (Banks, investment companies, hedge funds etc.)
- Energy Production (excluding Electricity)
- Electricity (Generation, Trade, Retail, Transformation etc.)
- Representation of Interests
- Technology / Construction
- Governmental Organization / Regulatory Authority
- Other (please specify)

Q6. Which energy sources is your current (or last if not employed currently) company / organization engaged in or making business with?

- Fossil Energy (Oil, Gas, Coal etc.)

- Solar Power (all types)
- Wind Power
- Hydro Power
- Tidal Power / Wave power
- Geothermal
- Biomass (including Biofuel and Biogas)
- Other (please specify)

Q7. In which of the following business forms is your current (or last if currently unemployed) company / organization engaged in (in the Mexican energy market)?

- Joint Venture
- Merger or previous acquisition
- Cooperation or alliance with partner in Mexico
- Subsidiary
- Foreign direct investment (any type)
- Loose business contact
- Not engaged
- Other (please specify)

Q8. When have investments from the company / organization you are working for (or were working for if currently unemployed) been made or will be made in the Mexican energy market?

- No investments made or planned - please proceed with question 10
- Investments have already been made before the de-regulation
- Investments have approximately started with the de-regulation in 2013/2014
- Investments will be made within 2 years
- Investments will be made within 5 years
- Investments will be made after 5 years
- I don't know

Q9. Which of the following business forms is your current (or last) company / organization planning to engage in (in the Mexican energy market)? (Rating: 1-5; Highly unlikely - Very likely)

- Joint Venture
- Merger or acquisition
- Cooperation or alliance with partner in Mexico
- Subsidiary

- Foreign Direct Investment (any form)

Q10. In which time period is the company / organization you are working for (or were last working for) planning to increase business in general in the Mexican energy sector? (Rating: 1-5; Highly unlikely - Very likely)

- Within now - in 1 year's time
- Within 1 - 2 years
- Within 2- 5 years
- After 5+ years
- No plan to increase business

Q11. Which of the following would you describe as reasons for your company / organization to enter the Mexican energy market? (Rating: 1-5; No reason at all – Main reason)

- Access to the local Mexican market
- Easy access to natural resources
- Less energy production costs
- Higher electricity prices in Mexico
- Company expansion
- Relocating business to Mexican market

Q12. To which extent do you think the reformation has influenced investment strategies of U.S. renewable energy companies in the following areas? (Rating: 1-5; Number will greatly decrease - Number will greatly increase)

- Investments (FDI) in Mexican businesses
- Alliances or cooperation with Mexican businesses
- Joint Ventures
- Subsidiaries of U.S. renewable energy companies in Mexico
- Informal cooperation with Mexican partners or authorities

Q13. Please evaluate, how prosperous you believe the following investment strategies of U.S. renewable energy companies would be in the Mexican energy market: (Rating: 1-5; Very un-prosperous - Very prosperous)

- Investments through Joint Ventures
- Investments through a merger or acquisition (including acquisition of assets)
- Investments through alliances or cooperation
- Investments through setting up a subsidiary

- Investments (FDI) in Mexican renewable energy businesses

Q14. How would you describe the impact of the reformation of the Mexican energy market on the investment forms of U.S. renewable energy companies? (Rating: 1-5; Strongly discouraging - Strongly stimulating)

- U.S. businesses investing (FDI) in Mexico
- U.S. businesses setting up subsidiaries in Mexico
- U.S. businesses setting up value chains in Mexico (through Joint Ventures, Acquisitions, Alliances etc.)
- U.S. businesses moving parts of their value chain to Mexico

Appendix 2 – Statistical results (SPSS)

Hypothesis 1

Group comparison 1

7) Business form currently engaged in Mexico - Not engaged * InvestNO Crosstabulation

			InvestNO		Total
			,00	1,00	
7) Business form currently engaged in Mexico - Not engaged	false	Count	31	22	53
		% within 7) Business form currently engaged in Mexico - Not engaged	58,5%	41,5%	100,0%
		% within Invest-NO	79,5%	44,9%	60,2%
		% of Total	35,2%	25,0%	60,2%
true		Count	8	27	35
		% within 7) Business form currently engaged in Mexico - Not engaged	22,9%	77,1%	100,0%
		% within Invest-NO	20,5%	55,1%	39,8%
		% of Total	9,1%	30,7%	39,8%
Total		Count	39	49	88
		% within 7) Business form currently engaged in Mexico - Not engaged	44,3%	55,7%	100,0%
		% within Invest-NO	100,0%	100,0%	100,0%
		% of Total	44,3%	55,7%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10,846 ^a	1	,001		
Continuity Correction ^b	9,450	1	,002		
Likelihood Ratio	11,289	1	,001		
Fisher's Exact Test				,001	,001
Linear-by-Linear Association	10,723	1	,001		
N of Valid Cases	88				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 15,51.

b. Computed only for a 2x2 table

Group comparison 2

7) Business form currently engaged in Mexico - Not engaged * IncrBusNO Crosstabulation

			IncrBusNO			Total
			1,00	2,00	3,00	
7) Business form currently engaged in Mexico - Not engaged	false	Count	44	12	9	65
		% within 7) Business form currently engaged in Mexico - Not engaged	67,7%	18,5%	13,8%	100,0%
		% within IncrBusNO	65,7%	50,0%	42,9%	58,0%
		% of Total	39,3%	10,7%	8,0%	58,0%
Total	true	Count	23	12	12	47
		% within 7) Business form currently engaged in Mexico - Not engaged	48,9%	25,5%	25,5%	100,0%
		% within IncrBusNO	34,3%	50,0%	57,1%	42,0%
		% of Total	20,5%	10,7%	10,7%	42,0%
Total		Count	67	24	21	112
		% within 7) Business form currently engaged in Mexico - Not engaged	59,8%	21,4%	18,8%	100,0%
		% within IncrBusNO	100,0%	100,0%	100,0%	100,0%
		% of Total	59,8%	21,4%	18,8%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4,227 ^a	2	,121
Likelihood Ratio	4,219	2	,121
Linear-by-Linear Association	4,060	1	,044
N of Valid Cases	112		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,81.

Hypothesis 2

Group comparison 1

Energy - Ren, Foss, Both * 8) Investments made or planned - No investments made or planned - Q10 Crosstabulation

			8) Investments made or planned - No investments made or planned - Q10		Total
			false	true	
Energy - Ren, Foss, Both	Not renewable energy	Count % within Energy - Ren, Foss, Both % within 8) Investments made or planned - No investments made or planned - Q10 % of Total	12 44,4% 30,8% 13,6%	15 55,6% 30,6% 17,0%	27 100,0% 30,7% 30,7%
	Renewable Energy	Count % within Energy - Ren, Foss, Both % within 8) Investments made or planned - No investments made or planned - Q10 % of Total	27 44,3% 69,2% 30,7%	34 55,7% 69,4% 38,6%	61 100,0% 69,3% 69,3%
Total		Count % within Energy - Ren, Foss, Both % within 8) Investments made or planned - No investments made or planned - Q10 % of Total	39 44,3% 100,0% 44,3%	49 55,7% 100,0% 55,7%	88 100,0% 100,0% 100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,000 ^a	1	,987		
Continuity Correction ^b	0,000	1	1,000		
Likelihood Ratio	,000	1	,987		
Fisher's Exact Test				1,000	,584
Linear-by-Linear Association	,000	1	,987		
N of Valid Cases	88				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,97.

b. Computed only for a 2x2 table

Group comparison 2

Crosstab

			IncrBusNO			Total
			1,00	2,00	3,00	
EnSourceRenewAll	,00	Count	21	8	6	35
		% within En-SourceRenewAll	60,0%	22,9%	17,1%	100,0%
		% within IncrBusNO	31,3%	33,3%	28,6%	31,3%
		% of Total	18,8%	7,1%	5,4%	31,3%
	1,00	Count	46	16	15	77
		% within En-SourceRenewAll	59,7%	20,8%	19,5%	100,0%
		% within IncrBusNO	68,7%	66,7%	71,4%	68,8%
		% of Total	41,1%	14,3%	13,4%	68,8%
Total		Count	67	24	21	112
		% within En-SourceRenewAll	59,8%	21,4%	18,8%	100,0%
		% within IncrBusNO	100,0%	100,0%	100,0%	100,0%
		% of Total	59,8%	21,4%	18,8%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	,119 ^a	2	,942
Likelihood Ratio	,119	2	,942
Linear-by-Linear Association	,026	1	,872
N of Valid Cases	112		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,56.

Hypothesis 3

Group comparison 1

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
12) Influence of the Reform on U.S. investment strategies - Investments (FDI) in Mexican businesses	Number will greatly decrease	Count	5	6	11
		% within 12) Influence of the Reform on U.S. investment strategies - Investments (FDI) in Mexican businesses	45,5%	54,5%	100,0%
		% within Energy Producer	7,8%	12,5%	9,8%
		% of Total	4,5%	5,4%	9,8%
	No change	Count	12	7	19
		% within 12) Influence of the Reform on U.S. investment strategies - Investments (FDI) in Mexican businesses	63,2%	36,8%	100,0%
		% within Energy Producer	18,8%	14,6%	17,0%
		% of Total	10,7%	6,3%	17,0%
	Number will greatly increase	Count	47	35	82
		% within 12) Influence of the Reform on U.S. investment strategies - Investments (FDI) in Mexican businesses	57,3%	42,7%	100,0%
		% within Energy Producer	73,4%	72,9%	73,2%
		% of Total	42,0%	31,3%	73,2%
Total	Count	64	48	112	
	% within 12) Influence of the Reform on U.S. investment strategies - Investments (FDI) in Mexican businesses	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
12) Influence of the Reform on U.S. investment strategies - Alliances or cooperations with Mexican businesses	Number will greatly decrease	Count	0	4	4
		% within 12)			
		Influence of the Reform on U.S. investment strategies - Alliances or cooperations with Mexican businesses	0,0%	100,0%	100,0%
	No change	% within Energy Producer	0,0%	8,3%	3,6%
		% of Total	0,0%	3,6%	3,6%
		Count	7	5	12
	No change	% within 12)			
		Influence of the Reform on U.S. investment strategies - Alliances or cooperations with Mexican businesses	58,3%	41,7%	100,0%
		% within Energy Producer	10,9%	10,4%	10,7%
Number will greatly increase	% of Total	6,3%	4,5%	10,7%	
	Count	57	39	96	
	% within 12)				
Number will greatly increase	Influence of the Reform on U.S. investment strategies - Alliances or cooperations with Mexican businesses	59,4%	40,6%	100,0%	
	% within Energy Producer	89,1%	81,3%	85,7%	
	% of Total	50,9%	34,8%	85,7%	
Total	Count	64	48	112	
	% within 12)				
	Influence of the Reform on U.S. investment strategies - Alliances or cooperations with Mexican businesses	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
		% of Total	57,1%	42,9%	100,0%

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
12) Influence of the Reform on U.S. investment strategies - Joint Ventures	Number will greatly decrease	Count	0	2	2
		% within 12)			
		Influence of the Reform on U.S. investment strategies - Joint Ventures	0,0%	100,0%	100,0%
		% within Energy Producer	0,0%	4,2%	1,8%
		% of Total	0,0%	1,8%	1,8%
	No change	Count	12	6	18
		% within 12)			
		Influence of the Reform on U.S. investment strategies - Joint Ventures	66,7%	33,3%	100,0%
		% within Energy Producer	18,8%	12,5%	16,1%
		% of Total	10,7%	5,4%	16,1%
	Number will greatly increase	Count	52	40	92
		% within 12)			
Influence of the Reform on U.S. investment strategies - Joint Ventures		56,5%	43,5%	100,0%	
% within Energy Producer		81,3%	83,3%	82,1%	
	% of Total	46,4%	35,7%	82,1%	
Total	Count	64	48	112	
	% within 12)				
	Influence of the Reform on U.S. investment strategies - Joint Ventures	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total	
			No Energy Producer	Energy Producer		
12) Influence of the Reform on U.S. investment strategies - Subsidiaries of U.S. renewable energy companies in Mexico	Number will greatly decrease	Count	1	3	4	
		% within 12) Influence of the Reform on U.S. investment strategies - Subsidiaries of U.S. renewable energy companies in Mexico	25,0%	75,0%	100,0%	
		% within Energy Producer	1,6%	6,3%	3,6%	
			% of Total	,9%	2,7%	3,6%
	No change	Count	12	10	22	
		% within 12) Influence of the Reform on U.S. investment strategies - Subsidiaries of U.S. renewable energy companies in Mexico	54,5%	45,5%	100,0%	
		% within Energy Producer	18,8%	20,8%	19,6%	
			% of Total	10,7%	8,9%	19,6%
	Number will greatly increase	Count	51	35	86	
		% within 12) Influence of the Reform on U.S. investment strategies - Subsidiaries of U.S. renewable energy companies in Mexico	59,3%	40,7%	100,0%	
		% within Energy Producer	79,7%	72,9%	76,8%	
			% of Total	45,5%	31,3%	76,8%
Total	Count	64	48	112		
	% within 12) Influence of the Reform on U.S. investment strategies - Subsidiaries of U.S. renewable energy companies in Mexico	57,1%	42,9%	100,0%		
	% within Energy Producer	100,0%	100,0%	100,0%		
		% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total	
			No Energy Producer	Energy Producer		
12) Influence of the Reform on U.S. investment strategies - Informal cooperation with Mexican partners or authorities	Number will greatly decrease	Count	1	3	4	
		% within 12)				
		Influence of the Reform on U.S. investment strategies - Informal cooperation with Mexican partners or authorities	25,0%	75,0%	100,0%	
			% within Energy Producer	1,6%	6,3%	3,6%
			% of Total	,9%	2,7%	3,6%
			Count	9	8	17
	No change		% within 12)			
			Influence of the Reform on U.S. investment strategies - Informal cooperation with Mexican partners or authorities	52,9%	47,1%	100,0%
			% within Energy Producer	14,1%	16,7%	15,2%
			% of Total	8,0%	7,1%	15,2%
			Count	54	37	91
			% within 12)			
Number will greatly increase		Influence of the Reform on U.S. investment strategies - Informal cooperation with Mexican partners or authorities	59,3%	40,7%	100,0%	
		% within Energy Producer	84,4%	77,1%	81,3%	
		% of Total	48,2%	33,0%	81,3%	
Total		Count	64	48	112	
		% within 12)				
		Influence of the Reform on U.S. investment strategies - Informal cooperation with Mexican partners or authorities	57,1%	42,9%	100,0%	
		% within Energy Producer	100,0%	100,0%	100,0%	
		% of Total	57,1%	42,9%	100,0%	

Group comparison 2

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
14) Impact of the reformation on the investment forms of U.S. - U.S. businesses investing (FDI) in Mexico	Strongly discouraging	Count	0	3	3
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses investing (FDI) in Mexico	0,0%	100,0%	100,0%
		% within Energy Producer	0,0%	6,3%	2,7%
		% of Total	0,0%	2,7%	2,7%
	No impact	Count	9	8	17
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses investing (FDI) in Mexico	52,9%	47,1%	100,0%
		% within Energy Producer	14,1%	16,7%	15,2%
		% of Total	8,0%	7,1%	15,2%
	Strongly stimulating	Count	55	37	92
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses investing (FDI) in Mexico	59,8%	40,2%	100,0%
		% within Energy Producer	85,9%	77,1%	82,1%
		% of Total	49,1%	33,0%	82,1%
Total	Count	64	48	112	
	% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses investing (FDI) in Mexico	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up subsidiaries in Mexico	Strongly discouraging	Count	0	4	4
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up subsidiaries in Mexico	0,0%	100,0%	100,0%
		% within Energy Producer	0,0%	8,3%	3,6%
		% of Total	0,0%	3,6%	3,6%
	No impact	Count	8	10	18
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up subsidiaries in Mexico	44,4%	55,6%	100,0%
		% within Energy Producer	12,5%	20,8%	16,1%
		% of Total	7,1%	8,9%	16,1%
	Strongly stimulating	Count	56	34	90
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up subsidiaries in Mexico	62,2%	37,8%	100,0%
		% within Energy Producer	87,5%	70,8%	80,4%
		% of Total	50,0%	30,4%	80,4%
Total	Count	64	48	112	
	% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up subsidiaries in Mexico	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up value chains in Mexico (JV, Acqu.)	Strongly discouraging	Count	0	3	3
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up value chains in Mexico (JV, Acqu.)	0,0%	100,0%	100,0%
		% within Energy Producer	0,0%	6,3%	2,7%
		% of Total	0,0%	2,7%	2,7%
	No impact	Count	10	8	18
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up value chains in Mexico (JV, Acqu.)	55,6%	44,4%	100,0%
		% within Energy Producer	15,6%	16,7%	16,1%
		% of Total	8,9%	7,1%	16,1%
	Strongly stimulating	Count	54	37	91
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up value chains in Mexico (JV, Acqu.)	59,3%	40,7%	100,0%
		% within Energy Producer	84,4%	77,1%	81,3%
		% of Total	48,2%	33,0%	81,3%
Total	Count	64	48	112	
	% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses setting up value chains in Mexico (JV, Acqu.)	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	

Crosstab

			Energy Producer		Total
			No Energy Producer	Energy Producer	
14) Impact of the reformation on the investment forms of U.S. - U.S. businesses moving parts of their value chain to Mexico	Strongly discouraging	Count	2	6	8
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses moving parts of their value chain to Mexico	25,0%	75,0%	100,0%
		% within Energy Producer	3,1%	12,5%	7,1%
		% of Total	1,8%	5,4%	7,1%
	No impact	Count	24	11	35
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses moving parts of their value chain to Mexico	68,6%	31,4%	100,0%
		% within Energy Producer	37,5%	22,9%	31,3%
		% of Total	21,4%	9,8%	31,3%
	Strongly stimulating	Count	38	31	69
		% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses moving parts of their value chain to Mexico	55,1%	44,9%	100,0%
		% within Energy Producer	59,4%	64,6%	61,6%
		% of Total	33,9%	27,7%	61,6%
Total	Count	64	48	112	
	% within 14) Impact of the reformation on the investment forms of U.S. - U.S. businesses moving parts of their value chain to Mexico	57,1%	42,9%	100,0%	
	% within Energy Producer	100,0%	100,0%	100,0%	
	% of Total	57,1%	42,9%	100,0%	