An evaluation of theories of competitive advantage and its impact on the case of Photon Energy Group in Hungary

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Executive summary
The purpose of this project is to evaluate the different theories of competitive advantage and how these theories can help the case company – Photon Energy N.V. – to achieve and maintain competitive advantage over other competitors in the solar industry in Hungary. The full problem formulation sounds: **What can theories of competitive advantage contribute to helping Photon Energy N.V. in securing a strong position on the Hungarian energy market?**

Main justification for choosing this topic is the sheer fact, that the usage of renewable energy resources is the only viable option in sustaining a better environment and in securing a better future for the upcoming generations.

The report starts with giving background information of the solar industry and why is it an important substitute to other conventional energy sources in the future. The industry has been going through significant changes for the last years, since mankind is slowly running out of its fossil fuels, thus making it imperative for them to find other sources of producing energy. After the initial introduction, presentation of the problem formulation and research question backed with the justification of choosing this problem, the report further goes into the methodology part that structures the report and the research design. I have chosen the objectivist approach as presented by Burrell and Morgan for this project.

Hereafter, the report provides the theoretical foundation for further analysis in the project. The literature review chapter will be dedicated to the theories of competitive advantage and their development throughout the years. Firstly, the definition of competitive advantage happens. Furthermore, with competitive advantage, strategic management is also worth mentioning. After defining these basic terminologies, the theories of competitive advantage will follow – market-based view (MBV), resource-based view (RBV), knowledge-based view (KBV), capability-based view (CBV), and finally, the relational view of strategy which has gained a lot of attention nowadays. Each of these theories will be defined in different sub-chapters. The literature view chapter will conclude with a summarization of three major differences between each theory.

The following chapter will be dedicated to the case company Photon Energy. In this chapter, the most relevant theory or theories of competitive advantage will be used and reflected on
the case of Photon Energy. Within this chapter, Porter’s five forces will be used to identify the overall situation in the solar industry in Hungary and the overall attractiveness of said industry.

The last chapter contains the conclusion of the report providing answer to the problem statement and research questions.
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List of acronyms

BP - British Petroleum
Btu - British thermal unit
CEO - Chief Executive Officer
DC - Direct current
EBIT - Earning Before Interest and Tax
EBITDA - Earnings Before Interest, Tax, Depreciation, and Amortization
EPC - Engineering, procurement, and construction
EUR - Euro
GDP - Gross Domestic Product
GHG - Greenhouse gas
HUF - Hungarian forint
IRENA – The International Renewable Energy Agency
MW - Megawatt
O&M - Operations & Maintenance
PE - Photon Energy
PV - Photovoltaic
RES - Renewable energy sources
YoY - Year over Year
Acknowledgment

This following Semester Project has been conducted during the 9th semester in MSc – International Business Economics (IBE) and served as a part of my examination at the Aalborg University, Denmark.

The development of this project would not be possible to accomplish without the help of several people along the way. Firstly, I would like to express my gratitude to my supervisor, Mrs. Susan Vonsild for her guidance during the process of writing. I would also like to thank her for being supportive from the beginning and for giving me a lot of useful advice that helped me to finish this project.

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1. Introduction

Solar energy is a major renewable energy source with the potential to meet many of the challenges facing the world. There are many reasons to promote its share in the energy market. This power source is increasing in popularity because it is versatile with many benefits to people and the environment. Solar is a safe alternative which can replace current fossil fuels like coal and gas for generation of electricity that produces air, water, and land pollution. In 2015 solar energy was the fastest growing energy sector with a 33% rise (Shankleman 2016). Nuclear power pollutes water and land and has caused environmental catastrophes. Use of solar energy will eliminate these unsafe, unclean consequences from using conventional fossil fuels. But apart from these factors, the main reason to switch from fossil fuels to alternative sources of energy is the ongoing threat of climate change. Climate change has led to increase in flooding and hurricanes due to disturbed weather patterns. Higher carbon dioxide concentration is making oceans acidic and killing marine life, like corals, and the list can go on for many pages (WWF 2017). Solar power can restrict climate change as it produces no carbon emissions. The carbon footprint of solar panels can be offset in as quickly as four years’ time according to Teske (2012). According to the annual report created by Ferroukhi (et al 2016, p. 2-6), global renewable energy employment increased by 5% in 2015 to reach 8.1 million, from which solar PV was the largest renewable energy employer with 2.8 million jobs in 2015.

Solar energy technologies have a long history. Between 1860 and the First World War, a range of technologies were developed to generate steam, by capturing the sun’s heat, to run engines and irrigation pumps (Smith 1995, p. 38-47). Solar photovoltaic (PV) cells were invented at Bell Labs in the United States in 1954, and they have been used in space satellites for electricity generation since the late 1950s (Hoogwijk 2004). Solar energy grew briefly in its importance during the 1970s and early 1980s, but was later faced with sharp decline due to lack of sustained policy support (Bradford 2006). It was approximately 20 years later until solar energy regained its momentum, exhibiting phenomenal growth since then.

Solar energy has experienced phenomenal growth in recent years due to both technological improvements resulting in cost reductions and government policies supportive of renewable energy development, utilization, the increased volatility of fossil fuel prices and the environmental externalities of fossil fuels, particularly greenhouse gas (GHG) emissions. Like
other renewable energy technologies, solar energy benefits from fiscal and regulatory incentives, including tax credits and exemptions, feed-in-tariff, preferential interest rates, renewable portfolio standards and voluntary green power programs in many countries. Thanks to this, many major European electricity producers have made a shift to solar generation and as a result more and more countries, industrial operators and electricity producers are focusing on solar energy which is deemed as a solution of the future. Therefore, companies such as Photon Energy have the need to focus on competitive advantage, hence the relevance of the topic of competitive advantage in the energy sector.

Figure 1: World energy consumption by energy source in quadrillion Btu

![Graph showing energy consumption by source from 1990 to 2040, with petroleum and other liquids, coal, natural gas, renewables, and nuclear as energy sources.]


The aim of this project is to explore how can theories of competitive advantage contribute to helping in gaining a competitive advantage over other competitors situated in the same business sector, in this case the energy sector of Hungary. To achieve this goal, I will review the literature and examine what scholars have covered in regard to the theories of competitive advantage. Competitive advantage can be described as an advantage, where a nation, an industry or a firm has a factor(s) or uniqueness that gives them advantage in competitive terms over their competitors (Patane and Jurison 1994, p. 6-10).
Figure 2: Framework of the semester project

As you can see in the figure above, this project will be divided into seven chapters. The first chapter introduces the reader to the context of the research, followed by a description of the background. The subject of the next chapter will be the problem formulation backed with research questions and problem justification enriched. Apart from this, I would like to dedicate a small paragraph in this chapter to the company being investigated, their background and motives of expansion to the Hungarian energy sector. In the methodology part, paradigms in social science, qualitative and quantitative data collection, and paradigmatic approach will be addressed, and the choice of research approach is presented. In the fourth chapter, the theories of competitive advantage and their development throughout the years shall be discussed. Firstly, I will define what competitive advantage is and what advantages come from maintaining a competitive advantage over other fellow companies. With competitive advantage, strategic management is also worth mentioning. After these basic terminologies are defined, the theories will come on their turn. These are – market-based view (MBV), resource-based view (RBV), knowledge-based view, capability-based view, relational view of strategy. In the empirical part, the most relevant theory or theories of competitive advantage will be used and reflected on the case of Photon Energy. The main source of information will be a possible series of interviews with the business development manager of Photon Energy who is now stationed in Budapest, and various documents from the official website of the company or documents acquired through other ways. The whole semester project will conclude with a summarization of gained knowledge, followed by answering the problem formulation and proposed research questions. Possible suggestions or advice how to gain and
maintain competitive advantage over fellow competitors shall be included. Last but not least, the reflections chapter will be dedicated to my research experience(s).
2. Problem formulation

The purpose of this chapter is to give the reader a better insight into how the problem formulation was developed and which factors made the authors choose this over other alternatives.

In today’s constantly quickly changing time is an absolute necessity for enterprises to pay great importance to management, because management is a key element for organization survival. The company is not in the market alone and number of competitors is waiting for its mistakes. It is more and more difficult to build a competitive advantage due to a strong competitive pressure and the fact that resources, technologies and information are comparable and can be reproduced (Goldsmith 2013, Singh 2012). Because of the need to stand out against competitors, a significant part of studies on competitive advantage refers to the identification of its sources (McClelland 1994; Feurer, Chaharbaghi 1995). The competitive advantage concerns a factor or several factors that make the organization successful. The enterprise is subjected to increasing quality demand, adaptability and flexibility (Nilsson, Rapp, 2005).

As mentioned before in the introduction part, with the depleting resources of fossil fuels the importance of introducing other main sources of energy is getting increasingly important by each day. The humanity is well aware of the possible consequences once the conventional energy sources run out, that is why governments are trying to distribute various benefits for companies willing to invest their resources into green energy. These benefits include fiscal and regulatory incentives, including tax credits and exemptions, feed-in-tariff, preferential interest rates, renewable portfolio standards and voluntary green power programs.
In the figure above, we can see the approximate time until complete exhaustion of all the coal, nature gas, and oil reserves with the current tempo of consumption. However, it is worth noting that these values can change with time based on the discovery of new reserves, and changes in annual production.

On one side, it is a splendid idea to support companies to produce alternative energy, but on the other side it creates a great pool of competition with new entrants all the time. Because of this, companies such as Photon Energy N.V. must lay they focus on how to remain competitive and how to have the upper hand against other competitors, in this case. Therefore, raising the following research question:

“What can theories of competitive advantage contribute to helping Photon Energy N.V. in securing a strong position on the Hungarian energy market?”

2.1. Research questions
In order to effectively answer the research question raised, the following research questions will be introduced:

- What are the different schools of thought about competitive advantage?
- What is the current status of PE’s presence in the Hungarian market?
- What advice can be derived from these theories to help PE achieve and maintain competitive advantage in Hungary?
2.2. Problem justification

Main justification for choosing this topic is the sheer fact, that the usage of renewable energy resources is the only viable option in sustaining a better environment and in securing a better future for the upcoming generations once the conventional energy resources are fully exhausted. As for the Hungarian energy market, solar power is rapidly advancing, despite significant lagging behind most of the European states. By the end of 2015 Hungary had installed more than 110 MW of photovoltaics. The country’s capacity robustly grew in 2016, reaching 225 MWs (Hegedűs 2016). This rapid growth can be explained by the notable solar potential in Hungary, with nearly 2100 sunlit hours yearly, reaching in some summer hot periods 1000 W/m² value. Renewable energy sources contribute extensively to the fulfilment of national economic objectives (job creation, GDP increase, security of supply, etc.), and therefore, it is a strategic objective to increase their use to the highest possible extent. Thus, making Hungary’s 2020 RES target 14.65% of total gross energy consumption (Ministry of National Development 2011, p. 37). State and Union-level support plays a central role in the spread of solar energy systems.

To show that Hungary takes seriously the change to renewable energy sources, they made some new developments with regards to the regulatory framework on electricity generation from RES. These changes, as a result, are changing the investment environment for the development of photovoltaic power plants (PVPP) in Hungary. The most important part of this regulatory framework is the financial incentive scheme which aims to promote electricity generation from RES. Even though it was a good step made by the government, it had a side effect of causing landslide changes on the PVPP market in Hungary. The reaction of the market players was, that an overwhelming majority of the applications were submitted by developers wishing to build new PVPPs and consequently shifted from wind turbines to PVPPs (Wolf Theiss 2017, p.1).

From one of these many development companies is the company addressed in this semester project – Photon Energy N.V. Within this sub-chapter I would like to dedicate a few words about their background, possible motives of expansion to Hungary, and challenges they are facing in the early stages of development in Hungary.
Photon Energy NV is a global solar power solutions and services company with a wide range of expertise covering the entire lifecycle of solar power systems. Their track record includes almost 50 MWp of solar power plants built and commissioned and more than 200 MWp in operations & maintenance portfolio. Photon Energy’s team has a proven record of accomplishment and in-depth knowledge of project development, investment management, project finance, insurance, technology solutions, EPC and O&M. Photon Energy is headquartered in Amsterdam, Netherlands and has offices in Australia, the Czech Republic, Slovakia, and recently Hungary. Photon Energy is an innovative company dedicated to providing best-in-class solar power solutions that are robust, reliable, cost effective and applicable anywhere there is sunshine. Their power solutions provide solar and solar-hybrid power for a wide range of customers and applications (PE annual report 2016, p. 12).

Figure 4: Photon Energy N.V. at a glance

As mentioned in the monthly report of the company published in November (2017, p. 5-6), project development is a crucial activity in Photon Energy’s business model of covering the entire value chain of PV power plants. The main objective of Photon Energy’s project development activities is to expand its proprietary portfolio of PV power plants for long-term ownership, which provides recurring revenues and free cash flows to the Group. Photon Energy currently develops PV projects in Australia and Hungary and is evaluating further
markets for opportunities. Currently, the Dutch development company plans to deploy 50 MW of PV capacity in Hungary until year-end 2019 provided with O&M and EPC services for external customers in the country in the long-term. In the Pest region of Hungary Photon Energy is developing 11 projects with a grid connection capacity of 498 KW each. The installed capacity has been designed to be between 570 and 575 KWp for each plant. On 10 May 2017, Photon Energy received the energy production licenses under the KÁT support system, allowing each plant to feed a total volume of 16,950 MWh of electricity into the grid at the guaranteed price of HUF 31.77 (EUR 0.102) per KWh over 25 years from the date of grid connection. During the 25-year support period the power plant is licensed to sell 14.3 GWh of renewable energy, generating revenues of at least EUR 1.464 million over the entire period.

By the words of the company’s CEO Georg Hotar, “We have been evaluating the market very carefully and are now confident enough to announce that we have decided to both enter into the proprietary development of projects and to seek cooperation with local project developers to bring PV projects to the bankable ready-to-build stage” (PV magazine 2017). The main reason for this giant step to enter a new foreign market is, that the Hungarian PV market in 2017 has recently seen its greatest growth ever (Bellini 2017).

Since their entrance on Hungarian soil in early 2017 the company managed to acquire 100% of the shares of Fertőd Napenergia-Termelő Kft., a Hungarian limited-liability company owning all licenses, rights and permits for the construction of a 520 KWp (DC) photovoltaic power plant in July, and in October, Photon Energy purchased 100% of the shares of Ráció Master Oktatási Kft., which owns the KÁT licenses, grid connection and land usage rights for 8 PV projects in the Komárom-Esztergom region in Hungary (PE Monthly report (November) 2017, p. 6-7). These steps can be classified as a brown field investment in the terms of market entry that can be a possible future subject of discussion in another project.

Main challenges the development company is facing right now are......

The possible main motives for the company to choose Hungary as their next target to expand to according to the Hungarian Investment Promotion Agency can be:

- Competitive investment environment,
- Liberalized energy market,
- Government commitment in the areas of sustainability and energy efficiency,
- Feed-in-tariff system for renewable energy sources,
- Availability of state and European Union funds (HIPA 2017, p. 1).
3. Methodology

The methodological chapter will elaborate on the methods, tools and approaches used to answer the problem formulation of this report. The required foundation is created in this chapter to achieve the goals of this report. Every research paper consists of different approaches that are formed in various ways depending on the researcher’s needs and viewpoints. Furthermore, different foundation for knowledge depends on the way how the world is perceived by the researcher and how is reality understood. As a reason, it is important to formulate how root assumptions and methodological aspects were built along the way of this research (Kuada 2010).

According to Kuada (2010), methodology is a plan and a strategy of activities that set a guideline for the whole research. It analyses the reasons for the choice by using specific methods in the research. Methodology can be also recognized as a research design or a process that is required to conduct in order to be able to find the desired knowledge (Kuada, 2010). Frankfort and Nachmias (1996, cited in Yin, 2013) stated that methodology brings a plan that helps leading a process of the researcher and subsists of analysing and gathering data, portraying the observations and results. This following chapter analyses the concept of paradigms, describes, and discusses different methodological approaches.

3.1. Theoretical research methodology

3.1.1. Paradigms in social science

To fully understand the research methodology discussed and used in this thesis, the clarification must be made regarding the definition of paradigm. A paradigm is a set of theories, methods, set of beliefs, dominant thoughts and principles that justify the choice that had been made by the researcher in a specific area of the research under the intense examination. The term paradigm is nowadays connected to Kuhn (1970), who is describing and framing various scientific findings over time in different fields. The paradigm represents a set of common understanding and common questions asked about the phenomenon being studied (Kuada, 2011). Kuhn argues that every field of research is characterized by a set of common understanding of what phenomenon is being studied, the kinds of questions that are useful to ask about the phenomenon, how researchers should structure their approach to answering their research questions, and how the results should be interpreted. These
common characteristics constitute a paradigm. The main idea is to deeply understand why and how the research had been formed to its final results. Furthermore, according to Burrel & Morgan, there are four main groups of assumptions from which the researcher can distinguish. These are: ontology, epistemology, methodological assumptions, and assumptions about human nature (Kuada, 2010, p. 5). These assumptions which were previously mentioned can be classified as “the four levels of understanding” which means, with every assumption of these four, different views, understandings will lead to different research approaches and thus to different outcomes (Raad 2014).

**Ontology**

There are as many definitions for ontology as there are researchers who are concerned about this concept. As per Kuada (2009, p. 5), Ontology is a term used to describe the nature of what the researcher seeks to know something about – i.e. the “knowable” or “reality”. The question of whether the social world is real and external to an individual human being is ever impending among some scholars, which therefore imposes itself on whether individuals creates his own social world which would be a product of his cognition. The assumption implies that the findings or part of view of the researcher is considered to be a “reality” (Kuada, 2009).

**Epistemology**

Epistemology is the next level of understanding related to ontology and the term is describing the nature of knowledge and the means of knowing – i.e. “how we know what we know” or what we conceive as a “truth” (Kuada 2009, p. 5). Epistemology also advocates the way of how the research should be understood by the reader. Since every researcher considers factors of knowledge differently to be crucial for the research, individual’s preferences are the core for the epistemological viewpoint. In other words, it is related to the knowledge and by what process the knowledge is created in a certain field of research. Also, epistemology can be adopted by two different standpoints (Kuada, 2014).

**Human nature**

The third term examines the understanding of the researcher towards the human existence and the environment that is surrounding them. The relationship between the social environments from the outside is what the researcher seeks to find out, if they codetermine
each other and this is what also is considered to be the “truth” to the researcher (Kuada 2009). “Some researchers see the social environment as being outside the individual. Other researchers hold the view that human beings and the social environment co-determine each other” (Kuada 2011, p. 34).

**Objective-subjective perspectives**

The objective and subjective views to research are returning distinctive topics in the discussions of paradigms in social science. Burrell and Morgan also acknowledge this distinction. This discussion continues and discusses the question “whether researchers can see “reality” only from an objective (i.e. external) or a subjective (i.e. socially constructed) perspective or whether reality can be seen from both perspectives in the same project” (Kuada 2011, p. 35). The next figure clarifies these assumptions and two directions (Burrell and Morgan 1979).

**Figure 5: The objectivist-subjectivist dispositions in social science**

As we can see from the figure above, within the ontological approach we have a distinction between the subjectivist approach – *nominalism*, and the objectivist approach – *realism*. Both the approaches have a different perspective of the social world and thus can be seen as various realities. Realism “postulates that the social world is real and external to the individual cognition. That is, the “real” world is made up of hard, tangible and relatively immutable
structures” (Fast and Clark 1998: cited in Kuada 2009). On the other hand, nominalism “assumes that reality is constructed by individuals in interaction with each other and is presented in the form of names, labels and concepts” (Fast and Clark 1998). This puts reality into many objects and multiple realities in everyday scene of a social life (Kuada 2009).

**Epistemological assumption**

Within the epistemological assumption part, we have a distinction between the subjectivist approach – *anti-positivism*, and the objectivist approach – *positivism*. Positivism reflects an epistemology which seeks to explain and predict what happens in the social world with an emphasis on regularities and causal relationships between its constituent elements. The positivist researcher believes that any social science researcher can be objective and conduct his investigations as an external observer. Anti-positivism, on the other hand, takes various forms but assumes mostly that the social world is essentially relativistic (e.g. socially constructed) and can only be understood from the standpoint of individuals directly involved in the social activities under investigation (Kuada 2009, p. 6-7).

**Assumptions about human nature**

As for the human nature perspective, we can identify *voluntarism* – subjectivist approach, and *determinism* – objectivist approach. Determinism states that human actions are influenced by external factors in their social environment and thus its external environment influences a researcher. The contrary statement known by the term voluntarism which is believing that individuals act freely and completely autonomous from the social world (Burrel & Morgan, 1979).

**Methodological assumption**

In the methodological consideration we have the *idiographic* and *nomothetic* approach. A specific Methodology that can be obtained is the nomothetic approach using systematic usage and techniques that in general is resulting in usage of quantitative techniques such as surveys and questionnaire- usage to identify trends and do hypothesis testing (Burrel & Morgan, 1979). The idiographic approach is stating that the research topic, hypotheses testing, and analyses can only be done by obtaining own personal experiences and understanding through
“getting inside situations and involving oneself in the everyday flow of life” (Burrel and Morgan 1979, p. 6).

3.2. Practical research methodology

Looking at the social science domain in which we are situated, research methods have been grouped into two broad groups namely, qualitative, and quantitative research methods. The choice of method chosen largely depends on the information one needs and is deeply rooted in one’s methodological approach. In this section of the report, I am going to consider both qualitative and quantitative research methods while paying more attention to the specific research methods that I think best suit the project and can help me to gather data that will answer my problem formulation.

The ideal approach chosen for this paper is the case study research. The main purpose of the case study method is to bring a more detailed insight and understanding how organizations and humans operate and interpret the theoretical knowledge into a certain context. As determined by Yin (2009), case study method is an empirical analysis that researchers apply. Furthermore, it is an existing phenomenon with a link to the real-life context. Case studies permit the researchers to further investigate the surroundings of events while being within the close proximity to practice, compared to a laboratory research and testing (Yin, 2009 cited in Merriam, 2014). By using the Case study research, the researchers get an understanding of an issue that is complex and is particularly handy in situations when an in-depth knowledge is required to answer the research questions. As Yin furthermore pointed out, using a case study is particularly useful when the researcher is striving to get answers for questions starting with “why” or “how” (Yin 2009).

During my traineeship in the Hungarian office of Czech Trade, a governmental trade promotion agency of the Czech Republic with its main objective to develop international trade and cooperation between Czech and foreign entities, I had the opportunity to work on one of their project which was the case of Photon Energy. I thought it would be truly interesting to get engaged in their activities with regards to the solar energy and since the market with similar companies on the energy market is exponentially growing, with new entrants all the time, it would be interesting and useful to study these kinds of companies in order to get an explanation about their success. As I mentioned in the previous paragraph dedicated to Yin’s
teachings where he stated that the choice of choosing case study research depends very much on the research question and it is most appropriately applied when the study question starts with “how” and “why” and researchers have limited influence over events. Since my problem formulation started with a “how” and considering above discussion, I decided to apply case study for my research.

There are three types of case studies for research purpose and these are as follows:

- Explanatory, or casual studies,
- Descriptive case studies,
- Exploratory case studies (Yin 2009).

I will apply explanatory or causal case study because I want to explain the reasons or the backgrounds on the basis of which the company’s leadership make their decisions during the creation of important strategies to achieve competitive advantage over other competitors.

3.2.1. Qualitative and quantitative data collection

Quantitative data collection is the systematic empirical investigation of observable phenomena via statistical, mathematical, or computational techniques (Given 2008). In other words, it is the calculation of data through statistical technique. There are different quantitative analysis methods such statistics, graphs and charts which allow the researcher to calculate the data more appropriately. These include ethnography, participant observation, in-depth interviewing, and conversational interviewing (Bryman and Bell 2011).

Qualitative data analysis can be defined as the development of concepts which helps us to understand social phenomena in natural rather than experimental settings. Giving due emphasis to the meaning, experiences, and view of the participants (Nigatu 2009, p. 5). The qualitative research method emphasizes words rather than quantification in the collection and analysis of data. Hence, this technique leans towards concepts that come out from various situations and approaches that are not based on statistical data. Furthermore, in the qualitative research, the focus is put more on the words reasoning than numbers that had been collected and then analysed, in other, words it is less important how the data were quantified. Also, this method follows the characteristic of interpretive epistemological approach, thus, the researchers are more on the subjective side and the understanding is
gathered by the interpretation of participants. The qualitative data collection brings more information needed for the investigation (Wang and Donets 2017). This is generally done in interviews, open ended questions, or focus groups.

**Types of data collection**

Two types of data collection can be identified which can help me in answering the formulated research question and these are – primary data, and secondary data. 

**Primary data** are information collected by a researcher specifically for a research assignment. In other words, primary data are information that a company must gather because no one has compiled and published the information in a forum accessible to the public. They can be gathered via surveys, observations, experimentation, interviews, questionnaires, and focus group interviews, etc. (Saunders et al, 2007).

The primary data have own advantages and disadvantages, for example one of the main advantage of primary data collection is the high reliability it offers, since all the data is collected by the concerned and reliable party, and has a full control over the data that are being researched. On the other hand, a big disadvantage can be the fact that the designated data collection takes a lot of time and effort, the coverage is limited, some respondents do not give timely, honest responses, et cetera.

**Figure 6: Types of primary data**

![Diagram showing types of primary data](Own fabrication)
Secondary data are characterized as all data that can be found for a specific topic and had been collected researched by another researcher in the past. If the researcher uses these data, then these become secondary data for the current users. These may be available in written, typed or in electronic forms. Saunders (et al 2016) implies that secondary data can be both quantitative and qualitative and are part of the explanatory and descriptive research.

As for the advantages and disadvantages of using secondary data, one of the main advantages of secondary data is the fact that these are easily accessible and quite cheap sources of information in comparison with primary data. Another advantage can be the frame of mind it gives to the researcher with regards to the direction the researcher should go for a specific research (Saunders et al 2016). The disadvantage that comes with secondary data, just to name a few, is that the data were originally collected for a different purpose and therefore may not be optimal for the research problem under consideration (Hox and Boeije 2005). Other negative side is that the data becomes obsolete and old by the passage of time.

When deciding if collecting primary or secondary data, there are few factors that need to be considered prior. For many researchers, the main advantage when using secondary data is the advantage of fewer monetary resources that need to be allocated for the research (Janouskova 2017, p. 33).

Figure 7: Types of secondary data

Source: Saunders (et al 2016), p. 319
Reliability and validity

In qualitative research reliability and validity are important criteria in establishing and assessing the quality of research. (Bryman and Bell, 2015, p. 395) A good qualitative study can help us “understand a situation that would otherwise be enigmatic or confusing” (Eisner, 1991, p. 58) This relates to quality concept in qualitative study has the purpose of “generating understanding” (Stenbacka, 2001, p. 551). According to Seale (1999, p. 266) “trustworthiness of a research report lies at the heart of issues conventionally discussed as validity and reliability”. Thus, two elements are necessary to consider: reliability and validity (Abbott et al., 2012).

Reliability refers to the consistency of responses and/or findings of the research (Creswell, 2009, p. 195; Saunders et al. 2009, p. 156). However, in qualitative research reliability like generalizability (external validity) “plays a minor role” (Creswell, 2009, p.195). Validity constitutes strength in qualitative research, and it means the accuracy of the findings, their credibility and authenticity (Creswell, 2009, p. 196). In order to check the accuracy of the validity, the findings consist self-reflection, rich and thick description, respondent validation, prolonged involvement, peer debriefing, and triangulation. (Creswell, 2009, p. 196). Apart from that, Lecompte and Goetz (1982) identify four types’ views that signify reliability and validity – external/internal reliability, and external/internal validity (Lecompte and Goetz 1982, cited in Bryman and Bell 2015). External reliability means the degree to which study can be replicated. Internal reliability when there are more members of the research and the team agree about what they see and hear. Internal validity defines whether there is a match in between researchers’ observations and the theoretical ideas they develop. External validity defines the degree to which findings can be generalized through social settings (Bryman & Bell, 2015, p. 395).

The objective of this semester project is to achieve internal validity by developing a conceptualized framework that has been created based on the obtained theoretical knowledge from the literature review and case study analysis.

3.3. Paradigmatic approach

This sub-chapter will be dedicated to explaining and defining of chosen paradigmatic approaches – FISI, and S-O-R Approach.
The FISI classification of paradigms was chosen due to the fact that I found it to be the most suitable to explain the methodological view used in this semester project. A simple classification of the root assumptions of the FISI classification of paradigms is presented in the figure down below (Figure 8).

**Figure 8: FISI Classification of Paradigms**

Functionalism in the business field means that organizations have the power to make changes in the structures, which allow them to align with their operational environment. It is popular in studies in Economics and its derived disciplines, including business economics. Interpretivism emphasises the need to understand peoples’ definition of situations in which they are involved and the meaning from their experiences. Structuralism sees human societies as composed of complex systems of interrelated parts. A notable characteristic of the structuralist perspective is an emphasis on the collective rather than the individual. Interactionalism highlights the idea that interactions between people have an important role in the social life functioning (Kuada 2009, p. 8-9).

Apart from the basic four distinctions, there are four other classifications in each quadrant, these are:

- **Structural functionalism** – a combination of both structuralism and functionalism with its general understanding that society has an existence over and above individuals.
- **Structural interpretivism** – states that the social world is organised in terms of some basic structures that define relationships.
• **Interactional functionalism** – is a spin-off of interactionalism and functionalism. Scholars from this quadrant believe that social institutions are made up of interconnected roles or inter-related norms, making interactions essential for the effective functioning of social systems. Interactions produce social norms and the predictability of behaviours that allow expectations to be built and roles to be defined.

• **Interpretive interactionalism** – the basic philosophy of this quadrant is that organizations and their employees interact within and outside their organizational boundaries (Kuada 2009, p. 10-11).

I tend to believe that the research will follow the functionalistic narrative, to be more precise, the interactional functionalistic direction. Whether it is the right choice, finishing of the literature review chapter should give me the best answer. However, it has to be stated that the legitimacy of decision is very much dependent on the number and type of articles I will find during my research process in the next chapter.

Since it was previously mentioned that this semester project will follow the functionalistic narrative, which states that organizations make adaptive structural changes to their environment that render them more in fit with their situations and thereby maintain effectiveness. Starting from this perspective, it can be found in the *stimulus-organism-response* approach in business economics. This model argues that environmental factors stimulate organizations which in turn respond to the environmental stimulus with specific behaviours (including strategies). That is, organizations are likened to simple biological organisms whose response behaviours are determined by factors within the environments in which they live (Kuada 2009, p. 9). From this, I tend to see the pattern how the environment affects the companies they operate in. Companies are trying to gain better and better market positions with any means necessary, hence the S-O-R approach can be used to describe how organisations react to certain stimulations by environmental factors.

![Figure 9: The S-O-R Approach](image-url)

*Source:* Buxbaum (2016), p. 8
Choice of paradigm

The objective for this study is to investigate how can theories of competitive advantage contribute to helping the investigated company gain and maintain a strong market advantage over other competitors on a new, foreign market. The study aims to find some possible and sensible answers and conclusions for the problem formulated above in the introduction chapter. In other words, I am going to create and build business knowledge, which will be the foundation of my reflections, recommendations, and conclusions. I am a knowledge creator, a researcher as well as an observer during my internship at the Czech Trade in Budapest, Hungary. Therefore, I will follow the objectivist approach as presented by Burrell and Morgan (1979).

3.4. Research approach

According to J. Kuada (2011), there are two research types: descriptive and normative. The descriptive research attempts to describe an analysed situation, while identifying the issue through information provided directly or recently. The normative research, the guidelines are involved and needed to be followed for decision making. In this project, the descriptive research type has been chosen. The main reason of decision-making is the specific information related to the project investigation is needed to be collected.

I, as a researcher am flexible in my investigative techniques and I tend to view on the research as a holistic endeavour because I will persistently try to observe the facts correlated to the theories of competitive advantage and their impact on companies. Moreover, qualitative research shall be conducted in this semester project which is more appropriate than the quantitative because it will allow me to give a robust description and explanation of the phenomenon instead of getting involved with quantification and statistical procedures. By choosing this method I allow myself more freedom in the information collection process. The goal of this project is to identify and critically discuss how can theories of competitive advantage contribute to helping a company in achieving and maintaining a strong market position due to competitive advantage.
4. Literature review

In this part of the semester project I shall be addressing the topic of competitive advantage and strategic management. In current environment, with growing interdependence between the markets and in increasing competition, it is more difficult to maintain current enterprise market position. It is increasingly important to correctly select companies’ strategy, because as mentioned by Kotler: “if the company has the same strategy as the competitors, it actually does not have a strategy. For these reasons it is necessary for the company to base this strategy on their own market position and build on their distinctive competitive advantage.” Thus, in today’s constantly quickly changing time is an absolute necessity for enterprises to pay great importance to management, because management is a key element for organization survival. The company is not in the market alone and number of competitors is waiting for its mistakes. Therefore, the term strategic management is closely linked to competitive advantage. Strategic management is essential part of successful and growing organization. Established strategic management helps the organization in search for possible solutions in the changes that are typical for today’s time.

Competitive advantage is obtained when an organisation develops or acquires a set of attributes (or executes actions) that allow it to outperform its competitors. The development of theories that help explain competitive advantage has occupied the attention of the management community for the better part of half a century. This chapter aims to provide an overview of the key theories in this space. The overview will span a long timeline, starting from the 1960s to formulations that were introduced in mid-2013. At the beginning, two kinds of competitive advantage theories were dominant. These were – the Market-Based View (MBV), and the Resource-Based View (RBV). From the resource-based view were later derived the knowledge-based view (KBV) and the capability-based view of strategy. Recently, the relational view of strategy has gained much appraisal amongst the scholars. (Wang 2014).

To address the formulated research questions, the literature review chapter will be conducted in a narrative form (Danson and Arshad, 2014). I have decided to consider various management journals of the highest quality as well as those focused on knowledge-related topics, accounting for both American and European perspectives. I managed to gather information mostly from these journals – Journal of Multinational Financial Management, Journal of Management Studies, Journal of Business Strategy, Journal of Business Research,

4.1. Competitive advantage and strategic management

The pursuit of competitive advantage is arguably the central theme of the academic field of strategic management (Furrer 2008; Hoskisson et al. 1999; Porter 1996). According to Tichá, Hron (2003) the basic purpose of the strategic management is to create competitive advantage as the most important condition for business success. All of the company’s potential is geared to achieve this goal by daily operational decisions based on long-term strategy. An older work by Pearce and Robinson (1988, p. 6) states that strategic management is a “set of decisions and actions resulting in formulation and implementation of strategies designed to achieve the objectives of an organization”. As far as I am concerned, strategic management is linked with the definition of organisational performance, competitive advantage and variables of strategic choice, where strategic choice determines the market in which to participate and where to position the organisation within those markets (Kotha and Vadlami 1995).

The term "competitive advantage" is characterized by phrases such as: a multi-level structure, a unique position (Porter, 1991; Matei 2013; Muratovic 2013). The specific character of the strategy and competitive advantage imposes the necessity to be flexible and to cope with the uncertainty. It also indicates the superiority of rather proactive than reactive approach in relation to competitors (Dimoska and Trimcev 2012). When it comes to defining the term “competitive advantage”, Smith and Flanagan (2006) offers us a good interpretation. They define competitive advantage as something, what separates the enterprise from others and keeps it alive and growing. Other explanation is given by Wang (2014), competitive advantage is “obtained when an organisation develops or acquires a set of attributes (or execute actions) that allow it to outperform its competitors”. Yet the biggest marketing mistake made by
enterprises, is not fully utilizing their competitive advantage. Other enterprises assume that they know their competitive advantage but in fact they do not possess it. Others actually have the advantage, but they fail to utilize it (Švárová and Vrchota 2014, p. 688). Apart from this, competitive advantage has an individual character and refers to a specific time interval. It is not possible to create a universal model of the strategy of success, which would be suitable for every organization at any time, because such a solution would eliminate the competitive advantage (Kay 1993, Feurer and Chaharbaghi 1995). In today’s world of globalization, it is more and more difficult for enterprises to maintain their competitive advantage due to a strong competitive pressure and the fact that resources, technologies and information are comparable and can be reproduced (Goldsmith 2013, Singh 2012). New companies are entering new markets, the competition is getting fiercer, and customers have the option to choose not only from local production, but from the worldwide production. Hence, the company is forced to increase their overall quality, adaptability, and flexibility (Nilson and Rapp 2005).

The prominent role of competitive advantage may derive from both the economic and military origins of the strategy literature (Whittington 1993). According to Furrer et al. (2008), strategic management was initially a body of knowledge that would underpin practical advice to managers. Porter (1985) argued that competitive advantage is a key determinant of superior performance. The superior performance of a firm arises from sustainable competitive advantages that are the result of either monopoly rents, Ricardian rents, or Schumpeterian rents (Peteraf 1993; Powell 2001). The following sections will be dedicated to the key theories of competitive advantage that creates the basis for study of strategy and competitive advantage.

**4.2. The Resource-Based View (RBV)**

According to Sciarelli (2008), the whole resource-based theory can be traced back to the year 1959 from the idea of Penrose who suggested that the resources possessed, deployed and used by the organisation are really more important than industry structure. (Barney, Della Corte and Sciarelli 2008, Della Corte and Sciarelli 1999). If the strategy is “a firm’s theory about how to compete successfully” (Barney, 2002), the source of the sustainable competitive advantage is the capacity to exploit a bundle of resources that the business has at its disposal or has access to, which are valuable, rare, and inimitable (Wernerfelt, 1984; Barney, 1991).
The term ‘resource-based view’ was coined much later by Wernerfelt (1984), who viewed the firm as a bundle of assets or resources which are tied semi-permanently to the firm (Wernerfelt 1984). From the perspective of a RBV, the firm is regarded as a unit; a single, organized group of heterogeneous assets that is created, developed, renewed, evolved and improved with the passage of time. The acceptance of the concept of the firm as a unit of resources and capabilities has prompted interest in identifying the nature of these varying resources and in evaluating their potential for generating profits (López 2005). The resource-based view is a theory about the nature of firms, as opposed to theories such as transaction cost economics which seeks to explain why firms exist (Coase 1937). In effect, the resource-based view is a statement about how firms actually operate (Lockett et al 2009).

During the early strategy development phase of Hoskisson’s account of the development of strategic thinking (Hoskisson et al 1999), the focus was on the internal factors of the firm. Researchers such as Ansoff (1965) and Chandler (1962) made important contributions towards developing the Resource-Based View of strategy (Hoskisson et al 1999). The literature that deals with the sources of competitive advantage usually classifies a firm’s resources into physical, financial, human, and organisational resources (Barney 1997, Barney and Wright 1998). Other authors who prefer to use a different classification also classify a firm’s resources as either tangible or intangible resources (Michalisin, Smith and Kline 1997, Ray et al 2004). Although all resources are important, the literature treats the human and organisational (i.e. the intangible) resources as slightly more relevant for creating a firm’s competitive advantage (Zupan 1996, Whitehill 1997). Those researchers (Del Canto and Gonzalez 1999; Lockett and Thompson 2001; Ray et al. 2004) who classify firm’s resources into tangible and intangible argue that intangible resources are often the most important ones from a strategic point of view. They argue that intangible resources are more likely to be a source of sustained competitive advantage rather than tangible ones. According to other scholars (Barney and Wright 1998, Prahalad and Hamel 1990) the human resources are the most valuable resources for a company.

Many scholars who can be classified into the resource-based theory argue that only strategically important and useful resources and competencies should be viewed as sources of competitive advantage (Barney 1991). They have used terms like core competencies (Barney 1991; Prahalad and Hamel 1994), distinctive competencies (Papp and Luftman 1995)
and strategic assets (Amit and Shoemaker 1993; Markides and Williamson 1994) to indicate the strategically important resources and competencies, which can help the company to achieve competitive advantage. According to fellow scholars Amit and Shoemaker (1993), strategic assets can be defined as “the set of difficult to trade and imitate, scarce, appropriable and specialized resources and capabilities that bestow the firm’s competitive advantage”. Core competencies can be classified as valuable firm-level resources that are impossible to copy, or reproduce (Barney 1991, Prahalad and Hamel 1994). And last but not least, distinctive competencies are all the activities that make the company unique on the market (Papp and Luftman 1995).

4.3. The Knowledge-Based View (KBV)

As mentioned previously, the knowledge-based theory was derived from the resource-based theory, in which knowledge is considered the key or strategic asset for firms, the latter being defined as the body or social context in which knowledge will be developed, sustained and, consequently, protected (Grant 1996). There are numerous scholars who analysed, contributed and consequently helped to develop this view, a particular mention should go to those of Nelson and Winter (1982), Penrose (1959), Prahalad and Hamel (1990), Kogut and Zander (1992, 1996), Orlikowski (2002), and subsequently Lei (2003).

Advocates of the knowledge-based school concerning the competitive advantage of a firm argue that a firm can win a competitive battle only if it possesses more relevant knowledge than its competitors (Inkpen 1998, Zack 1999). The ability to create value is not based as much upon physical or financial resources as on a set of intangible knowledge-based resources. From this perspective, knowledge is considered a key or strategic resource for firms and is thus established as a basic element of analysis (López 2005). Therefore, the processes of generation, development and application of knowledge assume special importance (Wikström and Normann, 1994; Nonaka and Takeuchi, 1995; Nonaka and Konno, 1998).

4.4. The Capability-Based View (CBV)

As the name can tell us, the capability-based view advocates that a firm’s competitive advantage derives from its capabilities, competencies (Collis 1991, Day 1994). Grant (1991) argued that capabilities are the source of competitive advantage while resources are the source of capabilities. Various scholars tried to classify the sources of capability-based
competitive advantage. These sources were later collected and put onto a list by Čater (2003, p. 311) as follows – core skills (Tampoe 1994), distinctive capabilities (Snow and Hrebinjak 1980, Hitt and Ireland 1985), organisational capabilities (Collis 1994), organisational capital (Prescott and Visscher 1980), dynamic capabilities (Eisenhardt and Martin 2000, Luo 2000), and core competencies (Leonard-Barton 1992, Post 1997). According to Čater (2003), companies that want to build their competitive advantage on capabilities should focus on their business processes, change their key processes into strategic capabilities, and should make important, strategic investments to support these capabilities since capabilities alone cannot create competitive advantage (those which are easily reproduced), only if these capabilities have gone through a difficult development process and are complex (Bartmess and Cerny 1993, Ulrich 1987, King, Fowler and Zeithaml 2001).

4.5. The Market-Based View (MBV)

The market-based view of the firm has its roots in the field of industrial organization economics. Greatly influenced by the early work of Harvard economist Mason (1939) and his doctoral student Bain (1956), IO economics analyses the structure of industries, the effects of concentration on competition, and the boundaries between firms and markets, among other factors (Mason 1939, Bain 1956, Hoskisson et al 1999, Stigler 1968). Within the industrial organisation school there are two important views of the origin of a firm’s competitive advantage that are worth mentioning. The first view is represented by the classical industrial organisation school Mason (1939), and Bain (1956) who argue that a firm can neither influence industry conditions nor its own performance (Lado, Boyd and Wright 1992, Gadhoum 1998). In this view, the competitive advantage is sourced in external sources – the characteristics of the environment determine it – rather than in internal sources. The other group which can be called the new group of industrial organisation scholars is represented by Hansen and Wernerfelt (1989). They argue that companies can have a certain amount of influence on their relationship between industry structure and a firm’s performance. In this context, an enterprise can have an important influence on creating its own competitive advantage (Gadhoum 1998).

Deducing from the previous lines, the market-based theory argues that industry factors and external market orientation are the primary determinants of firm performance (Bain 1968, Caves and Porter 1977, Peteraf and Bergen 2003, Porter 1980, 1985, 1996). When talking
about the market-based view, it is worth mentioning that there are two most popular theories in this category. These are Bain’s (1968) *Structure-Conduct-Performance* (SCP) framework, and Porter’s (1980) *five forces model* – based on the previously mentioned framework created by Bain). The SCP paradigm held its fame from the 1940s to the 1960s as a way to analyse the relation between the structure of an industry, the industry conduct, and the resulting industry performance (Barney and Clark 2007, p. 13-14; Sawyer 1991, p. 110). The paradigm was later improved by other scholars (Caves and Porter 1977, Caves 1980, Porter 1980).

**Figure 10: Structure-Conduct-Performance Paradigm**

![Structure-Conduct-Performance Paradigm](source)

From the above figure, the *structure* determines the behaviour and strategies of competing firms in that industry. This industry *conduct* in turn affects the *performance* of firms in the industry (Tirole 1999, p. 1).

**4.5.1. Porter’s five forces**

In this sub-chapter, Porter’s five forces will be elaborated to deliver a framework for further analysis of the industry level of a firm. This theory of the five forces consists of different actors that are present in the industry with a certain interest or function. In formulating strategy, firms commonly make an overall assessment of their own competitive advantage via an assessment of the external environment based on the five forces model (Porter 1979; 1985). The *five forces* are:

1. Threat of entry by new entrants,
2. Threat of substitute products
3. Bargaining power of suppliers
4. Bargaining power of buyers
5. Intensity of rivalry among established firms (Hill and Jones 2010, p. 43; Porter 1979, p. 6; Wang 2014, p. 34).

The importance of using this theory is that it enables the firm of interest “to find a position in industry where the company can best defend itself against the five forces, or can influence them in its favour” (Hollensen 2011).

**Figure 11: The Five Forces that Shape Industry Competition**

1. **Threat of entry by new entrants**

New entrants to an industry bring new capacity and a desire to gain market share that puts pressure on prices, costs, and the rate of investment necessary to compete. This group can enter the industry and start competing for the same customers and profits as the firm of interest does. Therefore, rivalry in the industry is increasing which is not beneficial for the firm of interest. The seriousness of the threat of entry depends on the barriers present and on the reaction from existing competitors that the entrant can expect. Barriers of entry are affected by:
• Economies of scale,
• Product differentiation – rate of diversification and originality of a firm’s products creating customer loyalty towards the products.
• Capital requirements – the need to invest large financial resources in order to compete creates a barrier to entry.
• Customer switching costs – how expensive it is for a customer to switch from one supplier to another.
• Access to distribution channels – can the new competitor access the existing distribution channels, or can it create its own channels in the sector (Porter 2008, p. 26-28).

2. Threat of substitute products

A substitute performs the same or a similar function as an industry’s product by a different means. Videoconferencing is a substitute for travel. Plastic is a substitute for aluminium. Email is a substitute for express mail. Sometimes, the threat of substitution is downstream or indirect, when a substitute replaces a buyer industry’s product. To be more precise, substitutes are products that can replace products in the industry and thereby lead customers of the industry and the related profits to another one. The threat of substitution relies on:

• The substitute offers an attractive price-performance trade-off to the industry’s product.
• The buyer’s cost of switching to the substitute is low (Porter 2008, p. 31-32).

An important note for strategy formulation of a firm in relation the substitutes is that if the company wants to minimize the risk of substitutes, it need to make the product more unique, so the substitute can lose its identification as the substitute.

3. Bargaining power of suppliers

Powerful suppliers capture more of the value for themselves by charging higher prices, limiting quality or services, or shifting costs to industry participants. Powerful suppliers, including suppliers of labour, can squeeze profitability out of an industry that is unable to pass on cost increases in its own prices (Porter 2008). A supplier group is powerful if:
• It is more concentrated than the industry it sells to,
• The supplier’s product is unique or at least differentiated,
• There is no substitute for what the supplier group provides,
• The supplier group can credibly threaten to integrate forward into the industry,
• It does not depend heavily on the industry for its revenues (Porter 2008, p. 29-30).

The companies can reduce the bargaining power of suppliers by finding alternative products that can substitute the original ones, enabling a larger group of suppliers to deliver (de Raad 2014).

4. Bargaining power of buyers

Powerful customers— the flip side of powerful suppliers—can capture more value by forcing down prices, demanding better quality or more service (thereby driving up costs), and generally playing industry participants off against one another, all at the expense of industry profitability (Porter 1979). The bargaining power of buyers is high if:

• There are few buyers, or each one purchases in volumes that are large relative to the size of a single vendor,
• The industry’s products are standardized or undifferentiated,
• Buyers face few switching costs in changing vendors,
• The lower the profits of the buyers are the higher the chance is for incentives to lower the purchasing costs,
• The number of sellers of the product is high. Thus, a large number of competitors are competing for the same customers and so the chance of replacement is high (Porter 2008, p. 30-31).

In order to minimize the bargaining power of buyers, companies can increase the number of customers they sell to by producing highly valued and differentiated products to increase the importance of the firm within the sector they operate in (Porter 2008).

5. Intensity of rivalry among established firms

The last factor of Porter’s five forces is created of market competitors. Rivalry among existing competitors takes many familiar forms, including price discounting, new product
introductions, advertising campaigns, and service improvements. High rivalry limits the profitability of an industry. The intensity of rivalry is high if:

- Competitors are numerous or are roughly equal in size and power,
- Industry growth is slow. Slow growth precipitates fights for market share,
- Exit barriers are high. Exit barriers, the flip side of entry barriers, arise because of such things as highly specialized assets or management’s devotion to a particular business,
- The product or service lacks differentiation or switching costs, which lock in buyers and protect on combatant from raids on its customers by another,
- Firms cannot read each other’s signals well because of lack of familiarity with one another, diverse approaches to competing, or differing goals (Porter 2008, p. 32-33; Porter 1979, p. 142).

It is imperative for the company to realize the position within the sector they currently operate in and that the wellbeing of the industry needs to be cherished.

To summarize, the five-force model enables organisation to analyse the current situation of their industry in a structured way. However, the model has limitations. Porter’s model assumes a classic perfect market as well as static market structure, which is unlikely to be found in present-day dynamic markets (Wang 2014).

4.6. The Relational View of Strategy

The relational view of strategy was analysed in detail for the first time by Dyer and Singh (1998) where the two scholars argue that in contrast with the resource-based view (where resources owned by a single firm) the company’s resources may extend beyond company boundaries. According to Dyer and Singh (1998), that interfirm linkages may be a source of relational rents and competitive advantage. Relational rents are defined as a “supernormal profit jointly generated in an exchange relation-ship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners” (Dyer and Singh 1998, p.662). Apart from that, the relational rents can be classified into four distinctive sources of competitive advantage, these are:

1. Relation-specific assets,
2. Knowledge-sharing routines,
3. Complementary resources and capabilities,


Furthermore, they conclude with a statement that, “at a fundamental level, relational rents are possible when alliance partners combine, exchange, or invest in idiosyncratic assets, knowledge, and resources/capabilities, and/or they employ effective governance mechanisms that lower transaction costs or permit the realization of rents through the synergistic combination of assets, knowledge, or capabilities” (Dyer and Singh 1998, p. 662).

From the year since this view was proposed it raised in its popularity and many other scholars conducted researches on this topic which helped in the development of this theory (Oliver 1990, Ring and Van de Venn 1992a, Ring and Van de Venn 1992b, Easton 1992, Ebers 1999, Seidmann and Sundararajan 1997, Gulati 1998, Dyer and Singh 1998, Ahuja 2000, Gulati et al 2000, Wang 2004, etc.)

To summarize this chapter, it is visible that there is considerable diversity in how strategy is conceptualised and in its units of analysis. Although, as it always is, the best perspective could be a mix from all these abovementioned theories – the market-based view, the resource-based view and its derivatives, or the relational view. As per Čater (2003), from these schools of thought three key differences can be spotted. The first one states that while the resource-based, the capability-based, and the knowledge-based view thinks that the competitive advantage can be achieved from the inside of the company, the market-based school believes that competitive advantage dwells in a company’s surroundings, mostly in the structure of its industry (Barney 1991). The second difference can be found on the organisational level at which the sources of competitive advantage are discussed. The market-based and resource-based school consider sources at the strategic business unit level (Porter 1985, Wernerfelt 1984, Peteraf 1993), the knowledge-based and capability-based schools discuss them at a corporate level (Stalk, Evans and Shulman 1992, Tampoe 1994, Wiig 1997). The third difference is buried in the width in which they perceive the sources of competitive advantage Čater (2003).
5. Case study Photon Energy Group

For much of the global economy, energy has become one of the strategic factors driving business decision-making. Businesses and consumers are increasingly considering the energy efficiency of the products and services they buy and use. In industrial production, companies are searching for the most energy-efficient process design solutions. In the energy industry itself, the demand for innovative, climate-friendly technologies to produce heat and power is also growing. These developments are the result of economic and political facts: the long-term depletion of fossil fuels and public policy decisions to curb greenhouse gas emissions (GHG). Thus, energy has become a key factor in gaining a competitive edge, and the relevant global markets are growing rapidly. In this chapter, the most relevant theory of competitive advantage will be used and reflected on the case of Photon Energy and this would be the market-based view of strategy, Porter’s five forces model, and the resource-based view. The MBV emphasizes the role of market conditions in developing strategy for the firm, the five forces model helps to determine an industry’s attractiveness by these five forces that shape the opportunity for superior performance in an industry, and the RBV emphasizes the resources that the business has at its disposal or has access to, which are valuable. In this case, the crucial intangible asset of the company – the know-how, and other strategic tangible assets such as inverter cardio and other instruments in their possession.

As for the currently ongoing situation in Hungary with regards to the solar power, currently Hungary has approximately 22.6 MW of photovoltaic capacity installed. This is a 3.9 Watt per inhabitant installed capacity, which is the 6th smallest value in the European Union (EurObservER 2015). Starting from this, it is evident that the solar market in Hungary is not yet fully developed and is still in its beginnings. Due to the low presence of competition on the Hungarian solar energy market and to other set of factors Hungary is becoming a promising market for solar photovoltaics in the next couple of years. With a share of 11% of electricity consumption being generated from renewable energy sources in 2016, Hungary falls significantly short of its EU commitment of 20% by 2020. Therefore, one of the main advantages that Photon Energy can have in their inventory is the fact that they are amongst the first entrants in the solar energy business which can secure them a strong position on the solar market. Hungary has limited potential for other renewable energy sources and thanks to the material decline in investment costs for PV plants and local financing costs in combination
with functioning support mechanisms provide for the commercial viability of PV plants in Hungary. Off-take prices for renewable energy around EUR 100 per MWh for up to 25 years allow for attractive returns for investors, while local banks have a strong mandate and appetite to provide long-term project financing on attractive terms. These circumstances resulted in the decision of Photon Energy to invest their resources into building at least 50 MWp of new PV projects in the next couple of years (Photon Energy 2017). Since then, Photon Energy acquired various Hungarian energy companies through brownfield investments and is set to produce approximately 11.3 MWp by the end of January 2018 (PE Monthly Report (November)).

To better understand the situation and overall attractiveness of the renewable energy market, especially the solar market, Porter’s five forces model will be carried out in order to disclose the attractiveness of the whole solar industry. In a perfectly competitive industry, where companies are involved in a cruel fight for market shares, offers the worst prospect for long-run profitability. The weaker the forces collectively, the greater will be the opportunity for superior performance.

**Threat of entry by new entrants**

In terms of renewable energy developers, the cost of research and development are enormous, and economies of scale are favourable to existing companies and a large barrier to new development companies. A rather well-known corporation with a stable background, such as Photon Energy has a cost advantage in comparison with potential new entrants. The company has been developing cost-efficient and effective production methods throughout their existence. In addition, they have acquired many crucial Hungarian companies through various acquisitions that have KAT licences in their possession which allows them to build new solar plants on Hungarian soil. Apart from that, Photon Energy has precious technological knowledge since they started in the solar business which makes it harder for competition to enter the solar industry. Moreover, other activities, such as constant project development by Photon Energy gives the opportunity to effectively expand their area of business in Hungary and hence gaining the upper hand via significant economies of scale in contrast with other possible new entrants, as they enjoy cost reductions from mass producing their standardized solar cell modules, discounts on purchases of parts, advantages of spreading fixed costs over
large production volumes and the advantage of spreading marketing and advertising costs over a large volume of output. This makes it easier for companies such as Photon Energy to fend off new entrants and maintain control of market share.

As for the government regulation, regulations, and rules from the government or for example unions and other legislators can play a huge role regarding the height of the barrier to entry by new corporations. However, in the case of Photon Energy in Hungary, the legislation regarding the renewable energy looks robust while the general legal system as well as corporate and commercial law is different but manageable.

The customer switching costs also requires considerable sums of money and time to switch from the products offered from one corporation to the products offered from another. High switching costs means high barriers to entry for a new company in the industry mainly because PV technologies are rather expensive and complex and therefore come with higher costs. This results in the loyalty of customer using these products, unless there is a substantial advantage in shifting to another corporation’s products. This decision by the customer to switch to other competitor can be halted by the services offered by Photon Energy – solar O&M and monitoring, Photon Energy Command (PECOM) software, inverter cardio, etc. – which can help in generating solar energy more effectively, resulting in higher energy yields.

To summarize this part, I can say that the threat level for new entrants in the solar industry is medium, but it can be an object of change towards a higher level of entrants in the future.

**Threat of substitute products**

The second factor that Porter describes in his five forces theory is the threat of possible substitutes. Substitutes are products that can replace products in the industry and thereby lead customers of the industry and the related profits to another one. The most direct substitute for renewable energy is electricity generated in fossil-fuel or nuclear power stations. Traditionally they have also been more economical than renewable sources of energy. Renewable energy is becoming more and more affordable for consumers and is finally at the point where it can actually achieve grid parity and save consumers money, but historically renewable energy has been far more expensive than alternative substitutes. The
economic benefits of renewable energy substitutes make this the most severe threat level in the industry.

To conclude, until humanity runs out of all its fossil fuel reserves that help us generate electricity, these conventional energy sources will always pose a threat for solar energy generation, hence it is clear that the level of threat in this case is significant – high.

**Bargaining power of suppliers**

To consider, all the components that create a complete solar cell are made from crystalline silicon. Despite it’s a raw material that can be found freely in the nature, and its production is not complicated, there have been recorded shortages of this crucial material (MITei 2015). Since crystalline silicon is unique and necessary for producing solar cells, there are currently no other means of substitutes in this setting. This phenomenon can offer the relevant suppliers a considerable bargaining power over its customers, in this case Photon Energy and other companies situated in this industry. Other factor that can increase the bargaining power of suppliers is the fact that crystalline silicon is also largely used in industries (mostly electronics) other than solar energy. On the other hand, as previously mentioned, since crystalline silicon can be found freely in nature and its creation is not difficult, hence making it un-unique. By this, the bargaining power of suppliers weakens and lowers via the switching costs of their customers, in this case the solar industry. Other factors that can weaken the bargaining power of suppliers is the fact that the solar industry is exponentially growing and developing over the time, making it lucrative and attractive to serve.

Taking all these factors, it can be stated that the bargaining power of suppliers in the solar industry is somewhere between low and medium, which is more of an opportunity than a threat towards the companies invested in solar industry – in this case for Photon Energy.

**Bargaining power of buyers**

Michael Porter’s fourth force out of five stands for buyers’ power in the industry. The buyers are also of great importance to Photon Energy since this group is responsible for the turnover of the firm. In general, the bargaining power of consumers is fairly low in the renewable energy development market. Switching costs are fairly low for a customer in the position to shop energy providers. The wrinkle in this analysis is the long-term contracts that are typically
available with home solar systems. If a customer has entered into a Power Purchase Agreement, a loan option, or lease option for solar, these agreements can be for 20-30 years.

In summarization, the buyers have little or no say at all when it comes to the levels of prices, quality, and services. Instead they pretty much have to settle for what is offered and profits can thereby remain at a high level, thus making the overall bargaining power of buyers relatively low. However, due to the fact that the solar industry has been continuously growing in recent years, with it the base of buyers also expanding, new coming customers have the luxury of forcing solar companies to lower their prices and be more competitive to meet customer’s needs. Even though the bargaining power of buyers still remain low.

**Intensity of rivalry among established firms in the solar industry**

As for the last force from Porter’s five forces which is dedicated to the intensity of rivalry among companies in the same industry they operate, in this case the solar industry can be said that in general the competitive landscape differs drastically by each country and region. The growth rate of industries can be a significant factor in competition, and the renewable energy industry is growing exponentially which in turn drives price competition.

According to Varga (2008), there were approximately 200 companies situated on the solar market, but from this number only a few companies are involved in big solar plant installations, and not every company is fully invested in solar energy. This number is of course exponentially growing each year. Deducing from the previous statements, the overall solar industry in Hungary is not yet fully developed with its share of 11% of electricity consumption being generated from renewable energy sources in 2016 which lacks behind the overall EU commitment of 20% by the year 2020. From the perspective of Photon Energy which is apart from its solar interests in Hungary also competing internationally – currently on two continents – with their largest market share situated within Europe. Within Hungary Photon Energy is faced by competitors such as MET Power Hungary, MVM OVIT Zrt., E.ON Kft., and ÉLMŰ-ÉMÁSZ Kft, and so on. These companies are greatly interested in developing and building solar powerplants with the capacity of multiple MWp.¹

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¹ Currently the largest solar powerplant in Hungary can be found in Mátra with the solar capacity of 16 MWp. The powerplant was set operational in 2015 (INDEX 2015).
The level of rivalry is down as more and more companies are entering the solar market. To reach product differentiation with energy may be difficult for some. As for the Photon Energy, it’s the impeccable and crucial know-how and the wide variety of products and technology they offer that can make all the difference in contrast with other competitors, starting with offering lower energy prices and so on. Statistics have already shown that the Hungarian solar market is set for a record breaking 2018 year. From the previous statements, it can be said that the level of rivalry between companies in the solar industry is, even though it’s not yet fully developed and will be only continuously expanding further, medium.

To summarize, the overall attractiveness of the solar industry in Hungary is generally good with a lot of potential to further develop and expand within the industry. That is mainly because of the liberalized energy market, the strong appetite from banks to finance PV projects, the government’s willingness to help solar companies to settle their businesses in Hungary through various feed-in tariffs for renewable energy sources (KAT licences for instance), and through other state and European Union funds in order to achieve the 20% commitment by the year 2020 set by the European Union. A testament to that can be the willingness of Photon Energy to invest in and develop solar powerplants with total solar capacity of 50 MWp by the year 2019, hence making Hungary as one of their main solar energy bastions.

**Figure 12: Porter’s five forces spider diagram - current situation in the solar industry in Hungary**

![Porter's Five Forces Spider Diagram](image)

**Source:** Own fabrication

(0- Weak, 3- strong factor)
Conclusion

The final chapter contains conclusions drawn based upon the findings in the previous chapters of this report. Consequently, the chapter will provide answers to the problem statement and research questions stated at the beginning of the report. In this semester project I decided to do a company analysis and a valuation of the solar power solutions and services company Photon Energy N.V. based in the Netherlands. Even though I was originally assigned for my internship at the Czech Trade, there was this option inside my internship curriculum to help and take apart on the activities of Photon Energy which have just recently set its foot in the Hungarian solar business – making it more lucrative for me to conduct a research on. In the following section I will summarize the findings which can help me in answering the following research questions, thus ultimately leading me to the answering of the proposed problem formulation at the end.

Photon Energy was founded in 2008 in Prague, Czech Republic and later went public on the Warsaw and Prague Stock Exchange in 2013. Photon Energy’s team has a proven track record and in-depth knowledge of project development, investment management, project finance, insurance, technology solutions, EPC and O&M. Photon Energy is headquartered in Amsterdam, Netherlands and has offices in Australia, Switzerland, Czech Republic, Hungary and Slovakia. Since the establishment in 2008, the company has struggled with presenting positive financial results – see Appendix 1. This has changed last year (2017), when the companies consolidated revenues increased by 6.8% YoY to EUR 4.908 million, leading to an all-time high EUR 3.140 million EBITDA (+14.5% YoY), a EUR 1.229 EBIT (+36.2% YoY), a EUR 0.613 million net profit (+251.2% YoY), and a Total Comprehensive Income of EUR 1.051 million (+36.4% YoY) (PE Financial Report 2017Q3, 2017).

The first research question is dealing with the different schools of thought about competitive advantage. To answer this, I found out that at the beginning there were two major schools of thought – the market-based view, and the resource-based view. Later, two other schools were developed over time which were the capability-based view, and the knowledge-based view. These two theories were derived from the resource-based view. Apart from these four “major” theories of competitive advantage, a more recent theory has emerged from the surface which received a considerable amount of attention – the relational view of strategy. The market-based view argues that industry factors and external market orientation are the
primary determinants of firm performance. Inside the MBV view two major types of theories can be find – Bain’s Structure-Conduct-Performance framework, and Porter’s five forces model which was largely used in this project to analyse the current situation in the solar industry in Hungary. The resource-based view on the other hand states that the firm is regarded as a unit; a single, organized group of heterogeneous assets that is created, developed, renewed, evolved, and improved with the passage of time. Moreover, the RBV school says that the source of the sustainable competitive advantage is the capacity to exploit a bundle of resources that the business has at its disposal or has access to, which are valuable, rare, and inimitable. These sources of competitive advantage can be classified into physical, financial, human, and organisational resources, or either as tangible or intangible. As mentioned previously, the knowledge-based theory was derived from the resource-based theory, in which knowledge is considered the key or strategic asset for firms. Advocates of the knowledge-based school concerning the competitive advantage of a firm argue that a firm can win a competitive battle only if it possesses more relevant knowledge than its competitors. From this perspective, knowledge is considered a key or strategic resource for firms. The school of capability-based view advocates that a firm’s competitive advantage derives from its capabilities, competencies where capabilities are the source of competitive advantage while resources are the source of capabilities. The sources of capability-based view can be classified into - core skills, distinctive capabilities, organisational capabilities, organisational capital, dynamic capabilities, and core competencies. As for the last school, the relational view school, they argued that in contrast with the resource-based view (where resources owned by a single firm) the company’s resources may extend beyond company boundaries. Furthermore, they stated that interfirm linkages may be a source of relational rents and competitive advantage.

To summarize, it is visible that there is considerable diversity in how strategy is conceptualised and in its units of analysis. Although, as it always is, the best perspective could be a mix from all these abovementioned theories – the market-based view, the resource-based view and its derivatives, or the relational view. Based on the conducted literature review, 3 significant difficulties were discovered between the schools. The first one states that while the resource-based, the capability-based, and the knowledge-based view thinks that the competitive advantage can be achieved from the inside of the company, the market-based school believes
that competitive advantage dwells in a company’s surroundings, mostly in the structure of its industry. The second difference can be found on the organisational level at which the sources of competitive advantage are discussed. The market-based and resource-based school consider sources at the strategic business unit level, the knowledge-based and capability-based schools discuss them at a corporate level. The third difference is buried in the width in which they perceive the sources of competitive advantage.

As for the second research question regarding the current status of PE’s presence in the Hungarian market. Currently, the Dutch development company plans to deploy 50 MW of PV capacity in Hungary until year-end 2019 provided with O&M and EPC services for external customers in the country in the long-term. In the Pest region of Hungary Photon Energy is developing 11 projects with a grid connection capacity of 498 KW each. The installed capacity has been designed to be between 570 and 575 KWp for each plant. On 10 May 2017, Photon Energy received the energy production licenses under the KÁT support system, allowing each plant to feed a total volume of 16,950 MWh of electricity into the grid at the guaranteed price of HUF 31.77 (EUR 0.102) per KWh over 25 years from the date of grid connection. During the 25-year support period the power plant is licensed to sell 14.3 GWh of renewable energy, generating revenues of at least EUR 1.464 million over the entire period. Since their entrance on Hungarian soil in early 2017 the company managed to acquire 100% of the shares of Fertőd Napenergia-Termelő Kft., a Hungarian limited-liability company owning all licenses, rights and permits for the construction of a 520 KWp (DC) photovoltaic power plant in July, and in October, Photon Energy purchased 100% of the shares of Ráció Master Oktatási Kft., which owns the KÁT licenses, grid connection and land usage rights for 8 PV projects in the Komárom-Esztergom region in Hungary (PE Monthly report (November) 2017, p. 6-7). By these acquisitions, Photon Energy N.V. is set to produce approximately 11.3 MWp by the end of January 2018.

The last research question and ultimately the stated problem formulation regarding advice that can be derived from the theories of competitive advantage which can help Photon Energy to achieve and maintain competitive advantage in the solar industry in Hungary shall be answered in the following passages. They can help to better understand the business environment in which they are, hence making them able to create appropriate business
strategies which can help them to achieve a strong market position. In the case of Photon Energy, the advice to be derived from the market-based view which argues that industry factors and external market orientation are the primary determinants of firm performance is the fact that the solar market in Hungary is still in the developing stage, with a fair number of competitors. There are approximately 200 companies situated on the solar market, but from this number only a few companies are involved in big solar plant installations, and not every company is fully invested in solar energy. The overall EU commitment of achieving a 20% share of energy consumption generated from renewable energy resource by 2020 is not yet fully fulfilled by Hungary and with its 11% seriously lacks behind the EU average. This situation can tell us that the solar market is not overcrowded, thus making the possibility for new entrants such as Photon Energy to expand their activities much earlier than the competitors would realize the opportunity which could lead Photon Energy to secure a strong market position on the solar market. If we take it from the resource-based perspective which states that the source of the sustainable competitive advantage is the capacity to exploit a bundle of resources that the business has at its disposal or has access to, which are valuable, rare, and inimitable. The essential sources of sustainable competitive advantage in Photon Energy’s case is the crucial know-how (PECOM software, inverter cardio, O&M solutions) which can help in producing solar energy more effectively at the same cost and the fact that the company not only develops and builds solar powerplants (see Appendix 2 for the portfolio managed by PE and Appendix 3 for future projects that are currently under development), they also provide O&M services for their customers, and other expertise that together cover the entire lifecycle of solar power systems. I think all these realities can be classified as essential sources that can help Photon Energy to stay ahead of its competitors.

In conclusion, to create a competitive advantage, the enterprise is required to progress, to innovate, and to discover the best competitive opportunities and exploit them. The firm definitely should not stop in the endeavours of improving the quality of its services, products, and its methods. It is imperative for the companies to be strategically aggressive and to react quickly. In order to preserve the competitive advantage in the long term, this advantage is the key element to be continuously improved.

A good example could be the implementation of Porter’s five forces in real life in order to scan the market and to find out the overall attractiveness of the industry in which the company wants to invest its resources in.
Reflections and perspectives

The project is focusing on solar power solutions and services company Photon Energy N.V. and therefore the recommended strategy might not be fully applicable to other similar companies. Nevertheless, these solar companies have many similarities and therefore it is still assumed that the analysis of Photon Energy provides a representative image of the situation within the Hungarian solar industry. The theories that were currently used can offer a complete sketch of situation. This project is directly a recommendation for further analysis where other different theories can be used to highlight the phenomenon thus giving us a new perspective which can bring up new sights and information possibly to a further extent. Moreover, a proper quantitative research would give an extra value to this research and thereby stimulating the findings of this project.
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# Appendix

## Appendix 1: Selected financial results of Photon Energy N.V.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total revenues</strong></td>
<td>4,594</td>
<td>4,908</td>
<td>19,916</td>
<td>20,896</td>
<td>134,177</td>
<td>138,032</td>
</tr>
<tr>
<td><strong>Gross profit</strong></td>
<td>3,935</td>
<td>4,021</td>
<td>17,056</td>
<td>17,119</td>
<td>106,354</td>
<td>104,890</td>
</tr>
<tr>
<td><strong>EBITDA</strong></td>
<td>2,744</td>
<td>3,140</td>
<td>11,894</td>
<td>13,370</td>
<td>74,157</td>
<td>81,916</td>
</tr>
<tr>
<td><strong>EBIT</strong></td>
<td>903</td>
<td>1,225</td>
<td>3,913</td>
<td>5,234</td>
<td>24,396</td>
<td>32,066</td>
</tr>
<tr>
<td><strong>Profit / loss before taxation</strong></td>
<td>210</td>
<td>883</td>
<td>912</td>
<td>3,758</td>
<td>5,683</td>
<td>23,023</td>
</tr>
<tr>
<td><strong>Profit / loss from continuing operations</strong></td>
<td>175</td>
<td>613</td>
<td>757</td>
<td>2,611</td>
<td>4,720</td>
<td>15,997</td>
</tr>
<tr>
<td><strong>Total comprehensive income</strong></td>
<td>777</td>
<td>1,051</td>
<td>3,367</td>
<td>4,476</td>
<td>20,991</td>
<td>27,422</td>
</tr>
<tr>
<td><strong>Non-current assets</strong></td>
<td>76,857</td>
<td>73,932</td>
<td>331,952</td>
<td>318,206</td>
<td>2,076,688</td>
<td>1,920,373</td>
</tr>
<tr>
<td><strong>Current assets</strong></td>
<td>13,083</td>
<td>13,403</td>
<td>56,508</td>
<td>57,687</td>
<td>353,514</td>
<td>348,140</td>
</tr>
<tr>
<td><strong>Cash and cash equivalents</strong></td>
<td>5,208</td>
<td>4,670</td>
<td>22,495</td>
<td>20,102</td>
<td>140,731</td>
<td>121,314</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>89,941</td>
<td>87,342</td>
<td>388,460</td>
<td>375,893</td>
<td>2,430,263</td>
<td>2,268,513</td>
</tr>
<tr>
<td><strong>Total equity</strong></td>
<td>28,210</td>
<td>26,832</td>
<td>121,840</td>
<td>115,485</td>
<td>762,234</td>
<td>695,951</td>
</tr>
<tr>
<td><strong>Current liabilities</strong></td>
<td>7,086</td>
<td>17,539</td>
<td>30,604</td>
<td>75,490</td>
<td>191,460</td>
<td>455,580</td>
</tr>
<tr>
<td><strong>Non-current liabilities</strong></td>
<td>54,645</td>
<td>42,964</td>
<td>236,016</td>
<td>184,918</td>
<td>1,476,513</td>
<td>1,115,982</td>
</tr>
<tr>
<td><strong>Operating cash flow</strong></td>
<td>2,365</td>
<td>1,644</td>
<td>10,254</td>
<td>7,009</td>
<td>63,932</td>
<td>42,943</td>
</tr>
<tr>
<td><strong>Investment cash flow</strong></td>
<td>-438</td>
<td>0</td>
<td>-1,889</td>
<td>0</td>
<td>-11,838</td>
<td>0</td>
</tr>
<tr>
<td><strong>Financial cash flow</strong></td>
<td>-1,348</td>
<td>-2,072</td>
<td>-5,844</td>
<td>-8,821</td>
<td>-36,435</td>
<td>-54,044</td>
</tr>
<tr>
<td><strong>Net change in cash</strong></td>
<td>579</td>
<td>-426</td>
<td>2,511</td>
<td>-1,812</td>
<td>15,659</td>
<td>-11,101</td>
</tr>
</tbody>
</table>

**EUR exchange rate - low**  
4.260  4.202  27.020  25.965

**EUR exchange rate - average**  
4.315  4.257  27.028  26.084

**EUR exchange rate - end of period**  
4.319  4.304  27.020  25.575

**EUR exchange rate - high**  
4.430  4.304  27.055  26.160

*Note: Exchange rates provided by the European Central Bank*

Appendix 2: The proprietary portfolio of Photon Energy N.V. as of 30 September 2017

<table>
<thead>
<tr>
<th>Nr</th>
<th>Proprietary portfolio</th>
<th>Legal entity</th>
<th>Country</th>
<th>Cap. (kWp)</th>
<th>Share</th>
<th>Cap. Pro-rata</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Komorovice</td>
<td>Exit 90 s.r.o.</td>
<td>CZ</td>
<td>2,354</td>
<td>100%</td>
<td>2,354</td>
<td>Dec.10</td>
</tr>
<tr>
<td>2</td>
<td>Zulikov</td>
<td>Photon SPV8 s.r.o.</td>
<td>CZ</td>
<td>2,031</td>
<td>100%</td>
<td>2,031</td>
<td>Nov.10</td>
</tr>
<tr>
<td>3</td>
<td>Dolní Dvořík</td>
<td>Photon SPV10 s.r.o.</td>
<td>CZ</td>
<td>1,645</td>
<td>100%</td>
<td>1,645</td>
<td>Dec.10</td>
</tr>
<tr>
<td>4</td>
<td>Svatoslav</td>
<td>Photon SPV4 s.r.o.</td>
<td>CZ</td>
<td>1,231</td>
<td>100%</td>
<td>1,231</td>
<td>Dec.10</td>
</tr>
<tr>
<td>5</td>
<td>Slavkov</td>
<td>Photon SPV6 s.r.o.</td>
<td>CZ</td>
<td>1,159</td>
<td>100%</td>
<td>1,159</td>
<td>Dec.10</td>
</tr>
<tr>
<td>6</td>
<td>Mostkovice SPV 1</td>
<td>Photon SPV1 s.r.o.</td>
<td>CZ</td>
<td>210</td>
<td>100%</td>
<td>210</td>
<td>Dec.10</td>
</tr>
<tr>
<td>7</td>
<td>Mostkovice SPV 3</td>
<td>Photon SPV3 s.r.o.</td>
<td>CZ</td>
<td>926</td>
<td>100%</td>
<td>926</td>
<td>Dec.09</td>
</tr>
<tr>
<td>8</td>
<td>Zdice I</td>
<td>Onyx Energy I s.r.o.</td>
<td>CZ</td>
<td>1,499</td>
<td>100%</td>
<td>1,499</td>
<td>Dec.10</td>
</tr>
<tr>
<td>9</td>
<td>Zdice II</td>
<td>Onyx Energy projekt II s.r.o.</td>
<td>CZ</td>
<td>1,499</td>
<td>100%</td>
<td>1,499</td>
<td>Dec.10</td>
</tr>
<tr>
<td>10</td>
<td>Radovnice</td>
<td>Photon SPV11 s.r.o.</td>
<td>CZ</td>
<td>2,305</td>
<td>100%</td>
<td>2,305</td>
<td>Dec.10</td>
</tr>
<tr>
<td>11</td>
<td>Břeclav rooftop</td>
<td>Photon SPV1 s.r.o.</td>
<td>CZ</td>
<td>137</td>
<td>100%</td>
<td>137</td>
<td>Dec.10</td>
</tr>
<tr>
<td>12</td>
<td>Bablun II</td>
<td>Sun4Energy ZV s.r.o.</td>
<td>SK</td>
<td>999</td>
<td>100%</td>
<td>999</td>
<td>Dec.10</td>
</tr>
<tr>
<td>13</td>
<td>Bablun III</td>
<td>Sun4Energy ZVC s.r.o.</td>
<td>SK</td>
<td>999</td>
<td>100%</td>
<td>999</td>
<td>Dec.10</td>
</tr>
<tr>
<td>14</td>
<td>Prša I</td>
<td>Fotonika s.r.o.</td>
<td>SK</td>
<td>999</td>
<td>100%</td>
<td>999</td>
<td>Dec.10</td>
</tr>
<tr>
<td>15</td>
<td>Blatna</td>
<td>ATS Energy s.r.o.</td>
<td>SK</td>
<td>700</td>
<td>100%</td>
<td>700</td>
<td>Dec.10</td>
</tr>
<tr>
<td>16</td>
<td>Mokra Luka 1</td>
<td>EcoPlan 2 s.r.o.</td>
<td>SK</td>
<td>963</td>
<td>100%</td>
<td>963</td>
<td>Jun.11</td>
</tr>
<tr>
<td>17</td>
<td>Mokra Luka 2</td>
<td>EcoPlan 3 s.r.o.</td>
<td>SK</td>
<td>963</td>
<td>100%</td>
<td>963</td>
<td>Jun.11</td>
</tr>
<tr>
<td>18</td>
<td>Jovice 1</td>
<td>Photon SK SPV2 s.r.o.</td>
<td>SK</td>
<td>979</td>
<td>100%</td>
<td>979</td>
<td>Jun.11</td>
</tr>
<tr>
<td>19</td>
<td>Jovice 2</td>
<td>Photon SK SPV3 s.r.o.</td>
<td>SK</td>
<td>979</td>
<td>100%</td>
<td>979</td>
<td>Jun.11</td>
</tr>
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<td>20</td>
<td>Brezovice</td>
<td>Photon SK SPV1 s.r.o.</td>
<td>SK</td>
<td>425</td>
<td>50%</td>
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<td>21</td>
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<td>50%</td>
<td>500</td>
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<td>22</td>
<td>Miyava</td>
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<tr>
<td>23</td>
<td>Symonston</td>
<td>Photon Energy AIS SPV 1 Pty Ltd.</td>
<td>AUS</td>
<td>144</td>
<td>100%</td>
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</table>

Total: 25,569

## Appendix 3: Photon Energy's project pipeline

<table>
<thead>
<tr>
<th>Country</th>
<th>Location</th>
<th>Project function</th>
<th>MWp</th>
<th>Commercial Model</th>
<th>Land</th>
<th>Grid connection</th>
<th>Construction permit</th>
<th>Expected RTB</th>
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<tbody>
<tr>
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<td>Ongoing</td>
<td>Secured</td>
<td>2017Q4</td>
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<td>Ongoing</td>
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**Total Own portfolio Australia**  47.6

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<th>Land</th>
<th>Grid connection</th>
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**Total Own portfolio Hungary**  11.3

<table>
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<th>Commercial Model</th>
<th>Land</th>
<th>Grid connection</th>
<th>Construction permit</th>
<th>Expected RTB</th>
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</thead>
<tbody>
<tr>
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<td>Gunning</td>
<td>Developer</td>
<td>316.0</td>
<td>Sale at ready to build</td>
<td>Secured</td>
<td>Ongoing</td>
<td>Ongoing</td>
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</tr>
<tr>
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<td>Sale at ready to build</td>
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**Total Development Australia**  1,425.0

*Note: Emarket = Electricity market, GC = Green certificates, PPA = Power Purchase Agreement, RTB = Ready-to-build*

**Source:** PE Monthly report (November) 2017, p. 5