Why are Swedish cleantech firms failing to internationalize?

A qualitative study investigating the barriers, drivers and internationalization decisions of private Swedish cleantech firms.
Abstract
The purpose of this thesis is to investigate what barriers and drivers influences the internationalization of private Swedish cleantech firms. The model of a multiple case study was chosen together with a qualitative method and an abductive approach. This was done by acquiring primary information from seven private cleantech companies, all located in Sweden and active in international markets. Furthermore, the theoretical framework presented the Uppsala model, network perspective, international new ventures, born globals, transaction cost theory and the OLI-model. With this theoretical framework, a conceptual model was created which shows how the parts are connected. In the empirical chapter, the primary data is presented to visualize what each individual company said regarding the different constructs of internationalization, drivers, barriers and internationalization decisions. Moreover, the analysis chapter visualizes the similarities and the dissimilarities between the theory and the empirical findings. The thesis concludes that there are both general, as well as specific barriers and drivers that are influential in the internationalization process of private Swedish cleantech firms. These are shown to influence the internationalization decision of managers to take an incremental approach to internationalization. The authors of the thesis also present the view that Swedish cleantech companies are generally too small, lack the financial resources and managerial drive needed to internationalize. The authors also present the theoretical and practical implications and provide recommendations for future research.

Keywords
Cleantech, Internationalization, Environmental technology, Green innovation, Environmental sustainability, Barriers and drivers, Internationalization decisions

Acknowledgements
We would like to thank all the participants in the thesis for helping us provide information about the Swedish cleantech sector. We sincerely thank the interview participants Anders Månsson at Malmberg, Staffan Lundegårdh at Ariterm, Torgny Larsson at Wapro, Fredrik Tunberg at Airwatergreen, Margnus Davidsson at TTM Energiprodukter, Hans Pettersson at Baga Water Technology and the participant from the anonymous company. This thesis was possible to conduct due to your contributions and we are very grateful for it.

We would also like to thank our supervisor Richard Owusu for his valuable feedback and thoughts regarding the thesis. It has been a great help to have the guidance throughout process of conducting the thesis. Furthermore, we would also like to thank our examiner Clarinda Rodrigues for her feedback as well as the opponents for their constructive critique during the course of the thesis.

Kalmar, 31 May 2017

Fredrik Rydqvist
Oscar Karlsson
Table of content

1. **Introduction** ........................................................................... 1
   1.1 Background ........................................................................... 1
   1.2 Problem Discussion ................................................................. 3
      1.2.1 Theoretical problematization ............................................. 3
      1.2.2 Managerial problematization ............................................. 4
      1.2.3 The research gap ............................................................... 5
   1.3 Research questions ................................................................. 5
   1.4 Purpose .................................................................................. 6
   1.5 Delimitations ........................................................................... 6

2. **Theoretical framework** ............................................................. 7
   2.1 Internationalization ................................................................. 7
      2.1.1 The Uppsala model of internationalization ......................... 7
      2.1.2 Network Perspective ......................................................... 8
      2.1.3 International entrepreneurship theory and Born Globals ........ 9
      2.1.4 Transaction cost theory and OLI-model ............................. 10
   2.2 Drivers .................................................................................... 11
   2.3 Barriers .................................................................................. 13
      2.3.1 Internal barriers ............................................................... 13
      2.3.2 External barriers .............................................................. 15
   2.4 Internationalization decisions .................................................. 17
   2.5 Cleantech .............................................................................. 19
      2.5.1 Defining Cleantech .......................................................... 19
      2.5.2 International growth of the sector ..................................... 19
      2.5.3 Cleantech technology diffusion ....................................... 20
      2.5.4 Governmental policies and institutions .............................. 21
   2.6 Conceptual framework ........................................................... 22

3. **Methodology** ......................................................................... 23
   3.1 Research approach ................................................................. 23
   3.2 Research method ................................................................. 24
   3.3 Research design ................................................................. 25
      3.3.1 Multiple case studies ....................................................... 26
   3.4 Sampling method ................................................................. 26
      3.4.1 Cases ................................................................. 27
   3.5 Data collection ...................................................................... 27
      3.5.1 Primary data ................................................................. 27
      3.5.2 Secondary data .............................................................. 28
      3.5.3 Interview Structure ......................................................... 28
   3.6 Operationalization ................................................................. 29
   3.7 Method of data analysis ......................................................... 30
   3.8 Quality of research ............................................................... 31
      3.8.1 Reliability ................................................................. 31
1. Introduction

In the introductory chapter, information is presented about the cleantech business in general as well as background to the topic studied. Following the background, a problem discussion is presented to highlight the relevance of the topic. Further on, the research question, purpose and delimitations of the thesis is presented. At the end of the chapter there is an outline figure to visualize the structure of the thesis.

1.1 Background

The rapid economic development of the 20th century has led to overconsumption of the resources available in the world and contributed to disruption in the ecological environment (Chen and Hung, 2016). Results of this is global warming, as temperatures are rising, as well as water and air pollution and therefore it treatens the climate (ibid). A strong illustrative example of climate change is that 1,3 million people die each year as direct result of air pollution (Cleantech Group and WWF, 2014). This is a side effect of the struggle towards an economic development in the world that has constituted in dangerous anomalies in the climate (Chen and Hung, 2016). Consequently, the development of environmental protection and a sustainable way of doing business has been implemented in the society. This has led to the development of the environmental sector called cleantech (Chen and Hung, 2016; Cleantech Group and WWF, 2014).

The focus on environmentally friendly solutions in a global world creates both opportunities and challenges for companies operating in it. The market is getting more intergrated and open for multinational corporations (Binz, Tang and Huenteler, 2017). At the same time the competition, complexity, and required knowledge in order to be successful is increasing (ibid). The shift in the market also challenges previously proven theories (Dicken, 2007). One of the theories challenged is the concept of first mover advantantages, consisting of an advantage of being the first actor in a market, which has been questioned due to an increasingly interconnected economy based on knowledge (ibid). The global economy has made emerging economies, especially from Asia, serious competitors in the cleantech sector (Nahm and Steinfield, 2014). China and India in particular are closening in on world leaders from the Western world in terms of technological development in the field of cleantech (ibid).

The concept of cleantech is sometimes hard to understand as it can be interpreted in different ways and therefore has several different definitions. Therefore, when mentioning cleantech in this thesis the meaning will be similar to Sweden's innovation authority's interpretation (Vinnova, 2013). Vinnova’s interpretation is that companies who is contributing to reducing the use of resources or energy as well as contributing to less pollution in the environment or focusing on cleaning polluted areas (ibid). The purpose of those innovative firms is to provide environmentally sustainable solutions with new technology (SwedishCleantech, 2017). Included in this definition are the companies within the fields of energy optimizing, renewable energy, resource and environment-savings, water and waste water, recycling and disposal, sustainable building, sustainable material and sustainable transports (ibid). The cleantech sector is such an important field of business for the future health of the planet and therefore it has
been largely accepted and more intensely focused on by decision-makers, governments, venture capitalists and companies (Cleantech Group and WWF, 2014). As a result, 41 billion US dollars has been invested in the field from year 2009 to 2014 (ibid).

The increased attention directed towards environmentally friendly solutions in the western world is widespread and many countries tries to improve their environmental solutions (Kanda, Hjelm and Dugand, 2016a). The authors also found that all countries in their study had implemented export promotion initiatives in order to foster increased exports for cleantech companies. In Sweden the organizations fostering export promotion are Business Sweden and The Swedish Trade Council and Invest Council (ibid). These organizations are supposed to be guiding companies with information and knowledge of how to do business internationally and how to get in contact with key actors in foreign markets (Business-Sweden, 2017). Furthermore, Kanda et al. (2016a) state four important focus categories that potentially increases companies exporting activities. These four categories are: financial aid, information, education and training as well as trade and mobility. In Sweden the regions focused on for exporters are Western Europe, North America, the BRIC countries (Brazil, Russia, India and China) and the Baltic states (Kanda et al., 2016a). The fields of business with an increased focus from the government are sustainable building, transporting, energy efficiency, water technologies and waste management (Swentec, 2008a; Swentec, 2008b; The Swedish Government, 2011).

Sweden has advanced environmental technology and is a top performer in many surveys conducted in the field (Swentec, 2008a; Vinnova, 2013; Cleantech Group and WWF, 2014). Sweden was in year 2014 listed as the fourth best country in the world in the Global Cleantech Index (Cleantech Group and WWF, 2014). The fields of non-fossil fuels and water quality were the two significantly largest export industries. Regardless, Swedish cleantech firms seems to be stuck behind overall in terms of foreign export in comparison to other countries (Frankelius, Hultman, Linton, Johanzon and Gunnarsson, 2011). The lacking Swedish performance can be seen when comparing the export of Sweden's total GDP which is around 50%, compared with the cleantech sectors export of only 16% of the sectors total turnover (World Bank, 2012; SCB, 2013). This failure in terms of exports has recently been presented as the Swedish cleantech mystery (Frankelius et al., 2011).

The research of Kanda, Dugand and Hjelm (2015) strengthens the view that Sweden as a country has not been very successful in capitalizing on the eco-innovation advantages possessed. This can be seen especially when it comes to the international market, by comparing their export performance with other similarly advanced innovative countries (Kanda et al., 2015; Kanda et al., 2016a). Sweden had, in 2013, 16 434 established companies in the environmental technology sector with 71 980 employees and an export of 4,1 million EUR (Kanda et al., 2016a; Vinnova, 2013). The same year Norway had 1786 established firms, 38 000 employees and 283 million EUR worth of goods exported (Kanda et al., 2016a). Another country with a great focus on cleantech is Denmark with around 58 000 employees and around 1000 companies, with an export
worth 8.5 million EUR (Kanda et al., 2016a; Denmark, 2017). Noteable in this case is that Denmark has one of the two largest research and development budgets for cleantech innovation in the world, compared to the size of the economy (Cleantech Group and WWF, 2014). As a last measure, Germany had 6448 established companies, 218 142 employees in the sector and an export worth of 24 million EUR in 2013 (Kanda et al., 2016a). When comparing Sweden's export performance with other countries of similar technological development it is clear that Swedish cleantech firms do not perform on the same level as comparable countries.

Considering that economic growth and sustainability has been closely linked to technological innovations, it is clear that the cleantech sector is important for the economic development of countries (Apak and Atay, 2015). Further strengthening the argument of the cleantech sectors importance for the overall growth of the Swedish economy is presented by Kanda et al. (2016a). They argued that small and medium-sized enterprises (SMEs) are essential to a country’s economy. In Sweden, around 98% of all Cleantech companies are SMEs and therefore their importance is undeniable. The sector employs almost 72 000 people and this enhances the view of Swedish cleantech as a highly important sector (ibid). Both overall and in Sweden the cleantech sector has experienced increased growth since its’ inception as a sector and has also received a large focus from both firms and governments (Caprotti, 2011; Kanda et al., 2015; Apak and Atay, 2015; Kanda et al., 2016a). Consequently, the cleantech mystery presented by Frankelius et al. (2011) is highly interesting. The high growth of the sector as a whole, and in Sweden clearly contradicts the absence of success for Swedish cleantech firms internationally.

1.2 Problem Discussion

1.2.1 Theoretical problematization

Firm characteristics and resources such as knowledge, previous experience from the international markets, and network relationships of firms are often emphasized as reasons or inhibitors of internationalization (Johanson and Vahlne, 2009). However, according to Oviatt and McDougall (1994), specific qualities within industries could also have a high influence on the internationalization path of firms. There are arguments that firms in inherently different industries such as service and manufacturing, also internationalize differently, both in terms of mode and speed (Andersson, 2005; Dunning, 1988). According to Fernhaber, McDougall and Oviatt (2007) there are almost 20 different industry factors, which they found in previous research. The authors argued that factors such as industry evolution, industry concentration, global integration, and ability to capture profits were all influential in firms’ internationalization (ibid). However, Andersson (2005) suggested that industry factors alone do not influence internationalization. Thus, it becomes obvious that there are multiple factors that influence the internationalization of firms, both external and internal (ibid). Due to the nature of, as well as the lack of research on, the cleantech sector (Bjornali and Ellingsen, 2014), this interplay between internal and external factors is an interesting research area in relation to the cleantech sector.
The most relevant constructs and explanatory parts of internationalization for the cleantech industry have been identified as barriers and drivers, as they are likely to differ between traditional firms and environmental firms. The traditional internationalization theories such as the Uppsala Model and OLI-model identified internal barriers such as lack of knowledge and financial costs (Johanson and Vahlne, 1977; Dunning 1988). However, these theories have also identified external barriers such as language, culture and competition (Johanson and Vahlne, 1977; Dunning 1988). As mentioned previously, industry factors such as industry evolution and the inability to capture profits could also be influential barriers (Fernhaber, et al., 2007).

There are also several drivers for firms to internationalize according to Leonidou, Katsikeas, Paliathadana and Spyropoulou (2007). For example, the authors argue that it could make the company's financial position better. Also, it is suggested that competitive advantages will be acquired by the firm and that the manager will develop new skills (ibid). Internationalization can also contribute to increased company growth, which is a driving force for many companies in the market (ibid). Furthermore, opportunity is a large driver for entrepreneurs to internationalize, as they are inherently opportunistic (Allen, 2016). However, Søndergaard, Oehmen and Ahmed-Kristensen (2016) found that companies from developed economies such as Danish companies, saw cost reduction as the main driver of internationalization, rather than opportunity. Therefore, it becomes obvious that many different aspects can influence the internationalization process.

Cleantech has overall received little attention, scientifically, which could stem from the fact that the sector is fairly new and is still being defined (Caprotti, 2011). Because of the relatively new emergence of the sector, a lot of the research has been focused towards the development of the sector (Apak and Atay, 2015). Research has also focused on the viability of the products in relation to more traditional industries (ibid). There has also been some research on the specific role of government policies on cleantech firms (Kanda et al., 2015). However, there is limited research aimed towards the internationalization process and the influence of barriers and drivers on cleantech firms (Bjornali and Ellingsen, 2014). Regardless, there have been one recent study by Kanda et al. (2016b) where barriers and drivers of Swedish municipality owned cleantech companies have been investigated. Nevertheless, no studies have been found regarding the internationalization process of private Swedish cleantech firms. Thus, there is a research gap concerning the internationalization process of private Swedish cleantech firms.

1.2.2 Managerial problematization

Sweden is one of the top performers when it comes to cleantech and environmental technology (Cleantech Group and WWF, 2014). The Swedish government is actively promoting exports of cleantech innovations, and have implemented policies who are meant to increase the Swedish cleantech exports (Kanda et al., 2015). Despite this technological advantage and active help from the government, the Swedish cleantech
sector is falling behind in the internationalization, as well as commercialization, of cleantech innovation (Cleantech Group and WWF, 2014; Swentec 2008).

The shift towards a more environmentally friendly business climate has been increasing in importance over the last years due to a number of factors, such as global warming and pollution (Binz et al., 2017; Chen and Hung, 2016; Cleantech Group and WWF, 2014). The markets around the world have recently become more open which gives managers opportunities, but also presents new challenges (Binz et al., 2017). It is argued that the competition, complexity and required knowledge is increasing as a result. Therefore, the international business environment requires managers to have more knowledge than what was previously necessary (ibid). As a result of internationalization, the competition is greater and therefore managers have to find ways to operate successfully with the tools available in their firm. Hence, it has been argued that managers lack of knowledge is a highly influential barrier that restrains internationalization (Tuppura et al., 2008; Johanson and Vahlne, 1977; Dunning, 1988). When managers learn from operating in international markets and develop skills by doing so, they tend to view the international market with a more opportunistic view (Tuppura et al., 2008; Leonidou et al., 2007).

Seeing as Swedish cleantech firms are not internationalizing at a rate one might expect, there is most likely a knowledge gap of managers of cleantech firms. Therefore, there is a need to extend the information about the internationalization process of cleantech firms. Hence, cleantech managers can benefit from learning about what barriers and drivers are affecting the internationalization of their sector. By learning from the experiences of others, managers could operate more efficiently in international markets. As a result, the wheel will not have to be reinvented again, by managers jeopardizing the future of the firm.

1.2.3 The research gap
Based on the problem discussion above, the research gap has been identified as a lack of research concerning the internationalization process of private Swedish cleantech companies. This thesis will therefore investigate the internationalization process, and specifically what barriers and drivers are influencing the internationalization decisions for these companies.

1.3 Research questions
Based on the research gap and problem discussion, two research questions have been developed:

➢ What are the barriers and drivers in the internationalization of private Swedish cleantech firms?

➢ How are the barriers and drivers influencing the internationalization decision of private Swedish cleantech firms?
1.4 Purpose

The purpose of this thesis is to analyze the internationalization of private firms operating in the Swedish cleantech sector and identify what barriers they face, as well as what drivers prompt them to internationalize their operations. This issue will be dealt with through case study research of seven Swedish Cleantech companies. The authors of this study intend to provide both scientific and practical contributions regarding possible barriers and drivers which might influence the internationalization process for managers of cleantech companies.

1.5 Delimitations

The thesis will only derive from private Swedish cleantech companies that are currently active in international markets. Furthermore, the thesis will be concerned with the barriers and drivers of internationalization and not the whole concept of internationalization. Hence, only the internationalization decisions deriving from the influence that barriers and drivers have had on the internationalization of the companies will be dealt with in depth.

1.6 Outline

<table>
<thead>
<tr>
<th>Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review</td>
<td>2</td>
</tr>
<tr>
<td>Methodology</td>
<td>3</td>
</tr>
<tr>
<td>Empirical Findings</td>
<td>4</td>
</tr>
<tr>
<td>Analysis</td>
<td>5</td>
</tr>
<tr>
<td>Conclusion</td>
<td>6</td>
</tr>
</tbody>
</table>

The chapter presents a background to the elaborated topic followed by a problem discussion in line with the research question and purpose of the thesis. The chapter then finishes with a paragraph of delimitations and an overall outline.

In this chapter the literature of the subject is presented. The constructs of internationalization, barriers, drivers and management decisions is dealt with in depth. At last, a theoretical framework model will be presented to visualize how the constructs are interrelated.

The chapter of methodology presents the methodological choices used to conduct this research. The methodological choices made are also argued for as to why they are considered to be appropriate.

In the chapter of empirical findings the information acquired through interviews are presented to provide value to the reader with relevant and interesting information about the topic.

In this chapter the empirical findings will be analyzed in relation to the literature review. An analysis based on the authors thoughts is also presented. Furthermore, similarities and differences found between findings and the theoretical framework are also presented.

In the final chapter conclusions based on the empirical data allows the authors to answer the research questions. Theoretical and practical implications are then presented, as well as the limitations of the study. To conclude, the authors give suggestions for future research related to the topic.
2. Theoretical framework

In this chapter, the theoretical framework of this thesis is presented. The chapter begins by explaining the phenomenon of internationalization from the main streams of research. Based on the different theories regarding internationalization the constructs barriers, drivers and internationalization decisions are then elaborated. Then, the context of the thesis, and some inherent characteristics of the cleantech sector are described. At the end of the chapter the theories are conceptualized into a model where the interlinkage of different theoretical constructs is visualized.

2.1 Internationalization

Internationalization refers to when companies decide to make their operations international by, for example, exporting, establishing sales offices abroad, or making foreign direct investment (FDI) (Johanson and Vahlne, 1977; Dunning, 1988). There are two main bodies of theory relating to the internationalization of companies, namely behavioral and economic theories (Johanson and Vahlne, 1990). Behavioral theories such as the Uppsala model, network internationalization perspective, international entrepreneurship theory and born global theory. Economic theories are those such as transaction cost theory and the OLI-model (Johanson and Vahlne, 2009; Dunning, 1988; Oviatt and McDougall, 1994; Coviello and Munro, 1997).

2.1.1 The Uppsala model of internationalization

The Uppsala model was developed in 1977 as a result of several observations of Swedish companies which began their internationalization by exporting and then subsequently increasing their commitment to the foreign markets (Johanson and Vahlne, 2009). The model suggests that companies start out with no regular exports in the first phase. They then move on to exporting through an agent. The third incremental phase is when the company establishes a sales subsidiary which they export through. According to the model, this will be followed until they finally establish a production facility in a foreign market (Johanson and Vahlne, 1977). Another assumption is that the companies also start out by exporting to markets with a low psychic distance to begin with. The reason for this incremental approach is because of uncertainty and lack of market-specific knowledge. According to the model, learning by current operations is at the heart of organizations, as this enables the company to learn about the market they operate in and gain valuable insights on which they can base further commitment decisions (ibid). For example, by establishing exports to a nearby country, the company gains knowledge of the market and the internationalization process and can therefore establish a sales subsidiary in said market or start exporting to a new market. Therefore, knowledge and learning can be said to be the essence of the Uppsala model (Johanson and Vahlne, 1977).

The authors updated the model in 2009 to acknowledge a changing economy and the growing body of research which emphasized different angles to the internationalization process. In the updated version, the model is placing more focus on the importance of relationships and the ability of the firm to spot opportunities (Johanson and Vahlne,
2009). The firm, through current operations and activities, learns and establishes trust within a network to facilitate and implement their internationalization. The focus on opportunities as a subset of knowledge also emphasizes the importance of being able to spot opportunities as a driver of relationship commitment, which also indicates internationalization commitment (ibid). Another major difference is that the authors denounce their former establishment chain and instead argues that depending on the network position, firms will choose entry market and mode accordingly (Johanson and Vahlne, 2009). The Uppsala model has also been argued to be an alternative to the OLI-model. The Uppsala model is meant to be an analysis tool which is more practical than the OLI-model, in that it focuses more on the firm activities than external advantages (Vahlne and Johanson, 2013; Dunning, 2008). According to Vahlne and Johanson (2013), the Uppsala model is meant to be general in its application and instead incorporate independent theories regarding the difference in for example locational advantages and mode of operation.

2.1.2 Network Perspective

Coviello and Munro (1997) presented a network internationalization perspective which differs from the Uppsala model. The authors instead argued that network relationships were an essential part, and that they provided the basis of a firm’s internationalization. Coviello and Munro (1997) also argued that a small firm will approach and begin a relationship with another, larger firm, on the basis of product development and that this relationship would provide a basis of market entry. When the relationship deepened and more contacts got involved, the smaller firm would be able to utilize this wide knowledge of the larger firms’ contacts, thus gaining access to, and entering international markets (ibid). Furthermore, firms can be proactively searching for new relationships to include in their network which will aid them in their internationalization (Chetty and Blankenburg Holm, 2000). However, firms may also be reactive and react to another firm’s initiation of a relationship and decide to internationalize from that interaction (ibid).

Coviello and Munro (1997) further argues that small firms would eventually learn to deal with operations more internally and seek to end their total dependence on the larger firms. This is done by diversifying their product portfolio, seeking markets outside of the network relationship, or establishing own operations in the current markets (ibid). Furthermore, the authors also argued that at the maturity stage, when firms diversify, the larger firm in the relationship could inhibit the smaller firms increased internationalization (ibid). While the Uppsala model largely argues that the network is important, it is still controlled by each firm (Johanson and Vahlne, 2009). Similarly, Chetty and Blankenburg Holm (2000) found that decision-makers of firms act selectively when determining what relationships they initiate. Agndal and Chetty (2007) instead argues that the network relationships influence the internationalization strategy of the firms. For example, the relationship can influence firms to change their internationalization strategy in terms of what markets they operate in, as well as what entry mode they utilize (ibid).
2.1.3 International entrepreneurship theory and Born Globals

Another behavioral theory and the most recent stream of internationalization theory started on the basic assumption that previous theories had missed a significant part of firms that internationalize (Oviatt and McDougall, 1994). These companies were SMEs, this differed from previous research who mainly focused on large multinational enterprises. These firms were found internationalize faster and very different from traditional and generally larger firms in previous theories (ibid). Some key concepts within international entrepreneurship theory are international new ventures, global startups, and born globals (Oviatt and McDougall, 1994; Knight and Cavusgil, 2004; Allen, 2016). Born globals is the most commonly used concept, but are similar to global startups and international new ventures, with some differences regarding the scope of the international operations (Allen, 2016). However, these terms all either stand for firms that are global from inception or develops global practices very close to inception (Oviatt and McDougall, 1994; Knight and Cavusgil, 2004; Allen, 2016). This is a stark contrast to the traditional firms which are mainly starting internationalizing when already developed. Therefore, they are searching for new paths to growth, through export, contractual modes or FDI, by targeting foreign markets (Johanson and Vahlne, 1977; Johanson and Vahlne, 2009; Dunning, 1988).

Born global firms are often small, innovative, and technologically advanced firms with knowledge which enables them to internationalize at an earlier stage than traditional firms (Knight and Cavusgil, 2004). Furthermore, it was found that the innovative nature of born global firms enabled them to develop specific knowledge and traits which allowed them to be successful in their early internationalization. Born global firms have had the opportunity to internationalize as a result of increased globalization. Globalization has given rise to less trade barriers as well as more developed communications capabilities which have fostered their growth (ibid). Moreover, the born global firm is driven by the entrepreneurial drive and international mindset of the manager to maximize the international performance (Knight and Cavusgil, 2004). Through specific internal organizational capabilities, the born global firm can develop high-quality goods, unique resources, and competitive international marketing strategies (ibid.)

According to international entrepreneurship theory, the born global firm largely utilizes export as the main mode of entry, because of limited resources due to newness and size (Knight and Cavusgil, 2004; Oviatt and Mcdougall, 1994). The main aspect of the born global firm, and the international entrepreneurship theory, is that they are knowledge-driven (Knight and Cavusgil, 2004; Oviatt and Mcdougall, 1994). However, according to Knight and Cavusgil (2004) the born global firm learns and acquires knowledge by internationalizing early, rather than small incremental steps. They argue that the small size of the firm enables it to be more flexible and able to be more dynamic in their internationalization, thus dealing with the uncertainty that internationalization means (ibid). However, according to Chetty and Campbell-Hunt (2004) firms exhibit different traits depending on the stage of internationalization. They furthermore argue that the initial internationalization of firms more closely resembles that of traditional firms,
namely that they expand to markets close to the home market. In later, subsequent internationalization, the firms then start exhibiting traits more resembling born-global firms, for example, they start focusing on entering multiple markets quickly (ibid).

2.1.4 Transaction cost theory and OLI-model
The economic models of internationalization theories are inherently more rational and economy focused in their explanatory parts than the Uppsala model, network perspective and born global theory (Johanson and Vahlne, 1990). According to Williamson (2010), transaction cost theory has continuously developed throughout the 20th century, starting with Coase’s (1937) argument that firms and markets both influenced and directed production greatly. This way of looking at costs and transactions inside and outside of the firm has been further developed in the economic models of internationalization (Williamson, 2010). Transaction cost analysis was suggested by Anderson and Gatignon (1986) as a way for firms to determine if they should internationalize or not, and specifically what mode of entry would be suitable. The focus is put on the degree of control that the firm wishes to have, as well as the relative cost of exercising that control. The costs of a certain transaction therefore determine what modes of entry are suitable in each situation (ibid).

Similar to the emphasis on transaction costs in transaction cost theory, Buckley and Casson (1979) argued the importance of ownership and location effect on firms’ internationalization. They argued that FDI was contingent on location effect and ownership effect. For firms to grow, they need to enter new markets, i.e. foreign markets, if the benefits of entering new markets outweighed the costs of doing so. The constructs location effect and ownership effect explained the different benefits and costs related to the internalization of foreign markets. The location effect highlighted the benefits of production in a specific market as being able to minimize the cost of production and serve markets effectively. The ownership effect refers to benefits as being able to avoid market imperfections by the organization being 'part' of the foreign market (ibid.)

Dunning (1980) elaborated on the location effect and ownership effect in his OLI-model. He argued that locational advantages such as production costs, transfer costs, and ownership advantages such as superior technology, innovation knowledge, productivity advantage, alone would not result in FDI. The firm also needed internalization advantages such as control of the product, quality assurance, and trademark infringement, for FDI to be utilized. In other words, without specific benefits of keeping production in-house through FDI which outweigh the cost of FDI, the firm will not internationalize through this mode (ibid). In later research, Dunning (1988) adds that there are several possible outcomes as far as internationalizing concerns. He reaffirms that without all the OLI advantages, FDI will not occur, but argues that there are still valid options of internationalizing based on the advantages that firms can identify. The author further argues that firms are forced to choose between best alternatives in relation to the OLI advantages, and identifies several options such as joint ventures, non-equity contractual agreements and intra- and inter-firm trade (ibid).
Furthermore, Dunning (1988) posits that country, industry and firm-specific variables also influence the OLI advantages, and how the company will view and evaluate the respective advantages considering these variables.

The OLI model has also enjoyed several updates to also incorporate strategic alliances, the various relationships that exist in networks, as well as the institutional impacts on the OLI advantages (Dunning and Lundan, 2008). The incorporation of institutions, both formal such as laws, regulations, and contracts, and informal such as norms, social customs, and trust-based relations, in the OLI model makes it more dynamic and appropriate for today’s business climate (ibid). Environmental regulations can be utilized as companies’ ownership advantages, as the company can adapt its products to fit countries environmental regulations. Companies can also exploit the ownership advantage that environmental regulations give them in the internalizing advantage. This can be achieved by, for example, forming a strategic alliance with an environmental organization which endorses the company’s product (ibid).

While the OLI model has provided a framework of analysis from which firms can base decisions of entry mode and market, it originally only sought to explain the internationalization in the form of FDI (Dunning, 1988). This is a major difference from the stages model, as the Uppsala model departs from no international activity and gradual build up in commitment (Johanson and Vahlne, 1977). According to the original OLI-model, however, a firm does not need to have previous experience in international endeavors, but can take part in FDI as long as the OLI-advantages outweigh the cost of doing so (Dunning, 1988). The OLI-model is also much more focused on the economic side of internationalization, as it primarily focuses on benefits and costs, which are mostly measured in financial terms, and not behavioral as the Uppsala model (Johanson and Vahlne, 1997; Johanson and Vahlne, 2009; Dunning, 1988).

2.2 Drivers

The main driver for internationalization in the Uppsala model is profit goals. Profit goals make the company want to expand their business, and consequently the firm needs to internationalize into new markets (Johanson and Vahlne, 2009). The authors further argue that when deciding to internationalize, there are mainly two determinant factors for the success of the companies. These determinants are knowledge about the market and knowledge about operations, which is called experiential knowledge in the Uppsala model (ibid). Furthermore, it is argued that market commitment and market knowledge affects risk and opportunity perception of a firm, which affects the success of their international operations (ibid). Moreover, Korsakiene (2014) found that a saturated home market, networks and relationships are additional drivers of internationalization for SMEs. Less influential drivers for the internationalization of SMEs were found to be the possession of a unique product, special knowledge and competence, and to be geographically located close to the customer (ibid). Moreover, the network internationalization perspective would argue that the main driver for a
company is the network which the firm is connected to. The network would influence a firm to enter a specific market, as it would increase the cooperation between those firms and increase the effectiveness of the network (Coviello and Munro, 1997).

The foundation of the transaction cost analysis is that firms strive to decrease the cost of transactions. To decrease these costs firms can internalize their operations (Anderson and Gatignon, 1986). The OLI-model highlights three advantages that helps the firm position itself as it visualizes the advantages and drivers of internationalization (Dunning, 1980). Firstly, ownership advantages can be financial superiority, technological knowledge, or innovative traits. Secondly, locational advantages constitute economic, political, social, and cultural traits specific to a market, which a firm can benefit from (ibid). For example, locational advantages were found to be influential in the renewable energy sector, as certain markets had the institutional environment which fostered renewable energy, and thus attracted more FDI (Lv and Spigarelli, 2015). Lastly, the internalization advantages refer to the advantage of utilizing FDI in internationalization, for example, this refers to protecting brand image, guaranteeing quality of products, and keeping competitors behind (Dunning, 1980).

According to Oviatt and McDougall (1994), the main asset and consequently the main driver for a firm in the international market is unique knowledge. This unique knowledge is a way of controlling assets that makes a firm specialized to create value in several different countries (Oviatt and McDougall, 1994). Previously, theories have argued that a firm need to possess a sufficient amount of resources in order to go international and that their devotion of these resources determines their performance in the market (Johanson and Vahlne, 2009). The theory of international new ventures argue that knowledge does not have to be owned but rather possessed through different constellations. Therefore, possessing unique knowledge is one key driver for a positive outcome of an international operation (Oviatt and McDougall, 1994).

Drivers for internationalization of born globals are outlined as technological competence, the possession of unique products, a great focus on quality, and using foreign distributor competences as a leverage. These all contributes to a better performance in the international market. As a result, innovation, research and development, knowledge improvement and abilities to create leverage are important factors for a successful market positioning (Knight and Cavusgil, 2004).

Drivers for export for environmental companies in the article by Kanda et al. (2016b) were outlined when interviewing decision-makers of these companies. There were five frequently mentioned drivers for export in their study. These were customer requests, environmental improvements, owner directives, organizational improvements (increasing employee motivation and making recruiting easier) and inquiries from other actors. To explore increased profit possibilities was another fairly frequently mentioned factor promoting export (ibid). Furthermore, it is argued by Hilmersson (2014) that firms should spread their operations to international markets to be more competitive since they become less dependent on the home market. Therefore, to get a more stable
business, by avoiding sales fluctuations, a firm and especially SMEs should target foreign markets (ibid).

Generally, for the cleantech sector as a whole, a growing awareness of the problems faced from an environmental perspective greatly promotes the growth of the field (Nijkamp, Rodenburg, Ubbels and Veen-Groot, 2000). The increased focus towards environmental agreements fosters the cleantech sector as the importance of it is visualized. The shift in the society towards alternative use of energy sources and dematerialization creates opportunities and drives environmentally sustainable firms towards new innovations and exploration of opportunities (ibid).

### Table 1: Drivers

<table>
<thead>
<tr>
<th>Profit goals</th>
<th>Special knowledge and competence</th>
<th>Leveraging foreign distributor competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of operations</td>
<td>Geographical closeness to customer</td>
<td>Customer and partner requests</td>
</tr>
<tr>
<td>Experiential knowledge</td>
<td>Decreasing operational costs</td>
<td>Environmental improvements</td>
</tr>
<tr>
<td>Saturated home market</td>
<td>Unique knowledge</td>
<td>Managerial drive</td>
</tr>
<tr>
<td>Networks and relationships</td>
<td>Technological competence</td>
<td>Organizational improvements</td>
</tr>
<tr>
<td>Unique product</td>
<td>Quality focus</td>
<td>Increasing competitiveness</td>
</tr>
</tbody>
</table>

**Source:** Own model with drivers compiled from previous research

### 2.3 Barriers

The theories of internationalization mention different barriers depending on their starting point and their focus areas of the process. Barriers can be everything from lack of knowledge to an underdeveloped market. Barriers can also be internal to the firm, such as lack of knowledge, or external, such as the underdeveloped market (Johanson and Vahlne, 1977; Dunning, 1988).

#### 2.3.1 Internal barriers

Internal barriers are mainly barriers which are dependent on the firm itself. Psychic distance is presented in the Uppsala model and constitutes of five factors that prevents the flow of information to and from a specific market (Johanson and Vahlne 1977). These five factors are language differences, degree of education, business practices, cultural aspects and industrial development. These factors become barriers as they cause uncertainty for firms when trying to expand their business into the international market (ibid). Furthermore, lack of knowledge and risk aversion are two barriers that greatly impact firms’ internationalization (Kahiya, 2013). However, these barriers can be diminished by experiential knowledge and learning from previous international operations (Johanson and Vahlne, 1977). Mainly, this knowledge is possessed by decision-makers and therefore, their abilities to operate in the international market is a main determinant for the success of the firm (ibid). The more knowledge a firm possesses on a managerial level, the more resources the firm is likely to devote to their international operations (Johanson and Vahlne, 2009). The international new venture
theory also emphasize knowledge, as it is considered to provide the firm with a competitive advantage and preferably a sustainable competitive advantage as it is a unique resource (Oviatt and McDougall, 1994). Therefore, unique resources in terms of knowledge be both a barrier and driver in this sense. If the competition possess unique resources that will be a barrier to internationalization whereas if the firm itself possess unique resources it will be a driver (ibid). Moreover, the network perspective suggests that relationships can also inhibit firms’ internationalization process when a smaller company is trying to move away from very close ties to a larger firm (Coviello and Munro, 1997).

Kahiya (2013) analyzed the impact of export barriers on internationalization path of SMEs, of both international new venture character as well as conventional enterprises. Export barriers were found to have an impact on the internationalization path and internal barriers were specifically influential on the internationalization of SMEs. The internal barriers, which are considered to be within the firms control, such as knowledge and expertise, risk and return, managerial focus and commitment, and market adaption mix, were found to be particularly influential on the internationalization path (ibid). Firms with a lack of knowledge and expertise, risk perception as well as poor management of developments in the market were largely dependent on a gradual internationalization path. Conversely, firms with a lot of targeted managerial focus and commitment, ability to adapt to the market, and an opportunistic view of the international market, internationalized at a much greater speed (ibid). Moreover, Ahi, Baronchelli, Kuivalainen and Piantoni (2017) found that SMEs seem to use the incremental approach to market entry overall. The authors also found that a rational approach gave managers of SMEs more alternatives and the possibility to lower risk. However, managers did not use the most rational approach because of incomplete knowledge and a lack of experiential knowledge. Therefore, managers perceived an uncertainty of internationalization and an incremental approach was the least uncertain. This furthers the point that perception of barriers inhibits a firm’s ability to efficiently enter new markets and internationalize (ibid).

In the OLI-model several determinant factors for firms’ opportunities in the international market can be outlined (Dunning, 1988). The size, age and strategy of the firm is important as it gives a foundation of the scale of the operation. Larger firms have more resources which they can devote to international expansion operations (ibid). The OLI-model further posits the importance of ownership advantages and internalization advantages. If the firm does not possess ownership advantages such as superior technology or unique knowledge and there are no benefits of keeping production in-house. As a result, there are no incentives to internationalize, thus, the lack of internal advantages is considered an internal barrier (ibid). This is similar to the internal barriers of the transaction cost theory. The main purpose of the transaction cost analysis is to decrease the costs of production by doing business in the international markets (Anderson and Gatignon, 1986). Therefore, the most prevalent barrier is high transaction costs, as this removes incentive to internationalize (ibid). Furthermore, Dunning (1988) argued that more resources in the possession of a firm diminishes the
barriers faced by the company. In line with this argument, Kanda, Hjelm, Kairento and Nygård (2016) found that resources were internal barriers in the internationalization of Swedish municipality environmental technology firms. They argued that influential internal barriers were resources in the form of lack of time and personnel, and long lead times of the projects (ibid). Furthermore, firms also face the problem of having limited financial resources, as well as high start-up costs in the early internationalization phase (Korsakiene, 2014). These internal financial factors can effectively inhibit a firm’s possibility to internationalize their operations (ibid).

In the field of energy-saving technologies the most significant barriers are inadequate information when it comes to pay-back time, costs of the technology and perceived efficiency of the products. These are all interrelated with the competences of the firm. Therefore, the advantages of the environmental solutions can consequently be vague. This leads to the companies in this field facing difficulties in promoting their unique selling point (Metcalf and Hasset, 1999; Andersson and Newell, 2004).

Table 2: Internal barriers

<table>
<thead>
<tr>
<th>Internal barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychic distance</td>
</tr>
<tr>
<td>Lack of knowledge and expertise</td>
</tr>
<tr>
<td>Risk-aversion</td>
</tr>
<tr>
<td>Lack of experiential knowledge</td>
</tr>
<tr>
<td>Lack of unique resources and internal advantages</td>
</tr>
<tr>
<td>Uncertainty</td>
</tr>
<tr>
<td>Relationships</td>
</tr>
<tr>
<td>Perception of risk and return</td>
</tr>
<tr>
<td>Lack of managerial focus and commitment</td>
</tr>
<tr>
<td>Ability to adapt to the market</td>
</tr>
<tr>
<td>High transactions costs</td>
</tr>
<tr>
<td>Lack of time and personnel</td>
</tr>
<tr>
<td>Limited financial resources</td>
</tr>
<tr>
<td>Technological costs and efficiency</td>
</tr>
</tbody>
</table>

Source: Own model with internal barriers compiled from previous research

2.3.2 External barriers

External barriers can firstly be viewed from a country perspective, for example, barriers to entering a market can be the economic development of a target market (Dunning, 1988). It could be either a developed market with a good economic situation or a developing market where the market is not yet fully developed. Depending on the product and company, the market characteristics can be barriers (ibid). The degree of industrialization is another important determinant from a country perspective as it gives a measure of the development of a country’s market and the feasibility of it for foreign investments. Moreover, market complexity can make it increasingly difficult to penetrate and enter a new market (ibid). In line with this, the international new venture theory outlines national regulations, local laws, differences in culture and practices of doing business as obstacles to operating in a foreign market (Oviatt and McDougall, 1994). The Uppsala model also emphasize differences in culture, language, business practices and industrial development as potential external barriers (Johanson and Vahlne, 1977).

Owen (2006) analyzed the competitiveness of renewable energy and found that there were substantial barriers for renewable energy technology because of cost-inefficiency.
In other words, renewable energy was not as profitable and efficient as fossil fuels, thus not cost-competitive as a substitute of traditional sources of energy. Furthermore, for renewable energy to be cost-competitive, governments and policy-makers would have to increase the cost of fossil fuels or subsidize renewable energy in order to overcome this barrier (ibid.) This leads to a natural disadvantage for firms in certain markets, as there are institutional barriers for markets in which there are no regulations to help the renewable energy industry (Carlsson, 2006). This view of lack of institutional help as a barrier has been identified in relation to the diffusion of renewable energy as well (Reddy and Painuly, 2004). Depending on the nature of various institutions, aimed to increase international activity, they could prove to be barriers for renewable energy (ibid). Also, Olbrich and Witjes (2014) found that fast changing nature of institutions can act as barriers to the internationalization of green technology, even though the reason for existence of the institutions is to promote internationalization of those businesses. Therefore, institutions and a governmental policy towards enhancing green technologies are an important part of internationalization, but can also serve as inhibitors due to inefficiency of said institutions (ibid).

Secondly, external barriers can be viewed from an industry perspective (Dunning, 1988). Here the technological development of the industry is a major determinant depending on the business of the company wanting to enter the market (ibid). Therefore, it is important for the internationalizing company to evaluate the maturity of the market, to understand how susceptible the market is for the implementation of the company's business. Furthermore, characteristics like a competitive structure versus a monopolistic structure in the industry are determinants for the attractiveness of the market (ibid). The renewable energy sector face barriers associated with the industry perspective, such as market failure due to inadequate technological and infrastructural advancement of a specific market (Reddy and Painuly, 2004). As Dunning (1988) mentions, industry competition has also been found to be an important barrier in other studies. For example, Korsakiene (2014) found that the most prevalent barrier to entering foreign markets was that of intense competition in foreign markets, and the difference in consumer behavior. Furthermore, other external barriers to entry were identified as bureaucracy, foreign market restrictions and difference in consumer preferences. This essentially emphasizes the importance of both industry and country perspectives on barriers (ibid). The same study also found that internal barriers were existent but that the external barriers were the most defining obstacles. Also, these findings are somewhat contradictory to previous studies, which argues lack of experience and knowledge as the most constricting barriers (Ahi et al., 2017; Kahiya, 2013).

According to Kanda et al. (2016b), there are specific barriers of export for environmental technology. Their study mainly focused on municipality owned firms’ internationalization and outlines many potential barriers for export of environmental technology firms. Their findings further emphasized that both the external barriers associated with the industry and country perspective were important (ibid). The most influential barrier was market differences. Other factors that were influential were the exhaustive administration, availability of funding, and the possibility to find new
customers, which consequently were external barriers (ibid). Furthermore, Nijkamp, Rodenburg and Verhoef (2001) outlined specific external barriers for energy efficient technology, in line with the industry perspective. The most prominent barriers were distinguished as economic barriers. Hence, the results of this was that alternative investments yielded higher returns, low energy costs reduce the importance of energy efficient technology and capital replacement disrupts the development of the technology (ibid). Furthermore, it is argued by the authors that economic barriers are the main barriers for this technology and therefore trumps both financial and uncertainty barriers (ibid). Also, the findings of Nijkamp et al. (2001) are strengthened in more recent research. Trianni, Cagno and Farné (2016) found that economic barriers were the most influential for SMEs in the energy efficiency sector in their path towards the international market.

<table>
<thead>
<tr>
<th>Table 3: External barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Exhaustive administration</td>
</tr>
<tr>
<td>• Market development</td>
</tr>
<tr>
<td>• Market characteristics</td>
</tr>
<tr>
<td>• Degree of industrialization</td>
</tr>
<tr>
<td>• Market complexity</td>
</tr>
<tr>
<td>• National regulations and laws</td>
</tr>
<tr>
<td>• High competition</td>
</tr>
<tr>
<td>• Culture differences</td>
</tr>
<tr>
<td>• Business practices</td>
</tr>
<tr>
<td>• Cost competitiveness</td>
</tr>
<tr>
<td>• Government institutions and policies</td>
</tr>
<tr>
<td>• Technological development of an industry</td>
</tr>
<tr>
<td>• Market maturity</td>
</tr>
<tr>
<td>• Technological infrastructure of a market</td>
</tr>
<tr>
<td>• Bureaucracy</td>
</tr>
<tr>
<td>• Foreign market restrictions</td>
</tr>
<tr>
<td>• Differences in consumer behavior</td>
</tr>
<tr>
<td>• Availability of funding in a market</td>
</tr>
<tr>
<td>• Possibility to find new customers</td>
</tr>
<tr>
<td>• Economic barriers</td>
</tr>
</tbody>
</table>

Source: Own model with external barriers compiled from previous research

2.4 Internationalization decisions

The traditional theories of internationalization have differing views concerning the decision-making process of internationalization (Johanson and Vahlne, 2009; Dunning, 1988; Knight and Cavusgil, 2004). The Uppsala model posits that managers are driven by profit goals but inhibited by uncertainty and lack of knowledge. Firms then internationalize incrementally to manage these barriers (Johanson and Vahlne, 2009). The OLI-model argues a more rational approach to making decisions about the internationalization of firms. Managers will utilize FDI if there is a positive outcome where the benefits outweigh the costs, otherwise another mode of entry can be chosen, i.e. they manage the barriers by adjusting the strategy (Dunning, 1988). Born globals, however, goes into operations with the mindset that internationalization will occur, from the very inception of the firm. Since born global firms are knowledge-driven, they will choose an internationalization path which is accessible to them, to learn and adapt accordingly (Knight and Cavusgil, 2004). Furthermore, as suggested by the network internationalization perspective, firms will utilize the network of the company to overcome barriers which they might experience, such as lack of knowledge or competences (Coviello and Munro, 1997). The firms also learn by working in their network to increase their knowledge and competence to overcome barriers thus influencing their future internationalization decisions (ibid).
The decision to internationalize is largely different for different firms. While some firms take the decision to internationalize proactively, others react to events which prompts them to internationalize (Coviello and Martin, 1999). The decision process is also important for the internationalization path of the company, as this involves the entry mode, market choice, and future internationalization commitment (ibid). Furthermore, decision-making is contingent on how managers and decision makers perceive opportunities in the international markets, as well as what their preference for risk aversion is (Coviello and Martin, 1999). Moreover, decision-makers’ individual knowledge and experience plays a large role in decision-making regarding entry mode and market choice (Collinson and Houlden, 2005). For example, barriers such as psychic distance play a role and influences the decision process, but with incentives specific to the industry in which the firm exists as well as through managerial knowledge and experience, such barriers can be managed (ibid).

Firms are affected by a variety of factors when internationalizing. Leonidou (2000) argued that export barriers affect the internationalization differently depending on the nature of the firm and decision makers. Smaller firms with less resources and organizational capabilities such as knowledge, experienced greater impact on decision making than more experienced firms (ibid). Also, the nature of the firms’ activities and products impacted the decision making. Firms with industrial products experienced less significant external barriers, such as customer habits, product standards, and export problems, than firms with a more end-user oriented product (Leonidou, 2000). However, contradictory to this view, Perks and Hughes (2008) found that entrepreneurial managers seemed to not view resource constraints as a major barrier to their decision process. They also found that national culture did not impact the decision to internationalize but rather that the individual perception of psychic distance could play a role in this (ibid). Also, favorable industry characteristics did not influence the entrepreneurial manager. Instead, the internationalization decision was contingent on the opportunity that the international market presented, and the entrepreneurial managers own knowledge and view of the situation (ibid). Moreover, characteristics of a firm’s product can help the firm overcome barriers to internationalization, such as financial restraints, managers lack growth orientation and knowledge (Hutchinson, Quinn, Alexander, and Doherty, 2009). Firms can therefore manage internationalization barriers by having a strong brand or other specific qualities such as premium quality of the product, which mitigate the barriers they might face (ibid).

When looking at the barriers for SMEs in the energy efficiency sector the most influential aspect was economic factors such as financial evaluation and analysis for small companies (Trianni et al. 2016). However, for medium sized companies the economic factors importance declined significantly. In the whole decision-making process managers usually experience lack of time, difficulties with competences, difficulties in making technology more efficient, as well as difficulties with spotting opportunities and needs in the market (ibid).
2.5 Cleantech
It is crucial to solve the environmental issues faced today with new technology and innovations (Boons, Montalvo, Quist, and Wagner, 2013). These issues generate unwanted environmental changes that needs to be solved urgently. Consequently, they also create economic opportunities as great amount of resources are spent to deal with the problems. Hence, the outcome is an opportunity to both explore economic opportunities as well as environmental sustainability opportunities (ibid).

2.5.1 Defining Cleantech
The cleantech term emerged in the early 2000s as a reference for venture capitalists to address environmental technologies with a lot of profit potential (Caprotti, 2011). Due to the newness of the sector there is no 'one' definition so far, and the definitions that do exist largely comes from the organizations and businesses addressing cleantech (Caprotti, 2011; Davies, 2013; Vinnova, 2013). According to Vinnova (2013) a cleantech company is any company who reduces the use of resources and energy, is less polluting or is cleaning a polluted area. Moreover, Caprotti (2011, p. 370) defined cleantech as: “[…] spanning a wide range of environmental technologies and processes, including renewable energy, nanotechnologies, energy efficiency and storage, materials, and other technologies and industrial processes”.

Cleantech as a sector can, however, be referred to as being a technological and business solutions to environmental problems (Caprotti, 2011). More broadly, the sector consists of technologies that produce a positive environmental impact, such as renewable energy, energy efficiency, environmental transport, and materials (ibid). Furthermore, the industries and technologies included in the cleantech sector are often referred to by different names than cleantech specifically (Kanda et al., 2015). Terms such as environmental technologies or green technologies, and sustainable innovations are all utilized in the cleantech literature, although organizations have largely adopted the cleantech term (Kanda et al., 2015; Apak and Atay, 2015; Vinnova, 2013).

2.5.2 International growth of the sector
The sector of cleantech has been growing at a fast rate during the last ten years due to changes of mind-set in the international environment of the market (Caprotti, 2011). This change has been carried out by several different actors such as firms, executives, policy makers and governments. In 2011, the sector was worth 284 billion dollars worldwide (Caprotti, 2011). Another study conducted argue that the total market value of environmental technologies and services had a worth of 556 billion dollars in 2003 and an estimated value of 850 billion dollars by 2010 (Montalvo and Kemp, 2008). The sector employed over two million people in Europe in the middle of 2000s (ibid). Moreover, even during the worst years of the most recent economic crisis the cleantech market grew with 30% overall between 2008 and 2010 which is far better than other industries like oil and gas (Kanda et al. 2015). The wind industry alone grew with 100% annually during the same period (ibid). Numerous authors state that the cleantech sector is estimated to be growing rapidly in the coming years (Montalvo and Kemp, 2008; Kanda et al., 2015; Boons et al. 2013). Investments in the sector are estimated to be
made with a value of 10 trillion dollars by 2020. This in relation to the 2.4 trillion that was invested during 2007 and 2011 (Montalvo et al., 2011).

2.5.3 Cleantech technology diffusion

The prevalence of green innovation and environmental thinking has increased during the last decade and cities and ruling bodies are increasingly implementing environmental policies (Carvalho, Mingardo, and Van Haaren, 2012). According to the authors, this has also led to an increase of cleantech business which focus on exploiting the opportunities that this increased environmental focus has provided. Furthermore, Carvalho et al. (2012) argued that green urban transport policies have increased the level of cleantech innovations in the cities that these policies were implemented. Cleantech innovators use the advantages that are being provided by cities GUTP to gain first mover advantage for a technology that has the potential for wider adoption at later stages. However, while many governing bodies are promoting environmental solutions, they are not widely adopted by private companies’ due to inefficiency of the technology (ibid). Moreover, Del Río González (2005) found that the primary driving force of adapting a clean technology is to improve the image of the company as well as complying with regulations. The investment of adopting clean technology is substantial, and often the comparative advantages are largely external for companies (ibid). Such investments provide social benefits of reducing pollution, instead of improving internal factors of a company such as increased sales and productivity. Thus, the cleantech sector and sustainability needs to become a driving force for the economic growth as well (ibid). According to Boons et al. (2013), this could be achieved by focusing on the role of developing business models aimed toward sustainability and cleantech.

Moreover, the economic and sustainable competitiveness of the cleantech sector has been under the microscope of researchers to review the factors favoring the adoption of clean technology (Jänicke and Zieschank, 2009; Owen, 2006). While some have found that the more resource-efficiency oriented firms within the sector have a high degree of economic viability and competitiveness, others have argued that more pollution oriented technologies are inherently disadvantaged (Jänicke and Zieschank, 2009; Owen, 2006). However, this disadvantage has been attributed to the generally small diffusion and existence of clean technology (Del Río González, 2005). The diffusion of clean technology is therefore important for increased success of cleantech firms and relative competitiveness in relation to traditional technologies (ibid). The diffusion of clean technology is primarily characterized by internal and external factors, such as technology improvements, economies of scale, price of energy, and regulatory framework (Montalvo and Kemp, 2008). The international arena provides a basis for increased diffusion of clean technology and positive environmental impact that this leads to (Del Río González, 2009). Yet there is ambiguity about the actual technological diffusion in the international community, and if the presence of environmental technologies in highly environmental countries leads to international clean technology spill over (ibid).
2.5.4 Governmental policies and institutions
Technological innovations are the new major tool for economic development in the world market (Apak and Atay, 2015). Therefore, possession of knowledge is becoming increasingly important. The knowledge a green innovation firm possess is therefore a factor fostering international competitiveness (ibid). This has led to a lot of initiatives to promote the development of the cleantech sector. The main purpose has been to maximize economic growth while minimizing the environmental impact (Samad and Manzoor, 2011). Furthermore, several researchers have argued that environmental policies and regulations are highly influential in increasing the competitiveness of clean technology (Carvalho et al., 2012; Jänicke and Zieschank, 2009; Kanda et al., 2015).

According to Carvalho et al. (2012), policies to minimize CO2 and improve the environmental impact are being adopted by governments and policymakers worldwide. There is a clear strategy of governments to promote the cleantech sector and foster the internationalization of such technologies. However, Kanda et al. (2015) found that the Swedish government is actively pursuing increased exports from the cleantech sector, but also that such policies were not utilized in an optimum way. Many cleantech firms, seemed to miss that they could receive government support to internationalize (ibid).

In Sweden, governmentally owned companies have since long been involved in business focusing on environmental sustainability (Kanda et al., 2016b). For example district heating, waste management, water supply and renewable energy for transportation are some of the fields where such companies have handled these services for the inhabitants. Subsequently, many municipal companies have developed a broad knowledge in this matter (ibid). However, the economic opportunities has led to new private firms in the cleantech sector entering the market and exploiting these opportunities (Carvalho et al., 2012).

As argued by Kanda et al. (2015), some policies have been found to be somewhat ineffective in promoting internationalization of cleantech, but the importance of regulations on environmental technology is still of great significance. Environmental regulations have been found to increase the use and diffusion of cleantech (Demirel and Kesidou, 2011). According to Costantini and Mazzanti (2012) the EU has increased its competitiveness due to environmental policies and taxation. High tech firms in the EU, such as many cleantech firms, benefitted from environmental taxation. At the same time, less high-tech industries were not negatively affected due to these policies, indicating a positive outcome, both economically and environmentally (ibid). However, the emphasis of environmental policies and institutions should be on practical application to effectively promote cleantech (Boons et al. 2013). Institutions of some countries prove to inhibit the success of firms, while other countries institutions greatly benefit cleantech firms (ibid).
2.6 Conceptual framework
The literature review has presented an idea of important characteristics of cleantech, as well as certain important concepts of internationalization. The conceptual framework below shows how technology diffusion and growth of the cleantech sector as well as institutional environment has provided an international opportunity of cleantech. The internationalization process thus begins with opportunity and is then put in relation to the drivers and barriers of individual cleantech companies. The barriers and drivers influence the internationalization decisions of if and how to target foreign markets and how to operate within these markets. In essence, the conceptual framework illustrates different factors involved in the internationalization process of private Swedish cleantech firms.

Figure 1: Conceptual framework
Source: Own model based on the theoretical framework
3. Methodology

In this chapter, the method used throughout thesis is described and explained. The methodological choices are presented and the appropriateness of those choices are argued for. The chapter begins with explaining the research approach of the thesis, and an explanation of why that approach has been utilized. The research method and design of the thesis is then presented to provide an understanding of how the thesis has been conducted. Thereafter, we present the cases, data collection, and how the theoretical framework was operationalized into interview questions. The chapter is then concluded with a discussion regarding the quality of the research as well as ethical considerations of the methodological choices.

3.1 Research approach

The research approach explains how the researcher relates to theory and the process of the study (Saunders et al., 2012). The main approaches are the deductive approach and the inductive approach which have different aims (ibid). The inductive approach starts with empirical data and ends in the development of theory (Esaiasson, Gilljam, Oscarsson and Wångnerud, 2012). For theory to be developed, the researcher needs to analyze the empirical data and come to conclusions based on the data. Moreover, if the topic of research is new with a limited amount of research and information, an inductive approach is the most suitable (Saunders et al., 2012).

The deductive approach to research methodology is appropriate when there is existing theory which can be utilized and tested in the study conducted by the researcher (Saunders et al., 2012). The research question and objective is therefore adapted to the specific theory available and the researcher focuses on testing available theory by collecting data. Furthermore, in a topic where there is a lot of research and hypotheses can be deduced, a deductive approach is usually preferred (ibid). Therefore, theoretical concepts are drawn from the literature and measured, and are also presumed to influence or have a specific impact, before the actual data is collected and analyzed (Patton, 2002).

There is also a third approach which is frequently utilized, namely the abductive approach, and it can be considered a mix of both inductive and deductive approach (Saunders et al., 2012). In abduction, the researcher observes a surprising fact about reality, and uses existing theory to guide the research in trying to explain the surprising fact (ibid). The abductive approach is often used to generate a new or modify existing theories. Furthermore, the abductive approach is generally preferred when the topic is widely researched, and is simply researched in a new context (ibid).

Considering that this thesis departs from both theory and reality, an abductive approach has been considered the most suitable. Firstly, the authors of this thesis found that Sweden was one of the most technologically advanced countries in the world when it comes to cleantech. Nevertheless, there has been little success in the internationalization of the Swedish cleantech sector. Therefore, the problem was thought to be something in
the internationalization process of cleantech companies which inhibited the companies from internationalizing successfully. Therefore, it was considered appropriate to investigate the internationalization process. Internationalization is a field in which there is a lot of research but not in the context of the Swedish cleantech sector. Furthermore, specifically barriers and drivers have a high influence on the internationalization process of firms and these needs to be managed by the firm, which is then reviewed in the context of cleantech. There are elements of the inductive approach, which is evident since the data is used to explain the phenomenon of Swedish cleantech internationalization. The authors of this thesis tried to find a pattern with barriers and drivers’ specific to the cleantech industry, which is in line with how data is frequently used with an inductive approach (Saunders et al., 2011).

3.2 Research method
The research method is characterized by a systematic way to collect, organize, and interpret qualitative data (Skärvad and Lundahl, 2016). In qualitative research, it is important to understand, explain, discover and to clarify values, beliefs, and experiences of the interview participants (Kumar, 2014). Therefore, text and language are important building blocks in explaining the results of a qualitative research. Contradictory to the quantitative approach, the importance of numbers is not so great in the qualitative approach (ibid). Still, it is not excluded to use numbers to analyze and compile data in qualitative research as it can enhance and clarify the findings of the research (Skärvad and Lundahl, 2016). Furthermore, qualitative research is based on expressing thoughts with words and images as well as collecting data and later categorize it in a structured manner (Saunders et al., 2011). Quantitative research on the other hand is more standardized and focuses on the variation of factors examined (Kumar, 2014). Usually, qualitative studies are of an exploratory nature as it does not follow any strict structure of how it should be conducted. Still, it focuses on the understanding of the phenomenon investigated (ibid). Since the study focuses on the internationalization of Cleantech firms and the barriers and drivers influencing this process as well as how they are managed a qualitative research method is preferred. The reason for this is that an in-depth study contributes to a profound understanding and explanation of the subject.

A qualitative study goes into wider depth of the subject investigated than a quantitative study (Denzin and Lincoln, 2011). It can be used to enhance the information about smaller parts of a bigger concept, and usually what is studied is very detailed to gain a great understanding of the particular research subject (ibid). By doing so the study presents more detailed data where the answers will be dealt with more extensively. This results in a more in-depth study with fewer participants than in a quantitative study (ibid). As the barriers and drivers of internationalization are smaller constructs of a wider concept, a qualitative research method is preferred.

Qualitative research is also usually associated with the inductive approach of structuring an academic paper (Denscombe, 2016). This is due to the fact it usually concludes in theoretical contributions (ibid). However, in this thesis, an abductive approach has been utilized together with the use of a qualitative approach. This is due to the information
available in the field of research. As the internationalization process has been extensively studied the availability of theoretical framework is sufficient (ibid). On the other hand, the research of barriers and drivers in the field of Swedish cleantech companies going international is very limited. Hence, a study of qualitative research with an abductive approach has been conducted.

3.3 Research design
The research design of a study determines how well the research question can be answered, and must therefore match the purpose of the study (Saunders et al., 2012). The research design can either be explorative, evaluative, explanatory, or descriptive. A study may also combine several forms of research design which would allow for a study to be both explorative and explanatory for example (ibid). Explorative studies often classify what the problem is early in the study, and present what is already known about the area of research (Skärvad and Lundahl, 2016). The study should have a problem formulation and present a literature review about the currently known aspects of the problem. An explorative study will also most likely utilize data collection in the form of interviews with experts, in-depth personal interviews and collect the data through case studies (ibid). Furthermore, explorative studies usually answer ‘How’ and ‘What’ questions (Saunders et al., 2012). Such studies can also be used to increase the understanding of a specific phenomenon if there is uncertainty regarding the nature of the phenomenon. Explanatory studies also include ‘How’ questions. The explanatory study focuses on determining why and how something is happening, namely what relationship there is between different variables (ibid).

Furthermore, the research design allows for the appropriate choice of research strategy. Qualitative research offers a variety of possible research strategies. Case study, focus groups, participation observation, and action research are all research strategies commonly associated with qualitative research (Kumar, 2014; Saunders et al., 2012). Other strategies, such as experiments and surveys are more commonly associated with quantitative research. There are, however, no exact rules and the strategies can also be combined (Saunders et al., 2012).

Case studies are often aimed at evaluating a specific process (Yin, 2012). According to the author, the case study design's starting point is that the researcher is trying to gain an understanding of a specific case from the real world. The benefit of the case study is that the researcher will get a very deep understanding of that specific case and other cases which might be reviewed later (ibid). This profound understanding cannot be achieved from other research strategies such as survey or experiments, as they focus more on context-control and measurement of specific variables (Saunders et al., 2012). The case study design can instead provide thorough understanding of a phenomenon in a specific context (ibid). Case studies are also useable when exploring a previous studied phenomenon from a new perspective and getting new understanding of said phenomenon in a different context (Skärvad and Lundahl, 2016). Furthermore, the choice concerning type and number of cases is important to put in relation to the research question of the study (Yin, 2012). The case has to represent the research
question and theoretical framework. For example, if the study is about previous research in a new context, the case must represent the new context well, and be a special case. The case study may also be of single and multiple case character (ibid).

Since this thesis aimed to evaluate and explore the internationalization process in a new context, a multiple case study was considered the most appropriate research strategy. The thesis can also be considered both explorative and explanatory. This since there is a need to answer what specific barriers and drivers there are in this sector, as well as how they have influenced the internationalization decisions of cleantech companies in their path towards the foreign markets.

3.3.1 Multiple case studies
Yin (2014), argued that a multiple case design is important in order to spread the risk, which might be beneficial if the data retrieved from a specific case is insufficient. The data from multiple cases can also provide a better analysis, as the results of several cases allows the analysis to generalize the results more. The ‘special’ circumstances and conditions of one case, which might influence the data, are less influential the more cases there are in the study (ibid). Furthermore, the use of multiple cases must be considered carefully since the cases must be relevant to answer the research question of the study (Saunders et al., 2012). This is because the cases relevance decides the appropriateness of using this design (ibid). Also, Yin (2012) argued that there are two additional types of case studies, namely, embedded and holistic. The embedded case study is used when researching aspects within cases, such as the employees of a company. The holistic case study on the other hand, is when used when reviewing the whole firm. The data retrieved from a holistic case is also more valuable if retrieved from a key individual of the firm such as a manager (ibid). Since the research question in this thesis is directed towards the sector of cleantech, multiple cases are critical to produce the desired results. This thesis also views the cases from a holistic perspective, namely that the firms are viewed as a single case. Yin (2012) argues that case studies benefit from having more than one respondent from each case. However, considering that the interviewees are CEOs and highly influential managers, which are those most familiar with the internationalization process of their firms’, this thesis fulfils the holistic multiple case study design.

3.4 Sampling method
Sampling is important when conducting a study, because it is impractical, and in many cases even impossible, to survey the entire population of the intended target population in a study (Saunders et al., 2012). The main sampling techniques are probability sampling and non-probability sampling, which refers to the degree of generalizability of the results to the target population (ibid). When conducting a study which requires generalizability across the population, a probability sampling method is often preferred. This is because non-probability sampling methods are limited in their generalizability and can, in a statistical sense, not generalize the findings across the entire population (ibid). However, non-probability sampling is effective when a specific phenomenon is studied (Ghauri and Grønhaug, 2010). Moreover, Skärvad and Lundahl (2016) argue
that probability sampling is rarely utilized, and that non-probability sampling, specifically purposive sampling, is the far more common form of sampling. In purposive sampling, the researcher selects cases that is presumed to generate knowledge, based on the purpose of the study (ibid). The main drawback with purposive sampling is that the judgement of the researcher can be faulty (Ghauri and Grønhaug, 2010).

Considering the purpose of this thesis is to identify internationalization barriers and drivers for the private Swedish cleantech sector. Purposive sampling was chosen as an adequate sampling method, with regards to limitations of resources and time. The purposive sampling in this thesis resulted in a sample consisting of firms within different cleantech industries. This was believed to generate the knowledge needed for this thesis. The sample in this thesis also matches the theoretical interpretation of cleantech as well as the purpose of the thesis, which strengthens the argument as to why purposive sampling was appropriate, according to (Grønmo, 2006).

3.4.1 Cases
Based on the sampling method of choosing, namely purposive sampling, this thesis developed a sampling based on the authors judgement. To avoid judgement errors, all cases was found through the organization Swedish cleantech which classified all companies as cleantech companies. Furthermore, all firms included in this sample was asked the question as whether they classified themselves as cleantech companies, which they all did. The chosen cases are seven cleantech companies within the fields of energy efficiency, renewable energy, water technology, wastewater solutions, and indoor climate. The company profiles are further elaborated in the empirical chapter.

3.5 Data collection
According to Saunders et al. (2012), to answer the research question, researchers must analyze a set of data which is derived from the choice of research design. Data can be everything from numbers to words and thoughts from interview subjects and which depends on the nature of the study (ibid). The collection of data can be done through observations, interviews, and questionnaires or be obtained from previous research, government publications, and census records for example. These different approaches give different sorts of data, namely primary and secondary data (Kumar, 2014). In this thesis, both secondary and primary data is utilized.

3.5.1 Primary data
Primary data is something which the researcher collects first hand, i.e. information provided through interviews, questionnaires or observations performed by the researcher. The main aspect of primary data is that none of the data is distorted but comes directly from the source of information (Kumar, 2014). Interviews is an approach to gathering primary data which captures the responses from a person and their perception of reality. Interviews are commonly utilized in qualitative studies (Saunders et al., 2012). Moreover, interviews can be conducted in several ways, such as one-on-
one between the interviewer and respondent, and between interviewer and a group (Bryman, 2011). Researchers can also conduct the interview face-to-face, via telephone, or with the use of internet-aided programs. Benefits of face-to-face compared to telephone interviews are that it might be easier to establish trust between the interviewer and interviewee, and that the interviewer can play on the emotional expression of the interviewee. However, the cost decrease and access to more potential respondents is substantial when incorporating telephone interviews (ibid).

Considering that the purpose of this thesis is to identify barriers and drivers of the internationalization process of Swedish cleantech, a largely unexplored subject, interviews was chosen as a suitable data collection method. The primary data that was collected is also the main analysis object. Both face-to-face and telephone interviews was utilized. The reason for this is mainly due to accessibility of firms that was willing to be interviewed. The industry sector of cleantech is spread out throughout Sweden and telephone interviews provided an easy access to firms situated in different parts of Sweden.

3.5.2 Secondary data
Secondary data is often referred to as previous empirical data in research, government publications or census records (Saunders et al., 2012). This is in line with Skärvard and Lundahl's (2016) view, namely that secondary data is information and data that has already been documented. It can be documented in previous empirical findings, and therefore written by either authors or organizations (ibid). Secondary data can be very usable to answer the research question of a study (Saunders et al., 2012). Therefore, in this thesis, secondary empirical data was used as a foundation for the empirical chapter.

3.5.3 Interview Structure
An interview can be conducted according to the researcher’s agenda and can be structured according to the content and questions that the researcher wants answers to (Kumar, 2014). The structure of the interview can be very strict, called structured interview, where the interviewer keeps to predetermined content and questions, where only direct answer to the specific questions are sought (Kumar, 2014; Saunders et al., 2012). The interview can also follow a more flexible structure, called unstructured or semi-structured interviews, in which the respondent can answer more freely and in-depth to general and open-ended questions (Kumar, 2014; Saunders et al., 2012). According to Skärvad and Lundahl (2016), a semi-structured interview, is an appropriate choice when the researcher has a predetermined topic and a set of questions that needs to be answered. Saunders et al. (2012) further suggests that, unlike the structured interview, the semi-structured interview allows the researcher to also follow up responses with follow-up questions. It also gives the researcher the possibility to adapt the structure of the interview based on the respondent (ibid). Semi-structured interviews are preferred in explorative studies, as this allows for more in-depth answer about a process and the attitude of the respondent, while still covering questions that needs answers (ibid). Therefore, the semi-structured approach to interviews will be used
in this thesis. This will allow the thesis to get full and rich information regarding Swedish cleantech firms’ experience of barriers and drivers to internationalization. The main topics will be covered by following an interview guide, but the interview will largely be unstructured, and allow the respondent to answer freely.

The respondents in this thesis did not have access to the interview guide beforehand, but were briefed on the main topics that the interview would cover, for them to reflect over their internationalization process. The reason for not providing the detailed interview guide is that the authors of this thesis believed this would allow for more spontaneous and honest answers. Furthermore, the theory suggests a very long list of barriers and drivers that might influence the internationalization process. Asking about every single one would not be feasible during an interview, as this would take a lot of time and make the interviews too long. Therefore, the authors of this thesis probed the interviewee’s by asking a general question of what barriers and drivers they have faced. The authors then asked for additional barriers and drivers, and made sure that the interviewee had time to consider everything that they might have experienced as barriers or drivers.

3.6 Operationalization

Skärvard and Lundahl (2016) argues that in a qualitative study it is important to reformulate the constructs used in the theory and apply them to the practical world. To reformulate them means that the concept will be delimited and defined to clarify what is included in the specific concept. The most common way is to use a concept in theory and then explain it with other words when conducting the interview (ibid). As a result, internationalization has been explained with other words to make it clearer when conducting the interviews. This way of rewriting constructs is called operational definitions and they are vital to achieve good results with the interviews (Skärvard and Lundahl, 2016). Moreover, the interview guide was built in such a way that each set of questions was supposed to answer a specific part of the research question. In figure 5 each cluster of interview questions will give answers to a particular part of the internationalization process. Furthermore, it is shown how the theoretical concepts were operationalized into real-world indicators of the concepts.
<table>
<thead>
<tr>
<th>Concepts</th>
<th>Interview questions</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company and respondent profile</strong></td>
<td>3-4</td>
<td>These two general clusters of questions were asked to determine the position and how long experience the respondent had, as well as to get an overall base of information of the companies in the thesis.</td>
</tr>
<tr>
<td><strong>Internationalization</strong></td>
<td>5-8</td>
<td>To get a wider understanding of where the companies established their operations in the international market. The reason was also to outline what strategies of expansion were used, their view of experience and how great the competition in the market was believed to be.</td>
</tr>
<tr>
<td><strong>Drivers of internationalization</strong></td>
<td>9-12</td>
<td>This part was conducted to gain a greater understanding of the drivers experienced by firms to have influenced their internationalization process. Furthermore, its purpose is to give a greater understanding of how the companies acted because of these barriers. The questionnaire is designed to outline what the firms did to manage their drivers in an underlying manner.</td>
</tr>
<tr>
<td><strong>Barriers to internationalization</strong></td>
<td>13-18</td>
<td>Questions were asked about the barriers in order to outline industry specific barriers to internationalization. The first questions start out by asking firms to name specific barriers. Depending on the answers, other potential barriers are asked whether they influenced the process of internationalization.</td>
</tr>
<tr>
<td><strong>Internationalization decisions</strong></td>
<td>6, 7, 14, 16, 18-19</td>
<td>There are many barriers and drivers affecting internationalization. Therefore, a section of how they were managed was of significant interest for the thesis. Since the answers to the questions differ to a large extent the decision was made to have some specific management questions while other questions provided overall information that improved the understanding of the managerial decisions made.</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>1-2, 20</td>
<td>The first two questions are general which asks if the participant wants to be anonymous and whether they accept to be recorded. The reason for asking this is to follow the ethics of interviewing and giving them opportunity to express themselves freely. Question 20 asks if there is anything the respondent would like to add to the questions previously asked. This is a way to assure that no loopholes were left uncovered.</td>
</tr>
</tbody>
</table>

Source: Own model of operationalization

3.7 Method of data analysis

The thematic analysis model is one of the few general methods for analyzing data in qualitative research (Saunders et al., 2012; Yin, 2014; Ryen, 2004). This method of analyzing data is structured to find patterns or themes of the data collected (Saunders et al., 2012; Yin, 2014; Ryen, 2004). To sort data by categories is considered to be of importance in order to get explanations to the research question (Ryen, 2004). Furthermore, the qualitative research method provides the interviewer with a large amount of data, and it is important to code it and to categorize it to simplify the process.
of generalizing it (Saunders et al., 2012). The thematic approach also allows the researcher to outline related data from different transcripts or notes (ibid). To create matrices, categorizing data, creating data displays and tabulating data are all frequently used methods to understand collected data (Yin, 2014). Furthermore, the analytic method also allows the testing of theories and it explains the collected data by using it in relation to each other (Saunders et al., 2012). Consequently, conclusions can be made since the data is more easily operated and better structured to enhance the whole picture and outline what results were found in the process (ibid).

The data was analyzed according to some general categorizations, for example what mode of entry each company used, if they used incremental internationalization and if there were some general barriers or drivers that affected all companies. Furthermore, patterns of barriers and drivers, as well as how the companies managed these was sought after. The data was also analyzed in relation to the previous theories of internationalization by seeing if there were elements of existing theories which explained the internationalization of Swedish cleantech firms.

3.8 Quality of research

The quality of the study conducted is determined by the factors validity and reliability (Saunders et al., 2012). The concepts of validity and reliability is therefore further elaborated below to outline what influences the quality of the research.

3.8.1 Reliability

Reliability refers to the degree of standardization in the data collection process (Skäravad and Lundahl, 2016). Furthermore, interviews should be as standardized as possible in terms of circumstances around the interview. This is for the interviewee not to be influenced by these circumstances and thus give directed responses that are reflected by underlying factors of the interview (ibid). Reliability is usually said to be achieved in an interview if the results of the interview can be reproduced when using the same method in a future study (Kvale and Brinkmann, 2014). Similar to this view, Ghauri and Grønhaug (2010) refers to reliability as being the stability of the measurement in the study. It is argued that the study should be able to be reproduced with similar findings once again if the study is reliably conducted in the first place (ibid). Thus, the circumstances of the different interviews in a study should be as similar as possible, including the way in which questions are asked (Kvale and Brinkmann, 2014). However, Kvale and Brinkmann (2014) further argues that too much focus on reliability in the interview phase can also restrain quality answers, as the interviewer is constrained in how much he can diverge from the interview structure. Therefore, the interviews in this thesis will depart from the interview guide but with the possibility to ask questions based on the previous answers.

The authors of this thesis believe that if a similar study was conducted it would lead to similar results. This since the theory regarding barriers and drivers would very likely be the same, and the secondary data would be much alike as well. Considering that a
qualitative research method has been chosen, the operationalization would most likely result in similar interview questions, since the barriers and drivers are so many, and thus becomes difficult to cover one by one. Moreover, the authors of this thesis utilized both face-to-face and telephone interviews, thus the circumstances around the interviews were inherently different by nature. However, the authors of this thesis tried to produce as similar circumstances revolving each interview as possible. The interview was conducted similarly in each situation without drifting away from the main purpose or asking leading questions. To achieve this, the interviews was conducted in similar environments without any controllable surrounding factors affecting the respondent during the interviews.

3.8.2 Validity
Validity is the other part that together with reliability determines the quality of the research material conducted. Unlike reliability the concept of validity is the process of verifying the collected material and to provide it with credibility (Saunders et al., 2012). More precisely, validity is to which extent the operationalization measures the investigated concept (Ghauri and Grønhaug, 2010). Hence, it is also popular by researchers to present validity as being either internal or external (Saunders et al., 2012; Ghauri and Grønhaug, 2010). Internal validity can be said to be when a causal relationship is found between two different variables. In detail, a causal relationship means that if something happens with one of the variables the other one will be affected as well (Saunders et al., 2012; Ghauri and Grønhaug, 2010). However, a correlation between variables does not guarantee that there is a casual relationship between them. Consequently, is not easy to find the correlation when doing qualitative research since no technical analyzes are made. Therefore, validity is adapted in a qualitative study (Ghauri and Grønhaug, 2010). Furthermore, external validity is best described as to which extent collected research results can be generalized (Saunders et al., 2012). External validity is therefore concerned with answering the question if findings from one interview or observation can be applied to other cases (ibid). Furthermore, Yin (2014) argued that generalizability from case studies can be achieved through analytical generalization. The findings of a case study are therefore not statistically generalizable to a population, but can be generalized to theory. However, a goal in analytical generalization is still to apply the results to more ‘real’ contexts and they can be applied in other situations as well, but the generalization cannot be considered statistically valid (ibid).

In this thesis, the relationship between barriers and drivers of the cleantech sector, and the managerial decisions of internationalization that are influenced by these two constructs, was studied. The authors of this thesis were therefore looking for an explanatory relationship between these constructs and the decisions made. Furthermore, the purpose was to generalize the findings to present data on what decisions previous firms have done and what their experiences of the process were. All the firms in this thesis are within the scope of our definition of cleantech, and they also identified as cleantech companies themselves, thus increasing the validity of the analytical
generalization of the results. Furthermore, the data collected during the interviews was also compiled and sent back to the responding companies to further increase the validity of the results.

3.9 Ethical Considerations

According to Saunders et al. (2012), ethical considerations are to be considered throughout a research project. The researcher will also be forced to take various ethical considerations into account at different stages of the research project (ibid). In western research, there are three frequently raised classical ethical considerations that needs to be taken in account when conducting a qualitative research (Silverman, 2011). Those are trust, confidentiality, and codes and consent. Trust is referring to the relationship between the interviewer and the interviewee. The interviewer has an important responsibility not to ruin the field of research for future studies by making companies reluctant to participate in additional research. This can be achieved by showing respect when presenting the information acquired through interviews and carefully evaluating whether to present sensitive information acquired (ibid).

Furthermore, in the data collection stage, it is important to make sure not to put pressure on the research subject to participate and get consent of participation (Saunders et al., 2012). All these guidelines have been followed in this thesis by evaluating carefully how to present data and how to formulate sentences throughout the thesis. Secondly, confidentiality means that researcher must protect the identity, place, and location of the interviewee in case the participant would wish to be anonymous (Silverman, 2011; Ghauri and Grønhaug, 2010). Therefore, the participants were asked whether they wish to be anonymous or not.

Lastly, codes and consent means that the interviewees are entitled to know that they are being part of a research (Silverman, 2011). Furthermore, they have the right to know what is being researched and they also have the right to not participate anymore if they would like that (ibid). In line with this, Saunders et al. (2012) presents similar thoughts as the researcher needs to inform the participant of the purpose of the study to make sure that the participant can give full consent (ibid). All of this was followed in the interviews conducted in the thesis. Also, the participants were informed about the bearing concepts and the subject before the interview and if anyone would have liked they could have cancelled the interview at any time. Additionally, there is also a need to let the participants read the work of the researcher before publishing, to make sure that the participant understands how their name would appear in the work, thus enabling them to give full consent (Saunders et al., 2012). These guidelines have been followed throughout the thesis as all respondents got a copy of how their opinions and thoughts would appear in the empirical chapter.
4. Empirical findings

In this chapter, the empirical data that has been collected from the different cases is presented. The chapter begins with a small introduction of the companies as well as the respondent in each case. The empirical data is then broken up and presented for each case in different subheadings, to easily present the findings in relation to the research question.

4.1 Swedish Cleantech sector

The Swedish cleantech sector is top of the line with many companies and great technological solutions. The sector has been stagnating in terms of foreign export and has consequently not achieved the commercial success one could expect considering its potential (Kanda et al., 2015). The exports of the cleantech sector in 2013 had a worth of 37 million SEK while the sector as a whole had a turnover of 222,4 million SEK (Kanda et al., 2016a). Despite the growth of the market in the last years the export of Swedish cleantech firms has remained on a low level. Moreover, according to Kanda et al. (2016a) the Swedish cleantech sector consists of about 98% SMEs.

4.2 Cases

The companies participating in this thesis are presented below. All companies are within the definition of cleantech and they are all active on the international market in some form. The data in this section was collected through interviews with managers of the different firms between the period 19th of April – 3rd of May.

Airwatergreen AB - Energy efficiency and indoor climate systems.

Airwatergreen is a company who provides energy efficient solutions to their customers. They provide it by dehumidifying building to keep them dry and cold in order to decrease the consumption of energy. The company currently employs 8 people. Since the start of the company in 2009, they have been growing at a fast pace and their first international operation was in 2015. Currently, the company is active in 5 markets outside Sweden with the first market being Denmark followed by Finland, Norway, Germany and just recently Chile.

Fredrik Tunberg is the head of sales and marketing at Airwatergreen. He has a master’s degree from an international university and therefore possesses a lot of international experience. Tunberg was employed to handle the international contact and to explore opportunities in new markets and has therefore been actively involved in the internationalization process.

Anonymous company A - Energy efficiency.

The company specializes in producing frequency converters for electric motors to regulate the speed and consequently save up to 70 percent energy. The company is currently employing 8 people and are today active in 6 countries outside Sweden with a focus on the Scandinavian countries of Denmark, Norway, and Finland, but are also present in Germany, Netherlands, and Luxemburg. As the product base is frequently
developed with a broader assortment and improved products the company wishes to expand further in the coming years.

The interviewed person is the CEO of the company and has a great experience from current and previous international operations. The goal of the company is to expand further in new international markets.

**Arifterm AB - Renewable energy and energy efficiency.**

Arifterm is a company that is a market leader in Scandinavia in the field of heating systems with bio fuel. The headquarter is located in Kalmar in the southeast part of Sweden. In total the company employs 80 people of which 12 are employed in Kalmar. The company has a production facility in Finland where the main components of the heating systems are produced. They are currently selling products to 27 countries but their focus is the Scandinavian market and the countries where heating systems are more frequently used due to cold weather. Their internationalization operations began in the early 2000’s with an order to Denmark. Since then, the company has internationalized to most countries in Europe.

Staffan Lundegårdh is the CEO of Arifterm and he has been working for the company for 13 years. He is one of the co-founders of the company and the reason for that is that he saw the potential of the market for heating systems. He has a long range of experience from international business and how to expand business internationally.

**Baga Water Technology AB – Wastewater and water purification technology.**

Baga is a company who is in the wastewater as well as the water purification business. The company currently employs 50 people all located in Sweden. Baga has recently acquired another company and entered the field of water purification. The company has a large market share in the Swedish market and therefore aims to intensify their international operations to bring their product portfolio to other markets.

Hans Pettersson is the CEO of Baga Water Technology AB and he has been in the position for almost a year. Pettersson is new in the field of environmental technology but has previously worked with in several international positions and therefore has a great knowledge of the internationalization of firms. In the position as CEO Pettersson is leading the company's international operations and is in charge of international sales.

**Malmberg Group AB - Renewable energy.**

Malmberg is a company located in southern Sweden with head office in the city of Åhus and subsidiary offices in various countries across Europe such as UK, Germany, Lithuania, and Italy. The company employs 160 people with a wide background ranging from engineers, sales staff, project managers, production staff etc. The company's current international activity is primarily concerning biogas and they have been actively pursuing the international market since 2007. As Malmberg focuses on biogas and water plants they do not sell products but rather sells entire projects.
Anders Månsson is a communications manager at Malmberg Group AB. His responsibilities involve communicating the activities of Malmberg with the different markets revolving all sections of the business. Månsson also needs to be generally updated regarding the internationalization process and activities on all the different markets of Malmberg.

**TTM Energiprodukter AB - Energy efficiency and indoor climate systems.**
The company is located in Kalmar with both an office and a production facility. Their focus areas are shunt groups, and degassing for decentralized heating, cooling and comfort cooling systems. TTM Energiprodukter currently has 25 employees in total. They have been active on the international market since the 1990's and they are currently exporting to Denmark and Norway but also have occasional export to Lithuania and other markets. The company aims to further internationalize, specifically with their degassing product.

The CEO of TTM Energiprodukter is Magnus Davidsson and he's been the CEO of the company for four years. Previously, Davidsson has been working at the company in other positions as well as internationally for another environmental technology firm in a similar field. Davidsson also has a vast education with over ten years of studying at an academic level both in the economic and the mechanical engineering sphere.

**Wapro AB – Water and flooding technology.**
The company is located in Karlshamn in the southern part of Sweden. The company specializes in water handling products such as backwater stops, water regulators and sluice gates. The company employs 18 people of which two works in the US market. The company was established in 1988. Their first international operation was in the early 2000's when they exported products in the Scandinavian market to both Norway and Denmark starting around the same time in both markets. Today, Wapro is active in 25 countries around the world, mainly in Europe but also in Australia, New Zealand, and USA. They are providing customers worldwide with their water technology products to hinder natural disasters such as floods and high tides.

Torgny Larsson has been the CEO of Wapro for four years ago and he also has the position as sales manager of the company's international sales. Larsson has a lot of experience of international business and has previously worked with international sales at other firms.

**4.3 Internationalization**
Fredrik Tunberg stated that Airwatergreen got their first sale to Denmark through their existing network. This happened with help from a contact of the company that wanted to distribute their products in the Danish market. Airwatergreen has had an outlined strategy go to close by markets, and their order of internationalization was Denmark, Finland, Norway, and Germany. The company has actively pursued internationalization and has changed their strategy of approaching new markets depending on the
opportunities in the markets. Furthermore, the company has been internationalizing rapidly and this goes in line with the focus of looking for new international markets continuously. Furthermore, Airwatergreen just recently started selling products to Chile which is a brand-new market for the company and a step away from targeting geographically close markets.

The second company chose to be anonymous in this thesis, therefore they will be called anonymous company A. The company have just left the start-up phase and consequently plans to expand further. The internationalization process started around one year ago and they are actively working in Norway, Denmark, Finland, Germany, Austria, Netherlands, Belgium, and Luxembourg. However, the first country the company targeted outside Sweden was Norway. The expansion to the first market happened naturally because it is necessary to travel to the market that you are active in and therefore a close market was chosen initially. In order to enter the market, existing contacts in the Norwegian market were utilized and after a while a distribution contract was signed. The use of contacts has been the strategy for the company and contracts with distributors have been used throughout the whole internationalization expansion. Despite large competition in the market, the potential growth of the company is huge as about 1-2% of the world market could use the product, which signifies a huge potential market.

Staffan Lundegårdh mentions that the first market Ariterm went to outside of Sweden was Denmark due to a customer request. As the company has two different focus markets their international operations vary between the two. For the housing section of the business they are active in 27 markets with more or less business in all the markets. However, the products specialized for industry facilities are actively sold in Finland, Sweden, Norway, and England. In the industry products assortment, England is a highly important market which accounts for 25% of the revenue. Despite going to Denmark first in the internationalization process there were no clear focus on going to close by markets first. The main determinant for entering a market at this point was the availability of the pellets used in the heating systems. Lundegårdh further explains that this drove Ariterm to the Austrian and German market. Nowadays however, the main determinant for entering a market is the availability of subsidies from governments. Therefore, the company is continuously screening the market for potentially suitable countries with subsidies. Focusing on the markets with subsidies however leads to great fluctuations in the sales of a market. This has led Ariterm to the use of distributors in a market as it would not be financially viable to start a sales office due to the uncertainty. As a result, distributors are used in all markets Ariterm is active in.

The international sales process of Baga started in Norway and has been focused towards a supplier that provides them with a part of their main components, and they also distribute Baga's products in the Norwegian market. The deal goes both ways as Baga distributes the Norwegian company's products in the Swedish market as well. Furthermore, Finland was targeted by the company five years ago but around four years ago the government in Finland changed the laws and regulations which made the market
disappear for Baga. The company has also started to look towards the Chinese market about a possible expansion. The licensing method of selling the technology to partners have been used throughout the expansion of Baga Water technology. Even if Baga licenses the rights to the technology they still sell components for the products to the licensing partners. The company also have to make services of their products in markets where they have installed wastewater plants.

Malmbergs most recent international operations started in Germany with a biogas plant in 2007. Since 2007 the international presence with biogas has expanded further to the markets of England, Denmark, Norway and Finland. Månsson further states that the company largely operate in markets where governments give subsidies to investors for the construction of a biogas plant, which increases the financial viability of the plant. The negative side of the subsidies is that the attractiveness of markets fluctuates to a great extent. Therefore, some markets go cold for a period of time and then the operation changes to mainly doing services and reparations in the markets. This has led the company to being active in several markets as a way to get more stable business as when the demand in one market declines it could be increasing in another market.

TTM Energiprodukter first entered the Danish market, closely follow by Norway and they have been active in those markets since the 1990s. In Denmark, the use of distributors was chosen in the market entry while in Norway they acquired a company. Later, the company in Norway was sold but they are still one of the largest suppliers of TTM Energiprodukter. There was no outlined strategy that TTM Energiprodukter should go to close by markets first but since they had similar systems that suited for TTM Energiprodukter's products it was natural to go there first. Therefore, the company developed their international operations through organic growth. Furthermore, due to the fact that the shunt groups are not able to sell in so many markets, a new, degassing product has been developed and will soon be introduced to the international market. According to Davidsson, the degassing products have a great potential internationally. As a result, the company is aiming to intensify their internationalization process and export the product to new markets.

Torgny Larsson at Wapro AB explained that the company has been active on the international market since the early 2000s. The company is currently active in 25 countries but their focus is directed towards 13 more attractive markets. The first markets the company entered was Norway and Denmark and this happened when the company exhibited on a fair and customers from these markets found the products interesting. It has been important for Wapro to spot opportunities and to capitalize on the opportunities in the market. Hence, the company is continuously looking for further expansion and it is sometimes about being at the right place at the right time. As a result of searching for opportunities, there has not been an active choice to expand to close by markets first. However, that the reason for the company expanding to geographically close markets has simply been that it is closer. It is a bigger probability to meet a Scandinavian customer at a fair in Sweden than an Australian customer. Nevertheless,
when expanding to markets it has been a strategy to use distributors to reach customers in the specific markets.

4.4 Drivers
Fredrik Tunberg of Airwatergreen AB explained that the first international market was Denmark which they internationalized into through their existing network, which resulted in them being distributors of the products in the Danish market. A similar process occurred in Finland through a distributor request. In the expansion to Norway, a networking event was utilized in the internationalization process as they pitched their products at an event which led to the establishment of a relationship with a customer. The network of Airwatergreen has thus been an important driver of the internationalization they currently have. However, Airwatergreen have had the intention to internationalize from the very beginning, and have had a very global mindset. For example, they have focused efforts toward protecting their products in both the US and China with patents, as to make sure that they could eventually take the steps to those markets. Airwatergreen has an opportunistic view of internationalization, and has tried to capitalize on opportunities when they have presented themselves, which have sometimes happened through coincidences in their internationalization. Thus, the managerial mindset has always been focused on the international markets. Furthermore, a specific driver of internationalization that Fredrik mentions is that the home market of Sweden is too small to match the ambitions of the company.

Anonymous Company A's driving force for internationalization has largely been dependent on the fact that the home market is too small for their specific product. The CEO of the company said that the foremost reason for them to internationalize was to survive. This is because the home market was too small to have a sustainable business and growth in. Furthermore, the company also sees a possibility to increase their sales volume through internationalization which in turn would help increase the profitability of the product, as they could purchase larger volumes of material and thus decrease cost of production. The driving force in their choice of market is somewhat dependent on the network of the company, as the relationships of the company are crucial in order to start the internationalization process. Therefore, the company has gone to markets in which they have had some sort of network and contact with other actors. Anonymous Company A is also actively looking for new markets to enter, and has an active goal to internationalize further. The main criteria for evaluating a possible market for expansion is that the market is be mature enough and susceptible for the product of the company.

Ariterm has been influenced and driven in their choice of market by two factors which they experienced in two different phases, according to Staffan Lundegårdh. In the early 2000s, prior to the 2008 financial crisis, the demand of the product was driven primarily by the accessibility of pellets which was used to fuel the heating systems. However, the access to this commodity has increased and is now available almost everywhere. After the 2008 financial crisis, the demand in the markets is primarily driven by where government subsidies are available for customer to invest in this type of
product. Demand fluctuates largely due to shifts in politics and government subsidies, which has made international expansion important to mitigate the effects of these fluctuations in sales on single markets. By being present internationally and on many markets, Ariterm can achieve more stable sales volumes. Continuous growth is also a driving force of internationalization of Ariterm, and the Swedish market is too small to achieve this goal.

Baga’s choice of market has largely been driven by the market demand of the product which is contingent on the climate as well as governmental regulations. The technology in Baga’s products is very sophisticated and is the most useful in cold climates which is why countries with cold climates are prioritized as potential markets. Also, strict governmental regulations that exists for wastewater handling is a driving force as these markets best fits Baga’s products. This is mainly due to the efficiency and sophisticated nature of the product. The fact that the requirements for unpolluted wastewater is increasing all the time, could potentially be a driving force for the company. Furthermore, a specific driver of internationalization that Pettersson mentions is the saturation of the home market, as it is hard to gain more market shares in the home market. Moreover, growth is considered a main driver for Baga and there are two main strategies to achieve growth. The two strategies are internationalization or to develop new products. For Baga, internationalization was the most efficient of the two ways, due to the cost of developing new products.

Anders Månsson stated that the initial driver of Malmberg’s most current internationalization, primarily involving their biogas product, was that opportunities presented themselves to go in to the German market. Essentially, they got a customer request from Germany which they chose to accept. They had unique competences within biogas that was required in Germany and they chose to take the opportunity to test internationalizing with this product. The company had very high confidence in the uniqueness and competitive advantage of the product which made the risk substantially smaller. Furthermore, Malmberg’s internationalization into other markets have been specifically influenced and driven by government policies, specifically where subsidies for biogas investments are available. This has been the most important driver of the internationalization for Malmberg, as investors needs government subsidies for biogas investments to be considered. However, Anders also mentions that Malmberg is actively looking for new potential markets to internationalize into.

The reason TTM Energiprodukter have primarily internationalized into Denmark and Norway has been that these countries have similar HVAC-systems (Heating, Ventilating, Air conditioning) as Sweden. These countries have decentralized HVAC-systems suitable for the company’s product, while for example Germany uses centralized HVAC-systems. Thus, the driving force in choice of market has largely been dependent on the nature of the markets HVAC-systems. The driving force of internationalization as such has primarily been to increase revenue and growth according to Davidsson. Another driving force has been that internationalization has provided the possibility to even out the sales and reduce fluctuation in sales.
Furthermore, in the cases where the company has exported to markets where they have no specific export focus towards, the main driver has been customer requests. Another driving force is managerial drive, as the company is also actively looking for opportunities to enter more international markets, specifically with their degassing product.

One of the main drivers of internationalization for Wapro have been to increase the awareness of the company’s products and to put the company on the map. However, there have been no specific drive to become the biggest company, but more about spreading knowledge about the company and getting recognized internationally. An underlying factor has also been to increase the revenue and growth of the company. Wapro is actively pursuing further international expansion and has a strategy of which markets they want to enter and be active in, and they have also been driven to specific markets due to customer requests. The internationalization process is to some extent influenced by the network of the company, as the nature of the relationship determines who the company does business with. Also, managerial drive and organizational will to succeed is a very important driving force of internationalization for Wapro. For example, Larsson considers their product to have a very high potential, and therefore the viability and potential of the product also becomes a big driving force in succeeding and thus also internationalization.

4.5 Barriers

Some challenges of internationalization are standard issues, according to Fredrik Tunberg at Airwatergreen. Costs of translating manuals to other languages, adapt the manual according to legal aspects in new countries in the native country are two problems they have encountered with standard issues. Therefore, it is important to have local contacts that can deal with such issues occurring. Financial restrictions can also act as a barrier for the company, as it costs a lot of money to showcase the product at international fairs. Other obstacles they have considered important are language and culture barriers, which have favored specific markets. Furthermore, they have done a risk analysis resulting in targeting smaller markets first in order not to risk failing in a large market before having an organization to do so. Since Norway is not a member of the European Union, transportation of goods becomes more complicated. This is also a general obstacle experienced by Airwatergreen, namely administrative issues such as the obstacle of documentation and customs.

For the anonymous company A, barriers related to business outside the European Union, and in the United States in particular, were considered specifically influencing. This was due to the differences in standards and certifications for their products. It has been difficult for the company to get the products approved by the authorities and it costs a lot of money. To get a green light for selling the products in the US market the company has to get their products and production facility inspected annually and that’s another costly procedure. Another influential barrier is the customs and stamps required when shipping the goods to other markets. Hence, the logistic process takes time and it
is difficult to fulfill the requirements of the products. Furthermore, due to high taxes it is hard for small companies to expand the business and afford the investments required to efficiently reach the international market. Consequently, another influential barrier for smaller companies to expand to the international market is the lack of financial resources. The CEO argues that the banks in Sweden will not allow smaller companies to take loans and because of that the company needs to have the money at hand in order to spend money on internationalizing. Moreover, local laws and regulations is also hindering the international expansion since it affects the price of the product to the customer. Also, while changing policies, laws, and customer profile is thought to increase sales in the future, the change is currently going slow which is hindering their international expansion.

Staffan Lundegårdh of Ariterm mentions a great number of barriers that he has faced during his time in the international market. The first one is the administration which is more difficult in foreign markets, however, this is a learning process and therefore it is not very influential. Furthermore, subsidies work in two ways as it is driver when they are implemented but a barrier when they are removed. Additionally, politics and regulations affects the requirements for the products in the field of heating systems. Therefore, adaption of the product to the new regulations is a barrier as it causes the products price to increase. Another barrier for Ariterm has been the fierce competition from Austria and Germany. The company has also experienced that limited resources have affected their internationalization. Furthermore, uncertainty from the customers is another barrier which affects business for Ariterm, specifically regarding the residential products.

Hans Petterson at Baga Water Technology argues that it is hard to start up an operation in a new country. One barrier is the difficulty of exporting their products mainly because of the bulky products. He also explains that their product is very well developed, as it was developed for countries where the weather is cold, and therefore there must be strict regulations restricting how much pollution there can be in the wastewater. Without strict regulations on the markets their systems are too well developed and consequently would be too costly. Also, changing temperature conditions, requirements and potentially global heating could work in their disadvantage according to Pettersson. Another barrier is logistics when exporting the products to foreign markets, as the size of the goods is a problem. This results in the need to start up production facilities in the target market in the geographically distant markets. Another barrier to internationalization is the documentation and certification in Norway that costs a lot of money. Thus, the company must evaluate the cost versus the potential of the product when launching it in Norway. Therefore, a cost analysis of the product is vital before bringing it to the market.

Malmberg outlined language as a barrier as everything must be adapted to the target country's language and it is also a barrier to have learn how to deal with documentation of the product in general. For example, to give an offer it sometimes needs to be in the native language which makes it costly and difficult. As experienced by the company it
can sometimes be hard to find the right competences in a market. Moreover, to be allowed to build a biogas plant there are certain standards that needs to be followed. This leads the company to putting effort into learning the standards which is very time consuming. Furthermore, in the field of biogas the company targets markets with subsidies, and as subsidies are contingent on politics, the market tends to fluctuate a lot. For example, in Germany, the subsidy system was removed which led to the market disappearing. Consequently, the withdrawal of subsidy systems is a great barrier for Malmberg, as this is necessary for the financial viability of biogas plants. In the water purification field, they can see a great growth globally but the problem is that such a plant does not generate money, it only costs money. The result is that such plants are not specifically interesting from an investor point of view.

Regarding barriers, TTM Energiprodukter has experienced difficulties with standards within the European Union. Even though there are unionwide standards many countries have made small exceptions from these general standards which leads to adaptions of the products. Barriers such as standards and documentation is more significant in some regions than others. One example of this is in Russia where all the heating systems needs to be hygiene tested and approved by the Russian standards of hygiene. Magnus further explains that there are a lot of barriers in internationalization and one additional significant barrier is language differences. Moreover, differences in business culture and market structure are barriers and therefore respect is needed to understand these differences. It is also important to be aware of policies and standards as some countries require more documents and in countries with a more bureaucratic system, this is something to be careful with. It is important to fulfill CE-standards and be able to present full production documentation, to avoid problems when inspections are made. Furthermore, Magnus suggests that geographical distance can be problematic due to transport difficulties related to geographical distant markets.

Torgny Larsson of Wapro suggests that it is important to not focus too much on problems of internationalization but to focus on the opportunities in the market instead. This is since barriers in foreign markets will always be present. Therefore, barriers are rather considered to be adaptions to other markets. However, a specific barrier can be the legal structure in USA as it can be intimidating and hard to understand. Also, language differences and cultural challenges are always present. This leads to the company being forced to make necessary adaptions, and they are rather considered as adaptions than problems as such. Larsson also mentions that national standards are influential when doing business abroad and that they vary widely. Furthermore, the packaging of the goods is important so that nothing breaks during transport. Decision processes and buyer behavior is also inherently different in other markets and therefore important to take into consideration. Sometimes, these processes take longer than the perceived opinion of how long time such things should take. Financial resources have also been influential in the company’s internationalization as the costs of intensifying operations are high.
4.6 Internationalization decisions

Airwatergreen has utilized several modes of export in their internationalization. According to Tunberg, they have utilized exports through distributors, direct exports, as well as direct exports to the customer with the help of a facilitator of the deal. The reason for this have been that in some cases the partners have not been willing to sign a distributor contract but instead wanted to act as a facilitator of the business-deal in question. In other words, depending on the situation, they have adapted their strategy. Previous international experience is important and facilitating, as it becomes easier to deal with differing cultures and business practices. There is also a learning curve to do business internationally, and you must learn how to deal with the issue of administration related to exports. For example, how to deal with customs in countries outside of the European Union is something which gets easier through experience. Being from Sweden is has helped Airwatergreen in their international positioning, as the Swedish brand is strong within the energy-efficiency business. Furthermore, Airwatergreen has utilized Business Sweden in their internationalization process, to start the process and establish themselves internationally. However, in that specific instance, they did not achieve their intended business and the business transaction was fruitless. One of the most important ways in which Airwatergreen has dealt with the uncertainty and risk of international expansion has been through incremental steps in the internationalization process. They have focused on going to markets close to the home-market due to culture being similar, geographical distance being small, as well as the size of the markets as manageable.

One of the ways anonymous Company A have dealt with the first contact to go international has been to use contacts and the network of the company. Therefore, experience of international expansion is extremely important for the company, as this is the knowledge needed to know what channels to communicate to and start the internationalization process. Another of the main ways the company have managed the internationalization process has been to adapt the product according to standards of other markets, as well as adapt how they do business in any given market. The CEO of the anonymous company suggests that financial resources can be a restraint when going international. This is, however, not a big issue of the company since they are listed on the stock exchange, thus making capital more available. Furthermore, dealing with internationalization has largely been contingent on the existing capabilities and network of the company, as they did not find the Swedish government or institutions to be helpful in their internationalization.

Ariterm AB has dealt with their internationalization process by actively evaluating and analyzing different strategies regarding to entry mode, namely export through distributors, exports through agents, as well as establishing their own sales offices. However, to mitigate the risks of international business, they have utilized the distributor model. This has also helped them with their positioning internationally and to overcome the barrier that swedes are not appreciated in international business, according to Lundergårdh. The internationalization decisions have also been influenced by lack of the biofuel ‘pellets’ used in their products, but since 2008, the decision is
more influenced by where there are subsidies available for their product. Furthermore, international experience is very important as this allows for greater understanding of cultural and business practices differences. Previous international experience also makes it easier for someone to adapt their approach to international business. Therefore, learning is an important aspect of managing barriers or obstacles. For example, administration of international business is considered a minor obstacle that Ariterm has overcome largely by learning. Moreover, Business Sweden has been utilized by Ariterm AB to build relationships with contacts and increase the business network. Constriction of limited financial resources also forces Ariterm AB to adapt their approach to internationalization, as they need to evaluate every business decision with a risk and reward analysis. Due to the large competition in the company’s industry, they have also adapted their internationalizing by moving towards more immature markets with less competition.

Hans Pettersson at Baga Water Technology argues that it is hard to start up an operation in a new country. One barrier is the difficulty of exporting their products mainly because of the bulky products. Pettersson also explains that their product is very well developed, as it was developed for countries where the weather is cold, and therefore there must be strict regulations restricting how much pollution there can be in the wastewater. Without strict regulations on the markets their systems are too well developed and consequently they would be too costly. Also, changing temperature conditions, requirements and potentially global heating could work in their disadvantage according to Pettersson. Another barrier to internationalization is the documentation and certification in Norway that costs a lot of money. Thus, the company must always evaluate the cost versus the potential of the product when launching it in Norway. Therefore, a cost analysis of the product is vital before bringing it to the market.

Malmberg AB based a lot of their internationalization decision to Germany on the perception of opportunities, as well as the competitive advantage that their product held. The knowledge and experience of Malmberg in the field of biogas has therefore been important for them in their decision to internationalize. Government policies and subsidies are considered both barriers and drivers in Malmbergs internationalization, and therefore their active search for new market opportunities are a way of managing the unreliability of these government subsidies. Månsson mentions that when one market has lost government support for investments in biogas, another market has implemented such policies, and thus they have been able to switch market. Moreover, to mitigate language, standards, culture, and market characteristics barriers, Malmberg is focusing efforts toward recruiting local personnel with knowledge of such things. Månsson also argues that it is important to have the will and drive to overcome obstacles in internationalization and not be afraid of them. Furthermore, despite that Malmberg have established more routines regarding internationalization, existing obstacles has remained quite influential. Also, limited financial resources did not seem to be a major influence in Malmberg’s internationalization, as the current smaller, family company profile has been an active choice.
TTM Energiprodukter has dealt with obstacles relating to different systems standards and fit of the product to other markets by having a strategy to only focus on markets that have similar HVAC-systems as Sweden. There has been a clear strategy to mainly focus their internationalization efforts towards countries where the product is a natural fit into the HVAC-systems, in this case specifically Denmark and Norway. The company also excludes markets where there is a lot of risk involved in doing business, such as the USA, due to the punitive nature of the legal system there. In relation to risk, the company also has a strategy to focus more on Europe, due to difficulties in transport management in more distant markets. Moreover, respect towards culture and business practice differences is important when deciding to internationalize. International experience is not necessarily required, even though it can be a benefit and facilitate the decision-making process. Davidsson also suggests learning by doing as a way of increasing the skill to manage obstacles in internationalization. Furthermore, being clear in communication to avoid misunderstandings is an important tool that is utilized in TTM’s internationalization process, to overcome language and culture barriers. Making sure to be organized regarding documentation of the products, as well as being prepared for bureaucratic procedures in foreign markets, to be an important way in which the company tries to manage administrative obstacles. Davidsson also mentions that they often need to make some minor adaptations of the products to overcome different standards of other markets, even within the EU.

Torgny Larsson, the CEO at Wapro AB, argues that managerial drive and the capabilities to see opportunities instead of obstacles as an important aspect of managing internationalization. The company has had a strategy of being aware of possible sales and export opportunities and capitalize on these when customers have shown interest in the company’s products. Wapro tries not to focus on limitations but rather trying to find solutions and adapting to any given situation that arises in the internationalization process. Therefore, the company is largely managing the internationalization by being adaptive to, for example, language differences. Furthermore, resource restraints have influenced the decision making regarding internationalization, however, Larsson emphasizes that all such investments are an active choice. For example, more resources would possibly have enabled them to make alternative strategic decisions, but it comes down to deciding and committing to internationalize with the resources available. Wapro has not changed their positioning specifically in international markets, however, there have been some adaptation to the product in order for Wapro to enter the markets. Furthermore, the company has utilized Business Sweden in their internationalization process, to increase their network.
5. Analysis

In this chapter, the empirical data is analyzed by connecting the empirical data to the theoretical framework. The empirical data is also analyzed more freely to find patterns of drivers and barriers and how they are handled by Swedish cleantech companies.

5.1 Internationalization

The Uppsala model suggests that firms tend to choose nearby markets to start their international operations within (Johanson and Vahlne, 1977). This still has viability today as the findings suggest that firms tend to go to nearby markets as a first step. The majority of the companies in this thesis started their internationalization process by entering the Scandinavian markets of either Norway or Denmark. However, Malmberg, started their operations in Germany, which also is a geographically close country. Moreover, while most firms in this thesis first internationalized into nearby markets, some of them exhibited characteristics of born globals. For example, Airwatergreen characterized themselves as having a global mindset from inception, a characteristic of born global firms according to Knight & Cavusgil (2004). Airwatergreen also took steps to ensure that they could substantially increase their internationalization by patenting their products in both China and USA. The reason for not internationalizing further was due to resource restraints and them wanting to test their product in smaller markets first.

Also, Anonymous company A had just recently started their internationalization and was already active in many different markets, however, they also started their internationalization in close-by markets. This is in line with the arguments of Chetty and Campbell-Hunt (2004), that born global firms develop more aggressive internationalization strategies after initially entering geographically close markets. This strategy has also been suggested by traditional internationalization theories (Johanson and Vahlne, 1977).

Furthermore, several of the cleantech firms have experienced limitations in availability of international markets, due to their niche products not being suitable for every market. TTM Energiprodukter have been largely limited to the Danish and Norwegian market due the difference in heating systems in other markets. Ariterm was limited in their internationalization in the beginning because there was a lack of availability of the raw material pellets, which is used in their burners. Baga Water Technology is still limited in their internationalization as their products are too developed for countries with warmer climates than Sweden. This signifies that different environmental technologies might not be suitable for the international markets, due to differences in standards across markets. Similarly, Malmberg experiences that their biogas-business is not cost-effective in relation to traditional technologies and are therefore contingent on government subsidies to enter other international markets. In line with this, Dunning and Lundan (2008) argues that locational advantages such as institutions, regulations, and norms can be influential in determining the appropriateness of a firms’ product on a specific market. Thus, the locational advantages of institutions, regulations, and business practices aimed at environmental sustainability, as well as general environmental awareness of a market, might be a determinant of the applicability of
Swedish cleantech technology in certain international markets. This further emphasizes the importance of governmental policies and institutions in the internationalization for Swedish cleantech firms.

When it comes to the strategy of internationalization, most companies used distributors to sell their products in the foreign markets. Airwatergreen, Anonymous company A, Ariterm, TTM Energiprodukter and Wapro all uses distributors. However, Baga Water Technology and Malmberg use other entry modes. Thus, there is some support for existing theory as many companies seem to utilize exports to start with (Johanson and Vahlne, 1977; Knight and Cavusgil, 2004; Oviatt and McDougall, 1994). According to Knight and Cavusgil (2004), this can be explained due to inexperience of the firm and limitations of resources. All the firms in this thesis experienced limited resources due to the small nature of the firms. However, many of the companies had fairly long experience of international markets and were inherently opportunistic about international business opportunities. Therefore, the internationalization strategy is more likely contingent on risk-aversion and sales-fluctuations than pure financial restraints. Many companies mention that due to changes in politics, sales tend to fluctuate and thus creates an instability in the foreign markets. The mindset of risk-aversion therefore seems to be a determinant of the choice of strategy. Carvalho et al. (2012) argue that governments are generally increasing the focus on the environment and creating favorable conditions for cleantech. While several companies in this thesis agree that this can positively influence the sales, the unstable nature of such governmental policies also seems to inhibit the companies from taking the step from the distributor-model.

According to theory, the network of a company is an important aspect of the internationalization strategy. Coviello and Munro (1997) argues that network relationships provide the basis of market entry. This is supported by the findings of this thesis, as multiple companies made their initial internationalization through contacts. However, none of the companies have been controlled in subsequent internationalization by the network, as suggested by Coviello and Munro (1997). The internationalization strategy has however been influenced by the network as suggested by Agndal and Chetty (2007), in terms of both entry mode and choice of market. This was observed in several cases in this thesis, as both Airwatergreen and anonymous company A entered their first market through existing contacts. Wapro also suggested that their internationalization was influenced by the network, but they exhibited a more rational approach where they selectively established the relationships needed. This is more in line with the view on the rational use of the network as suggested by Johanson and Vahlne (2009) and Chetty and Blankenburg Holm (2000). Therefore, while the network is an important aspect of the internationalization of the firm, it seems that the degree to which it is important differs between firms. Essentially, the network can influence the internationalization, but this is contingent on the managers view of the network’s importance.
5.2 Drivers

Theory suggests that firms internationalize due to profit and growth goals as well as the fact that the domestic market of a firm is too small to match the growth goals of the firm (Johanson and Vahlne, 2009; Korsakiene, 2014). This is supported by the findings of this thesis as the primary drive of all firms was to achieve sustainable growth. This is quite expected as growth is a natural assumption, as mentioned by Johanson & Vahlne (1977), and something most of the interviewees mentioned as an underlying factor for the willingness to internationalize. Similarly, a majority of the companies also argued that the Swedish market was too small for the firm to achieve this goal. Moreover, the fact that the domestic market is seen as too small by the companies may derive from the fact that all the interviewed companies are selling industrial products. There might simply not be enough customers due to the fact that the products are industrial.

Therefore, the competition in Sweden might make it hard to increase the market share in the domestic market, and make it a natural step for opportunistic firms to internationalize. This is supported by the fact that the CEO of Baga considered that the company would have difficulties to increase the market shares in Sweden as they already had close to 20% of the total market. However, this logic could also be applicable in other cases of the Swedish cleantech sector.

The current research on the influence of environmental policies from governments on the cleantech sector suggests that it is a highly influential driver of the sector (Boons et al. 2013). This is supported by the findings, as three companies considered governmental subsidies and environmental institutions to benefit them, and yet another firm said they potentially could benefit from them. At the same time, all these companies had also experienced problems with governmental subsidies and institutions due to shifting politics and focus. However, due to the shifting politics and nature of governmental subsidies, the companies also sought to diversify by entering more markets and stabilize the sales, thus giving credence to the views of Hilmersson (2014). This stabilization of sales and getting more consistent sales numbers is recurring in the findings of this thesis, even for companies that did not consider governmental subsidies to be a driver. While it is of course a driver tightly connected to the sustainable growth goal driver previously discussed, it also signifies that the market of cleantech is inherently unstable, particularly within some fields of cleantech. In this specific case, the desire to stabilize sales seems to be a risk-aversion behavior of the managers of the cleantech firms, thus providing substance to claim that risk-aversion is a driver of internationalization among Swedish cleantech firms. However, this trait is most likely not tied directly to cleantech, but rather industries where sales might fluctuate a lot in different markets.

The findings in this thesis suggest that the network of a company is an early driver of internationalization, which is in line with the network perspective according to Coviello and Munro (1997). Also, several of the companies rationally utilized the network when expanding as suggested by Chetty and Blankenburg Holm (2000). Airwateregreen, anonymous company A, and Baga were all driven to specific markets as well as to use a
specific entry mode in their first international expansion. However, the companies have not been explicitly steered or driven in their internationalization due to the network. The companies have rather been utilized the network as a tool to internationalize, which suggests that other drivers are actually more important in the initial decision to go international. Growth orientation and small home market as previously discussed are examples of such drivers. Furthermore, managerial drive and an opportunistic view of internationalization can be seen as underlying drivers which are the basis and reasons for why the network driver is then exploited. Most companies have exhibited opportunistic behaviors and all companies are actively looking for new markets to internationalize into which suggests that the decision-makers have a drive to internationalize. Since all the companies in this thesis already have internationalized and thus have managerial drive, this could provide insight into the problem of low internationalization and commercialization of Swedish cleantech. Lack of managerial drive and a non-opportunistic view of internationalization could potentially be the result of lack of knowledge of how to conduct international business, which according to Johanson and Vahlne (2009), would inhibit internationalization.

Several researchers have argued that unique knowledge and competence is a driver of internationalization (Dunning, 1980; Knight and Cavusgil, 2004; Korsakiene, 2014). Most of the responding companies considered themselves to have unique knowledge of some form, for example by being innovative and having a unique product. Mostly the companies pointed out that the technology utilized in their products was the best available on the market. Interestingly enough, some of the companies mentioned that their products could not compete with more traditional or competing technologies, and while they had belief in their product, they were competitively disadvantaged to substituting products. So, while superior technological advancement in some industries in the cleantech sector provided competitive advantage and acted as a driver, others were disadvantaged because of the very nature of the business. Thus, the arguments of Dunning, (1980); Knight and Cavusgil, (2004); and Korsakiene, (2014) is validated to some extent. The renewable energy sector seems to be the sector most disadvantaged as competing technologies were more competitive. This is because the renewable energy products provided the buyer with more social value, such as less environmental impact, but had a large initial investment cost and did not provide sufficient financial payback without subsidies. Thus, the arguments of Del Río González (2005) seems to be valid, that cleantech needs to become more cost-competitive. However, this is an industry in which there also exists a lot of governmental policies which promotes renewable energy (Lv and Spigarelli, 2015).

Governmental policies and institutions seem to have had a very significant impact on some companies in this thesis, specifically the companies’ active in the renewable energy industry. Governmental policies, specifically in the form of subsidies, but also of a regulatory nature, have been a driving force in which markets the companies are looking to further expand into. These policies provide multiple cleantech companies with a competitive edge, as they have promoted products which provide a social value such as environmental benefits. Either the costumer has been subsidized the additional
cost of the cleantech product, or they have invested in such products due to regulations. Thus, this thesis supports the arguments of previous cleantech research, that governmental policies and institutional environments are enabling factors of the cleantech sector (Boons et al., 2013; Costantini and Mazzanti, 2012; Demirel and Kesioud, 2011; Lv and Spigarelli, 2015). However, as mentioned earlier in this analysis, the institutional environment is a double-edged sword, and acts as a constrictor of international business and cleantech. This is because the removal of subsidies and regulations has a destabilizing effect on the cleantech sector. This is in line with the arguments of Boons et al. (2013) that considered the institutional environment of certain countries to have a negative effect on cleantech businesses. The difference between the findings of this thesis and Boons et al. (2013) is that a connection to the politics of certain countries has been noticed. Several companies have experienced the government’s policies of a market as initial drivers of internationalization, but then also experienced them as a barrier of internationalization in a later stage. Thus, emphasizing the metaphor of governmental policies and institutions as a double-edged sword.

5.3 Barriers

The theory of the Uppsala model presents that psychic distance is a barrier. Psychic distance consists of language differences, degree of education, business practices, cultural aspects, and industrial development (Johanson and Vahlne, 1977). It is clear that language differences play an important role as a barrier for firms internationalizing. Five companies in the thesis agreed with this and found language specifically to be an influential barrier in internationalization. Also, culture was influential when deciding which market to target and whether to target a specific market. Furthermore, for both Ariterm and Wapro, business practices had been perceived as somewhat constricting as other business practices could take longer and be more complicated. However, industrial development was also mentioned, out of context, as somewhat influential, but it was not outlined as a barrier specifically. Markets lacking the necessary industrial development were simply not considered by the companies. The degree of education was not mentioned at all as this was not seen as a determinant for the success of their operations. Nevertheless, the Uppsala model bears a lot of applicability from the perspective of barriers in the internationalization of Swedish cleantech firms. The three influential barriers language, culture and business practices would according to the theory cause uncertainty, which seems legitimate in these findings as well.

Kahiya (2013) argued that firms lacking knowledge and expertise, risk perception as well as having poor management of developments in the market were largely dependent on gradual internationalization. This claim does not seem applicable in the cleantech field of business. Ahi et al. (2017) found in their research that most SMEs tend to internationalize incrementally, which is in line with the results of the interviews conducted. However, Ahi et al. (2017) argued that this was due to incomplete knowledge and a lack of experiential knowledge. Contradictory to this view, most of the interviewees had a vast international experience and had previously been assigned to international tasks in previous positions. Nevertheless, the firms did to a large extent
internationalize gradually. This, however, seemed to be the strategy of the firms’ due to lack of financial resources and risk aversion.

All the companies in the thesis expressed financial resources to be important when deciding how to internationalize. This goes in line with Korsakiene's (2014) view that firms tend to view lack financial resources as constricting when internationalizing. Also, some authors argue that economic barriers are the most important barriers (Nijkamp et al., 2001; Trianni et al., 2016). Therefore, the internationalization simply had to be done gradually as the resources were allocated in a structured way to target particular markets. This goes in line with Dunning's (1988) view as he argues that it is easier for larger firms to internationalize as they have more resources to devote to the international operations. Kanda et al. (2016b) found that municipal cleantech companies also experienced limited resources to be inhibiting, but that other factors seemed more influential, such as market differences. The companies in their study were also between 81-969 employees, while the size of the companies in this thesis was between 8-160 employees. The ownership is also inherently different, since their companies are owned by the government, while our thesis regards private companies. This could potentially be a factor which explains the differences in these two studies.

Another barrier to internationalization was argued by Kanda et al. (2016b), when conducting a study on municipality owned cleantech firms, to be exhaustive administration. In the case of this thesis all the companies mentioned that administrative tasks like documents and certifications were increasingly complex in foreign markets. This strengthens the view of administration as an important barrier when internationalizing. However, it was argued through some of the interviews that this is a matter of learning and adapting in order to make this more efficient. Moreover, the view of national regulations and local laws by Oviatt and McDougall (1994) seems applicable when looking at barriers for cleantech companies. Partially due to the fact that the majority of the companies mentioned administration to be affecting them, but also due to the fact that several companies mentioned national standards and documentation to be barriers in their internationalization process.

According to Owen (2006) renewable energy technology is not cost-competitive compared to traditional energy sources. Anonymous company A specifically mentioned that they cannot sell their products by simply offering the best price to the customers. Their view was consequently to offer a whole package where they had more efficient machines, less noise, better operationality and more security in their frequency converters. Therefore, it is further argued by Owen (2006) that there is a need of governmental subsidies in order to make the technology competitive. Both Ariterm and Malmberg in the renewable energy sector mentioned a need for subsidies which makes the claim of Owen (2006) seem accurate. Anonymous company A however, did not need subsidies to sell their products, but they mentioned that increased taxes on fossil fuels would be beneficial for them. In some sectors, for example in the biogas sector and the air heating industry, there were subsidies which occasionally fostered an increase of sales for Malmberg and Ariterm. However, these firms have also
experienced these governmental policies as a double-edged sword as previously mentioned. Moreover, Olbrich and Witjes (2014) and Carlsson (2006) states that fast changing decisions made by institutions can act as barriers for companies in the cleantech sector. This view is enhanced when interviewing Ariterm, Malmberg and Baga who all have suffered from changing political mind-sets. For example, the market of Finland to a large extent disappeared for Baga, when regulations regarding wastewater were reduced. These findings suggest that certain industries and products within the cleantech sector are more inhibited by institutional barriers than others. Thus, there is a pattern of very specific institutional barriers for parts of the cleantech sector.

Dunning (1988) is the first one in the theoretical chapter presenting industry competition as being a barrier towards internationalization. Kosakiene (2014) fosters this view by presenting the same argument regarding SMEs. This seems to be accurate when analyzing the results of the interviews as Airwatergreen, Ariterm, TTM Energiteknik, Baga Water Solutions, Wapro and Anonymous company A mentions that there is a big competition in the foreign markets. This means that all companies in the thesis expressively mentioned industry competition to be an influential factor in internationalization. Most of the companies stated the competition to be tough and that it has grown since they started their internationalization. This provides basis to believe that competition is an influential barrier for these firms.

Furthermore, barriers such as uncertainty from the customer, finding competence and personnel, logistical difficulties, and differing customer behavior were also found in the empirical findings. This supports findings in previous research as these have all been discussed in the theoretical chapter. However, since these barriers only have been brought up in single instances, they do not seem to hold any particular relevance to the sector of cleantech, while still not denying their influence for firms’ in general. Therefore, they are not considered to be specifically important to the results of this thesis.

5.4 Internationalization decisions
One aspect of the internationalization decisions and management of different problems in the internationalization process is previous experience of international business. A majority of the companies specifically mentioned that previous experience was essential in order to deal with a variety of issues. Specifically, administrative issues are easier to deal with, cultural and language aspects are easier to understand, knowledge of business practices makes it easier to position the product, and previous international experience provided viable contacts. Theory suggests a positive relationship between managers’ knowledge and experience on the internationalization decisions (Coviello and Houlden, 2005; Johanson and Vahlne 2009). This is reaffirmed by the findings of this thesis. The cleantech firms in this thesis have all emphasized and identified previous experience and specific knowledge as important, although in different ways. Also, it is evident that learning is an important aspect of internationalization decisions. All the companies have learned how to identify potential problems that may exist in the internationalization process. This signifies that learning increases the management’s ability to take decisions
regarding how to approach the internationalization process. For example, companies standardize the internationalization process to some extent, by establishing routines of how to deal with administrative issues or establishing market evaluation criteria’s. This also gives credence to the Uppsala model, which suggests that learning is an essential part of internationalization (Johanson and Vahlne 1977).

Theory suggests that managers deal with barriers by adapting the internationalization strategy accordingly (Dunning, 1988). Born global theory further argues that firms will internationalize and then make the adaptations necessary (Knight and Cavusgil, 2004). Adaptations were also emphasized in the findings of this thesis, as a majority of the companies argued that there was a great need for adaptations in some capacity. Most frequently mentioned were product adaptions which made the product sellable in a specific market. It is therefore clear that the cleantech companies in this thesis have managed barriers associated with product standards and made internationalization decisions by adapting the product. This could signify a problem for cleantech companies, as these products are often inherently different than more traditional technologies, and could therefore face more problems with standards. However, the more likely case is that markets simply differ when it comes to standards and regulation, and therefore any company with industry products faces problems with regards to standards. Leonidou (2000) argued that firms with industry products faced less substantial barriers with regards to standards than other products. However, this seems contradictory since most companies face the problems of standards, despite having industry products. Furthermore, a number of companies had also focused on adapting their internationalization strategy, either in order to increase growth, or simply to enable internationalization to specific situations that arose. An interesting aspect is that companies seemed to make the internationalization decision first, and then managed the different problems that arose by adapting their strategy to fit the circumstances of the situation. This is in line with the arguments of Knight and Cavusgil (2004).

Furthermore, an important aspect of internationalization decisions is how the Swedish cleantech firms in this thesis actively utilize risk-analysis. It seems that risk plays a large role in the internationalization decision, albeit in different aspects of the internationalization process. Some focus more on the risk that certain markets pose, while others analyze risks more actively with regards to what mode of entry is the least risky. Kahiya (2013) argued that risk is a barrier which influences the internationalization of companies. While that argument can be considered supported, it is also clear that risk-analysis is a way of managing barriers, by basing the internationalization decision on those risks. For example, barriers such as the punitive legal system of the USA, long distances between customer and company, and complicated transports, were all barriers the companies managed by altering the internationalization strategy. What once again becomes apparent is that companies manage certain barriers by adapting their internationalization strategy, in line with the arguments of Knight and Cavusgil (2004). Another aspect to consider is that both risk-analysis and adaptations are done due to managerial drive, which all companies have exhibited. Thus, managerial mindset is not only a driving force of internationalization as
argued in the previous section regarding drivers, it is also a way of overcoming certain obstacles. While some specific barriers are inhibiting the entrance into certain markets, the managerial mindset and drive to internationalize leads the company to simply focus on other markets and opportunities.

An interesting finding that has emerged in this thesis is the fact that several companies have utilized the government institution, Business Sweden, when internationalizing. While several companies emphasize that Business Sweden can be helpful to acquire contacts in foreign markets, others argue that they cannot provide help that will benefit the company. According to Kanda et al. (2015), Swedish institutions are somewhat ineffective in promoting increased exports within the cleantech sector. Some companies agreed with this assessment and that Business Sweden could not provide them with sufficient support. Nonetheless, the findings in this thesis also suggest that Swedish cleantech companies can receive aid from the Swedish governmental institutions. However, the effectiveness of the aid that Business Sweden provides seems to be contingent on how the firms’ value this help, i.e. managerial perception. Moreover, several companies in this thesis utilizes Business Sweden to gain new contacts and expand their network in new markets. This is in line with Coviello and Munro’s (1997) arguments of how firms use their network to manage barriers that might arise. However, instead of using the existing network, they approach a Business Sweden and expand their network and gain market information, which in turn leads to further internationalization.

Theory suggests that resource restraints will greatly impact the internationalization decision of firms (Leonidou, 2000). All the companies in the thesis can be classified as SMEs as they all have less than 250 employees (EC, 2003). The companies therefore had to deal with the fact that resources are not endless, and they must base their internationalization decision on the cost and outcome of the decision. Thus, the theory regarding resource restraints impact on the internationalization decision is supported by the findings of this thesis. However, several companies argued that while financial restraints impacted the internationalization decision as described above, they also argued that limited resources were due to the company strategy. Wapro and Malmberg specifically mentioned that the smaller company profile was an active choice. Airwatergreen considered financial resources to not be a significant issue, as their internationalization went at a desired pace. Thus, even though financial resource restraint may impact internationalization decisions, several companies did not view it as a problem, but rather just the reality of the situation, similarly to the view of Perks and Hughes (2008). Moreover, to deal with the problem of resource restraints, companies adapted their internationalization strategy accordingly, in line with the arguments of Dunning (1988) and Knight and Cavusgil (2004).
6. Conclusion

In the following chapter conclusions of this thesis are presented and discussed. The theoretical implications as well as the practical implications of this thesis are also discussed. Lastly, some suggestions for future research are presented and argued for.

6.1 Answering the research question

Fast economic development and overconsumption has led to large environmental issues which is impacting the world's health. The problem is largely due to the inefficient use of resources and dependence on fossil fuels. Sweden is a world leader in the field of cleantech but has despite this not managed to commercialize or internationalize comparatively to the competitive advantage. There is therefore a great need to understand the reason for this failure of Swedish cleantech firms’ internationalization. The purpose of this thesis has been to investigate, and therefore get a greater understanding of the internationalization process of private Swedish cleantech companies. Consequently, this thesis has been conducted to answer the following two research questions: (RQ:1) What are the barriers and drivers in the internationalization of private Swedish cleantech firms? And subsequently: (RQ:2) How are the barriers and drivers influencing the internationalization decisions of private Swedish cleantech firms?

(1) The first research question regards whether there are specific barriers and drivers influencing the internationalization of private Swedish cleantech firms. Concerning the drivers of internationalization, the conclusion of this thesis is that basic drivers such as profit and growth goals as well as managerial drive are the basis of internationalization. The reason for entering international markets is because the Swedish market is too small to achieve a steady growth. Barriers to internationalization were many and varying depending on the mindset of the manager as well as product of the company. Culture, language, business practices, and exhaustive administration were all barriers that were found to be influential in the internationalization process of Swedish Cleantech firms. However, these barriers are more general and not specific to cleantech. Moreover, the competition within cleantech is considered large and is increasing, and was found to influence all firms in this thesis. As a result, this barrier could be considered cleantech specific. However, competition could potentially also be a driver to new and other markets with less intense competition. Limited financial resources are also a barrier that was found to directly influence the companies in the thesis. It was found to influence the sector as it acted as a constricting factor in the internationalization due to the impact it had on decisions made and the strategies of the firms. As a result, we argue that the lack of financial resources is inhibiting the international success of the sector and therefore is a cleantech specific barrier. Furthermore, we found evidence that renewable energy companies seem to experience large difficulties due to governmental policies and institutions. These have acted as both drivers and barriers and have affected renewable energies specifically. Moreover, product standards are limiting cleantech companies to specific markets, as the products are only suitable for specific markets. This essentially shows that there are barriers that affect specific industries within the
cleantech sector as well, and thus complicates the identification of barriers specific to the cleantech sector as a whole. Hence, our thesis concludes that limited financial resources and competition affect Swedish Cleantech specifically. Government policies and institutions influence specific industries within cleantech, and barriers such as language, culture, and business practices affect internationalization for firms in general.

(2) The second research question, of how barriers and drivers influenced the internationalization decisions of Swedish cleantech firms, followed naturally since it is a direct effect of the barriers and drivers experienced by these firms. Culture, business practices, large geographical distances, limited financial resources, governmental regulations and policies, and standards all affected the internationalization decision of Swedish cleantech firms. These barriers have been overcome by the drivers of growth goal, limited size of the home market as well as managerial drive. The firms’ have also learnt how to deal with such issues, thus making certain issues less important the more internationalized a company is. In relation to learning, the companies have also made necessary adaptations that they have needed to do to enter international markets. Furthermore, according to the findings in this thesis, risk-aversion is not a barrier, but rather the source of specific internationalization decisions of Swedish Cleantech firms. All the cleantech firms in this thesis have been smaller firms and have experienced limited financial resources to have influenced the internationalization decision. This limitation in financial resources, similar culture, business practices, market standards, and risk-aversion have resulted in an incremental approach to internationalization. Choosing markets close to the home market has ensured that the cleantech products have fit the market, and that the companies have large control of the operations. It is also clear that risk-aversion has influenced Swedish Cleantech companies to use a distributor export model. Therefore, we argue that risk-aversion and limited financial resources is the largest reason for the use of an incremental approach. For some companies, governmental policies and market standards have also been elements in the decision to use an incremental approach. We also conclude that managerial drive and a small home market is the essence of why Swedish Cleantech firms make the decision to internationalize. Therefore, we suggest that a reason for the lacking international success of Swedish Cleantech can be that managers lack the drive or knowledge to internationalize.

The conclusion of this thesis is therefore that a variety of barriers and drivers are influential in the internationalization decision, and that Swedish cleantech firms generally use an incremental approach to internationalization. The main reasons for Swedish cleantech firms internationalizing their operations were found to be growth goals and managerial drive. Two specific barriers experienced by all cleantech companies in the thesis were found as well, namely limited financial resources and competition in the cleantech sector. This is highly interesting and it fosters our view that Sweden has too many small firms with limited resources which does not allow them to compete sufficiently in the international markets. Sweden is technologically one of best countries in the world regarding cleantech according to several studies, but the amount
of exports is low. As illustrated by figure 6, there are inherent differences in the constellations of the companies in different countries.

<table>
<thead>
<tr>
<th>Table 5: Cleantech by country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country -&gt;</strong></td>
</tr>
<tr>
<td>Export Performance</td>
</tr>
<tr>
<td>Number of companies</td>
</tr>
<tr>
<td>Number of employees</td>
</tr>
<tr>
<td>Employees per company</td>
</tr>
<tr>
<td>Total exports / number of companies (EUR)</td>
</tr>
</tbody>
</table>

Source: Own model based on the research of Kanda et al. (2016b)

This leads us to believe that the Swedish companies in general are too small and lack financial resources and managerial drive to expand to international markets. As a result, this hinders internationalization. The large competition also suggests that the smaller companies in Sweden have a hard time gaining market shares against the bigger international companies. These elements together, leads to the lack of Swedish success in the international markets.

6.2 Theoretical implications

The sector of cleantech is fairly new and the first use of the concept started in the early 2000's. The sector has developed due to increased focus on environmental sustainability in the world, because of the climate changes and the global warming all over the globe. Consequently, research in the sector is limited. There have been studies regarding governmental impact and governmental promotion on the internationalization of the field as this, in some sectors, is very important for the growth of cleantech. Yet, research on the internationalization process of Swedish cleantech firms is largely underdeveloped. The aim of this thesis was to bridge that research gap and we have thus researched the various barriers and drivers, as well as how these have influenced the internationalization decisions of private Swedish cleantech firms.

The findings of the thesis demonstrate that a number of barriers and drivers are influencing internationalization of Swedish cleantech. All of them have been identified in previous research and internationalization theories. However, two barriers, namely financial resources and large competition in the field seems to directly relate to the cleantech sector. This enhances their importance and influence within this sector. To specific industries within the cleantech sector, governmental policies and market standards have also been found to be very influential, signifying differences in the cleantech sector as a whole. Moreover, profit-goals, managerial drive, and a small home market have been found to be the most influential drivers of internationalization. By specifying cleantech-specific barriers and drivers the thesis has contributed to the field
of research of these firms. In figure 7 we illustrate the results of this thesis and how they have impacted our original theoretical framework.

![Diagram](image)

**Figure 2: Updated conceptual framework**  
*Source: Own model based on the theoretical framework and empirical findings*

Figure 2 has been updated with new constructs and the importance of others have diminished. For example, institutional environment was found to influence the energy efficiency field greatly but other fields were not affected particularly by it. However, the size of the firms seems to influence the success in the international market and is therefore important to add to the figure. Furthermore, specific barriers and drivers have been added as their importance were significant on the Swedish cleantech sector as a whole. These constructs together influence the internationalization decisions made and consequently the success of the firms in the international markets.

### 6.3 Practical implications and recommendations

Our empirical findings enhance the importance to investigate the absence of the international success for Swedish cleantech firms as some of the interviewees expressed a need for research about Swedish Cleantech. Moreover, all the firms had a large drive to internationalize and viewed internationalization through an opportunistic lens. Therefore, we found that the companies in our thesis were not limited due to lack of managerial drive and that this is an important aspect of internationalization. Another conclusion is that there exist many barriers in the internationalization process of Swedish cleantech firms, and that each firm needs to find a way to overcome them. By understanding the different variables and learning from previous examples we feel that Swedish cleantech companies can become more successful in their international operations. Therefore, an increased knowledge and understanding about the barriers and drivers affecting cleantech firms in their international operations can help firms in their future internationalization.

The recommendation for Swedish cleantech companies is therefore to acquire knowledge about the experiences of previous companies. This knowledge can be
acquired from our thesis and previous research to some extent. They can also use their network to obtain knowledge and valuable information from companies that have experienced the international markets. Another suggestion is to hire competence with previous experience of international operations. Furthermore, Business Sweden is another source of contacts and knowledge about international markets, which can be beneficial for firms in their early internationalization.

6.4 Limitations
When conducting the interviews with companies from various fields within the broader concept of cleantech we understood that barriers and drivers were in some cases very different within these fields. For example, the renewable energy sector was to a large extent driven by subsidies which is both a barrier and a driver that companies in other fields were not affected by. Therefore, studies within each of the many sub segments of cleantech could improve results and give more detailed information about barriers and drivers for each sub segment. Our results are therefore presented as cleantech specific which applies to all companies in this sector unless otherwise is stated. Another limitation was that the companies in the thesis were active in the international market to different extents. Some companies were active in around 30 countries while others were only active in a few. However, this structure was chosen to get a wide perspective of the field and not only include some parts of the whole population. In cases where all companies are more equally committed it could be easier to draw general conclusions of the findings.

6.5 Suggestions for future research
Since the research in the field of internationalization of cleantech firms in very limited there are many potential research areas that could be interesting to deepen the knowledge about. However, some suggestions would be more influential and contribute more in our opinion.

(1) To investigate what barriers and drivers influenced the internationalization of either Danish, Norwegian or German firms.
Since countries such as Denmark and Norway, as well as the larger market Germany, are more successful overall in their exports of cleantech products it could be interesting to see if there are different barriers and drivers affecting these firms. By doing this, answers could be found to how or if they are different from the barriers and drivers experienced by Swedish firms.

(2) To investigate how large Swedish cleantech firms (250+ employees) are expanding their operations in international markets.
By looking at the internationalization of MNEs it can be found how these firms have managed to be successful and expanded their operations to become a large company. This information could be guiding smaller firms in their internationalization process to avoid mistakes when internationalizing and implementing strategies that are proven effective and successful.
7. References

Articles, Books and Reports


**Online Sources**

http://www.business-sweden.se/Export/tjanster/ [2017-03-26]


Interview participants

1. Månsson, Anders, Communication Director at Malmberg AB, telephone interview, 2017-04-19
2. Lundegårdh, Staffan, Chief executive officer at Ariterm AB, face-to-face interview, 2017-04-25
3. Anonymous company A – Chief executive officer, telephone interview, 2017-04-26
4. Larsson, Torgny, Chief executive officer at Wapro AB, telephone interview, 2017-04-27
5. Tunberg, Fredrik, Head of sales and marketing at Airwatergreen, telephone interview, 2017-04-28
6. Davidsson, Magnus, Chief executive officer at TTM Energiteknik, face-to-face interview, 2017-05-02
7. Pettersson, Hans, Chief executive officer at Baga Water Technology AB, telephone interview, 2017-05-03
Appendices
Appendix A – Interview guide

General Questions

1. Do you wish to be anonymous?

2. Is it okay if we record this interview?

3. Can you describe yourself in short? (What position do you hold? How are you working with the international market? How long have you been with the company?)

4. Can you describe the company in short? (How many employees? How many of these are working towards the international market? How long have you been internationally active? What is your main product? What markets are you currently active on?)

Internationalization

5. What was the first market that you entered outside of Sweden?
   • Why did you choose this market?
   • Did you actively decide to expand to close markets first?
   • How did you choose markets after the initial establishment?

6. What mode of entry did you utilize when you first entered the international market?
   • When you entered other markets, did you use the same strategy?
   • If you changed strategy, why did you change?

7. Would you consider previous experience of international expansion to be important?

8. How do you consider the competition within cleantech to be in the international market?

Drivers of internationalization

9. What factors was the driving force for your company to go international?
   • Were there any more factors?
   • Would you consider any of these factors to be of more importance?

10. Did these factors affect your choice of market in further international expansions?

11. Would you say that relationships with other actors has helped you in your international expansion?
12. Are you actively searching for new markets to enter?

**Barriers to internationalization**

13. Did you face any particular obstacles in your international expansion?
   - Were there any more obstacles?
   - Were any of these problems of greater significance that others?

14. Did you do anything specific to manage these obstacles?

15. Have you experienced any particular problems with government policies or institutions in the international market?
   - Do you feel like you are able to receive support from Swedish institutions to conduct business abroad?
   - Have international environmental agreements impacted you in a specific way?

16. Has limited resources been a problem for you in the expansion phase? In that case how?

17. Is there a specific demand for environmental products in the international market?
   - Would you consider any specific markets to be more interested in your products than others?

18. Would you say that it is hard to position yourself internationally?

19. Would say that the expansion problems have become less significant since your first expansion? In that case, how?

**Concluding question**

20. Do you have anything more to add on the subject?