CHALMERS

Developing a process for assessing market attractiveness in emerging industries and evaluating its usability

Master of Science Thesis in the Master Degree Program Management and Economics of Innovation

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Göteborg, Sweden, 2011
Report No. E 2011:004

Abstract

This thesis uses Grant's Framework for strategy analysis as well as additional concepts to put together a process to be used for evaluating and assessing attractiveness within of different country markets within emerging industries. This has been done since the authors could not find any existing framework fit for use in emerging industries with their specific conditions such as lack of a dominant product design and unclear industry structure compared to for example a mature industry.

The process for assessing market attractiveness consists of three main parts. First, the process consists of an external part that employs concepts from Porter's Five Forces together with examining Complementarities to evaluate the external attractiveness of geographical markets. Secondly, a Resource Based View perspective is employed to assess the organization's relevant internal strengths and weaknesses in the relevant markets using self assessment as well as problematizing questions to be answered by employees. The third part is a questionnaire that is used to map and identify customer needs within the emerging industry. The findings from these three parts are then combined in an analysis and all evaluated markets receive an attractiveness rating that reflects their believed relative attractiveness for the organization to enter.

The developed process has been developed and evaluated using a case study of ABB Cewe-Control during the summer and fall of 2010. The task was to assess relative market attractiveness for a number of European markets within the emerging industry of charging units for electric vehicles that the company considers entering. The industry of charging units is closely related to the electric vehicle industry, hence a complementary industry, which is currently emerging on a global basis with several electric vehicles (EVs) being launched at this point in time.

The authors were strengthened in their belief that the importance of conducting a thorough analysis of complementarities as well as the overall suitability of using Porter's Five Forces Framework for analyzing the external environment of the firm. However, for the internal perspective in the analysis, the authors found that the mapping of internal strengths and weaknesses for the Resource Based View perspective depended on the cooperation of employees at the organization in focus. Due to for example organizational politics, this can be hard to achieve as employees are asked to rank their own capabilities and performance. The conclusion is that this kind of study needs to be anchored within top management of the organization.

The findings from the case study at ABB Cewe-Control suggest that the process is well suited for its purpose although with some minor tweaks and methodological adjustments.

Acknowledgements

First and foremost we would like to thank our Chalmers supervisor Magnus Holmén. Mr. Holmén has given us valuable input and feedback throughout the work with this thesis, especially the methodological aspects. Not only have our meetings with Magnus useful and critical to our success with this thesis, but they have also been very joyful and fun. Secondly, we would like to thank our supervisor and project leader at ABB Cewe-Control – Björn Lager. Mr Lager has showed great enthusiasm as well as patience with our work at ABB. We have received great support in our work in all aspects and Mr. Lager has also very helpful in meeting our demands. Mr. Lager has also entertained us during evenings and shown us the town of Nyköping, where ABB Cewe-Control is located. Third, would like to thank Stefan Arvidsson, the Manager of Product Management and Development at ABB Cewe-Control, for accepting and allowing us to work at ABB during the summer of 2010 and then to conduct our master´s thesis at the company. Mr. Arvidsson has been very accommodating and flexible in his approach to us and this assured a good and satisfying result of our work for both parts. Finally, we would like to thank several employees at ABB that has been very helpful towards us, your cooperation was vital for the success of this thesis. This includes Peder Tjäderhane, Jenny Miltell, and Hector Zelaya De La Parra.

Gothenburg, January 2011

Marcus Brattås and Filip Sandung

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1 Introduction

In this section the background, the aim, the purpose, the limitations, and general outline of the thesis are presented.

1.1 Background

This thesis was initiated because the authors had an interest in the industry of electric vehicles and their associated charging infrastructure. In addition, the authors did a summer project employment at ABB Cewe-Control in Nyköping, Sweden where their task would be to conduct a market outlook for charging units in some European markets. This industry is seen as very interesting due to several reasons, not the least because of the environmental problems the world are faced with and electric vehicles possibility to reduce mankind's emissions of greenhouse gases. However, when attempting to analyse the electric vehicle industry, the authors found that while there are existing frameworks for analyzing *emerging industries,* these are not directly applicable to managerial or strategic questions but focuses on policy implications. No framework or method for analyzing these industries, such as the emerging electric vehicle industry, and evaluating different geographic markets that a company with limited resources has to prioritize between were found and this made the subject interesting for us.

Emerging industries are newly formed industries that have been created by innovations, emergence of new consumer needs or other economic or social changes that creates a new business opportunity. These characteristics give emerging industries several distinct features that separate them from established industries, for example be lack of a clear market structures or a of dominant product design. Such factors greatly increase the risk and the uncertainty for companies wanting to enter and engage in the industry. However, these emerging industries also come with several attractive features such as high profit, a growing customer base or the opportunity for an early mover to set a de facto industry standard. Naturally, an industry can emerge in several geographical markets or regions simultaneously, and this further gives organizations a more complex situation to scan and analyze when assessing their strategic options in an emerging industry. (Porter 1980)

The authors of this thesis had not found any suitable frameworks or models to be used when assessing and analyzing emerging industries from the perspective of established firms wanting to launch products on such markets. There are many frameworks and models for analyzing strategic options or opportunities in industries *in general*. However, it is believed that these frameworks or methods are not fully appropriate when taking into account the special characteristics found in emerging industries. Against this background, the authors identified a gap in the literature and set out to develop and test a process for assessing market attractiveness in emerging industries.

During the employment in the summer of 2010 at ABB Cewe-Control in Nyköping, Sweden, when the authors were working on assessing market potential for electric vehicle charging units in a number of European markets they gained some valuable knowledge and experience in one such emerging industry. This project made the authors curious about how to assess market attractiveness when launching a product in an emerging industry, not just considering the market potential. The electric vehicle charging unit industry will be used as first hand input to evaluate the usability of the process with a case study. By evaluating the usability of the process on an actual case it will increase the likelihood of being practically usable, which is one of the main desires from the authors. For the rest

of this thesis, ABB Cewe-Control will be referred to as ABB. When other parts of ABB is referred this will be stated explicitly, for example ABB Low Voltage in Germany.

1.2 Purpose

The purpose of this master's thesis is to propose a process for assessing market attractiveness in emerging industries and to compare different regional markets' relative attractiveness.

1.3 Limitations

This thesis has some very clear limitations, which now will be addressed.

The process is also supposed to be used when assessing market attractiveness from the viewpoint of an established firm active in industries and markets outside of the ones in the scope of the process. Another important limitation is that the developed process will be used to assess the *relative* attractiveness of the various markets in the study, which is their attractiveness compared to each other. The process is intended for organizations with limited resources, which means that they cannot afford to enter all markets within the emerging industry simultaneously and hence must prioritize between them.

Another limitation is that the process is supposed to be used in practice, and therefore the aim of the development of the process has been to ensure that it would work in practice. Hence the process has been created keeping a practitioner's view in mind.

1.4 General Outline

The outline of the thesis is as follows:
In the second chapter, a literature review will be presented which introduces and explains the various theoretical concepts that is used and discussed in this thesis. The literature review chapter serves as the basis on which the developed process is being built upon. The third chapter describes the methodology used in the writing of this thesis. The fourth chapter is a short one, basically presenting the developed theoretical process as the result of the literature review as well as the methodology chapter. The fifth chapter presents the empirical findings from the evaluation of the usability of the process. The first part of chapter five will present the case study company, followed by some samples of the interview guides used. The last part of chapter five is a presentation of the output of the process.

2 Literature review

This chapter will first give an account of the concept of emerging industries, as the process will be developed for those specific circumstances found in such industries. The second part of this chapter will present the concept of Contextualization that is used in the study. The third part introduces Grant's Framework for Strategic Analysis as well as the concepts that it contains. The fourth part presents the interview method that was used to gather data for the Resource Based View (RBV) analysis. Finally, a method for gathering and understanding customer needs is presented.

2.1 Emerging industries

This part will define what an emerging industry is and what special characteristics that it has. In many analytical contexts as well as in this thesis, the word industry means a group of firms producing

products or services that are close substitutes for each other (Porter 1980). One example is the transport industry where consumers can choose between several different means (substitutes) of transportation such as owning their own car, going by train, bus or by airplane to fulfil their transport need.

2.1.1 What is an emerging industry?

As the aim of this report is to develop a process for analyzing market attractiveness in emerging industries it is important to define the concept of emerging industries to be used in this thesis. In his work *Competitive Strategy* (1980), Porter (p. 215) describes emerging industries as "newly formed or re-formed industries that have been created by technological innovations, shifts in relative cost relationships, emergence of new consumer needs, or other economic and sociological changes that elevate a new product or service to the level of a potentially viable business opportunity." Olleros (1986) writes about emerging industries to arise from not just any innovation, but rather from radical innovations, that is, either discontinuous or disruptive. A discontinuous innovation is when performance or cost is significantly improved by a modification in existing technology base; an example would be a technical innovation that radically improves the printing quality of ink jet

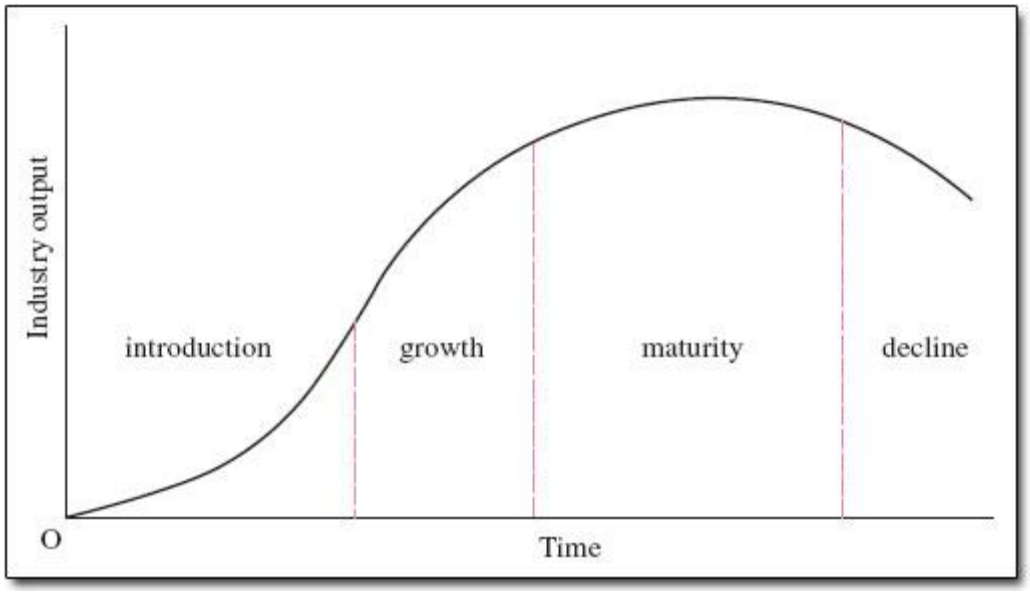

Figure 1 - Industry Life Cycle (Saraswathi, 2010)

printers. A disruptive innovation, on the other hand, is a shift in technology base as for example going from ink jet printers to laser printers. Olleros (1986) further describes how these radical innovations disrupts the status quo in existing industries and tends to undermine existing competences and create demand for new ones. Compared to a mature industry, emerging industries are seen to not be in equilibrium, hence there is no status quo. Sometimes, radical innovations in one industry can create a completely new industry that emerges in parallel to the old one.

The concept of emerging industry can also be related to the Product Life Cycle (PLC) model. The PLC is a very popular model that is widely used by many authors and describes the life cycle of a product or an industry as a curve with different stages, as illustrated above in Figure 1 - Industry Life Cycle (Saraswathi 2010). The total life cycle of an industry is divided into four separate stages; introduction,

growth, maturity and decline. The individual length of the stages varies between industries and the model but is believed to be a good illustration of concepts in an industry.

The first stage of the industry life cycle is considered entrepreneurial and innovative. The sales and profits in the industry are often quite small or even negative; however the growth prospects are high. The competition within the industry usually toughens during the development of this stage as other entrepreneurs realize the market potential and want their share of it (Doyle and Stern 2006).

The growth stage is usually characterized by quick growth of both sales and profits. Market leaders beginning to appear as a result of consolidations and shakeouts of smaller competitors. Consumers are beginning to recognize the industry and some of the bigger players in it (Doyle and Stern 2006).

The concept of emerging industries used in this report will be considered to spawn the Introduction phase and early part of the Growth phase (Doyle and Stern 2006). This is because the description of these two phases as included in the model is believed to match that which is used by the authors such as Porter (1980) and Olleros (1986) in their description of emerging industries as described above.

2.1.2 Characteristics of an emerging industry

As emerging industries arise by innovations, new needs or other shifts in market and demand structure, these industries pose serious challenges for management to work in. This is because the rules for competition are unclear and that there is a lack of a clear market structure. Firms entering the emerging industry are faced with many uncertainties, both in terms of product as well as market structure (Dorf and Byers 2008). MacDonald, in his article *Strategic alternatives in emerging industries* (1985), means that the firm that chooses to enter an emerging industry will find "...that the fundamental strategic ground rules have yet to be established for the first time" (MacDonald 1985, p 159) and that "Firms in emerging industries face indeterminacy rather than structure" (MacDonald 1985, p 162). Porter (1980) also describes how the main competitive problem in an emerging industry is the lack of industry structure and rules. Lack of structure applies to industry actors, that is customers and competitors, but also technological uncertainty. This means that there is possibly great uncertainty about what product configuration that will ultimately prove to become the dominant design. The special characteristics that are found in the emerging industries are believed to impact the methods used for evaluation, as will be further discussed below.

2.2 Market attractiveness

In this thesis, market attractiveness is a wider notion than market potential. Attractiveness includes the dimensions of size, growth, level of competition, legal and governmental aspects (answers.com 2011).

2.3 Contextualization

In order for the researchers to be able to conduct an external analysis of the industry, it is believed a thorough understanding of the industry context is vital before attending the analysis. It is argued that this contextualization mapping of industry actors can be done using the five elements presented by Dorf and Byers (2008):

Five elements of an industry analysis:
1. Name and describe the industry
2. Describe the regulatory, political, and legal issues in this industry
3. Describe the growth rate of the industry and the state of the evolution of the industry
4. Describe the profit potential and the typical return on capital in the industry
5. Describe the competitors in the industry and the rivalry among them

Table 1: Five elements of an industry analysis

This industry analysis is written in a general sense, that is, not specifically for emerging industries, as is the focus in this thesis. When adapting it to an emerging industry environment, Profit potential (element 4) appears to be of less importance since the typical return on capital in the industry is not a valid measurement in the case of an emerging industry, as it is not fully developed and most firms have just entered the industry. Further, it is believed that point two, regulatory, political and legal issues are more important in an emerging industry than in a more mature one. This is because government subsidies and regulations are often important for reaching an industry take off and can play a significant role in its development (Jacobsson and Lauber 2006).

2.4 Grant's framework for strategy analysis

Economic and management literature feature many examples of frameworks for analyzing strategy and strategic options in developed or mature industries. Although this is not exactly the same thing as assessing the attractiveness of an emerging industry, the authors will assume that a workable way of constructing a process for emerging industries is to base it on such a strategy analysis framework. Grant provides a suitable strategy framework to use as a starting point in his book *Contemporary Strategy Analysis* (2010). He views strategy as a link between the firm and its environment as shown below in Figure 2 - Grant's framework for strategy development.

Figure 2 - Grant's framework for strategy development

Grant writes: "The task of business strategy … is to determine how the firm will deploy its resources within the environment and so satisfy its long-term goals and how to organize itself to implement that strategy" (ibid, p 12). This dual perspective that uses both an internal perspective (The Firm) and an external perspective (The Industry Environment) is believed to be a suitable approach for the scope of this thesis. Such a holistic view is assumed to be of utter importance when assessing an

emerging industry due to the uncertainty involved since it gives a broader perspective for analyzing the different aspects of the attractiveness relevant for the firm.

Grant's framework comprises four components;

1. Goals, values and performance
2. Resources and capabilities
3. Structure and management systems
4. Industry environment (Competitors, Customers, Suppliers)

Their relations can be seen above in Figure 2 - Grant's framework for strategy development. As this framework will serve as the basis for our process, each of its concepts will be more thoroughly presented below. Also, it is argued that the first and third components are not suitable for the practitioners view undertaken in this thesis. This will be discussed in the following sections and finally the two components will not be included in the proposed process.

2.4.1 Component 1: Goals, values and performance

This part of Grant's framework considers the issues of goals and values. The firm's goal considers such issues as the goal of the firm in terms of creating value for shareholders versus stakeholders to the firm. The issue of value considers the company's ethical values and social responsibility and different ways of calculating and measuring profitability. It is believed that these issues are considered to be of limited importance for the practitioners view used in this thesis.

First, the goals of the firm are important issues but do not affect individual market attractiveness in emerging industries. This is also true for the ethical values and social responsibility. These do not affect the attractiveness of individual markets *within* an emerging industry, but rather the attractiveness of the industry as a whole. Since this thesis will compare market attractiveness within an already chosen industry that has its given social setting and ethical issues, this part of Grant's framework is believed to be of minor importance for this thesis. Third, the Performance factor considers different ways of measuring the company's performance. This is believed to be of no importance in this study because this factor does not at all have an impact on the assessed attractiveness of individual markets within an emerging industry.

As is discussed above, these factors are not believed to be relevant for this thesis and are hence removed and will not be used in the developed process.

2.4.2 Component 2: Resources and capabilities

To analyze the main internal factors in the firm, Grant uses the Resource Based View (RBV) presented by Wernerfelt (1984 and 1988). This part of Grant's framework is considered to be highly important to include in a process for assessing attractiveness in emerging industries and will hence be kept in the proposed process which will be presented chapter 4. This is because, as previously shown, emerging industries have a lot of uncertainties and it is therefore argued that it becomes even more important to have knowledge about the firm's own strengths and weaknesses, which is included in this component.

The RBV emerged in the early 1990s. The basic idea is that in the ever changing external environment of the firm, the firm in itself with its own resources and skills should be the basis from which to form a strategy (Grant 2010). This can in some ways be seen as opposite to Porter's theories but is used as a complement in Grant's framework. Instead of asking market focused questions such as "which of

our customers' needs do we seek to serve", the firm bases its strategy in the internal resources it possesses, thus exploiting its own advantages compared to other firms.

The base of the firm's strengths lies within what is called its Organizational capabilities. Helfat and Lieberman (2002, p. 131) describe the firms organizational capabilities (or competences) as the "firm's capacity to deploy resources for a desired end result". The firm's capabilities are in turn made up of a set of resources which may be divided into three types; tangible, intangible and human as is shown in Figure 3- Organizational capabilities below.

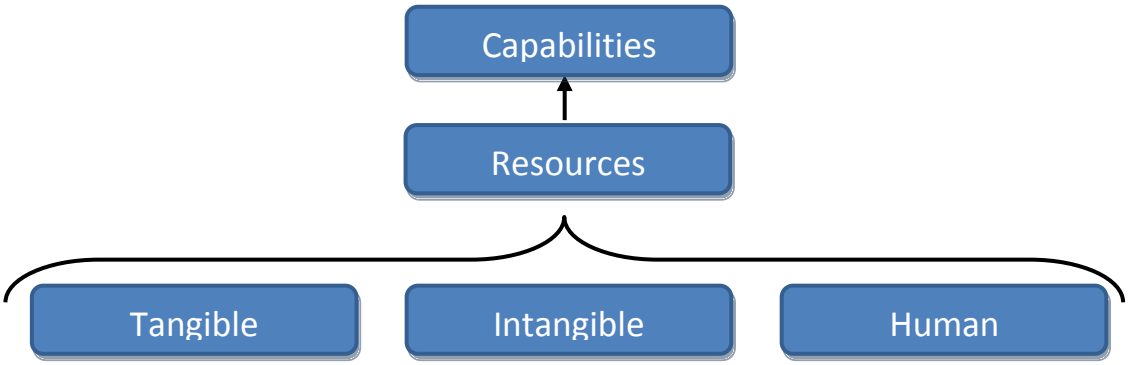

Figure 3- Organizational capabilities

Hence, the resources are the productive assets owned by the firm. Tangible resources are financial (cash and securities) and physical (land and equipment). The intangible resources are the intellectual property rights (IPR) of the firm; patents, copyrights, licences etc. Also the reputation of the firm and its relationships with other firms and stakeholders are included within the intangible resources. Finally, human resources are basically the skills and know-how of the staff but also how well the staff communicates and collaborates with each other.

Grant (2010) provides a practical guide for how to conduct a RBV analysis of a firm. This guide however, is based on the idea that the firm wants to initiate a change in its strategy and hence the method is not suitable for the developed process in this thesis as the purpose is only to assess the firm's current position. As the scope for this thesis is to develop a process for comparing the relative attractiveness for several markets, the main focus is not to initiate strategic change but rather to assess the firm's current position. Because of this, it is believed that it is not important to use all of the elements in Grant's proposed guide, for example an extensive mapping of the firm's resources. Instead, only the first step will be used, which is to identify key success factors and organizational capabilities and map their connections. Also, mapping a large number of tangible, intangible and human resources and their relations to a set of capabilities is a very complex work and due to limited time and resources it is excluded from this thesis.

2.4.2.1 Criticism against RBV

Although the RBV has been around for a long time and seems to be rather accepted by the academy it is important to mention that there are serious questions being raised on the validity of the RBV as a theory. Truijens (2003) has in his paper "A Critical Review of the Resource-based View of the Firm" gathered critique directed towards the RBV and has divided them into categories of the matter of the critique. The different categories of the critique are definitional issues, methodological issues and deficiencies (Truijens, 2003). Although it would certainly be interesting to investigate all the types of

critique directed towards the RBV, this thesis will focus on the methodological issues and specifically the difficulties of empirically researching on the areas of intangible resources.

Since intangible resources both are believed to play a great part in an organization's competitive advantage and are also hard to grasp (Truijens, 2003), it is important to acknowledge this issue and try finding a workable solution to it when trying to map and analyze them. In some situations there exist indicators that can be used to indirectly measure intangible resources, such as Miller and Shamsie (1996) did when they assessed movie studios' creative ability by measuring Academy awards won by the studios. However, there are not always such indicators available and also a critique against such indicators claiming that they are more of performance measures than intangible resource measures (Miller and Shamsie, 1996). Because of this, there is a possible need for new methods for assessing and valuating those factors that are considered to be of high importance. This will be further developed in chapter 2.4 and in 3.2.2 as a method of using ordinary self assessment questions as well as problematizing questions will be presented.

2.4.3 Component 3: Structure and management systems

This refers to the organizational structure of the firm, how it is controlled and managed. It also includes an analysis of corporate culture. These factors are considered to be of minor importance when evaluating individual market attractiveness since it is one organization acting on different markets, which implies that the firm's structure and management systems will not differ between markets and hence will not affect the markets in relation to each other. Because of this, this component is not included in the initial process.

2.4.4 Component 4: Industry environment

To analyze the industry environment that the firms compete within, Grant (2010) uses the Five Forces framework developed by Porter (1980). The starting point for this industry analysis is the question about what determines the level of profit within an industry? In Porter's Five Forces framework, this questions is answered by analyzing the five sources of competitive pressure; Bargaining Power of Suppliers, Bargaining Power of Customers, Threat of New Entrants, Threat of Substitute Products and Competitive Rivalry within an Industry. These will be further described below together with a sixth Force that is commonly used that is Complementarities. The sixth force is proposed by Grant (2010) as an addition to the Five Forces Framework and will hence be used in this study as well. The relations of the Forces and Complementarities are illustrated below in Figure 4 – Porter's Five Forces Framework.

Figure 4 – Porter's Five Forces Framework with added sixth force

2.4.4.1 Bargaining Power of Suppliers

The bargaining power of suppliers is affected by a number of factors. If the importance of the supplied item is very high and there are few or no substitutes, then the suppliers will have high negotiation power. Supplying a much differentiated product also makes bargaining power of suppliers higher. Supplier bargaining power is also affected by the number of potential suppliers and the availability of information for the buyer. (Porter 1980)

2.4.4.2 Bargaining Power of Customers

The analysis of bargaining power of customers is very much similar to the one for suppliers, only that relationship is opposite as seen from the own firm.

2.4.4.3 Threat of New Entrants

When an industry performs well and earns high returns of capital, it will attract new firms from outside the industry. The threat of new entrants is heavily dependent on the barriers of entry and the reaction from existing competitors specific for the industry. The principal sources of barriers to entry are the following; Economies of scale, Product differentiation, Capital requirements, Access to distribution channels and Cost disadvantages independent of scale, Governmental and legal barriers and Retaliation (from competitors) (Grant 2010).

2.4.4.4 Threat of Substitute Products

The price that customers are willing to pay for a product is dependent on the availability of substitute products. If substitutes to a product exist, then customers could possibly switch to the substitute if the price of the product gets too high. (Porter 1980). The threat from substitutes is also dependent on how easy it is to compare different product performances and prices with each other. If substitute performance is hard to assess, then buyers could be less eager to buy the substitute. The Internet has allowed new possibilities of comparing product price and performance, hence increasing threat of substitute products (Grant 2010).

2.4.4.5 Competitive Rivalry within an Industry

According to Grant, this is the major determinant of profitability within an industry. The concentration of sellers and the diversity of competitors are natural drivers of competition. If the product is hard to differentiate, and sellers hence provides products that are very similar, competition will be higher and margins will be lower since competitors will have to compete more on price than product differentiation. Also if the industry has lots of excess capacity together with high exit barriers prices will be forced to be lowered, hence lowering profitability. Finally, scale economies and the ratio of fixed to variable costs effects competition. If competitors have high fixed costs they will be more eager to try to get deals at any price that covers the variable costs (Porter 1980).

2.4.4.6 Complementarities as the sixth Force

Andrew Grove, former CEO of Intel, use Complementarities as a sixth force in the Five Forces Framework (Grove, 1997). According to Porter (1980), complementary goods offer more value to the consumer than if being offered individually. Hence, the combined value of two complementary products is greater than the individual value of each product. Because of this, the existence of the complementary product increases the demand for the other product. The demand for cars, for example, is highly dependent on the availability of gasoline or diesel, which can be seen as complements. In this way, complements have the opposite effect on products compared to

substitutes, that is, substitutes reduce the value of an industry's product while complements increase it. (ibid). There are many suggestions from different authors on how to modify Porter's Five Forces Framework with additional forces. However, only Complementarities has been chosen to be included in this thesis. This is because it is believed that the value of complementarities to the industry can be very high and have a dominant effect on it, as the example with gasoline and the auto industry. This is believed to be especially true for emerging industries, if there are no roads there is little use of owning a car and the consumer will not buy one. Dorf and Byers (2008, p. 89) give an example: "Without suitable widely located electric recharge stations, the future of electric vehicles is very limited". This is a good example of the importance of complementarities, without an adequate supply of complementary products there will be no growth for the market of the product in focus. Because of this, it is believed to be of outmost importance to understand the market for the complements and the also the companies supplying the complementary product, called complementors, in order to be able to understand the market that the emerging industry presents. Further, it is argued that it is important to identify and analyze the relationship between the product of the industry in focus and the complementarities. These relations could be for example subsidizes affecting both products/industries or local government regulations that differ significantly in different markets, thus impacting the emerging industry in different ways.

2.5 Problematizing RBV instead of asking questions

As described in the part on the critique on the RBV, the intangible factors are more difficult to acquire data for by using a traditional interview approach compared to, for example, to get the information needed for the Five Forces Framework. Not only is it hard to grasp what the intangible resources in an organization are, it may also be difficult for an employee to answer questions concerning the organization's strengths and weaknesses in a certain area due his or hers lack of knowledge in that area. An issue with framing the questions about an organization's capabilities in a certain area is that it may be difficult to determine whether the interviewee really possesses the knowledge to answer that question (Bryman and Bell, 2007), and by framing it as problem identification and solving instead the interviewer is in a better position to assess the quality of the answer since the thought process is better expressed. Specific issues when asking questions concerning capabilities in an organization is that the initial questions need to be very general, which in itself is something to avoid since such questions lack any frame of reference which will be an issue if you want to compare the answers in a later stage (Bryman and Bell, 2007, p.269).

Another way of acquiring the data needed to evaluate an organization's capabilities would be to turn the issues of the respective capabilities into problems and then through a problem-solving approach seek to understand the capability. So, instead of asking plain and simple "How are your marketing skills in Ireland?" another way of finding out the "marketing capabilities" in Ireland would be to ask about "what are currently the problems with your company's marketing in Ireland?". By asking in this manner and then follow up with further questions instead of just asking for an account of the marketing capabilities allows for a deeper decomposition of an issue until it is clear (Nickerson and Zenger, 2004).

A prerequisite for problematizing is to first understand the nature of problems in order to be able to construct a problematizing question. Landry (1995) defines four landmarks (LMs) as being necessary conditions for problems. LM1 is an occurrence that is perceived as negative by an organization or individual. LM2 is used to answer the question "Can something be done about it?". LM3 is about

whether the situation is grave enough to have resources allocated to solve the issue. LM4 is about the uncertainty of doing the right action and how to implement it. Landry uses these LMs to probe deeper into organizational problem-solving, however in this context it is purely the definitions that are interesting not the follow-up. Hence, in order to problematize the RBV questions, the LMs will be used as guidelines for what are necessary characteristics of what a problem should be composed of which is further discussed in the method chapter.

2.6 Customer needs

It was recognized quite early in the process creation phase that something was missing in order to provide a broad base for assessing market attractiveness for markets in an emerging industry. Although both market potential and internal factors have been covered, the customer perspective was missing. The reason for including customer needs would be to understand whether or not one type of offering would be viable on several markets, or the other way around if certain markets have very unique needs and hence might require more customization work in order to sell products there. Basically, a higher level of similar needs (compared with other attractive markets) would increase a market's attractiveness. To capture the needs of the customers, some steps from the Quality Function Deployment (QFD) method have been used.

QFD is a structured approach for translating customer needs into specific functions and incorporating those functions in products to meet the attended needs (Crow, 2002). QFD was developed in the late 1960s in Japan by the professors Shigeru Mizuno and Yoji Akao as a way of making sure to include all important customer needs in the first place instead of going back and forth in the product development process. The customer needs are summarized into a matrix, which is called "house of quality" due it's resemblance to an actual house. These matrices translate higher level customer needs into lower level functional specifications. The functions are all interdependent and these interdependencies are mapped in the QFD as either augmenting or impeding factors. That is, some factors such as weight, performance and safety in a car all interrelate but in different ways. For example, reduced weight has a positive impact on performance but may have a negative impact on safety. By illustrating these connections graphically it can help facilitate a discussion between different stakeholders. (Crow, 2002)

3 Methodology

This chapter describes the methodology used in the creation of the process as well as the thesis in general. The method and working process of this thesis has been conducted in a somewhat odd order due to some practical issues; see Figure 5 - Work process. The work process started with a literature review, but in parallel to that review the case study was also started. The reason for this way of organizing the work was that the authors did a summer internship with ABB Cewe-Control, and were during this employment supposed to evaluate market attractiveness in some selected European markets for EV charging units. By organizing the work in this manner, the authors had an almost complete data set for the external factors when the actual thesis work was about to start. The drawback however, was that since the literature review and the method work was only almost done, some minor follow-ups had to be done for the external factors during the fall semester.

There are definitely several methodological flaws with this outline of the thesis, mainly concerning that when the work with the market analysis started; the scope of the actual thesis had not been

clearly defined. All in all, due to practical implications this outline of the work was chosen to be able to complete the thesis during the fall semester.

The general approach to this thesis has been abductive, that is theory creation and empirical data gathering has been done intertwined. Once a part of the process was developed through the use of existing theory it was tested on empirical data gathering and changed when necessary to fit the reality and the lack of perfect and available information. By using this approach, the customer needs perspective was incorporated into the process at a quite early stage as an example.

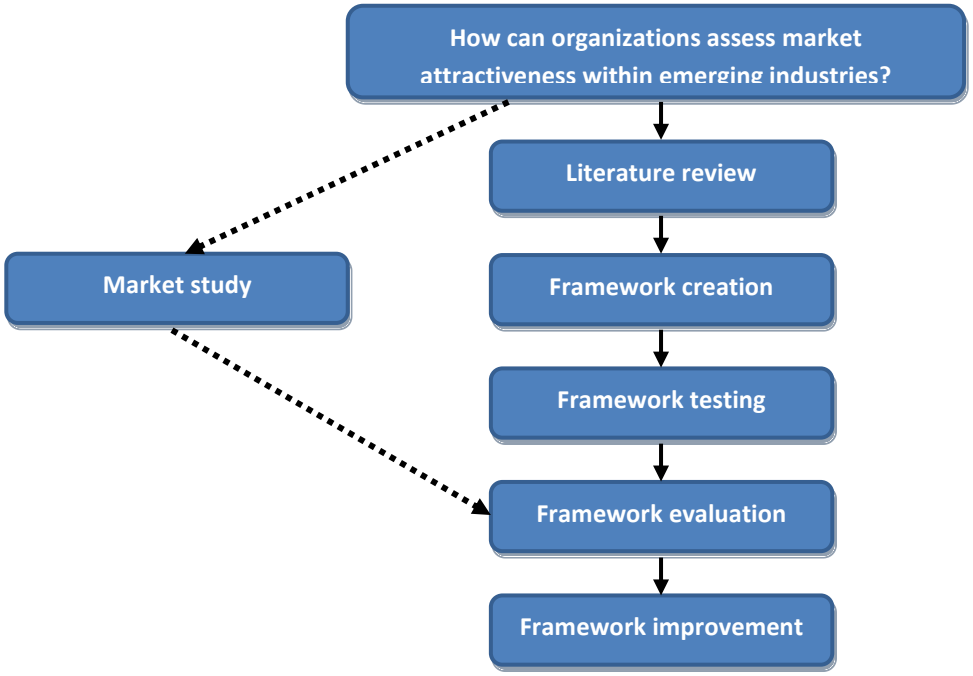

Figure 5 - Work process

The largest bias to be expected from the outline of the work process is assumed to be the fact that without any formal investigation the external focus of the developed process has now become the first part of the work process in the thesis. It might have been more suitable to start investigating the internal focus or perhaps do both in parallel. However, these are the conditions for this thesis and by acknowledging them and considering them during the work process our hopes and ambitions are to minimize any biases on the accuracy of the process and indeed the thesis.

In this thesis there will be an evaluation of the validity and reliability of the methods used in the thesis. There are many different definitions of validity and reliability in the literature but in this study three different validity definitions and one reliability definition have been chosen. The three different definitions of validity believed to be the most important ones to assess are external, ecological and construct validity. External validity concerns the issue of generalizing the findings. Ecological validity is about whether the findings are really applicable in people's everyday setting. Construct validity has to do with whether the research really measures what it ought to measure. Finally, reliability is about the repeatability of the study's result (Bryman and Bell, 2007). These validities and the reliability parameter will be discussed in assessment of validity and reliability in chapter 5.4 and in the method discussion chapter in the end, see chapter 7.2.

3.1 Work process

To be able to develop the process for assessing market attractiveness when entering into an emerging industry the first step was to conduct a literature review on what has been used previously to do such analyses.

The plan was to, as quickly as possible, come up with a first draft of the process and then, through more extensive literature review and empirical evaluation, add factors initially missed out and also evaluate if the initial process's factors indeed are suitable. This literature search has been done by going through some strategy creation books and complementing that search with searching for scientific articles to explore other aspects of what to include.

3.2 Modifying the theoretical concepts to fit emerging industries

Once the initial literature review was done, the theoretical concepts and processs that had been judged to be suitable to use to build the new process had to be modified to suit the new context. First, the theoretical concepts from the literature review chapter are modified to fit an emerging industry. Next, a suggested method for data gathering for these modified concepts is presented.

3.2.1 Modifying the Resource Based View

The RBV presented in Grant's (2010) method is made for analyzing strategic implications as basis for initiating strategic change, not assessing market attractiveness as is the case in this study. When the focus is to initiate change, a deeper understanding of resources is probably more important than when analyzing market attractiveness. The point of breaking down the capabilities into resources is that in a second stage compare them to the competitors in order to assess whether they are strengths or weaknesses for the organization's competitive advantage. However, this is not necessary when evaluating an organization's competitive advantage since some of the capabilities themselves might be more suitable to compare than breaking them down into resources. It may also be very difficult to break down certain capabilities into more concrete resources due to the fact that there might be several factors intertwined. Hence, in this thesis the break down will only include key success factors and capabilities.

In addition, Priem and Butler (2001) discuss that the RBV is subject to some issues with contextualization in terms of what resources are considered more or less important in different context. They conclude that except for some rare examples, of which Miller and Shamsie (1996) is one, there has not been much research done on the context's impact of the resources and capabilities that ought to be focused on.

A typical issue with emerging industries is that the key success factor are not known in the early stage of the industry's life cycle and hence might not be an applicable way of figuring out what capabilities to compare. Miller and Shamsie (1996) use a categorization into "property-based" vs. "knowledge-based" resources when they analyzed what resources that separated successful and not so successful Hollywood movie studios. Their categorization may not be suitable for all types of industries and instead, using a more internal perspective in listing the organizational capabilities may be more a valid approach when dealing with emerging industries. To identify important organizational capabilities through a purely internal perspective, an organization may classify capabilities in a functional manner. An example of some capabilities within each functional area can be seen below in Table 2 (Grant 2010).

Functional area:	Capability:
Corporate functions:	Strategic Innovation
	Multidivisional coordination
Research and Development:	Research
	Innovative new product development
Marketing :	Brand management
	Responsiveness for market trends

Table 2: Example of functional classification of organizational capabilities

Such an approach may not guarantee that the capabilities resulting in a competitive advantage are discovered but in an initial phase of an emerging industry there might not be any other way to be sure that the relevant capabilities are discovered at all. Grant (2010) uses the functional classification for linking and identifying the activities and processes that make up the firms distinct capabilities. It is believed that this deep derivation is not necessary for our process since Grant uses this mapping to initiate strategic changes in firms, as previously concluded. In our case, the mapping of capabilities (and sometimes resources) will only be used to assess the firm's current position, not for initiating changes in internal factors.

Except for the example of functional categories presented in the table above there are the following functions in an organization that are to be considered when assessing capabilities and resources; Corporate functions, Information Management, R&D, Operations, Product design, Marketing and Sales & Distribution (Grant, 2010). A short description on what types of resources and capabilities that may be included in each function follows below.

Corporate Functions

These functions include capabilities such as financial control, management development, strategic innovation etc. These are all capabilities and resources that can either facilitate or hinder new product launches in emerging industries since they are in the top of the hierarchy in organizations and therefore influence the entire organization.

Information Management

This function concerns integrated information systems linked to managerial decision making. Such systems may also either foster or hinder new product launches in emerging industries since they facilitate information overview and in turn decision making concerning for example whether to enter into an emerging industry or not.

Research & Development

This function includes capabilities and resources such as research, innovative new product development and fast-cycle new product development. These capabilities may be seen both as very important capabilities when launching new products into emerging industries, but may also be seen as something that has already been used to come up with a new product which is to be introduced into an emerging industry.

Operations
This function includes capabilities such as efficiency in volume manufacturing, continuous improvement processes, manufacturing flexibility etc. All of these capabilities have one thing in common and that is that they are to varying degrees tied to processes. According to Abernathy and Utterback (1978) process innovation generally occurs after product innovation in an industry life-cycle and since this process is aiming for emerging industries, operations related capabilities and resources are considered to be of less importance.

Product Design
This function means the capabilities in product design that the company possesses. This includes both the actual physical design and looks of product but also the capability to analyze customer needs and putting together an appropriate set of product functions that makes for an attractive product.

Marketing
Brand management and reputation building are two important examples of what may be included in marketing. These capabilities are all very important when entering into an emerging industry in order to build a customer base.

Sales & Distribution
This function includes effective sales promotion and execution, speed of distribution, customer service etc. These are capabilities that are also very important when launching new products into emerging industries due to their direct connection to sales and thereby revenue streams.

3.2.2 Resource Based View data gathering according to the literature
Grant (2010) proposes a four step method when analyzing the internal factors in a firm. Since this thesis will not involve identification and mapping of resources, only two of the proposed steps will be used. Step 1 is to identify key success factors within the industry. As previously mentioned, this is probably more difficult in an emerging industry than in a developed industry. Step 2 is to identify capabilities and link them to the key success factors found in Step 1. There may be several capabilities linked to every key success factor. In summary, these two steps will be used;

Step 1: Identify Key success factors in the industry

Step 2: Identify and link associated Capabilities

To illustrate the proposed method an example will be given. Suppose that the mobile telephone industry is analyzed. Step 1 identifies “Bringing innovative models to the market” and “Strong brand” as Key success factors. In Step 2 three different capabilities are identified, (1) Strategic innovation, (2) Innovative new product development and (3) Brand management. These capabilities are then linked to the two Key success factors identified in Step 1.

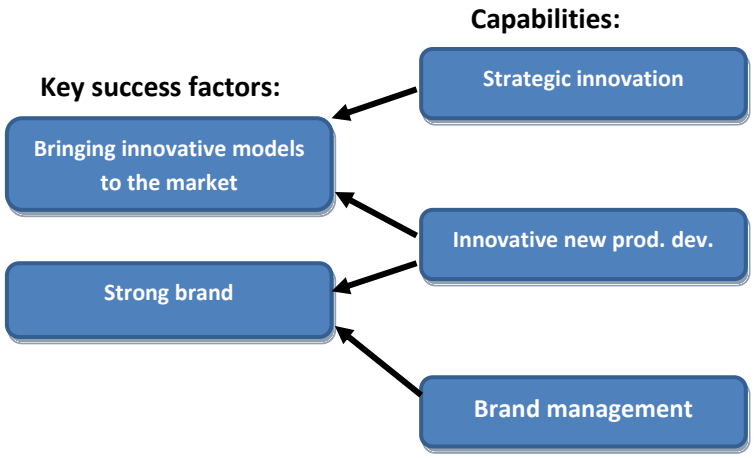

Figure 6 - An example of Key Success Factors and Capabilities

Although Grant (2010) proposes one way of gathering the data for analyzing the internal factors of the firm it is not at all clear *how* this data gathering is supposed to be done to actually get hold of the information needed. Since many of the capabilities of a firm are rather intangible and quite fuzzy it is difficult to ask people to rank their strengths and compare it competitors. As a solution to this difficult data gathering process, this process suggests a two-part approach to get hold of the information. The data needed to assess the capabilities is proposed to be gathered both through standard self assessment interviews but also be complemented with problematizing interviews to get another perspective.

The self assessment interviews

These interviews should be conducted in a way that lets the interviewed person assess the organization's activities within a number of areas. Questions may be asked in the manner: "How good would you say that your department is at performing function XYZ?" or "What is your estimation of your organization's capability to perform XYZ compared to your main competitors in the industry?". The interview template should be checked by people in the organization to make sure the correct "language" is used and that the questions make sense before the interviews take place. In addition, the questions should be pilot tested before the actual interviews are conducted. These types of questions can be done either as traditional open interview questions or with a Likert scale to produce results that are easier to compare. There is probably always a need to have a quite wide range of respondents for these interviews to capture not only one group of people's ideas.

Problematizing questions

The problematizing questions should be done to improve the validity of the data gathering. By asking questions in a way different to the self assessment interviews mentioned above, a different type of answer is received and this is believed to lead to more robust results. The questions should be constructed by identifying possible problems associated with each capability believed to be of high importance, as is further described in chapter 4.1. Using Landry's (1995) landmarks as guidelines for problem characteristics as basis for the problematizing process, the self assessment questions were transformed to problematizing questions. The process for doing so can in short be described as trying to ask the interviewees to identify an occurrence or part of a process that acts as a bottleneck and then try to suggest what could be done to fix it.

This way of asking the question will hopefully provide the interviewers with more hands-on and concrete data on what seems to be working and what could be subject for improvement. In addition

indication is probably achieved as to how well the organization that is evaluated is performing compared to its competitors.

As an example, translating a question about the organization's sales capabilities in a certain market from a self assessment question to a problematizing question could look like this:

How good would you say that your organization's sales department in Italy is, compared to your competitors? (Rank 1 – 5)

When translating this question into problematizing questions there are several possible variations that could be used. One example, if deciding to use Landry's (1995) first landmark for translating into a problematizing question would be to identify a sense of crisis and opportunity to improve the current situation. Such an approach could result in a problematizing question like the following:

In your opinion, what is the main reason that you are not selling more products in Italy?

This example just shows one way of asking in a problematizing way. The question is obviously asking for what the crisis is; why are not more product sold. Once the initial question have been asked, it is important to follow up with more questions to make sure the problem is well-described and also, in Landry's (1995) terms, to identify opportunities to improve the situation.

Triangulation

By combining both self assessment interviews and problematizing interviews, a method triangulation is achieved. The interviewees were not told that the areas of the self assessment and the problematizing questions matched each other, and this was used as a way of triangulating their answers. The main benefit of using these two different methods for assessing the strengths and weaknesses of an organization is that they complement each other well; the self assessment gives an estimate on how the interviewees assess their organization and the problematizing questions then gives examples of what might be subject for improvements. Together these two perspectives gave the interviewer a more nuanced picture of the organization's capabilities, strengths and weaknesses.

3.2.3 Porter's Five Forces Framework

As shown in the literature review, Porter's Five Forces Framework with the addition of Complementarities serves as a base for the external analysis in this thesis. This chapter will present the modifications that have been done to these concepts to better fit the special conditions within emerging industries.

3.2.3.1 Bargaining Power of Suppliers

The bargaining power of suppliers within emerging industries is believed to vary to a high degree. If there already exists a market for the components needed for the product, then the firm is more likely to have several suppliers to choose from, thus supplier bargaining power would be lower. It is believed that it is more likely that the firm experiences a high supplier bargaining power in emerging industries than in developed or mature industries. This is because firms entering the emerging industry are more likely to need to acquire or develop new competences to be able to provide their new product, because of this suppliers potentially have a high bargaining power, initially supplying a large part of the product before the firm has developed its own competence.

As discussed above, bargaining power of suppliers was believed to be of high importance to analyze in the case study. To be able to evaluate this factor for the emerging industry the product in question needs to be analyzed in terms of raw material and components in order to determine the bargaining power of suppliers. This can be done through standard interviews with internal product designers as well as internal or external experts on the availability of the raw material and components in the product.

3.2.3.2 Bargaining Power of Customers

As previously discussed for the bargaining power of suppliers, there are fewer actors in an emerging industry than for a mature one. This is also believed to impact the bargaining power of customers as there are fewer customers present and this increases the potential for a firm to be largely dependent on one of its customers before the industry has developed, thus a potentially high customer bargaining power. This may not be true for all emerging industries, but is probably common.

Evaluating customers' bargaining power requires data on size, brand strength, reputation, financial performance etc. The methods to use in order to gather this data is to conduct market research by using public data such as bureaus of statistics, annual reports as well as talking to industry experts.

3.2.3.3 Threat of New Entrants

This force is presumably one of the most present in an emerging industry since there are generally higher profits to be made in the growing phase of an industry before it is mature which would attract many potential competitors. This all depends on the complexity of the product and the barriers to enter and to be able to make an assessment there is a need to talk to experts both within the organization and externally. The threat of new entrants is especially high in the earliest stages of the emerging industry before a dominant product design has evolved.

To analyze the threat of new entrants an explorative approach can be used in which public media sources are used to a large extent to identify potentially new entrants. Another source of information is believed to be industry fairs as these are natural places for companies to show off their new products. Also, as the dominant design has emerged, analyzing will be simplified as the span of companies that poses the relevant skills and technology will be reduced.

3.2.3.4 Threat of Substitute Products

The threat of substitute products may or may not be an issue for emerging industries depending on what the product is supposed to do. In most cases there is probably an older substitute product available on the market and hence there is a risk that customers would prefer the old, tested product, hence the company in focus actually produces the new substitute themselves. In cases of fast moving industries there might be a threat of newer versions of the product.

To assess the threat of substitute products, both internal as well as external industry experts may be consulted to get a deep understanding of the industry. It might also be a good idea to consult the customers on their preferences and to thoroughly understand their *needs*.

3.2.3.5 Competitive Rivalry within an Industry

The competitive rivalry within the industry may be difficult to measure in an emerging industry due to that the competitive environment is changing rapidly as competitors enter on a frequent basis. It is argued that the competitive rivalry within the emerging industry is heavily intertwined and

associated with the threat of new entrants and because of this, much the same research methods can be used.

One way to assess the level of competition is to visit industry fairs, exhibitions and similar events. It is believed that there is normally a hype around emerging industries which may result in extensive media coverage which hence could be used to gather information on what competitors are present. The competitors then need to be evaluated to recognize strengths and weaknesses by for example evaluating financial performance, past track record, consulting industry experts etc.

3.2.4 Complementarities

As previously argued, Complementary products are believed to be highly important when analyzing emerging industries, much more important than for developed industries. If the development of an industry is dependent on one or several complementarities it is therefore vital to understand those products as well as the relations between the complementary products and the product in focus. Because of this importance, it is believed that the Complementary industry should be analyzed thoroughly, much in the same way done to contextualize the focus industry. For this purpose, Dorf and Byers' (2008) five elements of industry analysis can be used for this part as well:

Five elements of an industry analysis:
1. Name and describe the industry
2. Describe the regulatory, political, and legal issues in this industry
3. Describe the growth rate of the industry and the state of the evolution of the industry
4. Describe the profit potential and the typical return on capital in the industry
5. Describe the competitors in the industry and the rivalry among them

Table 3: Five elements of an industry analysis

Basically, the regulatory, political and legal issues of the industry should be analyzed together with mapping of the most important factors actors in the industry and the relations between those actors. As previously argued government regulations, like for example subsidizes, are believed to be more important in emerging industries than in mature ones and should be thoroughly investigated. If the complementary industry is also emerging, special importance could be given to predicted or planned changes in government regulations affecting the industry.

In order to find the information necessary to give a thorough understanding of the Complementarities, basic research methods using public sources can be used. These can be a combination of news articles, consultant reports, government publications or other sources that are publicly available. To further deepen the understanding, personal interviews with for example people from the complementary industry can be conducted.

3.2.5 Customer Needs

When considering evaluating customer needs in an emerging industry, a list of relevant needs must be compiled. This ought to be done in collaboration with an industry expert and customers. It is important to have open and non-prejudicial interview sessions to really capture what the customers want, not what you think you know the customer wants. This is done in order to get deeper insight and being able to list concrete needs that the customer expresses. This could be for example: "The product must be very safe to use under all conditions". The customer should be allowed to express

several needs. The list should be brief enough for customers to fill out and still exhaustive enough not to miss out on any important needs (Lindstedt and Burenius, 2003).

Once the list is compiled it should be answered by a representative sample of the customer base, however in emerging industries this is often not possible since most future customers have not come in contact with the product or service early in the industry life cycle. Then a convenience sample may be preferable since it at least captures the early adopters' needs and this initial survey may later be complemented when adoption rates are higher (Bryman and Bell, 2007).

4 Process for assessing market attractiveness in emerging industries

Based on the literature review and parts of the case study at least initiated, the following proposal is presented to be the process for evaluating market attractiveness in emerging industries. It consists of three parts, and within each of the following paragraph the different areas of investigation will be presented in more detail.

4.1 External factors

The foundation is Porter's five forces framework, but somewhat modified to suit emerging industries. As an example, a sixth force, complementarities, has been added since it is believed to be of great importance in emerging industries. Another modification is to make it more quantitative to facilitate an easier comparison between different markets.

4.2 Internal factors

Grant's RBV is the foundation here, but with the major modification being that the level of data gathering and interest stops with capabilities instead of going all the way down to the resource level. Another significant difference between Grant's RBV and this part of the process is the suggested method for actually gathering the data needed to conduct an analysis. In the process, a self assessment questionnaire in combination with problematizing questions are suggested for the data gathering of the internal factors. There is however one issue left to solve, namely what areas to ask about. That is, which types of capabilities are relevant to compare in order to understand the organization's competitive advantages in an emerging industry. Here, contextualization is the way to go. The researcher needs to have an understanding about the industry and organization in question before constructing the questions for the internal factors. This understanding can be gained through reading reports, meeting industry experts etc.

4.3 Customer needs

The customer needs may at first glance seem the most straight-forward to find, however it must be remembered that this process is supposed to be used in emerging industries and hence the number of actual customers present in the market is generally very limited. There are, however, ways to move around this issue. One example is to leverage on pilot projects and to seek to interview people involved in those projects. As suggested in this process, the compilation of the list of customer needs that will later be used in self completion questionnaires needs to be done in an open and non-prejudicial manner to ensure that no important needs are excluded due to any preconceptions from the researcher.

4.4 Evaluating market attractiveness

Based on the three areas above (External and Internal factors and customer needs), the evaluation and comparison between the investigated markets may be done. The basic idea for this part is to use color coding (green, yellow and red) to assign levels of attractiveness on the different investigated areas and then make a combined assessment to reach a ranking between the different markets.

5 Results

In this chapter, the process will be evaluated on its usability and put in practice through a case study on charging units for electric vehicles at ABB Cewe-Control. The process will then be subject to an evaluation and improvement process.

5.1 Applying the process on the ABB case study

Since the focus of this entire thesis is to create a process that is practically usable, there must be a test of its usability in practice as well as a test of the validity of the concepts and relations between those. For this sake, the process will be tested on ABB Cewe-Control's new product development project of a new charging unit for electric vehicles to evaluate usability.

5.1.1 Contextualization

This chapter contains a brief description of ABB Cewe-Control as well as about electric vehicles and some general subjects regarding the charging of EVs.

5.1.1.1 ABB Cewe-Control

ABB Cewe-Control is a business unit in ABB which is manufacturing, developing and marketing products that controls and distributes electricity up to 1000 Volts. Typical products include plugs, breakers, switches, soft-starters, cable distribution cabinets etc. In Sweden, Cewe-Control has facilities in Västerås, Stockholm and Nyköping employing about 550 persons.

Before late 2009, ABB did not have a charging unit in their range of products. However, after the recent hype concerning EVs, ABB's Marketing and Sales department had begun to receive inquiries from customers interested in charging units. A decision was made to develop a charging unit as quick as possible. It was decided that existing components from ABB's own electric engine heater would be used since it is basically the same product, and also that this first charging unit should be as basic as possible to allow for a quick product development and release. It resulted in ABB's first charging unit which was officially released during late 2009 (ABB 2010).

5.1.1.2 Electric vehicles

During the early days of the automobile, in the late 19th century, three different fuels competed for dominance. Gasoline, electricity and steam were used in parallel to propel engines used in cars. After some time, gasoline emerged as the distinct winner and was the dominant fuel for cars during the twentieth century. Because of gasoline being the winner in the struggle of fuel types, the development of electric vehicles for commercial use did not advance much. Vehicle manufacturers instead focused on gasoline and diesel engines and for most of the twentieth century there were little or no interest in improving fuel efficiency. This started to change as the oil crises during the 1970s started highlighted the need for more a more energy efficient society, and among that, more fuel efficient vehicles.

Types of electric vehicles - HEVs, PHEVs and BEVs

There are a number of different technologies that uses electricity in automobiles as a way to reduce fuel consumption. Three main categories of vehicles can be found;

- **Hybrid electric vehicles (HEVs):** These vehicles have a standard combustion engine but incorporate a differing range of functions and features to reduce fuel consumption through the use of electricity. These technologies can be start/stop functions, regenerative braking or batteries in combination with small electric engines that allows for very short ranges (< 2 km) of electric propulsion. Hybrids still rely on their combustion engine for all, or at least almost all, propulsion and this limit the potential fuel savings.

The focus of this case study is charging units and that does not concern hybrids since they cannot be charged. Instead, this thesis concern charging of plug-in hybrids and electric vehicles which will be presented below.

- **Plug-in hybrid (PHEVs):** A plug-in hybrid is a vehicle with two mechanical power trains. First it has a standard combustion engine and second, it has an electric engine which allows the vehicle to be propelled electrically. The electric engine consumes power from an onboard battery which is typically between 10-35 kWh. A car uses roughly 2 kWh for each 10 km of driving. This allows a PHEV with a battery capacity of 20 kWh to drive 100 km on electricity only before the car switches to the combustion engine. The onboard battery can be charged from an external electric power source via a plug while the vehicle is parked, hence the term “plug-in hybrid”.

- **Battery electric vehicles (BEVs):** BEVs are vehicles that rely solely on one or several electric engines and they have no combustion engine. Because of this, BEVs typically carry batteries that are larger than those for PHEVs, usually in the range of between 20-50 kWh. There are two main ways of extending the range of a BEV once the battery is depleted; 1) charging the battery or 2) swapping it for a charged one. Battery charging is the focus of this thesis and battery swapping will not be dealt with here.

In this report, the term EV will be used for both PHEVs and BEVs in situations where their differences are not important.

5.1.1.3 Charging of electric vehicles

As previously shown, the main difference between a PHEV and a BEV, is that the BEV is dependent solely on batteries for propulsion. When a PHEV runs out of battery, the vehicle simply switches to run on the combustion engine. If driving a BEV and the battery runs out, the driver cannot continue his or her travel and must stop for charging. Thus, the battery and its state of charge are of outmost importance for the BEV driver. There are different standards under development for EV charging, and put simply there are two main alternatives; slow and fast charging. Slow charging can utilize the current electricity infrastructure without any specific changes while fast charging demands new electricity infrastructure due to the enormous electricity output. The focus of this case study will be on various sorts of slow charging due to Cewe-Control’s range of products are operating on less than 1000 Volts, which excludes fast charging.

The simplest way of charging a vehicle would be for the driver to plug it in to the wall socket at home, i.e. conductive charging. This would not necessarily require any special equipment or plug, only a standard household plug (called Schuko) that connects the car to the socket. However, since the battery in an EV is a quite large energy storage, charging a depleted battery will take between 5-15 hours depending on the effect and the depletion of the battery prior to charging. Most products that exist on the market for charging today are in the shape of a metal box mounted on a pole that is installed like a lamp post in the ground. There are also other solutions like wall mounted charging units, but these are not as common today. Below, some examples of charging poles are shown.

Figure 7 - Three examples of charging units for EVs

5.2 The input of the first version of the process

Through a two month market study during the summer of 2010, the authors gained some insights into the emerging charging unit industry on a number of European markets, which were chosen by ABB. These insights have been gained through a large number of interviews with industry experts, mainly in Sweden, as well as with ABB sales representatives on several European markets. These insights will here be used to extract likely Key Success Factors (KSFs) for the charging unit industry in Europe.

In addition to the KSFs and corresponding capabilities the input for the process also include more traditional market data such as estimated market size and growth for example.

5.2.1 External factors

The aim of the process is to rank different regional markets according to their relative attractiveness and hence that is why the external factors will be compared between the markets.

5.2.1.1 Data gathering for the external factors

To conduct this study a cross-sectional research design was used to collect data which allowed the results to be compared between countries as well as to look for commonalities and differences between countries in terms of functional requirements, market size, governmental ambition etc. The study was mainly carried out during two months which would qualify the research as a single “point”

in time. The data collected was both quantitative and qualitative. The quantitative data, basically the estimated number of charging units and EVs on the respective markets, had to be complemented with some qualitative data, such as explaining what the estimations are based on and what other variables might influence those numbers.

All of the interviews conducted during the external factor data gathering have been done either over telephone or through personal meetings using a semi-structured approach. A common interview guide structure has been used but has been modified before each interview according to the interviewee, employer, his/hers position in the organization, the time available and the current area of interest etc. In some cases, the respondents preferred to answer by email, in which cases they were sent a standard questionnaire to be filled in and returned (by email). During all personal meetings and telephone interviews there were always two interviewers. The typical interview process was that one person was in charge of asking questions and the other was taking notes as well as following up on subjects of special interest appearing during the interview. In addition to that, most interviews were recorded and in cases of ambiguity as to what had been said during the interview the records were consulted.

As soon as the interviews were finished, the notes from the interviews were gone through and complemented by both of the interviewers to clarify and structure them. This was generally done within a couple of hours of the conducted interview to minimize the risk of memory loss and distortion.

The interviewees were mainly selected through a convenience sample in terms of how accessible they were. In the end it turned out that most of our “first choice” interviewee candidates were accessible and willing to participate in an interview. Because of the semi-structured approach used during the interviews, little quantitative results can be acquired from the interviews.

A main part of the data and information collected during the market study phase was retrieved using interviews with various actors both employed inside and outside of ABB. In markets outside of Sweden, these interviews were mainly done with ABB employees but some other persons outside of ABB were also interviewed. About half of the total number of interviews in the market study was conducted with people in Sweden. The Swedish interviews were done both with managers, R&D staff and development engineers at ABB. About half of the Swedish interviews were conducted with people not employed by ABB. These were representatives of interest organizations, government organizations and authorities as well as competitors to ABB within the AC charging industry. Apart from these formal interviews, a number of ad hoc meetings and discussions have taken place with representatives from companies active either within the electric vehicle industry or the AC charging industry, for example at exhibitions.

Porter’s Five Forces framework, with the sixth forces complementarities included, was used together with the five elements of an industry analysis as proposed by Dorf and Byers’ (2008) to generate a set of questions that were used in the interviews for the market study. All interviews have served to give an overview and understanding of the future market for charging units but also the electric vehicle industry. The electric vehicle industry represents the Complementarities Force in Porter’s Five Forces framework, and as previously discussed is deemed to be very important for this study. Naturally, the electric vehicle industry is the main factor that affects the industry of charging infrastructure. It was

considered important to identify the factors in the electric vehicle industry that were believed to influence the charging unit industry the most.

Below, the outline of the questions used for most actors interviewed in the market study can be seen. The exact questions and how they have been formulated has varied between different types of actors, for example an interest or government organization has both been given the same set of questions while competitors have been given a slightly different set of questions. However, the purpose of these interviews has been to give the authors a contextual understanding of the industry and provide input for the external analysis for the process. The main questions can be seen below as well as the overall topic they relate to in bold text.

- **Role of own organization:** Describe your work in your organization and the role of your organization on the market for electric vehicles and their charging?
- **Prediction of future market:** How would you describe the market for charging infrastructure in Sweden today and in the future? (Actors and networks, Market size, Trends, Problems)
- **Future actors on market:** What actors do you think will own and maintain the charging infrastructure for electric vehicles in a longer perspective?
- **Estimation of market demand:** What is your estimation of the demand for charging units in a few years perspective? How do you do that estimation?
- **Role of government incentives:** What role and how important do you consider economic incentives from the government to be for an adoption of electric vehicles and build out of charging infrastructure?

In addition to the interviews, data was collected through secondary sources available online on various government web pages, EV interest organizations, other NGOs and consultancy firm reports etc. To triangulate the data from these sources additional semi-structured interviews were conducted with ABB employees being involved in the EV charging project as parts of their assignments. All these sources were then later compiled and in cases of ambiguity, follow-up questions via e-mail or telephone were asked to the concerned parties. For an example of an interview template, see Appendix.

5.2.2 Internal factors

To use Grant's framework for evaluating internal factors, the key success factors of the industry will be presented and then broken down into corresponding capabilities.

Through interviews with industry experts, as stated above, several different key success factors (KSFs) have been identified and to validate that these factors are really the important ones they have also been compared to what both ABB and their competitors have invested R&D in and what they are promoting for their products. This type of triangulation assures that the industry experts' opinions are not just opinions but that the industry is in fact driving the development of the charging units in these directions. The various KSFs and the logic behind them will be presented next.

Interviews with Kelly (2010) and Barlow (2010), revealed that in Ireland and in the UK there are concerns with early prototypes that has been unable to withstand vandalism when placed on public streets.

Another concern raised by several interviewees in different positions has been the issue of the price of the charging unit (Interviews with Lewald (2010), Wingfors (2010), Jetmundsen (2010)). They all agreed on that for the bulk of the charging units, price would be one of the most important factors for the buyer to consider, hence they all thought that charging units needs to be low cost products in a few years perspective.

Ease of use for the end customer has been one of the most frequently recurring issue that has been raised during many of the interviews (Interviews with Tjäderhane (2010), Andersson (2010), Östermark (2010), Johansson (2010)). When breaking down the ease of use into more concrete sub-issues, one of the most frequent issues has been the compatibility between charging units, electric vehicles and different charging modes with various current and voltage.

Below follows a summary and translation these concerns and statements into capabilities:
Experience in robust and outdoor product development naturally leads to better preconditions for developing a robust and safe charging unit. ABB has long experience in producing cable distribution cabinets for outdoor environments in urban environments. This experience also helps keeping the cost down since much of the development work can be reused for charging units.

Another capability that contributes to a safe product is the modularization and reuse of existing components. By using components that have been used in other products, for example the cable distribution cabinets, there is no need to test that they work in an outdoor environment since they have a proven track record. Another very important effect of using existing components is that the production cost can be kept low, which is believed to be very important.

Since ABB is an established organization with great reach in Europe there is not the same need to develop a new sales organization to market and sell the charging units as is the case for some of their upstart competitors. Not having to set up an entirely new sales and distribution network, but rather just modifying the existing one, obviously saves money which results in lower costs.

Closely connected to the established sales and distribution network is the brand and reputation of ABB. Since ABB in many cases have been doing business with many of the potential buyers of charging units before, but in other areas such as power generation in cases such as utilities, they already have a brand and reputation that is recognized by the customers and hence do not need to spend as much money on advertising and marketing campaigns as many of their upstart competitors will probably have to do which in turn may contribute to a lower price.

Again, connected to the local reach of the sales organization, ABB have an advantage relative to many of their upstart competitors to catch trends faster and through their existing information management systems make sure that it reaches the appropriate departments to ensure charging compatibility on all markets which can be connected to ease of use since all customers will be offered products corresponding to their wants and needs.

Another aspect of such a huge organization as ABB is their influence in for example standard committees such as the IEC (International Electrotechnical Commission) where the charging standards eventually will be decided upon. By participating in such standardization work, the likelihood that the outcome of such process would be favorable for ABB increases.

5.2.2.1 Data gathering for the internal factors in the case study

The data needed to evaluate the internal perspective was acquired through interviews with ABB employees, both with employees in more central positions in Nyköping as well with local employees on the respective geographic markets. In total, four interviews were conducted. These interviews were both conducted as rather standard semi-structured interviews (so called self assessment interviews) as well as using a problematizing approach. The intention was to interview at least ten people for the internal factors, but it turned out that most people outside Sweden were not at all interested in participating in this kind of interview, despite participating in the external factor interviews for example.

The interviews started with letting the interviewees go through the self assessment interview guide, and if needed ask the interviewers to clarify questions. After the self assessment part, the interviewers switched to the problematizing questions and the procedure more similar to a semi-structured interview.

As soon as the interviews were finished, the notes from the interviews were gone through and complemented by both of the interviewers to clarify and structure them. This was generally done within a couple of hours of the conducted interview to minimize the risk of memory loss and distortion.

5.2.2.2 Self assessment interview questions

Below, the interview guide for the self assessment interview questions is presented. All the questions are relative to main competitors. The first questions in each area are self assessment and the others are follow up questions intended to clarify the initial statement.

1. **Experience in robust and outdoor product development**
    a. How good is ABB in developing charging units that are able to withstand vandalism and outdoor environments?
    b. What are ABBs strengths in this area?
    c. What are ABBs weaknesses in this area?
2. **Modular design using existing components**
    a. How good is ABB in leveraging on existing product portfolio, utilizing components used by other products?
    b. How can ABB leverage on modular design for their charging units?
3. **Industry knowledge and information sharing**
    a. How good is ABBs industry knowledge on this particular market?
    b. How well is this knowledge shared from this particular market to appropriate departments in the organization?
4. **Leveraging on Brand and Reputation**
    a. How strong is the ABB brand and reputation in this particular market?
    b. How well have ABB been able to leverage on its brand and reputation?
5. **Responsiveness to market trends**
    a. How well is ABB able to monitor and evaluate local market trends?
    b. How well is ABB to react to changing market trends in this particular market?
6. **Efficiency in sales and distribution networks**
    a. How well is ABBs sales network developed in this particular market?

b. How well is ABBs distribution network developed in this particular market?

5.2.2.3 Problematizing questions

Below, the interview guide for the problematizing questions is presented. The questions have been adapted from the self assessment questions through using mainly the first of Landry's (1995) landmarks for problem definitions. The questions were generally followed-up to make sure the problem was sufficiently described by the interviewee.

1) **Experience in robust and outdoor product development**
   a) What do you consider to be ABBs main problem in developing vandal and outdoor resisting charging units?
   b) Can you describe what you do to overcome this/these problems?
2) **Modular design using existing components**
   a) What do you think is ABBs main problem in utilizing existing components used in other products?
   b) What are the main problems when trying to leverage on modular design for charging units?
   c) What can be done to overcome these issues?
3) **Industry knowledge and information sharing**
   a) What are ABBs main problems when it comes to utilizing market information regarding charging units?
   b) What are the main problems when sharing knowledge between different departments?
4) **Leveraging on Brand and Reputation**
   a) What are the main problems that you experience when trying to communicate the ABB brand and the company values on your market?
   b) Are there any problems associated with the ABB brand when considering an entry into the AC charging unit industry for your market?
5) **Responsiveness to market trends**
   a) What are the difficulties that you experience when trying to anticipate customer needs and demands in general / for the emerging industry of AC charging?
   b) What are the main difficulties when trying to adapt ABB's market activities to changes in the industry?
6) **Efficiency in sales and distribution networks**
   a) What do you consider to be ABB's main weaknesses in the distribution network to the customer?
   b) What do you consider to be ABB's main weaknesses in the distribution network to the end consumer?

5.2.3 Customer needs

The customer needs were collected through mainly telephone interviews where various customers, installers, maintenance personnel and sales personnel were asked to rank fifteen different needs using a Likert scale. In addition, after each answer the interviewees were asked to give a comment and in the end also asked to prioritize the three most important needs and the three least important needs.

To identify the initial list of customer needs, the method proposed in the methods chapter was used with some modifications. First, to be more time efficient, the knowledge and learnings gained from

the initial market study were used to make a preliminary list of customer needs. Then, we used open interviews with persons both employed at ABB as well as outside of ABB to evaluate and modify our list according to their input. As previously discussed, it is important to note that ABB's customer is not the end consumer, but instead wholesalers, utility companies and real estate owners. Because a very small sample of existing customers were found, the customer needs list were chosen to include both factors that related to ABBs customers as the final consumer, for example "Easy to install" and "Easy to conduct maintenance" while also containing more user oriented factors such as ability to show "Charging status".

5.2.3.1 Data gathering for customer needs in the case study

For the customer needs, the idea would have been to talk to customers and ask them about what they think are important, as well as less important, features on a charging unit for EVs. However, in the emerging industry of EVs and charging units there are no real customers yet, which made it slightly more difficult to conduct the customer need data gathering. However, there are a lot of potential customers as well as some customers which are partaking in pilot projects. These customers served as a basis for the data gathering, in addition with sales representatives from Cewe-Control in the different European markets.

All in all, more than fifteen interviews with various customers and/or stakeholders were interviewed either to answer the complete survey and rank all customer needs or as input to what needs are important to ask about. Due to confidentiality issues, the list of interviewees cannot be published in this report. Due to time constraints as well as lack of existing customers and the large geographical spread of the markets, this was mainly done using interviews with representatives at ABB. These people were allowed to prioritize the identified customer needs using their knowledge of the local markets.

The actual data gathering was conducted as mixture of self-completion questionnaires and semi-structure interviews to follow up the answers. The self-completion questionnaires consisted of fifteen customer needs in the list that had been compiled through discussions with experts within Cewe-Control.

The list of customer needs was then to both sales representatives and customers in the different markets. In the email, the respondents were given the choice of either completing the questionnaire themselves or to go through it during a telephone interview. The typical interview was conducted over the telephone and started with the self-completion questionnaire and then for each of the fifteen customer needs the interviewees were asked to share their thoughts about why they assigned that specific need a certain number between 1 and 5.

Not everyone that was invited to take part in the study responded initially and both reminder emails as well as telephone calls were made to increase the response rate. These actions were fairly successful and the total response rate after these reminders was about 90 percent.

The list of customer needs used can be seen below in Table 4 - List of customer needs:

Customer Need	**Details**	**Importance** (1-5, 5 = most important)	**Comments**
Affordable to buy	Less than €800		
Easy to install	Space to work, easy to assemble, easy to mount		
Easy to conduct maintenance	Space to work, service hatch		
Safe	Child safe, power on/off, lockable hatch, position lights to prevent accidents		
Robust Construction	Vandal resistant, Weather proof, bike crash proof		
Payment features	Different types of payment systems possible, power on/off		
Charging status	Color coding to show whether unit is charging, standing by or disabled		
Lights	Lighting to facilitate handling, position lights to show where the unit is		
Load balancing	Preventing power failures, not charging while electricity load is high		
Design	Appealing design		
Small size	Less than 1.4 meters and less than 20kgs		
Able to measure electricity usage	Show electricity usage to user with a certified electricity meter		
Identification of user	Authentication of user before charging begins and to facilitate payment		
Usable even for disabled people	For example, accessibility for wheelchairs		
Charging several EVs simultaneously	Multiple outlets		
Additional needs:			

Table 4 - List of customer needs

In addition to this table respondents were also asked to list their top 3 most important needs as well as their 3 least important needs as can be seen below in Table 5 - Top 3 most important and least important needs. This was also seen as a way to make the respondents think more freely as they were not shown what they previously answered. In some cases the answers from the same respondent differed between the large customer needs table and the top 3 table, but for most cases the answers were similar.

Top 3 most important	Why?	Top 3 least important	Why?
1.		1.	
2.		2.	
3.		3.	

Table 5 - Top 3 most important and least important needs

5.3 The output of the first version of the process

In this chapter the results from the case study, where the aim is to test the usability of the process, will be presented.

5.3.1 Results market attractiveness external factors

The table below shows a summary of all external factor analysis done during this study. The coloring of the cells has been decided upon in cooperation ABB representatives and are mainly used here for conceptual understanding. The end-result that were presented to ABB were much more detailed and had justifications after each color.

The row *External factors overall* (Market attractiveness) shows a summary (high, medium or low) for the total market attractiveness concluded from the factors listed below it. A cell is colored green to indicate that the attractiveness of that factor is high, yellow for fair attractiveness and red for unattractive. It is important to note that across a row (which means comparing the same factors for the different markets) the attractiveness factor for one market is primarily set *in relation* to the same factor in other markets. For example, the internal rivalry within an industry can never be a good thing for ABB. However when comparing the Swedish and German markets it is apparent that the competition in Sweden is less fierce than in Germany where ABBs faces competition from very large companies such as the German based Siemens. Because of the relative difference Sweden is marked as attractive while the German market gets a red marking for being much less attractive in terms of local competition.

	Sweden	**The Netherlands**	**The UK**	**Germany**	**Ireland**
External factors overall (Market attractiveness)	**HIGH**	**MEDIUM**	**MEDIUM**	**LOW**	**HIGH**
Market Size Charging units					
Complementarities (Electric Vehicles)					
Market Size EVs 2020? (according to combination of estimations)	600 000	200 000	1 250 000	1 000 000	240 000
National passenger car fleet size today	4,3 million	7,6 million	28,5 million	41,7 million	1,9 million

Government incentives PHEVs	Somewhere between 0 and 4000 EUR depending on emissions	0	Up to EUR5700 during 2011-2014	0	Up to EUR2500 in subsidy + deduction of up to EUR2500 of VRT
Government incentives BEVs	4000 EUR	0	Up to EUR5700 during 2011-2014	0	Up to EUR5000 in subsidy + exclusion of VRT (EUR4000-11000)
Substitute technologies (if not EVs, what else?)	Technologically independent Government support, methanol/ethanol trials in place	No major alternative technologies	No major alternative technologies	Some trials in hydrogen fuel cells and also natural gas	No major alternative vehicle technologies
Pilot initiatives?	Less activities than many other European countries, but local automotive manufacturers and availability of green electricity	Goverment might impose a per km-tax on all cars. Government has allocated 65 MEUR ofr EV projects	Several government initiatives in many areas concentrated around geographical GLA	500 MEUR allocated for EV initiatives and auto manufacturers but this is not much compared to gov. support for auto industry in general	3500 charging units in Dublin before end of 2011. ESB gives first EV buyers a charging unit at home
Internal rivalry within industry					
What competitors are present in the market and how strong is the ABB brand and company position?	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Bargaining power of customers					
Main customers and their characteristics?	No big sized customers, no nationalistic issues	No big sized customers, no nationalistic issues since there are no Dutch AC charging unit manufacturers	Some nationalistic issues since the policy is that tax money should create job opportunities in the UK, no issues with big sized customers	Strong nationalistic influences in terms of choice of charging unit suppliers, Germans prefer to buy German	ESB is the single most important customer, they have great bargaining power

Regulations on how charging units are sold?	No regulations in place today	Possibly messy with several electricity meters in every charging unit, all units have to be three phase compliant etc.	Plans to introduce load balancing and possibly more regulations especially in GLA	No information which would support the hypothesis there are no particular regulations in place	Non found
Threat of substitute products					
Availability of private vs public parking spots in relevant areas (If not using a charging unit how can EVs be charged?)	Relatively high availability of private parking	Due to dense population there is not very high availability of private parking	Especially in the GLA, there is limited access to private parking spaces	Due to large cities with limited private parking and quite dense population	80% have access to off-street parking

Table 6 - Summary of external factors

As can be seen from the table, this study shows that Sweden and Ireland are the two most attractive markets for ABB in terms of external factors. The UK and the Netherlands are the second most attractive markets and Germany is the least attractive market in this study. This is shown in Table 7 - External factors market attractiveness summary shown below:

	Sweden	The Netherlands	The UK	Germany	Ireland
External factors overall (Market attractiveness)	**HIGH**	**MEDIUM**	**MEDIUM**	**LOW**	**HIGH**

Table 7 - External factors market attractiveness summary

Sweden

The main factors that makes Sweden an attractive market for ABB are the competitor and customer situation. ABB is partly a Swedish company and has a strong brand and a very strong position on the Swedish market. On the Swedish market ABB primarily faces competition from relative small companies, of which most are startups. These are the most important factors that make Sweden a very attractive market. On the EV side (complementarities) the Swedish government has not issued as strong financial incentives as in for example Ireland or the UK, but up to EUR4000 will still be available for EV buyers. Also, Sweden has two domestic auto manufacturers (Volvo and SAAB) that both have announced their own EV initiatives. A final and important factor that raises the overall attractiveness for Sweden is the availability of green energy. There is a growing debate about EVs total emissions of CO_2 if powered by electricity from coal or gas powered energy plants as is the case in many parts of Europe. As almost all of Sweden's energy stems from either hydroelectric or nuclear power Sweden is likely to be unaffected by the eventual debate about EVs total CO_2 emissions in other countries. In total this makes Sweden a very attractive market for ABB.

Ireland

The second market that got a high attractiveness rating was Ireland. The Irish government are offering very generous financial incentives that purchasers of EVs receive. Buyers of BEVs first receive EUR5000 in subsidies and then they pay no VRT (Vehicle Registration Tax) which amounts to between EUR4000-11000. Buyers of PHEVs receive a subsidy of EUR2500 and then a deduction of up to EUR2500 on their VRT. This is a strategy for achieving the Irish governments goal of reaching 240 000 EVs, or 10% of all vehicles, by the year 2020. There are other important initiatives as well as the domestic utility company ESB has several projects and aims to set up 3500 charging units nationwide until the end of 2011.

On the Irish market for charging units ABB currently faces competition mainly from Elektromotive (UK based), Coulomb (US based) and Podpoint (UK based) which are all small and relatively young companies specialized in this industry. Compared to these competitors, ABB already has a distribution and sales network as well as relationships on the market. ESB is very likely to be the single most important as well as largest customer on this market, which that gives them high bargaining power. The only factor in disadvantage of the Irish market is the relatively small size, only 1.9 million passenger cars. A warning should be issued about the Irish market as financial crisis has affected Ireland severely and this could possibly lead to changes in government policies or reductions in the financial incentives around EVs.

The Netherlands

The market in the Netherlands received a medium attractiveness rating in comparison to the other markets. The Netherlands have a medium sized car fleet of 7.6 million. The geography is flat and the country is heavily populated which are quite optimal conditions for EVs. However, the Dutch government has not yet announced any official initiatives to spur the adoption and spread of EVs and there are no financial incentives at all for EVs. Coulomb is the main actor on the Dutch market today and there are no domestic companies selling AC charging units. This is in favor of ABB since competition is possibly lower the government does not have any national companies that it could favor.

The UK

The UK is the second market to receive the medium rating for attractiveness in terms of external factors. The government has ambitious plans for EV adoption that it backs up with generous financial incentives for EV buyers as they receive subsidies of up to EUR5700 during 2011-2014. However, the budget for these subsidies were recently slashed to a sixth of the original budget by the new government and as of now would only cover about 9 000 EVs. There are several pilot projects and government initiatives, mostly concentrated to the area around London, GLA (Greater London Area). In the UK, ABB faces the same main competitors as on the Irish market; Elektromotive, Coulomb and Podpoint and these companies all charging units installed in several locations and are much more active in the market that ABB. These three companies have also some cooperation in that they recently agreed on a standard for RFID sensors (for payment and identification) on charging units. The government has issued funds that allows for up to 50% reduction in installation costs for charging units but the policy for these money is that they should be issued to companies that create jobs in the UK.

Germany

The German market was considered to be the least attractive market in the comparison. There are mainly two main reasons for this; lack of government incentives for EV adoption and domestic competition.

The German car market is very big with more than 40 million passenger cars as well as a domestic passenger car industry. The government's National Electromobility Development Plan aims for 1 million EVs by 2020 but has so far not announced any financial incentives for EV buyers. The German auto manufacturers are late when compared with for example French auto manufacturers in terms of EV development. There are instead competing technologies such as hydrogen fuel cells and natural gas that German car manufacturers previously have invested in. As an adoption of EVs is essential for the development of charging unit markets, this reduces the attractiveness of the German market for ABB.

The second factor is the domestic competition and national issues that do not speak in favor of ABB. The German based Siemens is likely to enter the AC charging unit market, which would increase competition. Also, Germany being strong in engineering tradition, more companies are likely to appear in the market, raising competition even more.

The main factors in advantage of the attractiveness of the German market are its huge size and the ambitious government plans. However, as previously, pointed out, these plans have not yet lead to much concrete actions in terms of for example financial incentives.

5.3.2 Results market attractiveness internal factors

Due to the low response frequency, this area is not especially useful since only Sweden and Germany may be analyzed. However, the lack of response from the other markets does send a signal regarding their commitment and cooperation with the development unit in Nyköping, Sweden. The authors aimed for a similar presentation, with a color coded table, as for the external factors but unfortunately this will not be possible.

What can be said however, is that for the four interviews that were conducted the problematizing questions definitely provided a new perspective on what the interviewees actually felt. As an example, one interviewee stated that ABB's size and reach was working well as an advantage compared to for examples small start-ups. But when the authors asked problematizing questions regarding the information sharing and internal communication/cooperation within ABB the respondent stated that there were a lot of problems. These problems, when digging deeper with follow-up questions, seemed to be quite serious with for example "rogue" development initiatives in other markets despite that the policy is that all development initiatives should be initiated centrally. This was just one example of how the answers from the self assessment questions provided one picture, and the problematizing question a quite different one.

5.3.3 Results market attractiveness customer needs

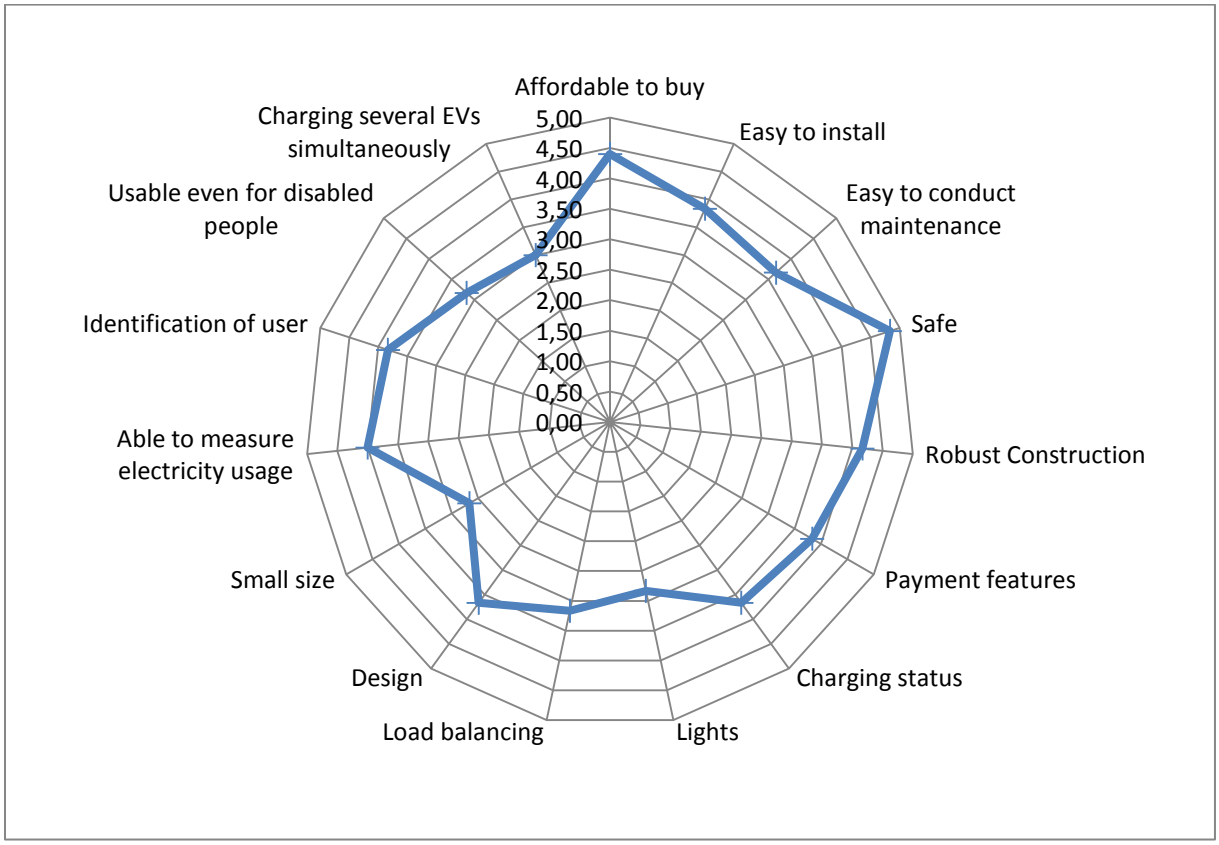

Figure 8 - Quantified view of the customer needs

As can be seen in the graph above, there is a spread between the different customer needs in terms of perceived importance. The results presented in the graph are not weighted and hence all responses are considered to be of the same relevance and importance. What cannot be seen in this

figure, but rather in the raw data, is that there were no significant differences between countries in terms of what the respondents thought were the most important features.

One of the reasons to include the customer needs into the process was that if the needs differed significantly between different markets, the product offers would need to be adapted to fit those needs. However, since there does not seems to be any significant differences the conclusions instead would be that there does seems to be necessary to adapt the product offers in order to compete on the different markets.

One finding that initially was not considered to be of much interest from the authors nor their supervisors at ABB was that the customer needs analysis resulted in different prioritization of needs. More specifically, some needs like safety was something that just had to be there. Without that feature being included, the customers would not even consider to buy the product. Hence, the customer needs could be divided into so called order qualifiers and more differentiable needs. The reason for such a categorizing of the needs is to clearly see what needs that have to be included in the offer and what needs that could be included and still add value to the customer.

5.3.4 Total market attractiveness

When considering all three parts of the process (external factors, internal factors and customer needs) there should be some indication as to which markets are more attractive if the process is working properly. In the case study that has been presented there are some clear indications based on the external factors that some markets are more attractive than others. On the downside, there are no such clear cut results based on the internal factors due to difficulties in retrieving the data needed as discussed earlier. The customer needs perspective did not change the total market attractiveness assessment because all markets in the study expressed quite similar customer needs. The customer needs perspective was incorporated into the study to cover the aspect that customer on different markets may ask for different offers and that should hence be included in the overall assessment of market attractiveness. In this case however, no such differences have been encountered.

To conclude, the overall market attractiveness assessment are generally based on the external factors results which can be found in chapter 5.3.1. Based on those results, Sweden and Ireland are the most attractive markets to initiate a product launch for EV charging unit.

5.4 Evaluation and evolution of the process

This chapter provides an evaluation of the process proposed in this thesis. First, the parts that seemed to be working will be presented and discussed and secondly, a number of changes to the proposed process will be presented.

5.4.1 What seems to be working?

The overall impression after using the Process for assessing market attractiveness in emerging industries is that in overall, it is well suited for its purpose of assessing market attractiveness within emerging industries, as will be discussed below.

5.4.1.1 Work process

In this study, the first step was to get an understanding of the industry as a whole, the contextualization. This was done in combination with the market study. After the contextualisation

and market study was completed, we conducted the internal factors and the customer needs study. We believe that this is a good way to conduct the work for most situations and would recommend other researchers to use the same approach.

5.4.1.2 Exclusion of elements from Grants Framework

Grants Framework for Strategic Analysis provided a good foundation to build upon. As stated in the Literature review chapter, Grants framework initially contained four components out of which number 1 and 3 were removed (see list below). This was done because they were believed to be irrelevant for the purpose of our developed process.

1. Goals, values and performance
2. Resources and capabilities
3. Structure and management systems
4. Industry environment (Competitors, Customers, Suppliers)

We still do not think that including goals, values or performance of the firm would add any valuable information to an analysis done with the proposed process, mainly due to the assumption previously presented, which was that these factors do not differentiate markets between each other. We have come upon no empirical findings that would suggest otherwise. However, Structure and management systems may have some importance that ought to have been incorporated, or at least acknowledged. The issue of getting the necessary input for the internal factors is something that could be considered a corporate culture issue and hence covered in this third component.

5.4.1.3 Porters Five Forces

There was little doubt about the appropriateness of using Porters Five Forces in the process since it is a widely adopted and recognized framework and it is also included in Grants original framework for strategy analysis. The exact content of the Five Forces was, however, modified in the case study as Bargaining Power of Suppliers and Threat of New entrants were removed. This was done to better fit the industry context as these factors did not seem to differ between the industries and were also believed to be of minor importance in itself. These kinds of adjustments are necessary to do when having a practitioners' approach. The rest of the Five Forces framework was used in the case study, but with focus on relevant factors and areas for each factor.

5.4.1.4 The importance of Complementarities

After testing the process, we have a strong belief in the importance of having Complementarities as an external factor and giving it high importance in the analysis. This may not apply for all emerging industries but for our case study the complementary industry of EVs is believed to have been the single most important external factor. It is also of high importance to have proper knowledge about this complementary industry, both on a general level as well as for each geographic market. Also, Complementarities is an important part of the contextualization in order to understand the industry in focus.

5.4.1.5 The concepts of Resources and capabilities

To evaluate and assess these internal factors for the organization in each market, the Resource Based View of the firm was used as it is included in Grants framework. As previously shown, the Resource Based View states that an organizations capabilities are made up by a combination of Resources and capabilities as shown below in Figure 9 - Resources and Capabilities:

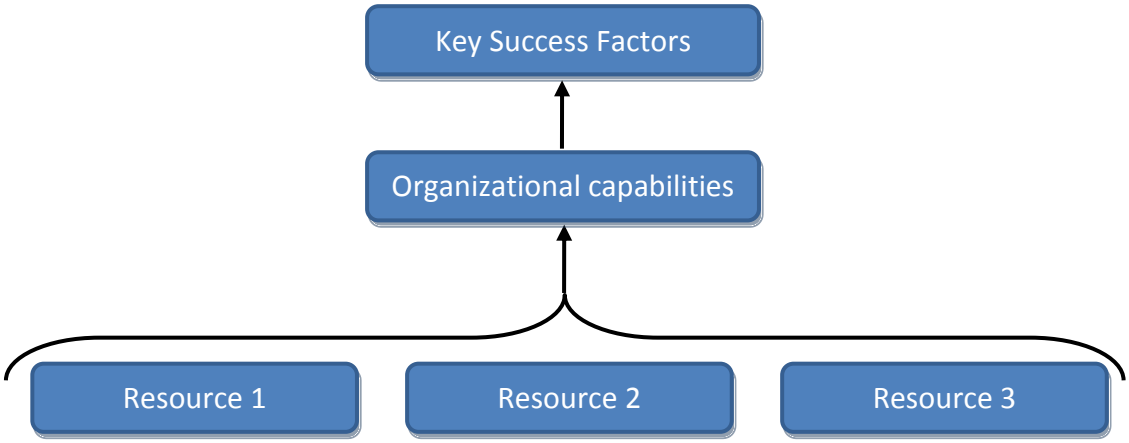

Figure 9 - Resources and Capabilities

However, as proposed for this process, with a practitioners view we did not consider it feasible to include a mapping of resources and their relations to a set of capabilities. It would simply be to complex and abstract to do this in a large number of markets in which the organization is present. Excluding the concept of resources in our process seems to have been a good choice as we have not encountered any problems related to this issue during our case study. The concept of organizational capabilities is much more relevant and feasible to map and evaluate and will hence be kept.

5.4.1.6 Self assessment interviews and problematizing interviews

To gather data for assessing the internal factors in this study, two different ways of asking questions were used. First, standard self assessment questions using a 1-5 Likert scale together with some follow up questions. This was a straight forward approach and we had no problems either with asking questions, getting answers or evaluating the answers. However, the quality of the answers is hard to assess since they only consist of a number between 1 and 5. Secondly, we used problematizing questions to identify and assess problems and bottlenecks within each relevant area. These questions were harder to formulate and not as easy for the interviewees to answer. However, we still consider this to be valuable input for an analysis as it forces the interviewees to think about a subject from a different point of view than the standard self assessment questions.

5.4.1.7 Customer needs

We encountered some problems when trying to collect data from customers. When launching a new product on the market of an existing industry it is probably a lot easier to get into contact with existing customer to use their knowledge and experience to use in product development. However, as we tested and designed the process to be used in an emerging industry there were basically no existing customers. Secondly, as we analyzed several markets with a large geographical spread, we had no possibility to visit customers to do in depth customer interviews in person. Instead we mainly

relied on getting customer insights from local sales representatives. This is a major drawback in our study, but not fully related to the process.

5.4.2 What seems to need a remake?

An important finding in this study is in within the internal factors. To analyze and evaluate internal factors is still believed to be very important but it is probably the most important to do when coming from outside an organization than if already having an internal perspective of it, that is, if you already are employed by the organization. Based on our empirical findings, we believe that many employees within relevant positions in an organization already have a good understanding of how different parts of the organization work and how efficient these are. Because of this, there is less need to spend a lot of time and resources on the internal analysis if the research is conducted by internal employees, or in other words, the process can be speeded up.

6 Conclusions and discussion

The following chapter includes both the conclusions followed by a discussion about the process as well as methodological discussion on the work process of the development of the process.

6.1 Conclusions

The purpose of this master's thesis has been to propose a process for assessing market attractiveness in emerging industries and to compare different regional markets' relative attractiveness.

Based on the literature review and the case study, the following process for assessing market attractiveness in emerging industries and to compare different regional markets' relative attractiveness is proposed.

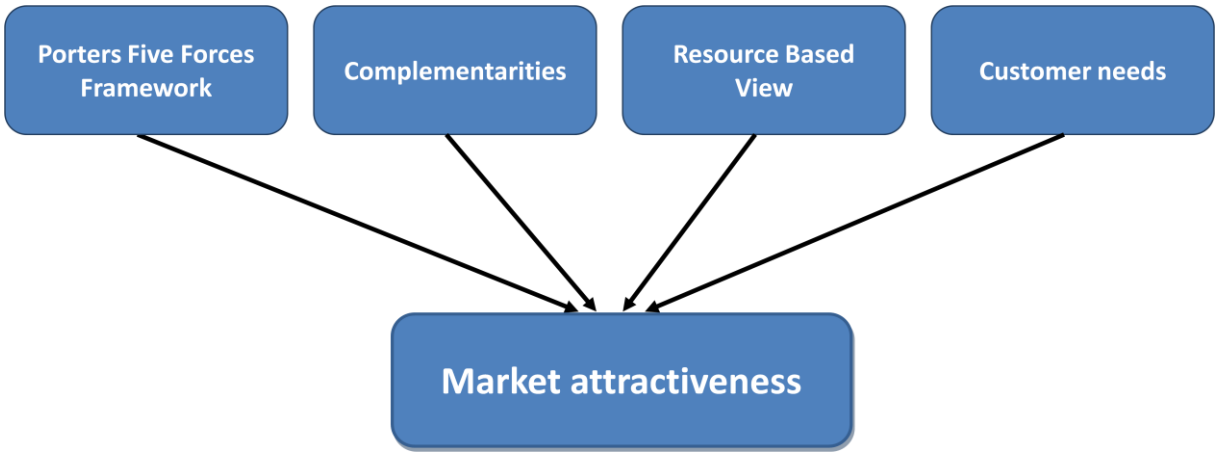

Figure 10 - The proposed process for evaluating market attractiveness

The foundation is Porter's five forces framework with the extension of complementaritities, but somewhat modified to suit emerging industries. In addition Grant's RBV is used, but with the major modification being that the level of data gathering stops with capabilities instead of going all the way down to the resource level. Another significant difference between Grant's RBV and this part of the process is the suggested method for actually gathering the data needed to conduct an analysis. In the process, a self assessment questionnaire in combination with problematizing questions are suggested for the data gathering of the internal factors. Lastly, the customer needs has been used as

the fourth part of the process. It may at first seem to be the problem-free how to gather data for the customer needs however it must be remembered that this process is supposed to be used in emerging industries and hence the number of actual customers present in the market is generally very limited.

Based on the four areas above, see Figure 10 - The proposed process for evaluating market attractiveness, the evaluation and comparison between the investigated markets may be done. The basic idea for this part is to use color coding (green, yellow and red) to assign levels of attractiveness on the different investigated areas and then make a combined assessment to reach a ranking between the different markets.

Before the discussion, a brief reflection about the results and some research recommendations will be presented.

In this thesis a process for assessing market attractiveness in emerging industries has been developed, and has also been applied during a case study within the emerging industry of charging units for electric vehicles. However, it is important to note that only the method of the process was tested during the case study. Hence, so far the authors do not know whether or not the process is at all accurate and suitable to use when assessing market attractiveness in emerging industries.

The only way to find out whether or not the process actually proves to be useful or not would be to test it, as has been done on ABB Cewe-Control, and then follow up the results of what happens if the company chooses to follow the process output. One way to measure the quality of the process compared to others, for example the RBV, Porter's five forces or something else, would be to find very similar organizations active in the same industry and try out the various processes on the organizations and then measure and compare the results. However, this is probably not doable in real life since there are too many uncontrollable variables present that could influence the results.

The authors suggest that further research ought to be conducted in the areas of capability and resource data gathering. Although the proposed method of using self-assessment interviews in combination with problematizing questions seemed to be working, there are still a number of issues left to solve including over-or underestimations from the interviewees.

6.2 General discussion

At the beginning of writing this thesis, and especially in the beginning of the data gathering for the process, it seemed to be a quite small task of actually conducting interviews. However, as a matter of fact most of the interviews took weeks of emailing and telephoning to persuade the interviewees to participate in the interview. It was actually quite surprising that it was in general more difficult to get in touch with persons within the organization (in the case study ABB) than external interviewees. As to why it was this way the authors do not know for sure but suspect that it could be due to lack of interest. Many of the external interviews conducted were mostly done with people that were very enthusiastic about this emerging industry and hence more prone to talk about it than for example a sales representative within the organization with more responsibilities than just this product in the emerging industry (in this case charging unit). Also, it is believed that potential and existing customers appreciated the opportunity for them to express their opinions and demands for future products.

Another important issue to emphasize when using this process is that it is much easier said than done to find appropriate people to interview in order to get an understanding of an emerging industry. In many cases the authors have come across people who say they are experts in the area, and that in some occasions also have been recommended by others, only to find out that they are just creative thinkers. Some emerging industries, like the electric vehicles and charging units, are comprehensible to almost all people which means that everyone will have an opinion on what will happen in the future and this can make it hard for an interviewer to separate experts from enthusiasts. The only sound advice the authors can give is to be as well prepared as possible when interviewing and when appropriate, ask for sources or background to statements that seem a bit odd. In the authors' case it became clearer whether or not the interviewee indeed was an expert or just someone with an impressive imagination. The more interviews that were conducted since experts tend to rely on studies, pilot projects or other types of empirical evidence as basis for their statements whereas the creative enthusiasts rely more on common sense, general trends in society, and other more abstract sources. Although it is not said that these interviewees' input is not valuable, just that it is important for the interviewer to be able to categorize accordingly whether or not the interviewee has important knowledge and understanding or not.

In theory it should be quite straight forward to compare different regional markets according to a couple of factors such as has been done in the case study. However, it turned out that in many cases it was quite difficult to separate some factors within a regional market which in turn made it difficult to compare results. In retrospective one way of mitigating the risk for this phenomenon to occur could be to segment the factors even more, trying to isolate the drivers and hopefully make it easier to compare. To be specific, in the case study a factor called "Government Incentives" has been used. This is a very broad factor and different countries' government has very different incentives they use to stimulate an emerging industry and when it comes to comparing the different countries' attractiveness based on this factor.

Due to some practical circumstances, the working process of this thesis has not been done the way the authors' would have wanted. The external factors phase was conducted prior to actual thesis work started due to a summer employment with ABB Cewe-Control. Although this was not the preferred process, the authors still do not know in what order it would be optimal to use the process. The three main components (External factors, Internal factors and Customer needs) are all in varying degree related, at least in part, and should probably be conducted in parallel for the best result. However, after completing this thesis with the quite extensive case study the authors do not know whether or not the three parts ought to be done in parallel or sequentially and in that case in what order. The only reflection the authors can offer is that by starting with the external factors, in combination with a general read-up on the emerging industry, it was possible to get a broad understanding, contextualization, on important aspects that might not be present on all markets. Another argument as to why external factors is more suitable to begin with is that without a market potential there is no need to even look at the internal factors. Also, the understanding of the emerging industry as a whole facilitates the identification of persons to interview to get customer needs and customer insight.

Another finding that emerged during the test of the process was that our proposed method can be used to funnel down the number of interesting markets in a way that supposedly saves time for researchers. If the study starts with an external study of large number of market, say fifteen, and the

study shows that five of those are very unattractive in an external perspective, then there is little need to include them in the further analysis. Hence, the internal analysis could be focused on the ten remaining markets that got for example a medium and high external attractiveness rating. The risks associated with this method are believed to be very low as markets should only be excluded in an early phase if they receive a very low attractiveness.

Although the process is not tested properly, the case study has at least provided some evidence that the process is usable in the gathering and analysis of the data even though the accuracy of the analysis is not known. To conclude, the process seems to be working in terms of being practically usable for gathering data and conducting an analysis based on the collected data. However, whether or not the process adds any value in terms of decision making, (i.e. the process' accuracy) is as of now not known and must of course be followed up before the authors can recommend anyone to use this process in the future.

6.3 Methodological discussion

One of the most difficult tasks in the development of this process has been to create some guidelines for how to transform the standard questions regarding the organizational capabilities and resources into problematizing questions to triangulate these abstract features. Despite using Landry's (1995) definitions of what characteristics a problem might have, it was still not always clear how to go from a standard question into a question trying to isolate a problem. There is probably, due to this difficulty, some discrepancies in this part in the case study which probably need some more work to create better guidelines. Although the method proposed in this thesis probably is not optimal, neither the authors nor their supervisor have seen any other proposed methods of capturing organizational capabilities.

During the work with this thesis there have been some discussions among the authors about using other factors than the ones used, and also quantifying the internal factors. This way the analysis would have been easier to conduct since the data would be very comparable and thus easy to rank between different markets. However, the downside of doing this is that the data gathering phase is much more complicated and the availability of the data needed to provide "objective" and comparable results is probably very limited.

One example of more objective data could be to use ABB's and its competitors' market shares for products that use the same sales and distribution channels as EV charging units and have these numbers as an estimation of each company's strength in this area. As for modularization and component use, purely quantitative measure could have been used; for example how many of the components in charging unit X are also used in other products. This approach was discarded due its difficulty of actually gathering this data, especially from ABB's competitors.

6.3.1 Validity and reliability discussion

The construct validity in the process is probably varying between the different areas of investigation. The construct validity of the external factors is believed to be quite high since the questions asked are quite straight forward and the results are quantitative to a large extent which also helps the verifying that the questions actually answers to what is asked for. However, one issue that might influence the construct validity negatively is the fact that only one type of interviews was conducted

for most of the data. To aid this issue, secondary sources were used to complement the interview sources. All in all the construct validity is assumed to be fairly high.

The issue of external validity, or generalizability, has a quite dual meaning in this thesis. The actual results of the case study are not considered to have high external validity, which is neither strange nor has it been a priority to achieve. The more important meaning of the external validity concerns the process and is supposed to be of high external validity due to its general application areas. Although it is limited to emerging markets it is believed to be fairly generalizable within that field, i.e. it should be possible to use the process on all sorts of organizations as long as they are in an emerging industry.

The ecological validity has been a concern during the entire process and it has been of utmost important that the process should be practical to use in real-life situations. As a result much effort has been put into making the data gathering and analysis phases manageable, in some situations at the expense of accuracy and robustness of the output of the process. This has been motivated by the fact that the uncertainty in most of the quantitative data and hence the choice to go for more practical use than robustness and rigor.

The internal validity of the process, and this thesis, is difficult to assess since there is no evidence of whether or not this process is accurate or not. It would probably require very controlled experiments to evaluate the internal validity where to similar organizations would use either this proposed process or something completely different and then be evaluated after some time to measure which process seems to be the better. Since this would be extremely difficult to conduct in real life, there is no way of telling the strength of the internal validity.

The reliability of the work in this thesis is also quite ambiguous in terms of the process development and the process usability evaluation, i.e. the case study. Since most of the development work for the process has had infinitely many possible outcomes depending on what theoretical concepts that are chosen to be included in the process. Hence, the likelihood that someone else would come up with a similar process that we did is low and that someone else would come up with exact same process is highly unlikely.

The development of the process aside there is another meaning of reliability in this thesis, namely the results of the case study. This part is stricter in terms of what can, and indeed, has been done. There is no infinite pool of things to consider once the process has been developed and hence if someone else would try to copy this part of the thesis work, chances are that the results would be quite similar. It all depends of course on access to information and interview candidates and to some extent also the level of knowledge regarding the industry (which we have termed contextualization).

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7.2 Interviews

Interviewee:	Organization	When (weeks of 2010):	How:
Peder Tjäderhane	ABB Nyköping	v 25	Personal meeting
Marcel Wennekes	ABB Netherlands	v 26	Email
Derek Kelly	ABB Ireland	v 26	Telephone
Vidar Jetmundsen	ABB Norway	v 26	Personal meeting
Henrik Wingfors	Swedish Energy	v 26	Personal meeting
Anders Lewald	Swedish Energy Agency	v 26	Personal meeting
Stefan Montin	Elforsk	v 26	Telephone
Graham Barlow	ABB UK	v 28	Telephone
Calle Johansson	Pelles EL	v 44	Telephone

Appendix

An example of a template for an interview conducted with an ABB sales representative in Ireland.

Questions for Derek Kelly Sales manager, Ireland

1. How would you describe the market for EV charging infrastructure in your region today?
    a. Actors
    b. Relations between actors
    c. Market size
    d. Market growth
    e. Trends
    f. Issues/Problems
2. What actors do you consider to be the most important and influential in your market?
    a. Concerning EVs?
    b. Concerning charging infrastructure?
3. Who are your main customers today?
    a. Private companies?
    b. Government? Etc
4. How would you describe the value chain for ABBs charging units in your area today?
    a. Who is the buyer?
    b. Who installs the charging units?
    c. Who is the owner?
    d. Who performs maintenance and service?
5. What actors do you consider to be ABBs main competitors in your market?
    a. How do their offers differ from ABBs?
    b. What are the price levels of these competitors? Forms of payment?
    c. What business models do these competitors use?
6. Are there any specific geographical or other types of regions that are believed to be on the front edge of the EV and charging unit area?
7. What is the estimated size of the EV charging infrastructure in your area?
    a. Number and type of charging units? And/or
    b. Size of EV fleet?
8. What variables do you use and consider most important in such estimation?
    a. What are the main uncertainties?
9. For your region, is there an economic rationale for buying and using EVs?
    a. Today?
    b. In the future? When?
10. What role and how important will government subsidizes and tax incentives be?
    a. What subsidizes exist today?
        i. EV charging infrastructure?
        ii. EVs?
    b. What governmental agencies are responsible for these issues?
11. Are there any country specific requirements for EV charging units?
12. What reports or articles are of relevance for understanding and getting knowledge about your market for EV charging?
13. What kind of customers in the EV charging area would you consider to be the most important for ABB to attain in your market?
14. What kind of EV charger offer would you consider to be most successful for ABB in your market?
15. Finally, do you have any concluding thoughts or opinions about the future for EV charging in your region?