

*Master Thesis*

**E-commerce Adoption and Implementation Strategy**

**for a High-Tech Firm**

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**Svetlana Golubova**

MSc Business Administration

Track International Management

**University of Twente**

School of Management & Governance

National Institute for Knowledge-Intensive Entrepreneurship (NIKOS)

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**Supervisors University of Twente**

1<sup>st</sup> supervisor: Dr. E. Constantinides

2<sup>nd</sup> supervisor: Prof. Dr. P. D. Englis

## **Abstract**

The use of e-commerce by SMEs makes it interesting to look at the reasons and processes of e-commerce implementation in context. There exist several best practice models of e-commerce adoption. In this report, these models are applied to a high-tech start-up firm and the results show that several common inhibitors of e-commerce implementation are recognized. Further, a marketing and operational strategy is proposed for the start-up firm which aligns the best practices, internal firm capabilities, external environment and market characteristics.

**Keywords:** e-commerce adoption and implementation, high-tech firms

## **Management Summary**

This thesis brings together the topics of e-commerce strategy, high-tech entrepreneurial firms, B2B strategy, internationalization, and online marketing. The focus of the thesis is on a stage process of e-commerce implementation. The tendency to sell online is visible in different sectors of the economy, in both B2C and B2B environments, and in both large and small firms. There are multiple benefits recognized in a B2B e-commerce context, for example the improvement of inter-organizational processes which lead to efficiency and a competitive advantage.

The focus of analysis in this report is a small high-tech firm that is in process of implementing e-commerce. The firm needs to select a suitable operational and marketing strategy. Moreover, the firm needs a clear representation of the market for a new product that it launches online. In the high-tech B2B sector, and in particular in the distribution of high-tech components for the research industry, there is interest to sell products online because e-commerce provides access to distant markets and because e-commerce is an efficient transaction mechanism. However, high-tech products are complex products and this can make the buying party reluctant to immediately purchase the product online. This indicates that an online channel does not have to be a substitute for the offline channel but can rather perform a complementary role. The web-shop can be used as a marketing tool for collecting relevant customers' data through evaluation of visits.

This research is conducted by first collecting literature and after that applying it to the high-tech firm. Moreover, primary data sources such as interviews, survey and observations are used. This research has multiple findings. First, the findings indicate the importance of several best practices of e-commerce adoption, and the importance of aligning e-commerce objectives with the internal and external environment. It is important for small firms to implement an e-commerce strategy that is suitable for the specific objectives that the firm sets. The other finding is directly applicable to the start-up firm. It is identified that there is a market for the products; however the customers require slightly different specifications of the product. Some customers are interested in buying the products online, while others perceive many drawbacks in using e-commerce. These market characteristics have important implications for the future directions of the firm.

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## Abbreviations

<b>B2B</b>	Business-to-Business
<b>B2C</b>	Business-to-Consumer
<b>E-commerce</b>	Electronic Commerce
<b>STS</b>	Simple Technology Solutions

## **Acknowledgements**

This report describes the results of my graduation project carried out at Simple Technology Solutions<sup>1</sup> and the University of Twente. This graduation project is the last phase of the Business Administration Master's program within the track of International Management.

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Hereby I present the findings.

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<sup>1</sup> All the company names used in this thesis are fictional.



# **1. Introduction**

This chapter introduces the topic of the master thesis. First, the background of the study is presented, followed by a presentation of the case company. After that, the research questions are specified and are illustrated in a research framework. And at last the objectives of the study are explained, the methodology is presented and an outline for the thesis is given.

## **1.1 Background**

To remain competitive in global markets, e-commerce seems to become imperative and therefore, companies are increasingly adopting e-commerce systems. A lot of research has focused on differentiating “adopters” from “non-adopters” of e-commerce and on indicating which firm characteristics lead to greater adoption (Daniel et al., 2002; McCole & Ramsey, 2005; Jeon et al., 2006). The focus of prior research is often on SMEs and in particular on explaining the slow speed of adoption of e-commerce in small firms because of the absence of necessary internal capabilities. In general, it appears that the adoption of e-commerce is affected by two contextual variables: internal readiness, which is influenced by IT, organizational and buying need characteristics; and external pressure, which is influenced by supply chain structure, demand and industry characteristics (Bakker et al., 2008).

E-commerce can be seen as a stage process, in which firms first outweigh the reasons for e-commerce adoption. There are multiple benefits of e-commerce as opposed to traditional commerce which are relatively applicable to all firms. For instance e-commerce leads to disintermediation of the supply chain, which means that companies can eliminate costly sales agents and decrease costs; moreover e-commerce provides access to distant markets because it is said to blur international borders (Longenecker et al., 2011). It appears a reasonable decision for many firms to explore e-commerce opportunities, due to globalization of markets and the increasing importance of doing business internationally. The availability of e-commerce software and supporting institutions is also a favorable factor for e-commerce adoption.

Once a firm decides to engage in e-commerce the implementation process starts. During this process it is important for the firm to identify the enablers and inhibitors of e-commerce implementation (Levy et al., 2005). The purpose is to make a strategic use of the enablers of e-commerce and to overcome the barriers of implementation. An example of an enabler of e-

commerce success is the existence of a market and a critical mass for the product, and an inhibitor of e-commerce implementation can be the lack of internal IT systems.

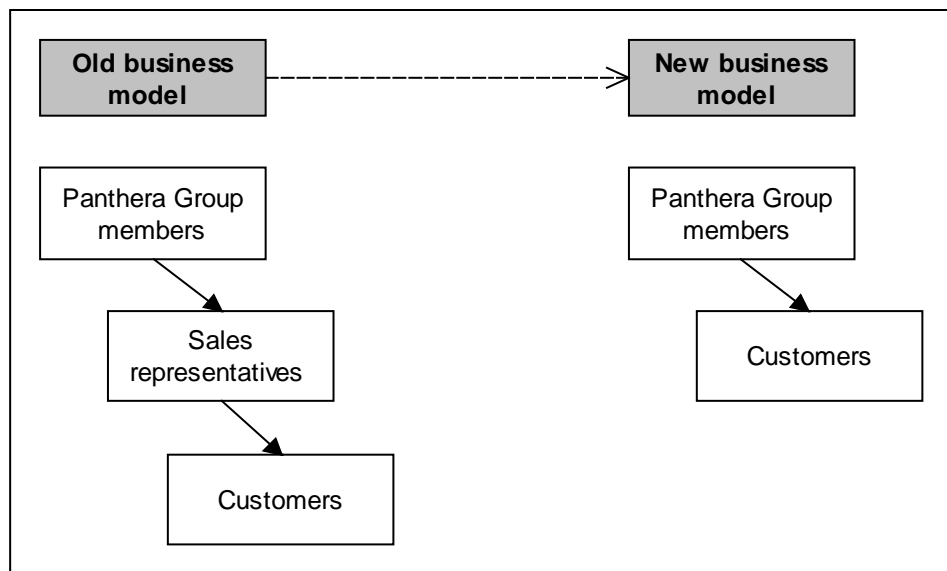
Managers must be able to identify e-commerce applications that have a strategic and competitive potential for the firm, before committing valuable resources to possibly unsuccessful e-commerce implementation projects (Lewis & Cockrill, 2002). This means that the firm should have a clear vision of what exactly it wants to achieve with e-commerce – the objectives and perceived added value – be it capturing new markets or decreasing costs. The e-commerce implementation process must be aligned with the e-commerce objectives. Jiang and Yu (2009) said that the implementation of e-commerce is the process by which an organization seeks to achieve its e-commerce objectives.

E-commerce is a tool through which firms can attain competitive advantage. Therefore it is interesting to further explore how firms exactly go about implementing e-commerce systems, and which path firms take from e-commerce idea generation up to realization of e-commerce success. Moreover, e-commerce implementation should be studied in context. In particular, the small and medium-sized enterprise context is interesting because it constitutes a major part of the economy and has been relatively unsuccessful in exploiting e-business (Eikebrokk & Olsen, 2007). Also, large firms are more likely to adopt new technology than small firms due to economies of scale. Another context that is interesting to study is the industry context, because implementing e-commerce requires different competencies in different sectors of the economy. For instance Sadowski et al. (2002) mention that the adoption of e-business by SMEs is affected by industry characteristics and that SMEs in knowledge intensive industries have been more inclined to adopt Internet services and products. Moreover, firms in more information intensive industries and that operate globally are more likely to have the need for e-commerce (Gibbs et al., 2002).

## **1.2 Case of Simple Technology Solutions**

Simple Technology Solutions (STS hereafter) is a start-up knowledge-intensive high-tech firm, operating in a B2B environment and specialized in high-tech niche products. The start-up company is a spin-off of a holding that operates in the electronic high-tech manufacturing sector. The objective of STS is to offer niche products through a virtual channel, and more specifically through a web-shop. Important to note is that by opening a web-shop the holding firm

reconfigures its business model and shifts from a traditional to an electronic distribution model. In its current business model the holding works with sales representatives. The new business models includes cutting out the middlemen and focusing on a large, borderless market with high-volume sales transactions (Figure 1). In this new business model, STS wants the firms within the holding to simultaneously become the suppliers of STS. In other words, STS wants to offer products through its web-shop that are supplied internally from its trading partners within the holding.



**Figure 1.** Business model reconfiguration

By opening STS, the holding firm incurs a certain risk because 1) it starts to work with a new innovative electronic channel with which it has no prior experience<sup>2</sup> and 2) it introduces a new, innovative and complex product through the web-shop with only a slight perception of demand. Moreover, the challenge for STS is to become part of the global production networks of customers, which often have rigid structures. Above that, the holding has limited experience with marketing niche products online.

Though, STS has several Unique Selling Propositions (USPs) such as the ability to supply a niche product based on own technology and the attractive price levels that can be set. STS anticipates to have a global reach through the electronic mechanism and to sell large volumes at reduced price levels. In addition, the holding expects to use e-commerce as a marketing tool. To

<sup>2</sup> Within the holding a similar virtual organization has been introduced previously, however it is not clear whether it has been a success and whether it was a relevant experience.

simplify this research only one product of STS is considered, namely the new innovative product which STS first launches through its web-shop.<sup>3</sup>

## **1.3 Research question(s)**

### **1.3.1 Management problem**

The management of the holding realizes that both opportunities and threats arise when establishing e-commerce, and that several barriers have to be overcome before e-commerce is a success. First of all, the firm has to cope with technical and operational issues: start-up firms often encounter problems with setting up a web-shop in case there are not enough IT-literate employees in-house. Furthermore the firm has to overcome the liability of newness, which means that it is at a disadvantage vis-à-vis established firms.

STS is interested in selecting an appropriate e-commerce strategy in order to extract value from the venture. This appropriate strategy consists of several components, both high-level strategic components – such as business planning – and more operational components such as developing the web-shop content and launching a marketing campaign.

The problem identified by the management of STS is as following:

- **Which e-commerce strategy should the high-tech firm STS adopt, in order to achieve its strategic objectives?**

It is important to emphasize that the management problem addresses the case of STS directly. This implies that this study also focuses on the contextual factors that are relevant for STS; these contextual factors are the small firm size, a B2B market and a high-tech environment.

### **1.3.2 Sub-questions**

In order to answer the management problem, the problem is first broken down into several sub-questions. In Table 1 the sub-questions are listed, together with a rationale for each question.

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<sup>3</sup> The product is a Transmission Electronic Microscopy (TEM) membrane.

**Table 1.** Overview of sub-questions

1.	<p><b><i>What is e-commerce?</i></b></p> <p>Clarifying the concept of e-commerce is important because there can be a confusion as to which aspects e-commerce encompasses.</p>
2.	<p><b><i>What are the benefits and drawbacks of e-commerce?</i></b></p> <p>The benefits and drawbacks of e-commerce can give an indication of the outcome of e-commerce. Also, benefits of e-commerce can be overemphasized and the drawbacks can be underestimated.</p>
3.	<p><b><i>What are the drivers and objectives of e-commerce adoption?</i></b></p> <p>An essential step is to identify why exactly firms decide to implement e-commerce, and what they aspire to achieve. A lack of direction can lead to slow and ad hoc e-commerce implementation.</p>
4.	<p><b><i>What are the best practices of an e-commerce strategy?</i></b></p> <p>Taking a best practice approach is important in e-commerce. However, e-commerce should be studied in context because it is the question whether a one-size-fits-all strategy is applicable.</p>
5.	<p><b><i>What are the internal and external enablers, inhibitors and capabilities of e-commerce implementation?</i></b></p> <p>The internal and external context of the firm can be studied to identify favorable and unfavorable conditions. Firms should be able to leverage their resources and overcome the barriers.</p>
6.	<p><b><i>Which e-commerce operational and marketing strategy is appropriate for STS?</i></b></p> <p>Previous questions identified e-commerce best practices. Now STS can be analyzed along these best practices through internal and external firm analysis. Moreover, an analysis of the market can be given to provide recommendations to the firm.</p>

### **1.3.3 Research framework**

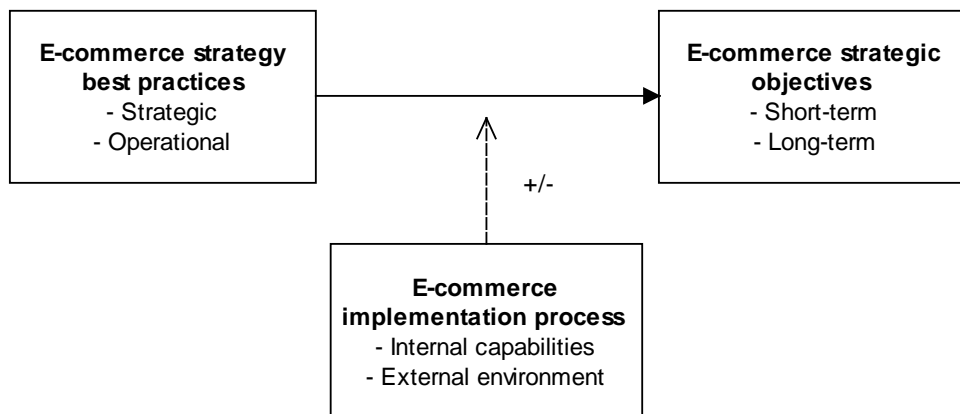
The research questions can be illustrated in a research framework (Figure 2).

The first variable is strategic business objectives of the firm. By formulating its objectives, the firm should answer why the business exists and which performance it wants to achieve. The second variable is termed e-commerce strategy, it consists of necessary steps that the firm should

take in order to achieve e-commerce objectives. The third variable is the actual implementation of e-commerce, and it consists of enablers and inhibitors of e-commerce.

The proposition as illustrated in Figure 2 states that the achievement of business objectives, and hence the desired e-commerce performance, is influenced by the appropriate application of e-commerce best practices. The relationship between strategy and firm outcomes is further influenced by the presence or absence of these necessary e-commerce drivers. The firm will benefit if the enablers outweigh the inhibitors. The plus sign implies that the presence of relevant internal factors will positively influence firm performance.

The relationship between the variables as represented in Figure 2 can be explained as following. In case it is identified that the objective of STS is to find new customers, the e-commerce strategy has to be designed in such a way, that STS penetrates multiple geographical markets. This implies, for example, that the web-shop should be accessible in several languages, that payment and tax systems are available for more regions and that the online marketing campaign is targeted across multiple locations (operational strategy). This in turn means that the firm should possess an international mind-set (internal capabilities) as well as support from relevant third parties (external environment).



**Figure 2.** Research framework

## 1.4 Objectives

The research has both a scientific and a practical relevance.

The scientific relevance is the contribution to the body of knowledge about implementation process of e-commerce in small organizations. In essence, this study shows how high-tech knowledge-intensive SMEs and start-ups can best organize their B2B electronic enterprise, and

which strategies they should use. This is an important aspect because little research has been carried out about the use of e-commerce in the context of start-up knowledge-intensive firms. Moreover, the study highlights the importance of considering multiple factors in the implementation process, such as the existence of a market and internationalization capabilities.

The practical objective is to assist the company STS in creating an efficient and successful web-shop mechanism, and to help STS achieve its desired e-commerce performance. The study results in a recommendation for STS, including the activities that STS should carry out. The results can also serve as a blueprint for other high-tech start-up firms that plan to enter the market through a web-shop mechanism. This is because the results can tell which practices to adopt, and which pitfalls to avoid.

## **1.5 Methodology**

Different research methods are used to answer the different subsets of the management problem. In order to identify best practices of e-commerce implementation, including drivers of adoption, e-commerce strategy and e-commerce implementation enablers and inhibitors, a review of the literature is used. Questions that are more specifically related to the case company are answered through interviews, a survey and observations. The research methods are further elaborated in chapter 4.

## **1.6 Outline of the thesis**

This paper proceeds as following. First, a literature review (chapter 2) discusses important aspects in the domain of e-commerce which are relevant for the case of STS. In the end of chapter 2 a theoretical framework is presented which builds upon the review of the literature. In chapter 3 an overview of the research strategy and methods is given. The chapter gives a rationale for the chosen research methods and also describes the data collection methods. After that, the case company is described in detail in chapter 4. This chapter analyses the objectives of the firm as well as its organizational capabilities. The company is also analyzed based on the factors that are described in the research framework in chapter 2. Finally, conclusions are presented in chapter 5.

## **2. Literature Review**

The management problem was presented in section 1.3. In order to answer the management problem, several sub-questions should first be answered. This chapter is organized around these sub-questions. In section 2.5, a conceptual model is outlined which furthermore clarifies the relationship between the concepts. This conceptual model is further applied to the case study in chapter 4.

### **2.1 Definition of e-commerce**

The definition of e-commerce found in literature is rather broad. As such, the term e-business is sometimes used a synonym for e-commerce, however e-business refers to any use of Information Technology (IT) within a firm while e-commerce is limited to the selling and buying via the Internet. For example, according to Kalakota and Whinston (1997, p. 3) e-commerce is “the buying and selling of information, products and services via computer networks”, the computer networks primarily being the Internet. A more narrow definition is given by Amit and Zott (2001) who say that e-commerce firms are firms that derive a significant or rapidly growing proportion of their revenues from transactions over the Internet. Often the definition of e-commerce is limited to the selling and buying by means of Internet, or in other words conducting e-transactions over the Internet. However, e-commerce can also have an informational and communicational function. For instance, Wen et al. (2001) discuss that the Web is used to support but not to replace a company’s main business activities. In the informational and communicational approach the Web is used as a supplement to traditional marketing, delivering additional benefits to customers and building relationships with them. Like this the firm can build brand awareness and image, and can use the Web as a cost-effective way by providing large quantities of information to customers and giving a company an instant global presence.

### **2.2 E-commerce benefits and drawbacks**

Even though there are multiple benefits of e-commerce, Zhu and Kraemer (2003) said that there are cases where many firms, concerned about falling behind on the technology curve, engage in ecommerce initiatives without deriving any benefits. Therefore, firms require an understanding of both benefits and drawbacks of e-commerce participation. The benefits and drawbacks are evaluated from the adopter’s point of view.



### **2.2.1 E-commerce benefits**

#### **Efficiency and low cost**

Firms often view e-commerce as an additional channel for doing business, as a means of reducing costs, as a vehicle for improving operational performance, or as a whole new platform for doing business with great prospects for achieving these gains (Gibbs et al., 2002). Indeed, one possible benefit of starting a virtual organization is that the costs are minimized because one or more units within the supply chain is eliminated. Similar reasoning is applied by Delone and McLean (2002) who describe the net benefit of e-commerce as whether Internet purchases saved individual time and money, and whether the benefits such as supply chain efficiencies yielded positive net benefits for an organization. A B2B e-commerce firm operates as virtual distributor that uses the Web to compete directly with traditional middlemen.

Another advantage that an e-commerce system offers is that it reduces overall marketing expenses and costs of market research. E-commerce permits managers to collect, gather, utilize and disseminate information from the website. From a marketing perspective, e-commerce can be effectively used to generate and store huge data on customer spending patterns, and the ability of a firm to generate valuable knowledge by analyzing such data could be a source of competitive advantage for the firm (Ramanathan et al., 2012).

Similarly, from an operational perspective, how a firm uses e-commerce to share information effectively across the entire supply chain resulting in improved forecasting accuracy and reduced costs could be a source of competitive advantage. E-commerce can be used to improve operational aspects such as order processing, order fulfillment and delivery, and marketing aspects.

#### **International opportunities**

Some other benefits of e-commerce start-up organizations are defined by Longenecker et al. (2011). They suggest that, because of their limited resources, small firms often cannot reach beyond local markets and those small firms confined to the brick-and-mortar world would typically serve only a restricted region. The Internet blurs geographic boundaries and expands a small company's reach. In fact, e-commerce allows any business access to customers almost anywhere. This view is supported by Savrul and Kılıç (2011) who say that besides cost reduction and productivity increases, e-commerce provides the enterprises with reaching to new markets. Alongside with elimination of protectionist policies, e-commerce allows the customers and the

enterprises to reach the most remote markets easily, which in result provides the trade volume and profit of both demand and supply side. According to Jeffcoate et al. (2002) e-commerce is a cheap way for SMEs to access the global marketplace.

### **2.2.2 E-commerce drawbacks**

There are also several drawbacks of e-commerce. For instance, issues of trust, market readiness, investment complementarities and technology standardization seem to be hindering the wide adoption of B2B e-commerce solutions (Dai & Kaufmann, 2002).

#### **Technical**

The technical limitations include the cost and hassle of developing and maintaining a website, insufficient telecommunications bandwidth and constantly changing software. Technical issues can arise during the entire e-commerce implementation process, from developing the content up to customer's complaints regarding the speed and visual attractiveness of the site. The small business owner should take into account the customer access limitations with regard to cable, wireless, and other connectivity options, as well as the fact that some potential customers still do not have convenient access to internet (Longenecker et al., 2011).

#### **Trust**

A major issue with e-commerce is trust in web vendors that consumers have and the lack of trust which leads to deterrence of consumer adaption of e-commerce (Bhattacharjee, 2002). A lack of trust in the technical and institutional environments surrounding the web can hinder e-commerce adoption. Trust is an important aspect of e-commerce, and more so when it comes to actually purchasing products than when it comes to using e-commerce as a means of obtaining information (Gefen, 2000). The author reveals that familiarity is another important aspect influencing e-commerce. This is an important finding, because it provides guidelines on how companies engaging in e-commerce can build potential customers' trust through increased familiarity with the company and its e-commerce procedures. Kim et al. (2009) argue that trust and satisfaction are the main key factors for a successful e-commerce relationship. Trust is an important factor to consider in e-commerce, since most transactions are consummated across large geographical distances. Thus, a consumer's belief concerning the online selling party is an important determinant of his or her willingness to make a transaction through the website.

Solutions to enhance trust have been outlined by McKnight et al. (2002). According to the scholars, if the target community is less experienced with the Internet, seals touting the security of the Internet and clear explanations of structural and technological safeguard may be used to promote institutional trust.

### **E-commerce readiness**

E-commerce also means dealing with different cultures, languages, and legal systems around the world. Companies, as well as countries, should be able to adopt e-commerce and step into the electronic marketplace. Not all developing countries are yet ready for e-commerce. For example, Molla and Licker (2005) said that in developing countries successful adoption of e-commerce strategy in an organization depends on its perceived e-readiness in e-commerce, managerial, organizational, and environmental contexts. The low level of information and communications technology diffusion in an economy can also limit the level of e-commerce awareness, a factor taken for granted in the developed countries. In addition, in most developing countries, Internet use and e-commerce practices have yet to reach a critical mass for the network externalities to take effect and encourage businesses to opt for e-commerce innovations. This means that firms should take into account that they cannot target all countries, because some countries are not yet ready for e-commerce.

## **2.3 E-commerce adoption**

Firms should be able to define the drivers of e-commerce adoption, and the objectives that they wish to achieve through e-commerce. The drivers should be translated into e-commerce objectives.

### **2.3.1 Drivers**

Drivers of e-commerce adoption are in this context the reasons for firms to adopt e-commerce. The drivers of adoption can also be either reactive or proactive. Some firms participate in e-commerce because their industry sector is active online (Stockdale & Standing, 2004). Those SMEs follow their trading partners online in order to retain a relationship. Other firms take a more proactive approach and go online because they recognize an opportunity to grow their business through e-marketplace activity. This process can also be characterized as a “pull” vs. “push” process. Some organizations are pulled online by their partners and other push their

products to the consumer. It appears to be that a “push” strategy is more risky. In a research by Sadowski et al. (2002) it is shown that in general, SMEs have a ‘wait-and-see’ attitude – until profitability is demonstrated – towards Internet adoption.

Chau (2003) has distinguished between firms that have an experimental view of e-commerce, and those that have a strategic view of e-commerce. The experimental users of e-commerce do not consider e-commerce to be strategically important to the business initially. These SMEs experiment with e-commerce to gain some experience and knowledge in order to determine what contribution it can make to the organization. According to Chau (2003) some SMEs developed a strategic approach to fully embrace and integrate their online sales and marketing activities while other businesses approached their e-commerce initiatives with an ad-hoc experimental mindset. Firms with a strategic view of e-commerce are businesses that can identify tangible benefits from e-commerce transforming business processes and integrate e-commerce components directly into existing workflows.

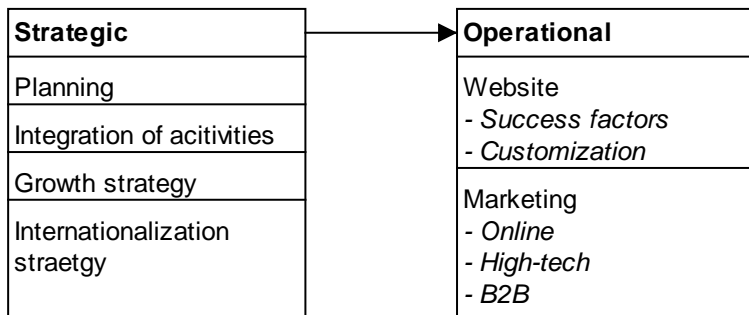
### **2.3.2 Objectives**

According to Constantinides (2002) online strategic objectives do not necessarily differ from the traditional ones and can be enhancing profitability, improving the company image, raising revenue, reducing operational costs, expanding the customer base, increasing the customer retention or augmenting the product and brand awareness among new groups. It is very important for firms to define the objectives of e-commerce very early in the process, because the further operational activities should be based on the outlined objectives. An example of a short-term purpose of an online venture can be encouraging the visitor of the website to undertake a certain action, such as to contact the website by mail or telephone or to purchase the product directly. The website itself is the virtual product display, promotion material, price catalogue and sales and distribution point and the prime mission of the website is to attract traffic, establish contact with the online target markets and brand the online organization (Constantinides, 2002). Further, it is important to mention that start-up firms that engage in e-commerce have to differentiate between firm survival and firm performance. According to Stockdale and Standing (2002), SMEs can realize benefits but it may take time for them to be recognized within the company. A steep learning curve will precede any benefit gain for many companies and it should

not be expected that this can be achieved in the short-term. A longer, slower approach may be a more reliable way to achieve sustainable advantages from e-marketplace participation.

## 2.4 E-commerce strategy best practices

E-commerce strategy can be examined at both the high, strategic corporate levels as well as at the more operational levels. Also, a distinction can be made between front-end functions of the website such as the sales portal, and the back-end functions that deal with order processing and logistics. Several best practices are defined and discussed in the sections below. An overview can be found in Figure 3.



**Figure 3.** E-commerce best practices

### 2.4.1 Strategic level

#### **Strategic planning**

It is interesting to discuss whether SMEs and start-ups should engage in formal or informal planning. Some authors emphasize that business planning is essential for start-ups. However, other studies do not acknowledge the importance of business planning in an SME context. According to Simpson and Docherty (2003) SME owner-managers tend to be more practical and do not acknowledge formal business strategies preferring instead to place reliance on their instincts or intuition. In general academic theory for e-commerce is found to be of little practical value to SMEs' owner-managers. In practice, it is often seen that firms take an informal approach and let strategy emerge in the course of action. In essence, as identified by Chau (2003) the strategic use of e-commerce by SMEs may be explicit in some cases but frequently it is implicitly implied.

The choice for a strategic approach also depends on the industry in which the firm operations. For instance, the study of Mohr et al. (2009) showed that strategy formation might be different in

a high-tech environment. In contrast to the neat, orderly process of strategy formation and execution implied by the formal planning approach, rapidly changing customer expectations, competitor actions, and technologies, such as those found in the high-tech environment, do not allow for such a rational process. Often referred to as an emergent planning process, the strategy is improvised or emerges from lower levels of organizations – whether through trial-and-error learning or incrementally with guidance from the top.

### **Virtual and traditional activities' integration**

Firms can be solely engaging in e-commerce and having no physical presence. These firms are termed virtual organizations. A virtual business model is an attractive business model to minimize operational costs while retaining a connection to a global market (Chau, 2003). In the study of Chau (2003) there were several cases presented in which the owners decided to establish separate business entities to explore the possibilities of targeting on-line customers exclusively. Creating a virtual business firm implies that there is a very high degree of business transformation.

Some firms choose a combination of both online and offline presence; those firms are called 'click-and-mortar' firms. These firms are also called net-enhanced organization: traditional bricks-and-mortar firms using e-commerce to enhance their organizations (Adelaar, 2004). One of the opinions is that some of those ventures derive significant added value from a combination of online and offline operations, partly because this business model is less risky. This view is supported by Porter (2001, p.18): "Strategies that integrate the Internet and traditional competitive advantages and ways of competing should win in many industries". According to the author, buyers will value a combination of on-line services, personal services, and physical locations over stand-alone Web distribution. Indeed, the value of integrating traditional and Internet methods creates potential advantages for established companies and it will be easier for them to adopt and integrate Internet methods than for dot-com's to adopt and integrate traditional ones. This view is supported by Drew (2003, p. 79): "Established firms whose business model is a mixture of 'bricks-and-clicks' stand to benefit from the experimentation and learning of early entrants and the maturing of the technologies underpinning the Internet".

Similar argument is provided by Constantinides (2002), who emphasizes the importance of synergy between online and offline business. The integration effort of front-office activities must be focused on utilizing existing communication strategies, brands, tools and channels in order to

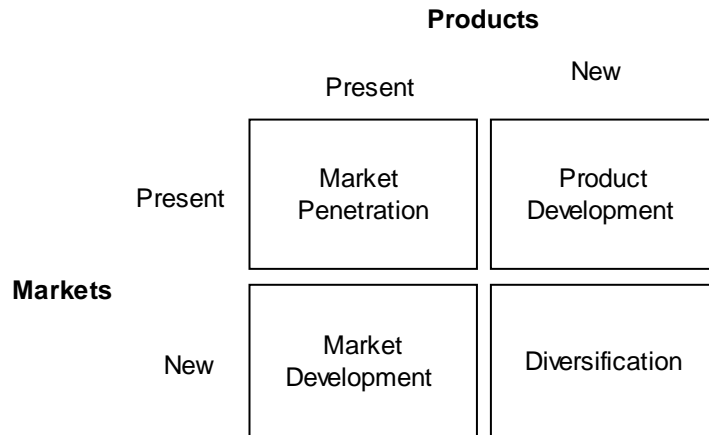
promote and support the Web operation during the introduction stage. Utilizing existing promotional activities and capitalizing on embedded customer goodwill is economical, less time consuming and more effective than launching new promotional campaigns. Moreover, integration of the back-office is important because the firm can benefit from economies of scale and learning effects, by using existing organizational infrastructures.

However, some drawbacks of integration were defined by Gulati and Garino (2000). According to the scholars, the integration of traditional and virtual activities comes at the expense of speedy decision-making, flexibility, and creativity. Other challenges to integration include price competition and avoiding the problem of online and offline businesses cannibalizing each other's customers.

### **Growth strategy**

A firm should be able to identify its attitude towards e-commerce growth. An interesting distinction of e-commerce growth potential strategies is given by Jeffcoate et al. (2002, p. 126): "SMEs may be divided into two main groups on the basis of their attitude towards growth: growth oriented and quality of life. The primary purpose of growth-oriented companies is to grow and create the most valuable company they can. In contrast, quality of life appeals to companies whose primary purpose is to provide an income for the owners". This is consistent with prior analysis about firms that view e-commerce as strategic or experimental: firms that experiment with e-commerce are firms that have a quality-of-life attitude.

Further, in case a firm identifies that it has a growth objective, and sees e-commerce as strategic, it can decide whether it wants to engage in product expansion or market penetration. The strategic intent in SMEs may be usefully understood using Ansoff's framework on product/market expansion. Ansoff's framework has been used by Levy et al. (2005) to consider the strategic intent and to map strategic growth intention of SMEs. This framework identifies four strategies for growing businesses (Figure 4). Market penetration is continuing to sell current products into current markets. Market development is selling current products into new markets. Product development is selling new products into current markets. Diversification is selling new products into new markets.



**Figure 4.** Ansoff product-market growth matrix

Adelaar (2004) mentioned that e-commerce can be used as a tool to offer added value to existing customers, which helps retain and intensify the relationship with these existing customers. Instead, new customers need to be made aware of a firm and its offerings, and will not have as much familiarity with the brand, resulting in higher costs to establish a sale. E-commerce strategies designed to move into unserved markets are considered complicated and costly, due to the necessary scalability of fulfillment processes and a need for in-depth market knowledge.

### **Internationalization strategy**

There are different theories of the speed of internationalization and the academic discussion addresses gradual globalization and born global firms. The first theory is that of gradual internationalization and is termed the Uppsala process model (Johansson & Vahlne, 1990; Andersson et al., 1997). It emphasizes learning by focusing on market knowledge and commitment and suggests that firms internationalize in a step-by-step process. Another internationalization theory is that of a born global firm (Knight & Cavusgil, 1996; 2004). This theory says that firms can globalize radically instead of following a gradual internalization process. A paper published in McKinsey Quarterly by Rennie (1993) described how companies in Australia seemed to do many business transactions outside their domestic market. These firms' output market is international from inception. This type of firms typically start to export less than two years after the foundation of the firm, and these young firms are responsible for approximately 20% of the total export (Rennie, 1993; McDougall & Oviatt, 2000). Hence, the concept of these born-global firms is opposing the traditional concept of firms following a



gradual internalization pattern, where they start sales domestically and move abroad slowly, by first entering culturally and geographically close countries.

Knight and Cavusgil (2004) mentioned that the trend of electronic interconnectedness in particular is driving the increasing incidence of born globals or 'fast internationalizes'. The rise of Internet and with it applications as electronic payments and social networks have moved the business playfield online. However, other reasons have been outlined as well. Gabrielsson and Kirpalani (2004) mentioned that a condition for fast internationalization is the globalization of market conditions which ensures increased convergence of worldwide markets. Another reason is limited home market conditions that give firms an incentive to go global. According to Knight and Cavusgil (2004) it appears that, in addition to the presence of environmental factors, firms must possess specific knowledge-based internal organizational capabilities that support both early internationalization and subsequent success in foreign markets. Examples of such internal capabilities are youth and smaller size, which include a degree of flexibility that appears to help these businesses succeed abroad. This flexibility is characteristic of young firms that lack the administrative heritage of large, older competitors. Moreover, Gabrielsson and Kirpalani (2012) added that the presence of more skilled entrepreneurial-oriented people is also important for fast internationalization. Another major factor in the explanation of the phenomenon born global is the management's commitment to internationalization (Rennie, 1993; Harveston, 2000). The attitudes and mindsets of the management team play an important role in determining the extent to which a firm engages in international activities. According to Harveston (2000), for start-ups in certain emerging technological sectors, globalization is inevitable, and offers interesting opportunities. This is because R&D expenditures can rarely be compensated by sales in the domestic market alone and finding foreign customers is therefore essential. Globalization is also inevitable since in many technological sectors the necessary resources and potential partners are scarcely available and scattered around the globe.

### **2.4.2 Operational level**

#### **Web-shop success factors**

An effective website is the one which may motivate consumers to take desired actions such as remaining at the site for a certain time period, downloading the content of interest, forwarding it to other people, asking for information from the site, and purchasing products or services. To

achieve such effectiveness, the content of the web site is critical and its importance is equal to the importance of location in the offline world. Literature suggests that web-shops work efficiently when they are set up from the perspective of the buyer, and not from the perspective of the technician or the designer. Usability, availability, reliability, adaptability, and response time are examples of qualities that are valued by users of an e-commerce system (DeLone & McLean, 2002). According to the authors, the content should be personalized, complete, relevant, easy to understand, and secure if prospective buyers or suppliers are to initiate transactions via the Internet and return to a site on a regular basis.

Different authors have described best practices for organizing a web-shop. According to Eisingerich and Kretschmer (2008) the most important aspect is customer engagement through the provision of in-depth information on related products and services. The online store should invite consumers to revisit the site to learn about new developments in the sector. This facilitates brand attachment and association with the company.

Constantinides (2002) specified best practices for organizing the e-commerce system. These best practices are for instance the web administration and the availability of technical and service personnel on a 24-h, 7-days a week basis, constructing the website, frequent reviewing and updating of the content, ensuring transaction functionality and site security, and collecting, processing and disseminating website traffic and transaction data and having a system back-up mechanism.

### **Web-shop customization**

One of the very crucial international business decisions surrounding the global e-commerce is whether to use a standardized approach to marketing and communications or a localized approach (Alhorr et al., 2010). According to Singh and Pereira (2005) web localization and cultural customization of websites is not only desired but should be an important part of company's global strategy, as global online consumers prefer local content that is adapted to their unique language and cultural preferences. Research shows that consumers prefer to shop on and interact from sites that are specially designed for them in their local language. Country-specific web content that is adapted to local culture and language enhances usability, and perceived usefulness, leading to higher purchase intentions. Above that, web design that is culturally familiar to local culture will give rise to higher trust. Localization of websites involves

modifications based on several cultural parameters including language, symbols, graphics, content, colors, and so on.

### **Online marketing**

Marketing is changing very rapidly and more and more the marketing stage is shifting from traditional marketing techniques to online presence and activities. Online marketing consists of many techniques, such as public relations, search engine optimization, social media, e-mail marketing, affiliate marketing and online advertising. Some advantages of online marketing are the instantaneous and instant access to global markets. Several online marketing techniques are identified by Eley and Tilley (2009) in the report 'Online Marketing Inside Out'. According to the authors, an important component of online marketing is social media. Social media is a broad term to describe all the different kinds of content that form social networks: posts on blogs or forums, photos, audio, videos, links, profiles on social networking web sites, status updates, and more. However, the use of social media and blogs must be evaluated in context. For small firms, engaging in such activities means investing considerable time. Sometimes, posting content through social media and blogs can be damaging in case the firm is not using social media consistently. One of the most important elements of an online marketing strategy is search engine optimization (SEO). By defining the relevant keywords it is easier for potential customers to locate the website. Online advertising is one of the most widely used online marketing tools. It is considered as permission marketing, in contrast with interruption marketing which is created by traditional marketing tools. For small firms, SEO can be a very effective strategy because not much initial investment is required.

### **High-tech marketing**

Marketing is essential in the context of a high-tech firm. According to Mohr et al. (2009) high-tech firms must execute basic marketing principles flawlessly. Marketing activities are sometimes either an afterthought to the product and technology development process or are not given the same importance as product and technology development. This results in failure rates of many innovative products. Technological superiority alone is insufficient for ensuring success of high-tech products; rather, high-tech companies must complement their technological process with a set of marketing competencies in order to maximize their odds of success. For example, knowing how to select the appropriate target market and communicate clearly the benefit the

innovation offers relative to other solutions, are critical marketing competencies. A well-developed marketing competency includes proactive consideration of the customer in the development process; it helps to guide technical specifications and determine appropriate market segments.

There is a link between technology intensity of a product and competitive advantage. Many high-tech knowledge intensive entrepreneurial firms tend to focus on their technological capabilities and to develop products that are typically taken to the market using a “push” strategy (Englis et al., 2011). In doing so, the firm and its downstream value-chain members push their technology into the marketplace with scarcely a thought of the consumer until after the product is in the hands of the user. This often leads to product failures.

### **B2B marketing**

The marketing techniques used in a B2B environment differ from those used in a B2C environment. These differences can be grouped into market structure, buying behavior and marketing differences (Canning et al., 2010). First of all, B2B markets are characterized by derived demand which means that businesses only buy things to facilitate the production of goods and services. B2B markets are also in general characterized by higher concentration of demand than consumer markets. Demand elasticity is important in B2B markets; it is argued that businesses have less freedom to simply stop buying things.

Organizations tend to have more professionalized buying processes than consumers, which in many organizations are implemented by managers who are specifically employed as purchasing professionals. Moreover, the degree of interactivity between B2B buyer and seller, as well as the importance of relationship are higher in a B2B environment. This suggests that in general, B2B buying behavior is more complex than B2C.

The sales and transaction volumes are also higher in business markets (Canning et al., 2010). The authors suggest that conventional tools of consumer mass marketing are not very appropriate; promotional messages must be tailored to the specific needs of the consumer. This corresponds with the most frequently used promotional tool in B2B marketing – personal selling – while advertising is more often used in B2C context.

## **2.5 E-commerce implementation enablers and inhibitors**

When implementing e-commerce, firms face several enablers and inhibitors as well as presence or absence of internal firm capabilities. In the sections below, several internal and external enablers and inhibitors are listed.

### **2.5.1 Internal factors**

Internal e-commerce enablers are related to the organization; these factors indicate the organizational readiness for e-commerce. The internal factors can be explained by the resource based view (RBV). The RBV says that the competitive advantage of a firm lies primarily in the application of the bundle of valuable resources that are at the firm's disposal. In other words, the theory of RBV stresses the importance of internal firm factors for firm development. As cited by Gregory et al. (2007): “The resource based view (RBV) considers a firm’s internal organizational resources (assets, capabilities, processes, managerial attributes, information, and knowledge) key drivers of its strategy and performance”.

The challenge for small firms is to actually succeed in the process of e-commerce implementation. This is because several barriers exist, such as lack of economies of scale, and insufficient financial and human resources available for large scale marketing activities. Large enterprises often engage in e-commerce by supplementing their traditional activities with online e-commerce presence. Larger companies have the advantage of having more financial leverage and tend to be leaders in adopting e-commerce, as they possess the IT resources needed for e-commerce. Though, in certain cases, SMEs may have advantages in e-commerce adaption such as being more flexible and innovative and being able to adapt to organizational changes required by e-commerce (Gibbs et al., 2002). Similar advantages were found by Zhu and Kramer (2005). They found that larger firms did not achieve greater extent of e-business use because large firms are also burdened by structural inertia, possibly due to fragmented legacy systems and entrenched organizational structures. This analysis suggests that there are different issues in e-commerce implementation for firms of different sizes.

### **Management commitment**

Management commitment appears to be crucial for IT success within a firm in general. It has been noted that the main barrier to electronic commerce is the unwillingness of managers to be responsible for technological change (Kalakota & Robinson, 2000).

Chan and Swatman (2002) conclude that an important management factor for implementation success of e-commerce is commitment. There are two relevant forms of commitment referred in the study: commitment of organizations to e-commerce initiatives, needed to support the process of implementation; and trading partner (or client) commitment to the project. Lack of management commitment means that the firm exhibits resistance to change and perceives e-commerce as a lower priority. Furthermore, according to Chatterjee et al. (2002), in firms where top managers believe that web technologies offer a strategic opportunity, their beliefs serve as powerful signals to the rest of the managerial community about the importance placed on web assimilation. Top management can legitimize the willingness of managers to expend their time and energy in making sense of the web technologies.

Moreover, in order to become an international and born-global firm it is very important that the management team has a global orientation. If the management team has a very positive attitude toward global sales, the chance that the sales will indeed be global is higher. Preece et al. (1998) for example state that managerial proactiveness significantly accounts for the intensity of international actions, whereas the available resources and the firm's age significantly contribute to the diversity of internationalization of young high-tech firms. The authors also emphasize that intense international activity at young age of global start-ups predominantly results from a distinctive growth-oriented attitude of the management, and is facilitated if a high degree of previous international experience of the management team prevails.

### **Nature of the product**

The critical success factors for e-retailing include the presence of a unique and/or innovative product or service that is saleable over the Internet, and that fits with the media of the Internet and exploits the electronic environment in a value-added way (Chappell & Feindt, 1999; Dawson, 2000; Simpson & Docherty, 2003). For instance, products associated with a high level of technology seem to benefit from online merchandising. This has been suggested by Drew (2003), who said that products and services of entrepreneurial start-up businesses in high technology or similar sectors are appropriate for SMEs to sell or promote over the Internet.

Gregory et al. (2007) suggested that product online transferability is very important for e-commerce success. Product online transferability implies a product's ability to be transformed into a digital signal. Traditional products and services with significant information content are susceptible to becoming highly digitized, from design to production to delivery (e.g., music,

news, financial services), and products that manage information (e.g., copiers, telecommunications) are adopting digital technologies for more of their components. Product online transferability enables a marketer to tailor the products more easily to fit customers' needs in an export market, which leads to a higher degree of adaptation, increased efficiency, greater distribution support, and even a more competitive price.

### **Financial and human capital**

The presence of a sufficient budget and the necessary people that will carry out the activities are essential ingredients in an e-commerce implementation process.

As discussed previously, e-commerce is a solution that can improve the efficiency of the firm. However, the cost of implementing e-commerce should nevertheless be considered. Internet adoption does not require high investment costs or an advanced pre-existing telecommunications infrastructure; however it does require valuable resources of time and effort to incorporate such telecommunications (Simpson & Docherty, 2003). According to Ramanathan et al. (2012) significant fixed costs are involved when a firm decides to adopt e-commerce. These sunk costs could impact a firm differently depending on its size. Larger firms can enjoy economies of scale leading to better utilization of e-commerce that could result in more pronounced impact of e-commerce on performance. Further, design of a website or an online advertisement requires more initial investments but less follow-up investments in contrast to order processing that may require regular investments.

The talent, experience and motivation that entrepreneurs bring to an organization can be expected to determine the success level achieved by firms. Numerous studies indicate that the entrepreneur's level of education is positively associated with firm survival and growth, but experience seems to be another no less important human capital element. The knowledge base acquired in schools, college or continuous education programs can be enriched with business experiences (Pena, 2002). Moreover, Van Huy et al. (2012) found that the firm employee's e-commerce knowledge is positively correlated with a firm's e-commerce adoption.

### **IT capabilities**

The importance of IT has been emphasized as an important tool for e-commerce success. Zhu (2004) results' emphasized the integration of resources as a feasible path to e-commerce value, companies need to enhance the integration between front-end e-commerce capability and back-

end IT infrastructure in order to reap the benefits of e-commerce investments. It appears that firms that already possess significant IT infrastructure can build upon these resources and implement e-commerce productively. Firms that adopt new Internet initiatives without existing IT knowledge would first have to go through a costly learning curve (Zhu & Kraemer, 2002).

In a research conducted by Zhu et al. (2003) it is suggested that high-tech firms, relative to traditional manufacturing, tend to have a more intensive and flexible IT infrastructure, which may make their e-commerce initiatives more effective. It is possible that there is path dependence such that companies must invest in complementary resources and transform their old accumulated resources to the Internet before investment in this relatively new technology becomes productive. Compared to high-tech companies, traditional companies suffer from the lack of complementary digitization in their value chains.

Additionally, it is found that high-tech and knowledge intensive firms were notably more sophisticated in their use of Internet technologies, with the possible exception of sales and marketing (Drew, 2003). In particular these firms attached much more importance to the use of the Web for recruitment, procurement, and internal communications than for instance manufacturing or service sector firms.

### **Social networks**

No start-up can survive without financiers, suppliers and distributors. New ventures, being resource poor, are much more dependent than large mature multinational enterprises on a supportive network of business associates (Oviatt & McDougall, 1995).

Access to networks is important in all stages of setting up a new firm. According to Greve and Salaff (2003) access to networks provides information and knowledge which complement that of entrepreneurs and help them establish a firm. Entrepreneurs use their social capital to access resources in each phase of the establishment process. In the implementation phase entrepreneurs tend to reduce the size of their social networks to most important, helpful members. In the more final, marketing stage of e-commerce implementation, it is very important that a firm has access to relevant social networks. Such social networks can facilitate a firm in the search for new customers.

Englis et al. (2011) stressed the different types of networks of a firm that consists of many different types of actors, individuals and organizations. Some authors are emphasizing the role of the university in helping the firm coping with its challenges. Many technology-based firms



originate from a university and are often the result of commercializing research results and/or many companies are founded by former staff members of a university; the parent organization often plays a critical role in the development of their spin-off. Universities are often these “strong partners” and they have relationships with other support-offering actors (e.g. incubators and regional development agencies) and together these organizations can also support the new venture in their internationalization and globalization.

### **2.5.2 External factors**

External factors outside the control of the firm also show to be important to the e-commerce implementation process. External e-commerce enablers can be explained by the industrial organization theory, which focuses on external markets to identify drivers of a firm’s strategy. The industrial organization framework is captured by the notion of co-alignment, or the fit between a firm’s strategy and its environment (Venkatraman & Prescott, 1990). Strategy is viewed as a firm’s deliberate response to the external industry and market imperatives. Managers within different industry sectors are faced with different environmental contexts and are therefore likely to develop different strategies (Daniel et al., 2002). According to industrial organization theory, external environmental factors, such as export market competitiveness, export market infrastructure, entry barriers, and technology orientation of industry, are major drivers of a firm’s export marketing strategy (Cavusgil et al., 1993). The external or contextual factors are factors that the firm cannot influence and occur at both the industry and the country level.

SMEs are usually characterized by a high level of environmental uncertainty such as fluctuations in interest rates, reliability of supply, competition, etc., and related to this is the point that the use of IT and e-commerce is often imposed on SMEs by major customers or suppliers. Such pressure from trading partners has been found to play a critical role in IT and e-commerce adoption by small firms (Iacovou et al., 1995).

### **E-commerce readiness**

According to Van Huy et al. (2012), the degree of government support and national IT infrastructure influence the degree of e-commerce adoption.

E-commerce readiness of countries has been emphasized by Al-Bakri et al. (2010). As mentioned previously in the chapter, not all countries are on the same level of IT development

and not all countries have equally improved their e-commerce capabilities. This is a restriction for firms that want to target the global market through e-commerce. Hence, companies have to be selective and select those markets where there are enough IT systems in place to make orders, as well as reliable delivery systems.

Some industry sectors are more extensively using e-commerce than others. As shown by Zhu and Kraemer (2002) high-tech firms are skillful at developing systems and processes that create and expand their dynamic capabilities, while traditional manufacturing companies are struggling to benefit from digitally induced transformations.

### **Competitive pressures**

Some firms engage in e-commerce because of strategic drivers to keep up with competition. With the emergence of Internet-based products and services, there are emerging opportunities especially in the area of e-commerce to regain competitive advantage vis-a-vis large firms but also vis-a-vis similar sized competitors; therefore it can be suggested that intensity of competition will increase the probability for SMEs to adopt advanced Internet-based services and products for their competitive advantage (Sadowski et al., 2002). From another perspective, a high degree of competition can be a threat to the firm to enter the market through e-commerce, because it will have to compete with existing online firms. This is similar to previous analysis regarding the drivers of e-commerce adoption, where firm either proactively recognize opportunities in electronic markets or merely follow competitors.

### **Trading partner participation**

Several studies by Chan and Swatman (1999; 2004) have indicated through case studies that firms encounter problems with participation of trading partners in e-commerce initiatives. In a few initiatives, the organizations even need to persuade their trading partners or clients with some incentives such as discounts on products/services, or by covering communication costs.

Moreover, as indicated by Zhu et al. (2003) e-business may necessitate more tight integration with customers and suppliers, up and down the supply chain. A firm's decision to adopt e-business may be influenced by the adoption status of its trading partners along the value chain, since for an electronic trade to take place, it is necessary that all trading partners adopt compatible electronic trading systems. The benefits of e-business initiatives of a firm depend not only on its own efforts to digitalize its value chain, but also on the readiness of its business

partners and suppliers. In B2B e-commerce, the adoption decision is influenced by inter-organizational factors like the nature of relationships between the organization and its existing and potential trading partners (Kshetri & Dholakia, 2002).

### **2.5.3 Market analysis**

#### **Voice of the consumer**

It is important to incorporate the voice of the consumer (VOC) into business planning as it affects firm survival (Englis et al., 2011). According to the authors, using the knowledge gained from the VOC, the firm is likely to develop the idea into a full-fledged business opportunity. It is also possible that firms may realize that an appropriate resource base to exploit the opportunity is not viable or that the product offering does not fit with the consumer. Likewise, the demand for the product or service may be insufficient for profitable exploitation. In these cases, the business concept may be revised or even abandoned.

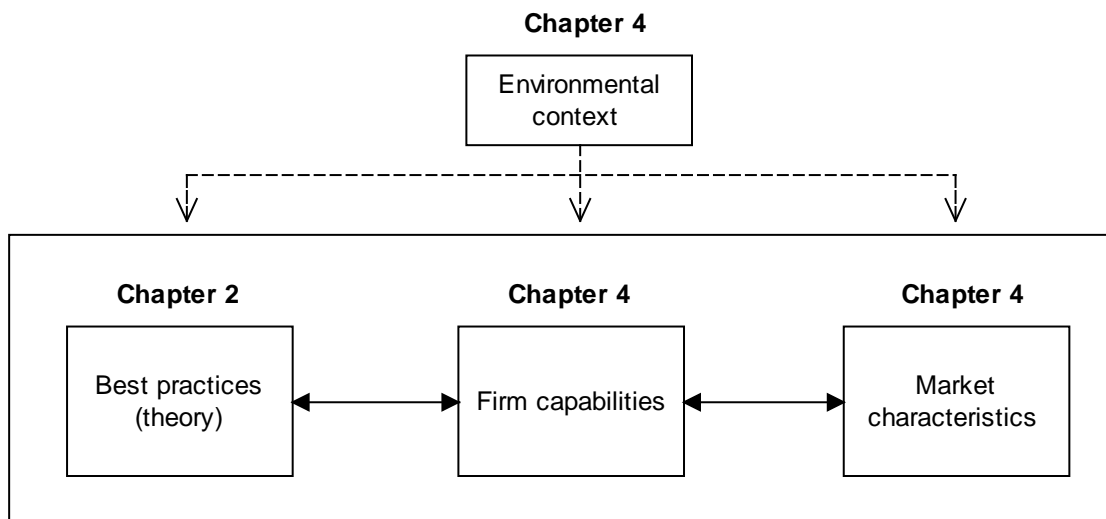
Certainly, it is of vital importance for web companies to identify their market domain, market potential, the profiles of potential customers and the online strategies of competitors (Constantinides, 2002). The global character of the Internet, the fast growth of online businesses and users' numbers, the changing demographics of the online population and the limited familiarity of many mainstream managers with e-commerce makes the market analysis a challenging task. The analysis, however, will yield a clear picture as to the market size, customer profiles, competitive situation and future trends. It will also reveal new market opportunities, assist the budgeting process and provide creative ideas as basis for the online marketing activities. This view is supported by Kartiwi (2006), who said that along with identifying key business processes and business strategies prior to e-commerce adoption, it is also important for the business to gather as much as information on e-commerce readiness of the external entity – the customers – that will also have an impact and influence on the e-commerce success in the business.

One very important question to ask is whether e-commerce is suitable for the products offered, and whether it is to the way that the firms' customers are doing business (McGregor et al., 2007). The market characteristics consist of: extent and nature of demand, geographical location of the demand and online behavior of the customer.

## 2.6 Conceptual framework

In the previous sections, theory about e-commerce best practices was identified. As can be seen in Figure 5, there should be a match between the best practices, the internal firm capabilities – the degree to which the firm is capable in handling e-commerce – and the demand of the market – the extent to which potential customers are interested in the product and in buying online. Moreover, there must be an overall alignment with the external environmental context of the firm.

In this chapter, the best practices regarding desired firm capabilities and market characteristics were identified. In chapter 4, the internal and external capabilities of STS will be identified, as well as the market of STS. These factors will be provided through primary data collection methods.



**Figure 5.** Conceptual framework

### **3. Research Methods**

In this chapter, the choice for the research strategy is justified. After that, the method of data collection is discussed including the selection of the sample. And at last issues about validity and reliability are discussed.

#### **3.1 Research strategy**

##### **3.1.1 Case study**

The choice for a research method depends on the nature of the problem and the purpose of the research.

According to Yin (1994, p.13): “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. This means that a case study takes an existing concept and tests it by a detailed illustration of a unit. In this paper the concept is e-commerce and the unit is the firm STS. The method that is used in this report can be best classified as a single case study research, because a single unit – the case of STS – is analyzed in depth. A single case study has the purpose to investigate a phenomenon thoroughly, get close to the phenomenon, provide a rich description and reveal its deep structure.

There are different types of case studies. In exploratory case studies, fieldwork, and data collection may be undertaken prior to definition of the research questions. Descriptive cases require that the investigator begin with a descriptive theory, or faces the possibility that problems will occur during the project (Tellis, 1997). The case study that is provided in this paper can be described as both exploratory and descriptive.

A unique characteristic of a case study is that both qualitative data collections and analysis methods and quantitative methods may be used (Yin, 1994). Furthermore, as discussed by Gillham (2000), a case study is only a main method. Within it different sub-methods are used such as interviews, observations, documents and record analysis, work samples, and so on. There are both advantages and disadvantages of using a case study research method. The advantages are that a case study provides in-depth information about a unit, in a natural setting and it allows a large amount of sources to be studied over a period of time. It allows the researcher to substantially increase knowledge about an aspect that is already known. A case study is also useful when it is difficult to obtain a big sample. The main disadvantage is however that it is

difficult to generalize results from a case study. Moreover, a biased response is an issue in a case study research. The research method deployed in this report can also be described as action research. During the research phase STS is implementing e-commerce, therefore it is a unique opportunity to see how STS handles the implementation process.

### 3.2 Data collection

In the previous chapter information obtained from secondary sources was analyzed. A review of the literature helped identifying several success factors of e-commerce implementation, for example the necessary internal firm factors that small firms should possess in order to succeed in e-commerce implementation. Further in this research the data is collected using primary data sources. The following data collection methods are used: interviews, observations and a survey (Table 2). Each separate data collection method has a different sample, uses a different data collection tool, serves a different purpose and answers a different part of the research question. For example, as can be seen in Table 2, the interviews with the management team determine the internal firm capabilities, the e-mail records serve as a basis to analyze the e-commerce implementation process and the survey with potential customers explores demand characteristics and customer's online behavior.

**Table 2.** Data collection

<b>Method</b>	<b>Sample/Data source</b>	<b>Tool</b>	<b>Factor explored</b>
<b>1. Interviews</b>	Management team	Semi-structured interview	Firm capabilities
	Customers	Semi-structured interview	Demand characteristics
<b>2. Observations</b>	E-mail records	Timeline	E-commerce implementation
	Website visits	Website statistics	Demand characteristics
<b>3. Survey</b>	Potential customers	Exploratory software	survey Demand characteristics

### **3.2.1 Interviews**

Semi-structured interviews are chosen as an interview method. This method permits the interviewer to ask open-ended questions. Moreover, it enables a two-way communication between the interviewer and the interviewee. The interviews are conducted with the management team and with potential customers.

#### **Management team**

The interviews with the management team of STS are conducted to determine the strategic objectives of the firm, as well as the approach to strategy formation. This management team of STS consists of 2 people. The following topics are addressed during the interviews: reasons for implementing e-commerce, objectives of the firm and desired firm performance, nature of the product, market orientation, web-shop design, marketing and commercialization. The interview consists of two stages: the first interview is held in February at the initiation of the project and the second interview is held in September, when the implementation phase is completed. The interviews can be found in Appendix 1.

#### **Potential customers**

STS selects 3 potential customers from the target market in order to conduct interviews. The 3 potential customers are located in the UK. Prior to the interviews, samples of products are sent to the customers. During the visits the focus is on whether the customers are satisfied with the products. The customer visits take place before the launch of the web-shop, because the visits are important for selection of the exact products to be placed on the website. The purpose of these interviews is to identify preferable TEM product characteristics. Other purpose of the interviews is to explore the consumer online behavior. The questions are designed in such a way, as to find out whether customers are willing to purchase products online and what the most important online purchasing aspects are. The focus of the interviews is on the following topics: product characteristics, usage and online procurement (Appendix 2).

### **3.2.2 Observations**

The observations consist of e-mail records and website visits. The e-mail records of STS are used to construct a timeline of events; the timeline is an illustration of the e-commerce implementation process. Another observation consists of the web-shop visits. These visits are

analyzed using Google Analytics website statistics software. Google Analytics shows detailed information about each visit, including the location, search medium, keywords, and so on. The results of observations will be discussed in section 4.3.

### **3.2.3 Survey**

A survey is designed and is sent to several potential customers. The questions in the survey are similar to the questions posed during the interviews with potentials customers.

#### **Purpose**

The survey is of exploratory nature and its purpose is to explore relevant customer needs. The results of the survey serve as a basis for the operational strategy, and the results help STS to design its product offerings, pricing and promotion strategy. It can also help STS decide which content to place online and how to design the web-shop. The following factors are explored throughout the survey: product characteristics, extent of usage, pricing, online behavior and trust. The questions can be found in Appendix 3.

#### **Sample selection**

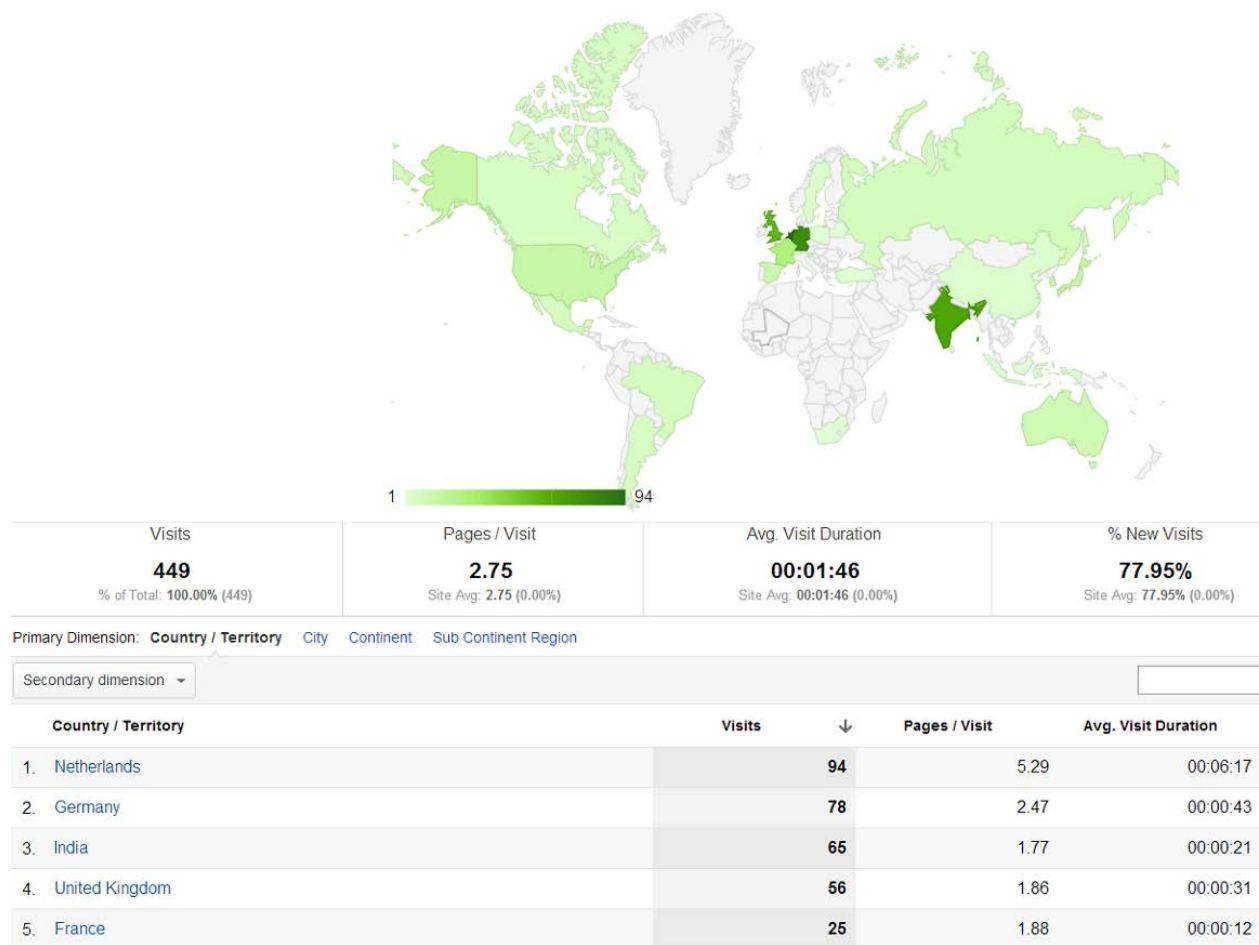
The potential customers are selected as following. The tool Google Analytics is used to analyze the website visitors in a certain period of time.<sup>4</sup> The chosen time period is July - September 2012. Within Google Analytics, first the customers are filtered on a country level. Those countries are selected from which the most visitors originated in the period between July and September 2012 (Figure 6). As can be seen in the figure, the website is visited 94 times in the Netherlands, 78 in Germany, 65 in India, 56 in United Kingdom and 25 in France. In order to simplify the research and select relevant locations, the threshold is drawn at a minimum of 50 visits during the three months period. This means that France is excluded from the sample. Moreover, the Netherlands is excluded in order to avoid bias; most of the visitors from the Netherlands are the owners and/or employees of STS or the holding. Subsequently, within each country, the visitors are filtered on a network level and only visitors that have entered the web-shop from a university network are selected. This is because it is very likely that visitors that

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<sup>4</sup> There can be a bias in the choice of location, because the visitors are influenced by a Google AdWords campaign that is run simultaneously. The Google AdWords campaign targets certain locations, namely countries in Western Europe, North America, Australia and Asia.



enter the website from a university network are potentially interested in buying the product offered by STS. After the relevant universities and departments are identified, the contact details are extracted from the websites of universities. The final sample consists of 58 leads from 3 countries: Germany, United Kingdom and India. First the potential customers are contacted by telephone and are inquired whether they want to participate in the survey. After that, an e-mail with a link to the survey is sent by e-mail. Within the following weeks several follow-up e-mails are sent to remind the customers to fill in the survey. The complete sample can be found in Appendix 4.



**Figure 6.** Visitors' origin

Source: Google Analytics

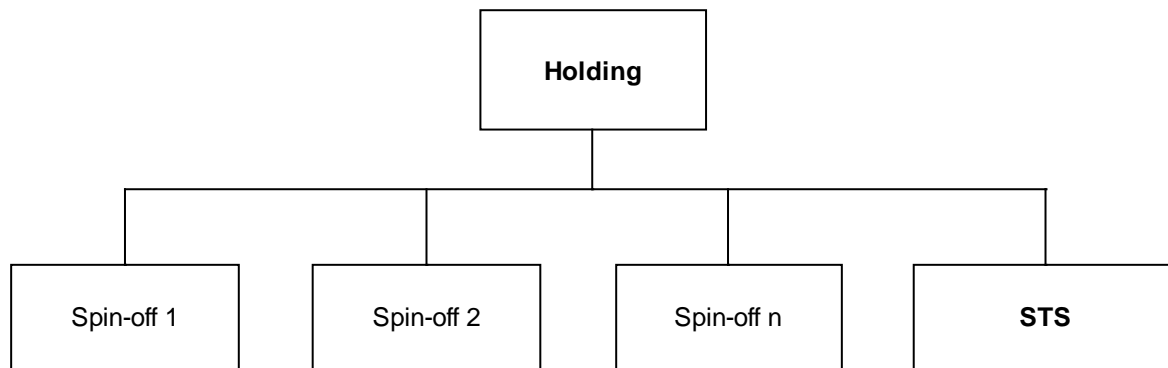
## 4. Case Description

In section 1.2 the case of STS was introduced. In this chapter, the case company is described in detail. First, a background of the firm is presented. After that, the case is analyzed along the factors that were identified in chapter 2. The analysis is based on interviews with the management team and firm observations. And finally, an analysis of the market is presented.

### 4.1 Background

#### 4.1.1 Organizational structure

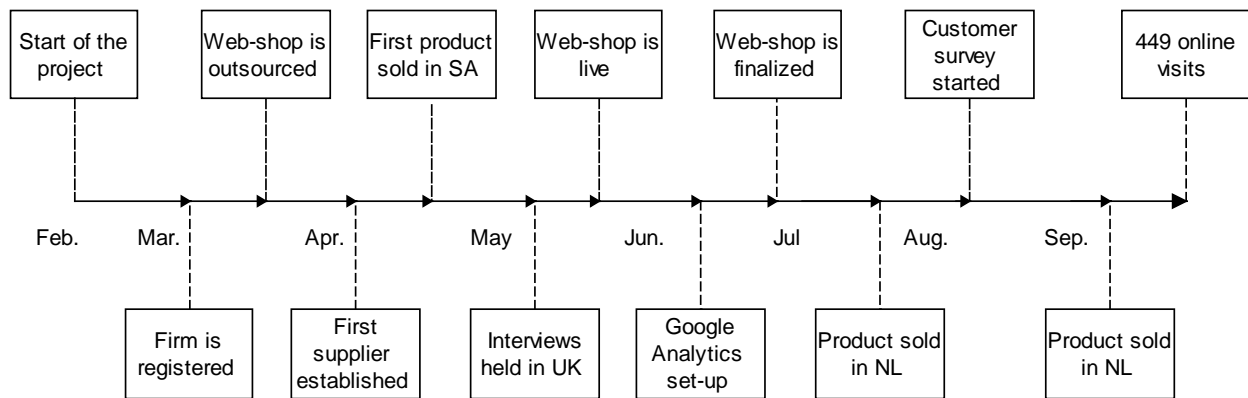
STS is a spin-off from a larger holding group. This holding has exhibited stable growth during the years of its existence. It has mostly grown through investments in new innovative start-ups. The goal of the holding is to open a new firm each year. Several spin-offs operate under the holding, including STS as in 2012 (Figure 7). The firms within the holding operate in a B2B market and have the knowledge and production techniques for the development and production of high-tech products. The holding also has established partnerships with laboratories and research institutes and can benefit from an extensive social network in the industry.



**Figure 7.** Organizational structure

#### 4.1.2 E-commerce implementation process

At the initiation of the project, the decision to implement e-commerce has been made. Between February and September 2012 the firm STS has been established and the website was designed. A timeline shows the most important events in this period (Figure 8).



**Figure 8.** Timeline of STS

As can be seen in Figure 8, the first few months were devoted to developing ideas, choosing the software for the web-shop and conducting a part of the market research. Also, contracts were established with several suppliers, the suppliers being other members within the holding group. After a preparation phase of 3 months the web-shop was launched. After the web-shop was online, it has been continuously improved until finalized in July. In July the web-shop was linked with a web statistics tool Google Analytics. This tool permits tracking the amount, timing and frequency of customer visits. It also shows the origin of the visitors and the keywords visitors use to enter the site. Several sales have been made during the e-commerce implementation phase. The amount of visitors has grown up to 449 visits by the end of September.

## 4.2 E-commerce adoption

The drivers and objectives of e-commerce adoption are identified through interviews with the management team.

### 4.2.1 Drivers

According to the managers of STS, one of the reasons to adopt e-commerce is to evaluate whether it is possible to sell high-tech products online. Another driver for adoption is to enable a worldwide coverage for high-tech products and to enable quick purchases for which no long-term buyer-supplier relationships are required. STS has an experimental rather than a strategic view of e-commerce. STS wants to experiment with e-commerce in order to determine which contribution the e-commerce system can make to the holding organization. Furthermore, e-

commerce is a not a project that is prioritized within the holding. As identified by Wilson et al. (2008), prioritization of other projects leads to slow e-commerce adoption.

#### **4.2.2 Objectives**

The main objectives of STS are to attract new customers, to increase sales of standard products, to increase brand exposure and to become well-known in the industry. These objectives are consistent with the objectives that have been identified as best practices in chapter 2. STS stresses that it wants to attract new customers and not the customers of the holding because it aims to avoid cannibalization of sales. However, it has been discussed in chapter 2 that integrating traditional and virtual activities does not necessarily lead to cannibalization (Constantinides, 2002).

### **4.3 E-commerce strategy best practices**

In section 2.2 several best practices of e-commerce strategy were proposed. In this section, STS is analyzed along these factors. It appears that STS does not follow most of the strategy best practices, but it does implement operational activities in accordance with best practices.

#### **4.3.1 Strategic level**

STS does not engage in formal business planning, but instead it lets strategy emerge in the course of action. The management of the firm only sets clear financial goals. It can also be said that STS has an implicit strategy. STS is furthermore a separate business and in the beginning there is not much integration of activities with the holding company. This is a deliberate decision of STS. However, towards the end of the e-commerce implementation process there is some integration, for example of support and marketing activities. Also, it becomes clear that a relative part of activities requires face-to-face communication which is difficult to be replaced by pure virtual communication. The attitude towards growth can be analyzed through Ansoff's framework. Because STS wants to target new customers, it can either engage in product or market development. One of the few consistencies with best practices is the approach of STS toward internationalization. STS realizes that an international approach is an imperative for success due to limited home market conditions.

### **4.3.2 Operational level**

STS decides to outsource IT implementation. Further, STS adopts the best-practices for designing the website. The web-shop provides access to unique products and it is easy for customers to order the products. The website initially offered only in English and customization is a long-term concern. The website has rather basic functionalities; more investment is needed to improve the visual attractiveness of the web-shop. Within the website there is the possibility of cross-selling. Further, an online marketing campaign is introduced in order to attract relevant visitors to the website.

## **4.4 E-commerce implementation enablers and inhibitors**

As discussed in section 2.5, there are several e-commerce enablers and inhibitors that positively or negatively affect e-commerce implementation and e-commerce success. It is necessary to bring the start-up STS into perspective by considering these various internal and external factors.

### **4.4.1 Internal factors**

#### **Management commitment**

The management does not have sufficient time to devote to implementing changes within the organization and to reconfigure the business model. There is in particular a lack of direction from the management; this is partly because management prioritizes other projects. The absence of direction and little attention paid to the firm makes the implementation process slow. However, this is a common problem in small firms, who have only a limited amount of resources to allocate to different projects; those projects are prioritized that deliver the most results in the short-run. Further, there is a disagreement within the management team regarding the future of the firm. This makes decision making complicated.

#### **Nature of the product**

The product offered by STS is technology-intensive, complex, and requires a lot of knowledge from the end user about how to utilize the product. The product is relatively innovative and new to the market. It is possible to customize the product towards the specific needs of the customer, and as will become evident further in the paper each customer indeed requires a slightly different product specification. However, for e-commerce success a standardized product is preferable; as well as for the firm itself. The product of STS is an experience good; this means that customers

want to try the product before purchasing it. Internet can be used to market product samples that can be sent to customers. Furthermore, some direct face-to-face communication is necessary with the customers regarding the product specification. This is a drawback in case e-commerce is intended to be used for transaction purposes only. Further, a potential threat is the fact that price is the main comparison point online for customers. Especially for first time purchases, customers cannot evaluate the quality of the product and the quality of the delivery.

### **Financing and human capital**

The firm is initially financed by the holding firm. A budget is available for the start-up phase. The financing consists of both fixed and variable costs, such as costs of registering the company, costs of performing market research and costs of outsourcing activities. There are a few people involved in the development of the firm. This is a deliberate choice of STS's management to minimize human capital costs. The management team has an international mind-set, this means that the management team realizes that its opportunities lie outside the home market.

### **IT capabilities**

STS does not have all the important IT capabilities. For example, there is a lack of knowledge of web-shop software and design. Firms often underestimate the importance and complexity of IT. Start-up firms often rush to engage into e-commerce without having sufficient IT-capability to build and operate a web-shop. In the case of STS, the challenge is to select the right software for building the web-shop and another challenge is to configure the software towards the specific needs of the venture. The existing web-shop software packages are standardized, and there is only limited ability to adapt the software and create a really novel design. Moreover, not the whole process of ordering can be automated through the web-shop. Instead, support and web-shop maintenance is required.

### **Social networks**

Because STS is a spin-off of an existing firm, it benefits from the existing network consisting of suppliers, customers, sales agents and employees. STS has made several sales during the implementation process by contacting its business partners. The sales have not been made through the web-shop, but the existence of the web-shop has facilitated the sales. This is an

interesting finding. It implies that a virtual business can be insufficient for survival; instead firms must know which customers exactly to target.

#### **4.4.2 External factors**

There are several firms that compete directly with STS and offer the same product. Most of the competitors are located in the United States. These firms seem to have successfully implemented e-commerce. However, STS can differentiate itself from its competitors in the way its website is designed. There is furthermore a problem with the participation of trading partners. Many firms within the holding do not yet see any opportunities in becoming suppliers of STS. An important external factor – demand characteristics – will be extensively evaluated in the next section.

### **4.5 Market analysis**

In this section, the market of STS is analyzed. The customers of STS are research groups at universities that work with Transmission Electron Microscopes (TEM). The product that is supplied by STS is a TEM membrane. This product is used as a component in microscopes during research and it is a very small but very important component. An important product characteristic is compatibility with equipment, because the product is used as a component in existing equipment.

#### **4.5.1 Demand characteristics**

Interviews and a survey are used to measure demand characteristics.

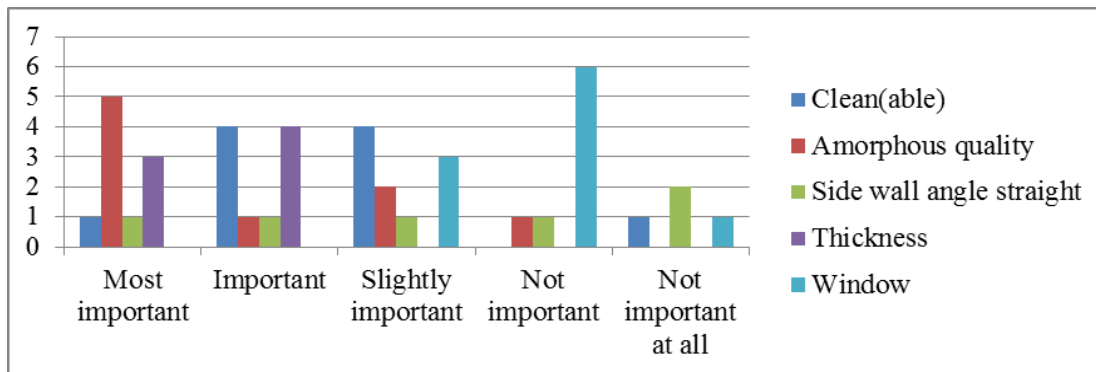
The interviews are successfully conducted with 3 potential customers in UK. The focus of the interviews is on technical specifications of the product, and on usage and price of the product.

The survey is sent out to 58 potential customers and has been completed by 13 customers. This gives a response rate of 22.4%. Another 7 recipients have responded that the survey is not relevant or applicable to them, because they do not work with TEM membranes. There were no response from India. As can be seen in Appendix 3, the survey first addresses questions related to product characteristics. This is followed by questions about the amount of usage, and about the price the customers are willing to pay for the product. After that, the focus of the questions is on e-commerce: which purchasing aspects are important in an electronic environment, what the perceived benefits and drawbacks of e-commerce are, and whether it is important for customers that the supplier of the product is physically close located.

## Product characteristics

Based on the responses of the survey, it appears that the ideal TEM membrane is thin, rigid and stable. The most important aspect of the TEM membrane is the thickness, the thinner the TEM membrane the better and the more the customers are willing to pay for it (Figure 9). But the small thickness of the TEM membrane should not go at the expense of other aspects; it is important that the TEM membrane is of high amorphous quality and is cleanable. The fact that the TEM membrane has straight side wall angles does not seem to matter a lot. Neither does the window size seem to be important.

Similar technical specifications were identified during the interviews. During the interviews it also became evident that each end customer of STS requires a slightly different specification of the product. For instance, one customer notes that "...we use 3mm discs but these grids are 2mm square, they will fit our holder but I need to fiddle about to ensure fit...". Another customer says the membrane is interesting if provided in in the right shape. This implies that the TEM membranes, as offered by STS to the customers, are not ready to be used by customers but must first be adjusted in shape and form. Also, the TEM membranes are used for different end applications in different universities, ranging from material to biological sciences. All these complications mean that STS must offer different variations of the TEM membranes online.



**Figure 9.** Product characteristics

## Usage and price

According to the results of the survey, most universities use less than 100 membranes per year. Other universities use between 100 and 500 membranes. Only very few universities use more than 500 membranes. There are differences between countries: in United Kingdom customers use between 100-500 membranes and in Germany between 0-100. The prices vary in different

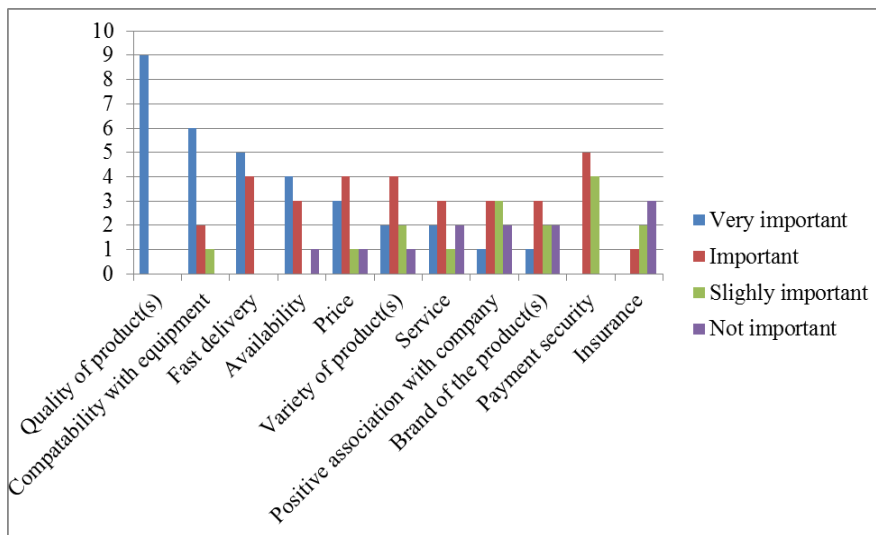


countries; in United Kingdom customers are willing to pay between 9 and 12 euro's for a TEM membrane and in Germany between 12 and 15 euro's.

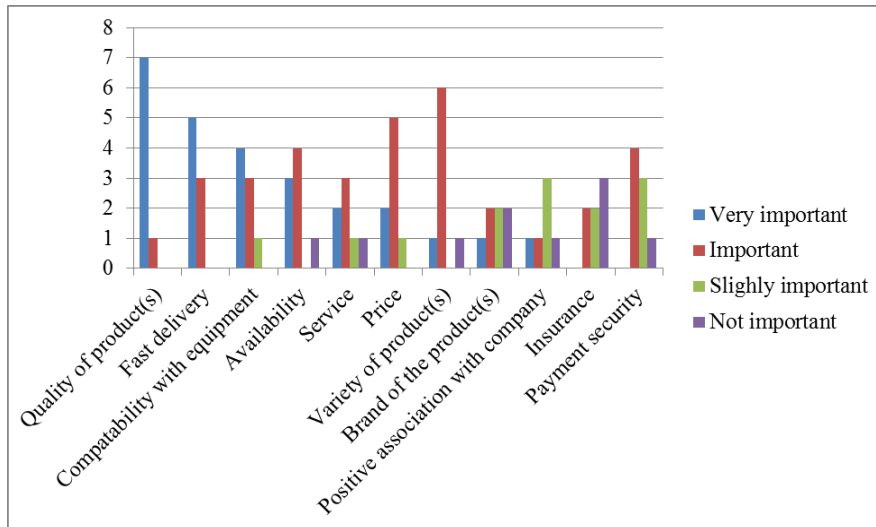
From this analysis it follows, that the amounts of TEM membranes used is a favorable market characteristic and it means there is a market share that STS can capture. Regarding the price, the target price that STS sets is approximately 12 euro's. As can be seen, customers are indeed willing to pay 12 euro's on average. Like this it can be concluded, that the extent of usage and the price that customers are willing to pay form a favorable external environment for STS.

### Purchasing aspects

The survey further asks the customers to identify which purchasing aspects are important when buying TEM membranes in a traditional environment, and which purchasing aspects matter in a virtual setting. A comparison can then be made between traditional and virtual environments. When purchasing TEM membranes, the following aspects seem to be important in a traditional purchasing process: quality of products, compatibility with equipment and fast delivery (Figure 10). When buying TEM membranes online, the following aspects seem to be most important: fast delivery, quality, price, and compatibility with equipment (Figure 11).



**Figure 10.** Traditional purchasing aspects



**Figure 11.** Online purchasing aspects

Looking at the traditional and online purchasing aspects, it can be seen that there are not many differences between the preferred purchasing aspects in a traditional and virtual setting. Only a few differences in desired purchasing aspects can be found. For example, it seems that customers value a variety of products more when buying online. This can be because customers want to choose from many product configurations online. Also, it can be seen that insurance is not very important in a traditional setting. An explanation can be that customers trust traditional suppliers.

### **Benefits and drawbacks of e-commerce**

According to the responses of customers, a reasons to purchase TEM membranes online is the convenience of a 24/7 accessibility. As mentioned in the review of the literature, virtual channels provide access to products instantly, anywhere in the world. Hence this is a logical perceived benefit. Another benefit as perceived by the customers is the ease of comparing prices online. The management team also perceives that price is the main comparison point online. Another customer notes that a benefit of e-commerce is that it is easy to look through the catalogue online.

Most cited drawbacks are problems with payment and security concerns. It has also been noted in chapter 2, that trust is an important issue in e-commerce. From the analysis of benefits and drawbacks it follows, that not all customers in this market are ready for e-commerce. For example, one of the customers said that a drawback of e-commerce is that there are no people to speak to. It seems that in this high-tech market, personal contact and communication is

important. For example, the customers might want a certain degree of after-sales support from suppliers. Another drawback of e-commerce is that it appears that region and location matter in this high-tech market. Most customers indicate a preference for purchasing from regionally close suppliers, because they think that regional suppliers have shorter delivery cycles and are more reliable. The reason for this could also be that customers mistrust electronic procurement in general, or because the characteristics of the market are such that personal relationships matter a lot for trust-building.

#### **4.5.2 Web analytics**

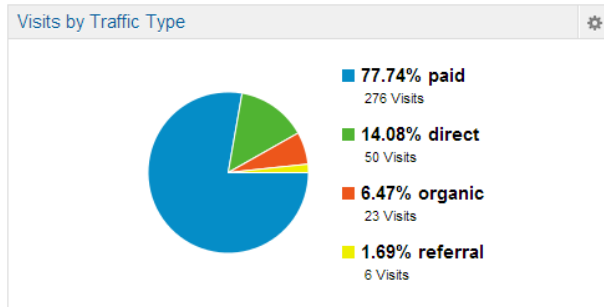
In a period of 3 months, from the 1<sup>st</sup> of July up to 30<sup>th</sup> of September, the website was visited 449 times, out of which 22.1% visitors were returning visitors. As has been shown in chapter 3, most visitors originate from Germany, India and United Kingdom. The average visit duration is rather short and is less than 1 minute (Figure 12). There is in general a high rate of visitors' drop-off. About 70% of the visitors leave the website immediately. This is an unfavorable characteristic, because it means that the search engine is not well optimized for STS. As discussed in chapter 2, search engine optimization (SEO) is a method used by firms to attract relevant visitors online.

Country / Territory	Visits	Avg. Visit Duration
Germany	78	00:00:43
India	65	00:00:21
United Kingdom	56	00:00:31
France	25	00:00:12
Japan	14	00:00:50
United States	14	00:00:11
Spain	12	00:01:32
South Korea	12	00:00:30
Australia	10	00:00:11
Brazil	7	00:00:14

**Figure 12.** Visitors by country and duration

As can be seen in Figure 13, most visits originate through paid traffic (77.7%). Organic visits account only for 6.5% of all visits. In the short-run, paid traffic can help the website build its online brand name, but in the long-run the firm will benefit more if it has a high rate of organic traffic. Organic visits mean that visitors enter the website through a search engine by using a combination of keywords. It is important to have a high rate of organic visits, because it means

that the site appears high in search engines. Several methods for increasing organic visits will be discussed in the next chapter.



**Figure 13.** Traffic type

Furthermore, as can be seen in Figure 14, in the period between 1<sup>st</sup> of July and 30<sup>th</sup> of September, 17 customers have considered purchasing a product from the web-shop. This data can be found by looking in the shopping carts of customers. Unfortunately, none of the customers proceeded to the payment stage. A reason for this can be that the transportation costs as displayed on the web-shop are too high.

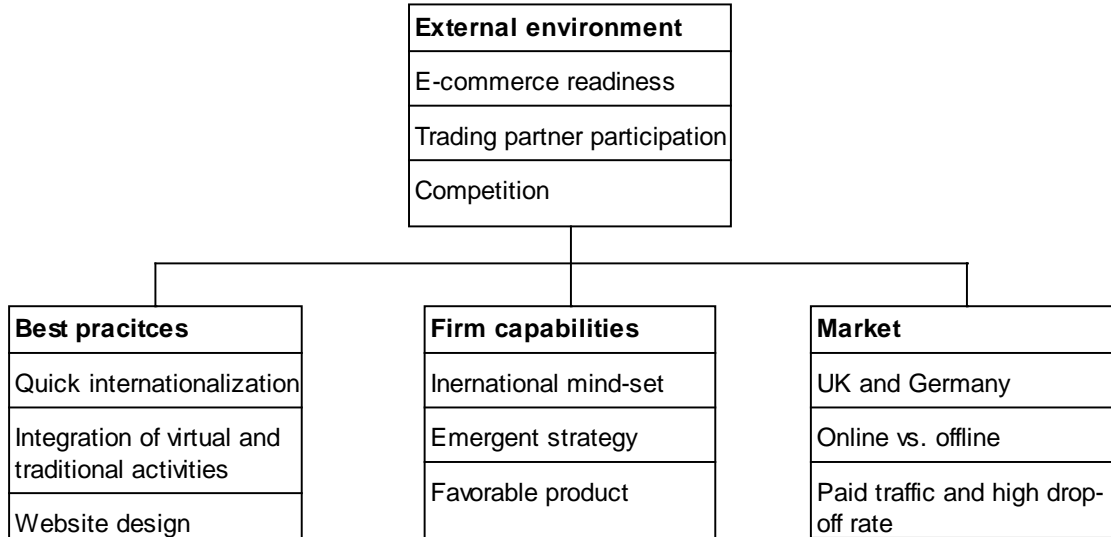
38	--	--	2 325,00 €	--	07/4/2012 15:34:06		
39	--	--	2 325,00 €	--	07/10/2012 20:55:33		
40	--	--	2 325,00 €	--	07/11/2012 16:41:54		
42	--	--	930,00 €	--	07/24/2012 16:44:11		
44	--	--	0,00 €	--	07/25/2012 12:19:49		
46	--	--	120,00 €	--	08/4/2012 00:23:35		
47	--	--	120,00 €	--	08/6/2012 15:18:08		
48	--	--	930,00 €	--	08/9/2012 16:58:25		
49	--	--	1 110,00 €	--	08/15/2012 13:23:07		
50	--	--	1 020,00 €	--	08/22/2012 10:57:06		
51	--	--	120,00 €	--	08/23/2012 09:21:39		
52	--	--	3 355,00 €	--	08/23/2012 19:49:05		
53	--	--	2 325,00 €	--	08/28/2012 11:16:21		
54	--	--	930,00 €	--	09/7/2012 17:33:06		
55	--	--	40 775,00 €	--	09/20/2012 03:09:56		
56	--	--	1 200,00 €	--	09/21/2012 15:48:30		
57	--	--	22 625,00 €	--	09/24/2012 15:55:22		

**Figure 14.** Shopping carts of customers

## 4.6 Findings

In the previous sections the case of STS has been described, including the background of the firm, the drivers and objectives of e-commerce adoption, the best practices applied by STS on the strategic and organizational level and the internal and external success factors of implementation. Moreover, some important findings of the market have been discussed: demand characteristics and website functionality.

As mentioned in section 2.5 it was identified that the suitable e-commerce strategy should be aligned with firm objectives, but also with the best practices, the internal firm capabilities and external environment. A conceptual model was proposed in section 2.5 In Figure 15 this conceptual model is applied to STS.



**Figure 15.** Findings

There is some consistency between the variables as can be seen in Figure 15. For example, one of the best practices of e-commerce is the quick internationalization that can be achieved. It can be seen that STS possesses an international mind-set, and that United Kingdom is a potential target market. Hence, this is a positive situation for STS. On the other side, the market shows that most visitors of the website originate through paid-traffic and most visitors leave the website immediately. This means that STS either has to improve its website design, or to re-evaluate the e-commerce readiness within the industry. It can also review whether the product is suitable for online procurement.

## 5. Conclusions

In this chapter first the research question and sub-questions that were proposed in chapter 1 are answered. After that, the main contributions of this research are presented. After the contributions are outlined, future recommendations for STS are given. And finally, the limitations and suggestions for future research are provided.

### 5.1 Research questions

At the beginning of the research the problem as identified by the management of STS has been outlined. After that the following research question emerged:

- **Which e-commerce strategy should the high-tech firm STS adopt, in order to achieve its strategic objectives?**

Further, the following questions have been identified as important to answer throughout the research:

1. What is e-commerce?
2. What are the benefits and drawbacks of e-commerce?
3. What are the drivers and objectives of e-commerce adoption?
4. What are the best practices of an e-commerce strategy?
5. What are the internal and external enablers, inhibitors and capabilities of e-commerce implementation?
6. Which e-commerce operational and marketing strategy is appropriate for STS?

The analysis of the research questions can be split into two parts. The first part was presented in chapter 2 and it answered the sub-questions through a review of the literature. The second part of the research applied the findings from chapter 2 to the case of STS. In the sections below a summary of both parts of the analysis is given.

#### **5.1.1 Literature**

In chapter 2, first several definitions of e-commerce were given. Mostly, the definition is narrowed down towards a transactional function of e-commerce as the buying and selling over the Internet. However, e-commerce can be used for other purposes, such as marketing, and informational purposes. Further, the main benefits of e-commerce are the cost savings and instant access that e-commerce provides to distant markets. Main drawbacks are technical issues

with regard to implementation of e-commerce within an organization, and the lack of trust of customers in proper functioning of e-commerce systems. Firms can have different drivers and objectives of e-commerce. The drivers can either be reactive or proactive, and are associated with a need for innovation or with the need to follow competitors. The objectives that firms set when engaging in e-commerce are firm-specific; however some general objectives as increasing market share and increasing sales are recognized. The best practices for implementation of e-commerce are for instance the integration of traditional and virtual activities, and the presence of an internationalization strategy. For successful e-commerce implementation, firms should possess favorable internal and external factors. Moreover, the presence of a market for the product is essential for success.

### **5.1.2 Case analysis**

To answer the main research question, first the main objectives of STS were identified. STS wants to reach new markets and customers through e-commerce and wants to significantly increase its sales and turn-over. In chapter 4 it has been seen that STS possesses both favorable and unfavorable condition for e-commerce success. Firstly, STS lacks management commitment and does not have a clear strategic orientation. Moreover, there is disagreement within the management team as to the exact purpose of the web-shop. Further, the product is on one side suitable for e-commerce because it can be standardized, on the other side it is a complex product which requires customer involvement and it appears that different customers value different specifications. Also, as has been seen from the market analysis, while some customer see many benefits of e-commerce such as good prices and variety of products offered, many customers do not trust e-commerce. In addition, the virtual business model requires some supporting activities. From this analysis it follows that a transactional definition of e-commerce – as desired by the management of STS – has not been shown to be suitable for STS during adoption and implementation period. STS can consider using e-commerce for marketing purposes to increase brand awareness and as a platform to present its products and information.

### **5.1.3 Results**

In general, STS has a rather pragmatic approach to e-commerce implementation, it implements e-commerce technology for immediate results. However, as became clear during and after the implementation process, e-commerce requires more investment than initially assumed. The

implementation process of e-commerce was rather slow in the opinion of the management team. Moreover, the website was online for a period of three months and no sales have been made through the web-shop. Many visitors entered the website, but none of them have yet contacted STS. STS has only sold several products through its own network. According to the management of STS, it is difficult to obtain commitment and trust from customers.

This has several implications. Firstly, STS can review the overall concept of e-commerce and virtual business. A virtual business model is very attractive because it is cost effective, but in reality it is difficult for the website to function on its own without support and maintenance. Instead, STS can complement resources with existing firms within the holding in order share marketing and support activities. Secondly, if STS decides to proceed with the virtual business model, it has to improve its internal firm capabilities. In the following section, recommendations for STS will be provided including the conditions for success.

## **5.2 Recommendations for Simple Technology Solutions**

In terms of growth, STS can first of all expand its product portfolio by introducing more product lines. At the moment, the most important product offered by STS online is the TEM membrane. This strategy is risky, in case there is not enough interest for the product. Instead, STS should offer a portfolio of products in order to spread its risks. STS should also engage in market expansion and try to target more customers. In the sections below, several components of an operational and marketing strategy are proposed.

### **5.2.1 Operational strategy**

A clear structure with responsibilities should be established within STS. According to Mohr et al. (2009) traditional centralized approach to organizing is not adequate for high-tech firms. Instead, innovative organizations have a multidimensional focus on customers, speed and flexibility. Therefore, high-tech firms require decentralization to sustain the effectiveness of the organization. STS has a rather decentralized approach and has already outsourced several activities. In the future, it should maintain this approach but at the same time assign clear responsibilities. STS should decide who is responsible for guiding the firm and initiating changes and who can be held accountable for the actions taken. This should be done in order to improve the commitment to the initial idea.



Some important operational decisions still have to be made within the firm, including order processing and after sales support. STS has to decide who will be responsible for accepting an order, and making sure that the product is delivered to the customer. In terms of logistics, the transportation costs are at the moment kept at a flat rate and are not configured for the type of product and for the final destination of the product. A flat rate was implemented because it was a more simple process to configure in the back office of the web-shop. However, this leads to high transportation costs even for countries that are geographically close located. This can lead to customers from neighboring countries dropping off.

Regarding pricing, STS can consider discrimination pricing strategies such as regional pricing and promotions. Using promotions can be effective to market the new product. Moreover, STS can send samples for trial to more potential users. Like this, the user can become acquainted with the new product.

### **5.2.2 Marketing strategy**

Currently an online advertising campaign is launched. The purpose of this campaign is to increase visitors' traffic to the website. This campaign should be expanded and should target multiple product lines simultaneously. Also, at the moment the marketing campaign is only effective in attracting visitors to the site, but not yet in encouraging online purchasing. Moreover, there is a high drop-off rate of visitors. This means that the online advertisement should be adjusted. For example, some filters can be installed for keywords and certain regions can be excluded from targeting so that only relevant visitors enter the web-shop.

It is also important for STS to monitor the website and engage in follow-up based on the obtained customer data. The visits that were monitored during the 3 months after implementation showed that the visitor's profiles are very diverse. Many visitors originated from neighboring countries: Germany and UK. This, combined with the results of the survey that showed that customers prefer regional suppliers, means that STS can experience a gradual internationalization process instead of an immediate internationalization. STS can start by entering markets that are close by, and by combining the virtual business with personal communication.

Further, STS can use other low-cost such as search engine optimization (SEO). SEO is crucial for online firms because it enables users to find the firm's website in search engines. Although

SEO is a low-cost solution, it requires significant technical knowledge. For STS, it will be a challenge to become acquainted with a SEO and to implement it consistently.

### **5.3 Implications for theory and practice**

This research offers multiple interesting theoretical and practical insights.

First of all, it appears that firms that do not have a clear strategic vision can encounter problems during e-commerce implementation because it is not clear which milestones should be set and who is responsible and accountable for achieving the milestones. This finding is consistent with prior literature which emphasizes management commitment as crucial for e-commerce success.

Another finding is that firms should be confident about the existence of a market for the product before committing valuable resources to e-commerce. In case there is not sufficient interest in the market for online procurement it makes less sense to prioritize e-commerce in the short-run.

It has also been seen throughout the research that the management can perceive e-commerce as easy to implement, while in reality it is more complex. Although e-commerce is a low cost solution in terms of finance, it should not be underestimated in terms of the time that has to be invested.

Furthermore, having an e-commerce distribution channel is often a necessary but insufficient condition for success. Firms should consider having a traditional channel besides a virtual one. The model which is often most successful is a bricks-and-clicks model. Here, the online channel acts as a supplement to offline sales. This implies also that it is important to consider e-commerce best practices. Though, this must be done in the light of contingent factors because it is unlikely that there is a one-size-fits-all e-commerce model.

And finally, e-commerce can be a facilitator of the idea, and not an end goal in itself. The idea can be anything from collecting relevant customer data, or promoting the brand online. For example, e-commerce can be used as a sales support tool where customers can browse through a catalogue online in order to get an impression of the firms' offering. So e-commerce can be a support tool for sales, and for internationalization. By analyzing website visits the firm can generate a database of prospects that can later be contacted with sales offers.

## **5.4 Limitations and future research**

One of the limitations of this study is that the results of this study cannot be completely generalized. This is because the results are related to firm-specific factors such as firm size, nature of product, and other environmental characteristics that only hold in the particular high-tech market. On the other side, this report can serve as a good example for similar firms as STS that wants to enter the virtual market.

There are also limitations in the case study analysis because the conclusions about the market are based on interpretations of 13 surveys and 3 interviews. In order to have a better overview of the market, a more large-scale survey should be conducted. Also, in this research several conclusions about the preference of customers for traditional channels are based on perceptions. Future research can focus more on why exactly customers prefer traditional or virtual channels.

Another limitation is that firm performance is only assessed for a period 2 months after e-commerce is implemented. Future research can focus on a more longitudinal approach, and observe firm performance for a longer period of time after e-commerce is implemented. The long-term success of e-commerce and not only its adoption can then be measured.

Also, only a few best practice models have been selected in the review of the literature. It can be the case that several important theoretical perspectives were excluded. In general, future research can use the conceptual model that was developed in this research in order to apply it to other firms.

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## 7. Appendices

### Appendix 1. Management team interview

<b>I. Interview before and during implementation of e-commerce</b>	
a.	<p><b>E-commerce perceived benefits and drawbacks</b></p> <ul style="list-style-type: none"> <li>• What does e-commerce mean to you?</li> <li>• What do you perceive as the main benefits and drawbacks of e-commerce?</li> </ul>
b.	<p><b>Drivers and objectives</b></p> <ul style="list-style-type: none"> <li>• Please describe the reasons for introducing e-commerce; why does the company decide to ‘go electronic’ (drivers of adoption)?</li> <li>• What is expected to be achieved through e-commerce (objectives of adoption)? What is the purpose of the web-shop itself?</li> </ul>
c.	<p><b>Strategy (planning, integration of activities, growth and internationalization)</b></p> <ul style="list-style-type: none"> <li>• How will e-commerce fit within the overall business?                      What is the reason for the particular degree of integration of virtual and traditional activities?</li> <li>• What is the attitude towards e-commerce strategy formation?                      What is the attitude towards growth and internationalization?</li> <li>• Which firm performance do you expect to see in the time frame: 0 – 6 months, 6 – 12 months, &gt;1 year:</li> <li>• Please indicate which strength and weaknesses you think STS has, as well as opportunities and threats:</li> </ul>
d.	<p><b>Operational (website design, marketing)</b></p> <ul style="list-style-type: none"> <li>• What – in your opinion – is the usability of the site; what is the ‘web experience’ that customers get?                      Will the website only have an electronic commerce mechanism or will also other content be placed?</li> <li>• How will operational activities be carried out; how will processing be handled and who will take care of complaints?</li> </ul>
e.	<p><b>Internal and external implementation enablers</b></p> <ul style="list-style-type: none"> <li>• To what extent do you consider to possess the following characteristics:</li> </ul>

	<p>management commitment, suitable product for e-commerce, financial and human capital, and social networks?</p> <ul style="list-style-type: none"> <li>• Which external factors influence e-commerce implementation and e-commerce success in the particular market?</li> </ul>
f.	<p><b>Market analysis</b></p> <ul style="list-style-type: none"> <li>• Which perception do you have of the demand for the product?</li> <li>• Are the customers ready to purchase the product through a virtual channel?</li> </ul> <p>What is the added value for the customer?</p>
<p><b>II. Interview after implementation of e-commerce</b></p>	
a.	How would you evaluate the implementation process?
b.	What would you have done the same and what differently? Why?
c.	How do you evaluate the speed of the implementation process? How can this speed be explained?

## Appendix 2. Customer interview

<p><b>I. Product specifications</b></p>	
a.	Please describe the specifications of your ideal TEM membrane:
b.	<p>When selecting TEM membranes, several aspects are important. Please rank how important these aspects are for <u>you</u> from 1 to 6, with 1=most important and 6=least important. Please do not use one ranking more than once.</p> <p>1 Thickness</p> <p>2 Window</p> <p>3 Amorphous quality</p> <p>4 Clean(able)</p> <p>5 Side wall angle straight</p> <p>6 Other, please specify:</p>

c.	Please indicate which <u>TEM machine</u> you have: Is it difficult to find TEM membranes which are <u>compatible</u> with your particular TEM machine? If yes, please describe why (you think) this is so:
d.	For which <u>type of analysis</u> is the TEM membranes mostly used for (application)?
e.	What are the <u>current trends</u> in the TEM market, and specifically in your country?
f.	How important are the TEM membranes for your experiments, as compared to other commodities? Please describe why this is so:

## II. Market analysis

g.	How would you evaluate your <u>usage</u> of TEM membranes, on a yearly basis? Please select one variable. <input type="checkbox"/> Between 0-100 grids <input type="checkbox"/> Between 100-500 grids <input type="checkbox"/> Between 500-1000 grids <input type="checkbox"/> More than 1000 grids
h.	Which <u>price range</u> do you find acceptable for a 20 nm membrane? How much more would you be willing to pay for a <u>thinner membrane</u> ?

## III. Procurement

a.	Please describe the current process of <u>purchasing</u> :
b.	Who is responsible for the <u>final purchasing decision</u> ? Please select one variable. <input type="checkbox"/> Only the purchasing department <input type="checkbox"/> Only scientific staff <input type="checkbox"/> Scientific staff decides where to purchase, purchasing department gives final approval <input type="checkbox"/> Purchasing department decides where to purchase, scientific staff gives final approval <input type="checkbox"/> Other, please specify:

<p>c.</p> <p>d.</p> <p>e.</p> <p>f.</p> <p>g.</p>	<p>Which aspects are evaluated before a <u>purchasing decision</u> is made. Please rank the following aspects in importance, with 1=most important and 12=least important. Please do not use one ranking more than once.</p> <ul style="list-style-type: none"> <li>1 Price</li> <li>2 Quality</li> <li>3 Fast delivery</li> <li>4 Reliability</li> <li>5 Availability</li> <li>6 Service</li> <li>7 Insurance</li> <li>8 Compatibility with equipment</li> <li>9 Variety of products</li> <li>10 Variety of payment methods</li> <li>11 Positive association with the company</li> <li>12 Brand of the product</li> </ul> <p>Please briefly describe your experience with <u>online purchasing</u>:</p> <p>When was the <u>first online purchase</u> made, approximately?                      Have you made more online purchases since then?</p> <p>What are the main <u>benefits and drawbacks</u> you encountered during purchasing from a web-shop?</p> <p>What would be the <u>main reasons</u> for you to purchase TEM membranes from a <u>web-shop</u> and not from any other source?</p>
<p>h.</p>	<p>Considering making a <u>purchase online</u>, please think about which <u>aspects</u> you would find important and rank the following aspects from 1 to 12; with 1=most important and 12=least important. Please do not use one ranking more than once.</p> <ul style="list-style-type: none"> <li>1 Price</li> <li>2 Quality</li> <li>3 Fast delivery</li> <li>4 Reliability</li> <li>5 Availability</li> <li>6 Service</li> </ul>

	<p>7 Insurance</p> <p>8 Compatibility with equipment</p> <p>9 Variety of products</p> <p>10 Variety of payment methods</p> <p>11 Positive association with the company</p> <p>12 Brand of the product</p>
<b>IV. Random</b>	
a.	<p>Is it important for you that the suppliers of TEM membranes are <u>regionally close located</u>? If, yes why? Please select one variable.</p> <p><input type="checkbox"/> We trust regional suppliers more</p> <p><input type="checkbox"/> We think that regional supplies have shorter delivery cycles</p> <p><input type="checkbox"/> We think that products shipped by distant supplies will be damaged</p> <p><input type="checkbox"/> Other, please specify:</p>
b.	<p>In your opinion, which <u>functionalities</u> should a web-shop have, besides selling TEM membranes? Please select one variable.</p> <p><input type="checkbox"/> Educate visitors about the how to use TEM membranes</p> <p><input type="checkbox"/> News feed with developments in the industry (newest products and applications)</p> <p><input type="checkbox"/> Provide a pleasant shopping environment</p> <p><input type="checkbox"/> Other, please specify:</p>

### Appendix 3. Customer survey<sup>5</sup>

**1. Please describe the specifications of your ideal TEM membrane and for which application the TEM membranes are mostly used:**

**2. Several aspects are important when selecting TEM membranes. Please rank how important these aspects are for you:**

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<sup>5</sup> The customer survey is designed together with the management team of STS.

- N/A   Clean(able)
- N/A   Amorphous quality
- N/A   Side wall angle straight
- N/A   Thickness
- N/A   Window

**3. How would you evaluate your usage of TEM membranes, on a yearly basis?**

- 0-100 grids
- 100-500 grids
- 500-1000 grids
- >1000 grids

Other (please specify)

**4. What are you currently spending on a 20nm membrane?**

- 6-9 €
- 9-12 €
- 12-15 €
- >15 €

Other (please specify)

**5. How important are the following aspects when purchasing TEM membranes?**

	Very important	Important	Slightly important	Not important	N/A
Service	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Very important	Important	Slightly important	Not important	N/A
Availability of product(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast delivery	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variety of product(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of product(s)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compatibility with equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insurance	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive association with company	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand of product(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Payment security	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input type="text"/>				

**6. How important are the following aspects when purchasing TEM membranes online (though a web-shop)?**

	Very important	Important	Slightly important	Not important	N/A
Service	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Very important	Important	Slightly important	Not important	N/A
Availability of product(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast delivery	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variety of product(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of product(s)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compatibility with equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand of product(s)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive association with company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Payment security	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

**7. What are the main benefits of purchasing TEM membranes through a web-shop?**

- Convenience (24/7)
- Better prices
- Product information and comparison
- N/A

Other (please specify)

**8. What are the main drawbacks of purchasing TEM membranes through a web-shop?**

- Security and privacy concerns
- Lack of full cost disclosure
- Problems with payment
- N/A

Other (please specify)

**9. Is it important for you that the suppliers of TEM membranes are regionally close located? If yes, please give a reason:**

- We trust regional suppliers more
- We think that regional suppliers have shorter delivery cycles
- We think that products shipped by distant suppliers will be damaged

Other (please specify)

**Appendix 4. Sample**

Country	City	University	Response
Germany	Berlin	Federal Institute for Materials Research and Testing	Completed survey
Germany	Bremen	University of Bremen	Completed survey

Germany	Duisburg	University Duisburg Essen	Completed survey
Germany	Hamburg	University Hamburg	Completed survey
Germany	Munich	Ludwig Maximilian University of Munich	Completed survey
United Kingdom	Cambridge	University of Cambridge	Completed survey
United Kingdom	Cardiff	Cardiff University	Completed survey
United Kingdom	Edinburgh	University of Edinburgh	Completed survey
United Kingdom	Glasgow	University of Glasgow	Completed survey
United Kingdom	Leeds	University of Leeds	Completed survey
United Kingdom	London	Imperial College London	Completed survey
United Kingdom	Oxford	University of Oxford	Completed survey
United Kingdom	York	The University of York	Completed survey
Germany	Elangen	University of Erlangen-Nuremberg	No response
Germany	Juelich	Forschungszentrum Juelich	No response
Germany	Berlin	Humboldt University of Berlin	No response
Germany	Konstanz	Konstanz University	No response
Germany	Ausburg	University Augsburg	No response
Germany	Berlin	Free University of Berlin	No response

Germany	Dortmund	Ernst Ruska-Centre (ER-C) for Microscopy and Spectroscopy with Electrons	No response
Germany	Dresden	Max Planck Institute for the Physics of Complex Systems	No response
Germany	Ilmenau	Technical University Ilmenau	No response
Germany	Jena	Institute of Photonic Technology - IPHT Jena	No response
India	Hyderabad	Mahatma Hgandi University	No response
India	Pune	National Chemical Laboratory Pune	No response
India	Guwahti	Indian Institute of Technology (iit) Guwahati	No response
India	Kharagpur	Indian Institute of Technology Khargpur	No response
India	Coimbatore	Amrita school of engineering	No response
India	Hyderabad	Hyderabad Central University	No response
India	Calcutta	Burdwan University West Bengal	No response
India	Calcutta	Kalyani University	No response

		West Bengal	
India	Calcutta	Indian institute of Science Education and Research	No response
India	Bangalore	Materials Research Centre	No response
India	Chandigarh	Panjab Univesity	No response
India	Chandigarh	Indian Institute of Technology Mandi	No response
India	Chennai	Indian Institute of Technology Madras	No response
India	Madurai	Madurai Kamaraj University	No response
India	New Delhi	Rajasthan University	No response
United Kingdom	Nottingham	Nottingham Nanotechnology and Nanoscience Centre	No response
United Kingdom	London	Queen Mary and Westfield College	No response
United Kingdom	Sheffield	Sheffield Hallam University	No response
United Kingdom	Bristol	University of Bristol	No response
United Kingdom	Carrickfergus	University of Ulster at Jordanstown	No response
United Kingdom	Guildford	University of Surrey	No response
United Kingdom	Hull	University of Hull	No response
United Kingdom	Reading	The University of Reading UK	No response

United Kingdom	Birmingham	University of Birmingham	No response
United Kingdom	Norwich	University of East Anglia	No response
United Kingdom	Plymouth	Plymouth University	No response
United Kingdom	Swansea	Swansea University	No response
Germany	Dresden	Helmholtz-Zentrum Dresden-Rossendorf	No response
Germany	Dusseldorf	Max Planck Institute for Iron Research GmbH	Not relevant
United Kingdom	London	National Institute for Medical Research	Not relevant
United Kingdom	Liverpool	University of Liverpool	Not relevant
United Kingdom	Newcastle	Newcastle University	Not relevant
United Kingdom	Southampton	University of Southampton	Not relevant
United Kingdom	St Andrews	University of St Andrews	Not relevant
United Kingdom	Manchester	University of Manchester	Not relevant