Benchmarking the implementation of E-Commerce A Case Study Approach

von Ettingshausen, C. R. D. Freiherr

http://hdl.handle.net/10026.1/2247

http://dx.doi.org/10.24382/3989

University of Plymouth

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Benchmarking the implementation of E-Commerce
A Case Study Approach

by

C. R. D. Freiherr von Ettingshausen

DOCTOR OF PHILOSOPHY

University of Plymouth
Business School

2009
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Abstract

Colin von Ettingshausen

Benchmarking the implementation of E-Commerce
A Case Study Approach

The purpose of this thesis was to develop a guideline to support the implementation of E-Commerce with E-Commerce benchmarking. Because of its importance as an interface with the customer, web-site benchmarking has been a widely researched topic. However, limited research has been conducted on benchmarking E-Commerce across other areas of the value chain. Consequently this thesis aims to extend benchmarking into E-Commerce related subjects.

The literature review examined two main bodies of theory, E-Commerce and benchmarking. It became clearly apparent that a gap in the literature existed for E-Commerce benchmarking. To address this gap, a single-case-study exploratory methodology has been applied. The case study method was considered most suitable for this research given the exploratory nature of the research aim and question as well as the potential for new insights to be gained from the samples.

Three sub-studies have been applied within this single-case-study exploratory design. In study 1, 20 semi-structured interviews were conducted to explore possible themes related to E-Commerce, benchmarking and E-Commerce benchmarking. Those themes were included in study 2, the exploratory quantitative questionnaire survey. 146 responses were analyzed in this phase. In study 3, six expert interviews were executed to explore potential themes based on the research of the first two studies. The data analysis of this thesis included descriptive statistics and a mixture of grounded and content analysis.
There were a number of important findings that emerged from this research. **Firstly**, E-Commerce benchmarking is mostly executed as web-site benchmarking, customer surveys and basic top line indicators like the E-Share. **Secondly**, exchange of best practices, target setting, customer satisfaction and competitive advantage emerged as benefits from E-Commerce benchmarking. **Thirdly**, there are two distinct differences between E-Commerce benchmarking and traditional benchmarking: (1) higher frequency and (2) types of indicators. **Fourthly**, external benchmarking, process benchmarking and additional indicators were identified as appropriate avenues of benchmarking E-Commerce.

The contribution of this thesis relates to extending current literature on E-Commerce benchmarking. Furthermore, a guideline for the implementation of E-Commerce benchmarking is provided. In summary it is proven that the implementation of E-Commerce can and needs to be benchmarked.
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Acknowledgements

Firstly I would like express my gratitude to my supervisors Prof. Phil Megicks and Dr. Troy Heffernan for their excellent help. The level of support I received was far beyond what I could have expected. I very much appreciated their feedback and guidance! Secondly, I would also like to thank Prof. Ian Chaston for supporting me greatly during the first half of this research journey.

I would like to extend my grateful thanks to Prof. Ralf Brickau who guided me from the beginning of the thesis to its submission. Furthermore, I would like to show my appreciation to Sylvia Eades who helped me very much on language related matters. Additionally, my gratitude goes to Prof. Wolfgang Tysiak for his support during the first data analyses.

In addition, I would like to thank BASF for the support to conduct this research. This "thank you" of course includes all the managers I interviewed. Dr. Gerd Kissau and Christoph Hansen need to be mentioned here for permitting this research to be undertaken.

Very special thanks go to my wife Jenny Freifrau von Ettingshausen for her love, support and understanding while I dedicated a lot of effort to this thesis which meant that family time was cut short.

Finally, I would like to dedicate this thesis to my father Dr. Othmar Freiherr von Ettingshausen, who inspired me to pursue this research. Unintentionally, the year of submission of this thesis coincides with his 75th birthday.
Author's declaration and word count

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Graduate Committee. This thesis was conducted part-time. It has received indefinite confidentiality status from the University of Plymouth Graduate School.

Word count of main body of thesis: 68.233 words

Signed: [Signature]

Date: 3 August 2009


1 Introduction

"E-Commerce benchmarking harbours many significant research opportunities, yet one finds scant evidence of empirical research on E-Commerce benchmarking" (Mc Gauhey, 2002, p 484).

This thesis is conducted to pursue some of those research opportunities. Its introductory chapter is structured as follows. Firstly, the background of this research will be highlighted. Secondly, the research aim and research questions are introduced. Thirdly, the importance of the research aim will be highlighted, leading into a short description of the methodologies applied. Next, each chapter of this thesis will be outlined. Finally delimitations are shown before the chapter ends with its conclusion. This structure is presented in the following illustration.

Illustration 1: Structure of chapter 1

| Chapter 1.1: Background to the research |
| Chapter 1.2: Research aim, research questions and contributions |
| Chapter 1.3: Importance of the topic |
| Chapter 1.4: Research methodology |
| Chapter 1.5: Outline of this thesis |
| Chapter 1.6: Delimitations of scope |
| Chapter 1.7: Conclusions |

Source: Developed for this thesis
1.1 Background to the research

"Any company starting an E-Commerce venture should first understand its market position and those of its competitors. As part of this process it needs to benchmark itself against similar companies. Furthermore, the rapidly evolving nature of the Internet business makes it all the more important for companies to benchmark their performance on a regular basis" (Jeffcoate et al, 2002, p 122).

Hence, the goal of this thesis is to develop guidelines for benchmarking E-Commerce applications. Web-site benchmarking, as one type of E-Commerce benchmarking, has been the focus of the contemporary benchmarking literature. In keeping with this trend, a number of studies have been examined for this thesis, for example Welling and White (2006) or Brown et al (2006). However, despite those existing sources, there is a limited understanding within the literature of a holistic E-Commerce benchmarking approach which includes other parts of the value chain too (Webb and Webb, 2004). Furthermore, E-Commerce and benchmarking have been examined intensively. However they have not yet been combined together significantly as E-Commerce benchmarking.

Today, companies are facing many challenges. According to Pavic et al (2007, p 320):

"The economic environment in which businesses find themselves today is perhaps the most turbulent in history".

Hence, the aim of this thesis is to gain a clearer understanding of how to implement E-Commerce with benchmarking to support corporations in their E-Commerce efforts during those turbulent times.
Benchmarking itself has gained popularity in the late 1970s as an attempt from Western companies to cope with cost pressure from Asian and particularly from Japanese manufacturers (Rau, 1996). Years later, the concept has also been applied across the whole value chain and subsequently sales and marketing functions were also included (Camp, 1989). Today benchmarking is even more widespread in business, including quality goals in service systems (Chen, 1998), supply chain interfaces (Bommer et al, 2001) or brand management (Andriopulous et al, 2000) to name only a few.

Originally published in 1989 by Robert C. Camp, the CEO of Xerox, the concept of benchmarking received almost world-wide popularity and other management tools like Six Sigma or Lean Manufacturing also included benchmarking into their methodology. The development of benchmarking also resulted in the foundation of networks like the International Benchmarking Foundation which promoted the use of benchmarking even further.

However, since the end of the last millennium a new business approach has again changed the business world, the introduction of E-Commerce. Moving from the last millennium to the new, parts of the business world evolved from terrestrial to cyberspace business (Haertsch, 2000). “This has led to redefining almost all aspects of businesses” (Ahmed et al, 2006, p 69). Consequently, E-Commerce has changed and is still changing the world (Pyne, 2000).

This new cyberspace business permits companies to store information digitally, creating numerous opportunities for streamlining processes along the value chain (Tapscott, 1995). Particularly the decline in prices of information technology, the development of Internet browsers and the commercialization of the Internet itself contributed to Internet- and E-Commerce growth respectively (Ahmed et al, 2006). In light of the very recent global economical downturn, Wolf (2009, p 74) even states that: “E-Commerce is considered critical”. 

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Nevertheless, studies suggest that benefits from E-Commerce utilization are considerably less than expected (Alshawi et al, 2003). While practitioners are attempting to capitalize on the opportunities of E-Commerce, they have not yet applied the benchmarking methodology to its full extend. During the early stages of E-Commerce, companies focused almost exclusively on implementing E-Commerce applications. However, they had little experience in developing appropriate E-Commerce goals or supporting management tools (Webb and Webb, 2004; Boisvert and Caron, 2006). As E-commerce becomes a key asset within a business portfolio, managers must learn how to measure and maximize these powerful assets and to develop appropriate strategies for E-Commerce investments (Rubin, 2002). However, Fink states (2006, p 81):

"With the emerging new economy, the simplistic accounting-oriented cost benefit analysis approach no longer suffices since there are new ways of doing business where benefits are closely intertwined with business activities".

Hence E-commerce applications need a tailor-made system to measure whether they are meeting their goals and to see how their performance progresses and how it compares with that of competitors (Wieder, 2000). Consequently, it is considered appropriate to explore the importance of E-Commerce benchmarking in this thesis. Not benchmarking E-Commerce activities would be a major mistake (Jahal, 2000). Thus, companies need benchmarking to assess their E-commerce performance (anonymous, 2008).

Therefore the aim of this thesis is to establish a better understanding of E-Commerce benchmarking. The findings from this research will also provide information on how to implement E-Commerce benchmarking. Furthermore a list of indicators which need to be included into E-Commerce benchmarking will be presented. In addition, potential ways of finding an external benchmarking partner will be highlighted. The next section of chapter 1 will highlight the research aim and research questions of this thesis.
1.2 Research aim, research questions and contributions

The research problem that will be addressed in this study is:

**Benchmarking the implementation of E-Commerce**

**A Case Study Approach**

Essentially it is argued that the transfer of brick and mortar benchmarking to cyberspace benchmarking has not yet reached its full potential. Therefore ways of implementing E-Commerce benchmarking will be established. This will include a guideline to conduct benchmarking studies within an E-Commerce environment. The data necessary to address the aforementioned research aim will be generated from samples at a chemical goods manufacturer. The following four research questions will be addressed.

The first research question (RQ) identifies current E-Commerce benchmarking activities. Previous research on E-Commerce benchmarking has focused on web-site benchmarking. This thesis will therefore analyse if that is still the case by exploring which types of Commerce benchmarking projects are currently conducted. Thus it will be asked:

**RQ 1: How is the benchmarking of E-Commerce business operations undertaken at BASF?**

The second research question will analyse potential benefits that can be related to E-Commerce benchmarking. The underlying assumption of this research question is that benefits of E-Commerce benchmarking need to be identified in order to further develop this tool and ultimately implement it as well. Hence it will be asked:

**RQ 2: What are the benefits of benchmarking E-commerce business operations at BASF?**
The third research question relates to differences between E-Commerce benchmarking and benchmarking traditional businesses. This research question is seen as important because potential areas for further development of E-Commerce benchmarking might be identified. Therefore it will be asked:

**RQ 3: What are the differences between benchmarking E-commerce business operations and traditional forms of benchmarking at BASF?**

Finally, the fourth research question attempts to identify ways in which E-Commerce benchmarking should be implemented. Taking into account the results from the previous research questions, a guideline for implementing E-Commerce benchmarking will be developed. Consequently it will be asked:

**RQ 4: What are the most appropriate ways of implementing the benchmarking of E-commerce business operations at BASF?**

Answering these research questions provides contributions that will be presented in chapter 7 of this thesis. In summary, the following contributions are made:

- The enhancement of E-Commerce benchmarking theory.

- The development of a guideline for benchmarking the implementation of E-Commerce.

The following section of this chapter outlines the importance of E-Commerce benchmarking.
1.3 Importance of the topic

To benchmark the implementation of E-Commerce is important because of five key reasons which are displayed in the below table. Each reason will be explained in the following paragraphs.

Table 1: Reasoning for the importance of this thesis

<table>
<thead>
<tr>
<th>No.</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E-Commerce development opportunities</td>
</tr>
<tr>
<td>2</td>
<td>Expectations for E-Commerce applications are not fully met</td>
</tr>
<tr>
<td>3</td>
<td>Limited E-Commerce benchmarking experience</td>
</tr>
<tr>
<td>4</td>
<td>Importance of benchmarking itself as a management tool</td>
</tr>
<tr>
<td>5</td>
<td>Gaps within existing literature</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

The first reason that emphasizes the importance of this thesis is that E-Commerce business is still growing significantly. Regardless of the size of a company, many corporations have committed to E-Commerce targets which still require a lot of resources dedicated to them. Looking at the potential of additional Internet users across the globe, it seems reasonable to agree that the opportunities for E-Commerce business developments are numerous.

The second reason that highlights the importance of this thesis is that E-Commerce applications have not fully met investors' expectations. 53% of the responses of an international study have realized only a modest impact of E-Commerce on their companies (Arthur D. Little, 2000). Despite the escalating importance of online service delivery, evidence indicates that E-Service levels are generally not satisfactory (Zeithaml, 2002). The failure of some dotcoms also shows that there is a need to increase the quality of E-Commerce applications. "Despite the great interest and demand shown towards E-Business, the number of successful applications is quite few" (Buyukozkan, 2004, p 761).
The third reason that underlines the importance of this thesis is the limited experience companies have with E-Commerce benchmarking. Because of this lack of experience it seems that E-Commerce benchmarking is a difficult issue (anonymous, 1997). Despite the fact that the importance of the Internet has risen in recent years, comparatively little is known about its effectiveness (Levenburg, 2006). In addition to that, many publications on E-Commerce benchmarking have been limited in scale or scope (Chakraborty et al, 2002).

The fourth reason that supports the importance of this thesis is that benchmarking itself is a key management tool. The benefits which have been associated with traditional benchmarking are numerous. Competitive advantage, best practice exchange, support for target setting, or planning and forecasting are few of those benefits. However, traditional benchmarking cannot work in an E-Commerce environment because cyberspace business is based on entirely different processes (Wieder, 2000). Consequently, conventional ways of measuring performances are inadequate (Rubin, 2002). Hence benchmarking techniques must change before companies are able to get an accurate assessment on their E-Commerce activities (Nash, 2001). However, many E-Commerce benefits are actually intangibles and thus are difficult to assess in terms of efficiency and effectiveness (Welling and White, 2006).

The fifth reason that indicates the importance of this thesis is that there are various gaps to be found in existing literature on E-Commerce benchmarking. Kaden et al (2002) state that in a relatively new E-Commerce scenario there are not yet generally acknowledged industry standards.

As Fellows states (2008, p 108):

"Unfortunately, because of the haphazard nature of the web, there are plenty of metrics in use, but few industry agreed standards and definitions".
Furthermore, the speed at which E-Commerce develops makes it difficult to develop these desired standards. One reason for the lack of generally acknowledged standards relates to the fact that E-Commerce and E-Commerce benchmarking are still relatively new. But despite the challenges related to E-Commerce benchmarking, to ignore this area is also not an option. Eid supports this viewpoint (2007, p 201):

"The main challenge for many companies today is to manage, control and advance daily business activities and find leverage points to improve performance, particularly in terms of market-oriented activities that can be influenced by the Internet".

E-Commerce benchmarking is unavoidable (Bermingham, 1999). Powell (2000) believes that benchmarking can and must play a major role in assisting companies to launch E-Commerce successfully. By remembering some of the basic benchmarking principles, companies can benefit from its advantages in cyberspace environments too (anonymous, 1997). Barnet (2000, p 60) believes in the potential of E-Commerce benchmarking:

"Who knows what impact E-Commerce will have on the way companies are managing their financial processes and their resulting performance measurements? Answers to these questions will come quickly because technology is making the benchmarking process smoother and easier".

Considering the above five key reasons that highlight the importance of this thesis, it seems reasonable to say that E-Commerce benchmarking needs to be examined much closer. E-Commerce itself is challenging existing benchmarking concepts. Thus E-Commerce benchmarking needs to incorporate the features of E-Commerce so that it can deliver benefits to E-Commerce. To address the aforementioned research questions, the following research methodology will be applied.
1.4 Research methodology

Before a certain methodology could be identified, the research paradigm for this thesis was selected. Research paradigms reflect general beliefs about the world which provide guidance to the researcher while conducting the study (Morgan, 1983). In principle there are four research paradigms: positivism, critical theory, constructivism and realism (Guba and Lincoln, 1994).

According to Perry (1998), realism is the most appropriate paradigm for business related research. Denzin and Lincoln (1994) argue that realism involves the discovery of a real world. As this applies to both E-Commerce and Benchmarking, realism seems to be the appropriate paradigm for this thesis.

This research is conducted as a:

**Single-case-study exploratory design**

As this thesis intended to explore themes that are relevant to develop a more comprehensive guideline to implement E-Commerce benchmarking, it combined different methods of data collection. According to Lehmann (1985), Bryman (1988) and Watson (1997) the combination of approaches provides advantages because qualitative and quantitative studies can complement each other. This approach also contributes to the aim of methodological triangulation. Triangulation allows the researcher to look at the research questions from different angles (Smith, 1997). Within this single-case-study, three sub-studies were conducted.

The first study involved qualitative exploratory research. 20 semi-structured interviews were conducted with managers from BASF Group companies with different educational and business backgrounds. These interviews provided insight in participants' beliefs about E-Commerce, benchmarking and E-Commerce benchmarking.
The **second** study consisted of quantitative exploratory research. A questionnaire survey was designed and implemented at business unit "XYZ" at BASF SE. 146 responses from this business unit were received and analysed. The importance of this study was to explore more themes related to the research topic. Those themes could be included in the third study too.

The **third** study involved the interviewing of six E-Commerce experts to further explore themes specifically related to E-Commerce benchmarking. This study also intended to confirm those themes that had emerged from the first two studies. The methodology will be explained in far greater detail in chapter 4 of this thesis. A brief overview of each chapter of this thesis will be provided in the following section.

### 1.5 Outline of this thesis

The following illustration highlights the structure of this thesis. As can be seen, this thesis is made up of seven chapters. Each of those chapters will be introduced in the following paragraphs.

**Illustration 2: Structure of this thesis**

<table>
<thead>
<tr>
<th>Chapter 1: Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 2: Contextual setting</td>
</tr>
<tr>
<td>Chapter 3: Literature review</td>
</tr>
<tr>
<td>Chapter 4: Methodology</td>
</tr>
<tr>
<td>Chapter 5: Presentation of the results for studies 1 - 3</td>
</tr>
<tr>
<td>Chapter 6: Discussions of the findings</td>
</tr>
<tr>
<td>Chapter 7: Conclusions and implications</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
Chapter 1, introduction: Chapter 1 provides an overview of this thesis. In this chapter the background of the research is described, including a discussion on the importance of the chosen subject and delimitations of the scope of the thesis. Furthermore, the research aims and subsequent research questions are identified.

Chapter 2, contextual setting: Chapter 2 gives the reader an insight into the context in which this thesis is undertaken. This thesis discusses E-Commerce, benchmarking and E-Commerce benchmarking. It utilised BASF, "The Chemical Company", as a sample to generate data that can be analyzed to answer the research question. The company history as well as current business figures will be introduced. Additionally this chapter will include information on the importance of E-Commerce, benchmarking and E-Commerce benchmarking at BASF.

Chapter 3, literature review: Chapter 3 analyses the existing literature on E-Commerce, benchmarking and E-Commerce benchmarking in depth. Hence each section of chapter 3 concentrates on those topics. E-Commerce and benchmarking will be referred to as the main bodies of theory. E-Commerce benchmarking will be referred to as the research theory. This chapter will establish the theoretical foundation on which the thesis will be built. It will furthermore identify research areas which are worthy of further analysis.

Chapter 4, methodology: Chapter 4 sets off providing an overview of existing research paradigms. Once the appropriate paradigm for this thesis has been carefully selected, it will describe appropriate methodologies used to collect data to address the research questions. As this thesis has chosen a single-case-study exploratory design, the realist paradigm was seen appropriate. A combination of qualitative and quantitative methodologies was implemented to gather data that was later analysed. Additionally, the methods for analysing the collected information are chosen in this chapter.
Chapter 5, presentation of the results for studies 1 - 3: In chapter 5 the results of studies 1, 2 and study 3 are reported. Furthermore the profile of each sample is shown. One section on each study 1, 2 and study 3 will be included in this chapter. The results will be highlighted as emerging themes and so called "elements" will be allocated to clarify their meaning.

Chapter 6, discussions of the findings: In chapter 6 the findings of each research question will be reported. Hence one section on each research question will be included in this chapter. Themes will be chosen based on their significance across all three studies and important ones will be allocated to each research question.

Chapter 7, conclusions and implications: The main aim of chapter 7 is to report how the results and findings of this thesis have contributed to the development of E-Commerce benchmarking. Therefore general conclusions and implications for theory will be highlighted. As implications for practise, the guideline for successful implementation of E-Commerce benchmarking will be introduced. Lastly, limitations of this thesis and additional research avenues will be shown.

The below illustration highlights which chapters predominantly represent research areas and which chapters refer to existing bodies of knowledge. Chapter 4, 5 and chapter 6 represent the research areas of this thesis. The presentation of the results and the discussions of findings are concluded in chapter 7 in which the contribution to existing theory and practise will be highlighted. Chapters 1, 2 and 3 are referring more to the existing bodies of knowledge.
As lined out in section 1.2, the general contribution of this thesis is two-fold. (1) E-Commerce benchmarking theory will be enhanced and (2) a guideline for benchmarking the implementation of E-Commerce is introduced. The following section will focus on the delimitation of scope of this thesis.

1.6 Delimitation of scope

In terms of the scope of this thesis, as an employee of the BASF Group, the researcher has chosen “The Chemical Company” as the company where the data were collected. The thesis itself and its execution within the company received Senior Management approval prior to submission of the application of this thesis at the University of Plymouth.
One of 14 operational divisions of BASF Group was chosen to implement the questionnaire survey. For confidentiality reasons, this unit will be referred to as business unit "XYZ". The semi-structured interviews and the focused expert interviews will not be limited to a particular site, business unit or country. As the researcher has access to various BASF sites around the globe, respondents were chosen according to their experience of the relevant topic much more than their closeness to the site of the researcher.

This thesis focused on Business to Business (B2B) E-Commerce and not on other types of E-Commerce like Business to Customer (B2C) E-Commerce for example. As B2B E-Commerce is the most significant type of E-Commerce, this approach seems viable especially for a large corporation like BASF which sells its products to other businesses and not to individual consumers. Because of this, the generalizability of this thesis can be an issue.

1.7 Conclusions
The aims of chapter 1 were to introduce and contextualize this research. It addressed the research background and highlighted research questions as well as a chosen research methodology. Furthermore the content and structure of the thesis have been outlined. Additionally important delimitations have been introduced.

The next chapter of this thesis will introduce the context in which this thesis was conducted. It will highlight the background of BASF "The Chemical Company". Furthermore the two main bodies of theory, E-Commerce and benchmarking, as well as the research theory E-Commerce benchmarking will be introduced in the context of BASF.
2 Contextual setting

As this research is employing a single-case-study exploratory research design, it is necessary to provide an insight into the unit of analysis, BASF (Badische Anilin & Soda Fabrik) "The Chemical Company". This chapter will commence with a description of BASF including its history, profile and strategy. Furthermore, specific attention will be tributed to E-Commerce, benchmarking and E-Commerce benchmarking at BASF. As can be seen in illustration 4, the implications of the context for this thesis will finalize this chapter.

Illustration 4: Structure of chapter 2

Chapter 2.1: BASF "The Chemical Company"
  Chapter 2.1.1: History of BASF
  Chapter 2.1.2: Company profile of BASF
  Chapter 2.1.3: 2015 strategy of BASF

Chapter 2.2: E-Commerce at BASF
  Chapter 2.2.1: Use of E-Commerce at BASF
  Chapter 2.2.2: Importance of E-Commerce at BASF

Chapter 2.3: Benchmarking at BASF
  Chapter 2.3.1: Use of benchmarking at BASF
  Chapter 2.3.2: Importance of benchmarking at BASF

Chapter 2.4: E-Commerce benchmarking at BASF
  Chapter 2.4.1: Use of E-Commerce benchmarking at BASF
  Chapter 2.4.2: Importance of E-Commerce benchmarking at BASF

Chapter 2.5: Implications for this thesis

Source: Developed for this thesis
2.1 BASF "The Chemical Company"

Since it was founded, BASF has expanded significantly. Initially being a small manufacturing site, it became the largest chemical company in the world. Many events of significance to BASF, but also to the chemical world have occurred during its history. The following section of this chapter will illustrate the most significant events and list them by phases.

2.1.1 History of BASF

Since its establishment in 1865 BASF has progressed into "The Chemical Company" through four phases (BASF Internet, 2008).

"1865-1901: The birth of the chemical industry and the era of dyes"

In 1935 German industrialization started when the first railway was built. The new railway system also promoted the abolishment of customs barriers between individual German counties and subsequently an internal German market was created. Due to this new freedom, additional business opportunities arose. Friedrich Engelhorn, owner of a coal gas company in Mannheim recognized the opportunities for coal tar, which at that time was only a by-product of his company's' business. Not long after that, he founded a corporation in Mannheim under the name "Badische Anilin & Soda Farbrik" (BASF).

Further milestones during this period were the construction of affordable housing for BASF employees by 1872, the establishment of a health fund by 1875 and the setting up of an internal patent office by 1880. In 1897 BASF also managed to win the race for the synthetic production of indigo which is used to colour jeans.


"1902-1924: The Haber-Bosch process and the era of fertilizers"

At the beginning of the last century, it became obvious that the increasing number of people in the world required an increasing food supply as well. At that time Chile played a major role for key supplies to the food industry because nitrogen as a nutrient for plants has been supplied almost exclusively by Chile. However, at that time stock levels decreased significantly due to stronger demand. In 1913 Fritz Haber and Carl Bosch managed to find a synthetic way of producing nitrogen and shortly afterwards, BASF began the production of such nitrogen.

Further milestones during this period are represented by the inauguration of the first materials testing lab in 1912, the discovery of Nekal, a textile auxiliary in 1916, the foundation of a committee for education in 1919, and the successful synthesis of methanol in 1923 by Matthias Pier.

"1925-1944: New forms of high pressure synthesis"

Once the First World War came to an end, the economical situation of the German population was poor. The German Kaiser has left his throne, the economic forecast was not very positive and the Wall Street Crash from 1929 also took its toll on the German economy. During that time period, BASF joined the so called "IG Farben Group". This was a conglomerate of different chemical companies who intended to maintain their competitiveness by utilising synergies. During the Second World War, IG Farben supported the German war machine by supplying nitrogen, rubber and gasoline. By the end of the war 33% of the Ludwigshafen plant had been destroyed completely with a further 61% of its buildings being partly destroyed.

Further significant events during that period include the synthesis of styrene in 1929, the invention of the magnetic tape in 1934 and the launch of intensive air raids on Ludwigshafen during 1943 and 1944.
"1945-1964: A fresh start, the economic miracle and the dawn of the age of plastics"

After the Second World War a large number of refugees wondered through Germany looking for accommodation and work opportunities. Hence the unemployment rates were quite high and there was a huge shortage on housing. However, shortly after the war, in May 1945, 800 employees started production again in Ludwigshafen and in 1952 BASF was re-established as one of the three successor companies of IG Farben.

Further milestones during that period include the discovery of Styropor in 1951, the acquisition of new homes for BASF employees, the start of a production facility outside Germany in 1958 and the establishment of a site in Antwerp (Belgium) by 1964.

"1965-today: The path to becoming a transnational organization"

Once the post war time struggles have been overcome, Germany's economy started booming significantly, which continued until the mid 1960s. But shortly after that, in 1967 the country did slide into a recession for the first time since the war ended. At that time BASF started to establish itself as a global company in all highly industrialized nations. As a result, the "Verbund" principle, in which the by-product of one production process becomes the core product of another production process, has been established. Since the beginning of this millennium BASF was actively involved in Germany's structural transformation towards research and science based industries.

Further milestones during this time period include the acquisition of Wintershall in 1969, the establishment of BASF's first own waste water treatment for the Ludwigshafen site in 1974, the introduction of a child and parent programme in 1986, the inauguration of a new ecology laboratory in Ludwigshafen in 1991 and the beginning of the construction of the world's largest naphtha steam cracker in Port Arthur, USA. The next section of this chapter will provide a short company profile of BASF.
2.1.2 Company profile of BASF

BASF focuses its activities on customers in 10 key industries (BASF company report, 2007). 14 operating divisions serve those industries. These divisions have been structured according to products, customer industries and production processes. This structure has enabled BASF to combine its core competencies better, enhance knowledge levels and consequently to bring products and system solutions faster to the market. The following table provides an insight into the different segments in which BASF operates.

Table 2: Split of BASF sales 2007 per business unit

<table>
<thead>
<tr>
<th>Business unit</th>
<th>Turnover in Bn €</th>
<th>% from overall turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals</td>
<td>14,2</td>
<td>25,1</td>
</tr>
<tr>
<td>Plastics</td>
<td>13,5</td>
<td>23,2</td>
</tr>
<tr>
<td>Performance Products</td>
<td>11,7</td>
<td>20,1</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>10,5</td>
<td>18,1</td>
</tr>
<tr>
<td>Agricultural products</td>
<td>5,0</td>
<td>8,2</td>
</tr>
<tr>
<td>Others</td>
<td>3,1</td>
<td>5,3</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>58,00</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: BASF company report 2007

BASF supplies products to a variety of international business partners in over 200 countries. As can be seen from the previous table, BASF’s revenues are distributed fairly evenly across all business units. Additionally, BASF’s strength is not only that it has an extremely broad product range, but also that it supplies different industries.

Table 3 shows an almost equal share of revenues across major industries. It becomes obvious that "The Chemical Company" does not only supply the chemical industry but also other industries which need chemicals. With a split across industries and divisions, BASF minimizes its exposure to economic cycles.
Table 3: Split of BASF sales 2007 per industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>% from overall turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals</td>
<td>5%</td>
</tr>
<tr>
<td>Automotive / Construction / Utilities</td>
<td>10 – 15%</td>
</tr>
<tr>
<td>Agriculture / Plastics / Oil</td>
<td>5 – 10%</td>
</tr>
<tr>
<td>Electronics / Furniture / Paper</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Others</td>
<td>10 – 15%</td>
</tr>
</tbody>
</table>

Source: BASF company report 2007

In terms of workforce, at the end of 2007 BASF had 95,175 employees worldwide. Although the fluctuation rate differs from region to region, the average rate worldwide in 2007 was just 1,6%. The split of BASF’s employees can be seen in the following table.

Table 4: BASF employees by region

<table>
<thead>
<tr>
<th>Region</th>
<th>2007</th>
<th>%2007</th>
<th>%2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>61,020</td>
<td>64,1</td>
<td>64,5</td>
</tr>
<tr>
<td>Thereof Germany</td>
<td>46,890</td>
<td>49,3</td>
<td>49,7</td>
</tr>
<tr>
<td>Thereof BASF SE</td>
<td>32,706</td>
<td>34,4</td>
<td>34,9</td>
</tr>
<tr>
<td>NAFTA</td>
<td>15,191</td>
<td>16,0</td>
<td>16,3</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>13,278</td>
<td>13,9</td>
<td>13,4</td>
</tr>
<tr>
<td>SA, ME, Africa</td>
<td>5,686</td>
<td>6,0</td>
<td>5,8</td>
</tr>
<tr>
<td>Overall</td>
<td>95,175</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: BASF company report 2007

In order to take advantage of the opportunities for profitable growth throughout the world, BASF is represented with production and sales facilities in all economic regions. Even though Europe is its home market, the dynamic regions of NAFTA, Asia and South America are gaining importance.
2.1.3 2015 strategy of BASF

To understand the overall context of E-Commerce, benchmarking and E-Commerce benchmarking, it is necessary to look at BASF’s overall strategy. The below illustration shows the building blocks of BASF’s “2015 strategy”. BASF’s goal is to remain the world’s leading chemical company. “With its strategy 2015, BASF will achieve this goal by successfully combining new and proven ideas” (BASF Internet, 2008).

**Illustration 5: BASF’s 2015 strategy**

```
Earn a premium on our cost of capital

Help our customers to be more successful

Form the best team in the industry

Ensure sustainable development
```

Source: BASF Internet (2008)

"**Earn a premium on cost of capital**:"
“Growth alone is not sufficient in international competition for capital. What will be important is to grow profitably” (BASF Internet, 2008).

"**Help our customers to be more successful**:"
“In order to grow profitably, we want to focus even more closely on our customers’ needs in the future and develop and apply the best business models for them and us” (BASF Internet, 2008).
"Form the best team":
"We have committed and qualified employees and an excellent management team. Together they ensure BASF's success" (BASF Internet, 2008).

"Ensure sustainable development":
"For us, sustainable enterprise means combining economic success with environmental protection and social responsibility, thus contributing to a worthwhile future for coming generations" (BASF Internet, 2008).

Within those four main pillars, various business tools like E-Commerce, benchmarking and E-Commerce benchmarking contribute to the successful implementation of the 2015 strategy. In the following sections, reference will be made to the 2015 strategy when appropriate to highlight the importance of those business tools.

2.2 E-Commerce at BASF
BASF started implementing E-Commerce in 2001. The following definition has been used internally (internal paper, 2003): "E-commerce is the electronic platform with which BASF wants to engage with its customers whenever feasible". The following sections will emphasize the use of E-Commerce and its importance at BASF.

2.2.1 Use of E-Commerce at BASF
Today all business units have developed E-Commerce activities. In essence, there are two main portals through which BASF conducts E-Commerce: (1) World Account and (2) Elemica. World Account went into operation in 2001. It is the global BASF web portal for enquiries on product, pricing, billing and order information as well as for placing orders online. Among other things, it offers certificates of analysis, information on order status and material safety data sheets. World Account also gives customers and BASF shared access for editing and storing documents in a protected area (BASF Internet, 2008).
Elemica also went into operation in 2001. It is an independent company which electronically connects the order management systems of chemical industry customers and suppliers. If full integrated, Elemica transmits orders, confirming and billing messages both to and from the customer and the supplier. Elemica lets every connected company carry out electronic order transactions with other Elemica partners (BASF Internet, 2008).

The number of transactions processed by Elemica, inbound and outbound, in 2007 compared to 2002, increased by 820% and 960% respectively (internal paper, 2008). Today BASF is connected via Elemica to other suppliers or competitors like Bayer AG, Dow or Procter & Gamble. The following illustration provides an overview of the development of E-Commerce related business at BASF. It becomes clear that World Account represented the biggest share in BASF’s E-Commerce business in 2008, followed by Elemica and EDI.

**Illustration 6: Development of E-Commerce business at BASF**

![Illustration 6: Development of E-Commerce business at BASF](image)
WorldAccount and Elemica are protected to offer a maximum degree of security to BASF and its customers. On request, the systems offer the opportunity for customers to incorporate new functions as well. In 2007 BASF released its fifth version of World Account. To cope with market pressures and to keep its entire staff members at the necessary knowledge levels, BASF has initiated an E-Learning platform. With this platform every key user involved in the process can update his or her knowledge and serve internal and external customers appropriately.

2.2.2 Importance of E-Commerce at BASF

With ever increasing market pressure, E-Commerce plays an important role within BASF's 2015 strategy. This viewpoint is confirmed by the overall target to manage 50% of BASF's turnover via E-Commerce by 2010 (internal paper, 2007). This internal paper also states that "the E-Commerce utilization rate is to be boosted wherever feasible".

BASF's objectives for E-Commerce can be clustered into three areas (internal paper, 2006): (1) top line growth (improve customer interfaces, offer new services, bridge across divisional boundaries), (2) margin improvement (rationalize internal processes, integrate ERP systems, and optimize procurement activities) and (3) increase customer satisfaction (develop horizontal strategies, serve small customers).

From the beginning, BASF had established a unit that was dedicated to E-Commerce. At that time, in 2001, this unit was assigned to BASF's IT department. However, with the increasing importance of E-Commerce this unit was set up separately from the IT business as BASF E-Solutions which also highlights BASF's dedication to E-Commerce.
Globally, the order entry value which was executed via E-Commerce in 2003 amounted to 3.7 billion Euros (internal paper, 2005). This value equated approximately 15% of BASF’s overall turnover during that year. In 2006 however this figure increased further to 30% of BASF’s overall turnover (internal paper, 2007). With this ratio BASF is also the leading chemical company in terms of E-Commerce.

In terms of the four pillars of BASF’s 2015 strategy, E-Commerce makes a strong contribution (internal paper, 2007). By streamlining order processes, the costs for communicating with customers have decreased. Sales have also been increased as new markets could be reached. Additionally, E-Marketing was introduced and cross selling initiatives have been established. Hence a premium on cost of capital (1/4) has been earned.

Furthermore, by introducing various E-Learning tools for employees the capabilities of BASF’s team improved and consequently the best team in the industry (2/4) has been established. By decreasing costs related to order processing, the customers also improved their cost position. Hence BASF helped its customers to be more successful (3/4). The sustainability (4/4) of the business development was also enhanced as process quality overall increases, reducing costs associated with mistakes occurring over a larger number of interfaces. The next section of this chapter will provide an overview of benchmarking at BASF.

2.3 Benchmarking at BASF

In defining the term benchmarking, BASF follows Robert Camp’s definition of 1989 (p 12): “Benchmarking is the search for industry best practices that lead to superior performance”. To further clarify this definition internally, BASF used the following words to share with its employees what benchmarking is not (internal paper, 2005): “(1) a concept for copying our competitor’s products, (2) a limited function or process, (3) a one time effort, (4) a method and (5) another of those management buzzwords that come and go”.
Additionally, the following fine-tuning of Camp’s definition at BASF is used (internal paper, 2005): “Benchmarking is (1) a concept for outpacing our competitors, (2) a general management responsibility, (3) a process of continuous improvement and (4) a management philosophy”. BASF has engaged significantly in benchmarking projects. The following section provides further insight into those activities.

2.3.1 Use of benchmarking at BASF

Ever since benchmarking has been introduced to the business world, BASF has applied it. BASF uses many different kinds of benchmarking (BASF Internet, 2008; internal paper 2007): (1) benchmarking of business units (e.g. coatings or fine chemicals), (2) benchmarking of business functions (e.g. logistics or production); (3) benchmarking of countries (e.g. Europe or South East Asia), (4) benchmarking of internal service functions (e.g. procurement or HR), (5) benchmarking of external selling functions (e.g. marketing or external logistics) and (6) cost to customer studies, where the whole value chain from incoming raw materials to invoice settlement is analysed.

One key example of BASF’s approach to benchmarking is the internal site benchmarking. In this case, all BASF production sites globally are benchmarked against each other with the following aims (internal paper 2007): “(1) to measure the actual performance, (2) to identify strengths and weaknesses, (3) to establish a track record for efficiency enhancements, (4) to plan further site development, (5) to establish an international exchange of ideas and best practices”.

Another good example is the external cost benchmarking. According to an internal paper (2005), “in all cases where we used this methodology, time and money spent paid off”. Additionally, BASF itself takes part in external benchmarking studies or purchases benchmarking figures from external service providers.
In an effort to maximize the benefits of benchmarking, BASF also uses external partners who help to generate necessary data. For example the German Benchmarking Centre, the Business Information Centre or public environmental records, consultants, investment bankers or other published checklists. The following section of this chapter highlights the importance of benchmarking at BASF.

2.3.2 Importance of benchmarking at BASF

In BASF's vision as "The Chemical Company" and for the fulfilment of the 2015 strategy, benchmarking plays a vital strategic part. As part of BASF's aim to be market, cost and technology leader, benchmarking is stipulated in the overall strategy (internal paper, 2005). When the use and spread of benchmarking increased at BASF, its importance also became more visible. Within BASF, benchmarks have multiple functions, for example: (1) personal and company target setting, (2) the identification of competitive gaps, (3) the monitoring of the performance of individuals and their respective units, (4) the clustering of customers. The following illustration shows BASF's approach "ambitious targets require ambitious benchmarks" (internal paper, 2003).

Illustration 7: Importance of benchmarking at BASF

![Diagram showing levels of achievement: Best of Basf, Best of Industry, Best of Best, Lateral benchmarking, External benchmarking, Internal benchmarking.]

Source: Developed for this thesis from an internal paper (2005)
Starting with internal benchmarking, it is intended to be "best of the best" whenever possible. Particularly, the customer satisfaction indexes that BASF conducts on a regular basis show how much benchmarking has become a day-to-day part of BASF's way of operating. Benchmarking also contributes to the fulfilment of the 2015 strategy.

Benchmarking contributes to top and bottom line figures by developing best practices to earn a premium on BASF's cost of capital. By introducing best practices, the quality and capability of BASF's employees is increasing. With better business practices and better capabilities, the quality of the product and service offer will increase and customers will become more successful. Furthermore, by implementing best practices, better teams as well as a better products and service offer, benchmarking contributes to sustainable development. The next section of this chapter will focus on E-Commerce benchmarking at BASF.

2.4 E-Commerce Benchmarking at BASF

This section will provide an overview of the use and importance of E-Commerce benchmarking at BASF. As E-Commerce benchmarking is an offspring of the original benchmarking term, there is no specific definition of E-Commerce benchmarking other than the benchmarking definition which originated from Camp (1989, p 12): "Benchmarking is the search for industry best practices that lead to superior performance".

2.4.1 Use of E-Commerce benchmarking at BASF

To benchmark its E-Commerce activities, BASF has engaged in different activities related to E-Commerce benchmarking (internal paper, 2006). BASF measures the E-Share, which represents the share of E-Commerce related turnover from the overall turnover. The E-Commerce top line adoption at BASF is slightly higher than the benchmark of the industry with approximately 39%. The industry benchmark according to this internal paper (2006) is 34%.
In terms of E-invoicing, BASF forecasts 50% of sent invoices and 90% of received invoices to be handled electronically, which is above the industry benchmarking of 45% and 70% respectively. On the supply side, electronic procurement processes are projected to grow to 50% by 2009.

BASF is also using internal comparisons within its own business units to compare the use of E-Commerce across its own departments and subsidiaries. It also compares its regions across the world with each other in this respect. Special attention is also paid to the number of order lines that are entered manually or automatically. Lastly, BASF compares the functions of E-Commerce portals and associates customer satisfaction indexes to them to make sure that expectations are met. The following table provides a deeper insight into the areas in which BASF performs E-Commerce benchmarking.

**Table 5: E-Commerce benchmarking types at BASF**

<table>
<thead>
<tr>
<th>Portals</th>
<th>Top line</th>
<th>Bottom line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionalities</td>
<td>Development of turnover per business unit</td>
<td>Costs per order</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>Development of order numbers per business unit</td>
<td>Costs of the system</td>
</tr>
<tr>
<td>Content</td>
<td>System availability</td>
<td>Number of order lines</td>
</tr>
</tbody>
</table>

Source: Developed from an internal paper (2007)

From the above table it becomes clear that BASF engages in E-Commerce benchmarking activities. As BASF is a large corporation which acts on a global scale, it is necessary to say that the extent to which it performs E-Commerce benchmarking relates to the amount of business the respective business unit conducts via E-Commerce. However, at this point there is no data available to prove this view. In terms of the importance of E-Commerce benchmarking, the 2015 strategy will again serve as a reference point.
2.4.2 Importance of E-Commerce benchmarking at BASF

By implementing best practices, both top and bottom line results can be enhanced and consequently a premium on cost of capital can be earned. Experiences of the applications of the various electronic portals are exchanged, allowing the BASF team to improve this particular service even further and during this process, the best team in the industry is achieved.

By providing ever improving E-Commerce solutions, customers and BASF have the opportunity to be even more successful. While E-Commerce benchmarking for example helps to reduce costs associated with poor quality of delivery, both the environment and the bottom line results of BASF and its customers are improved. Thus sustainable development is ensured.

The previous sections of this chapter outlined the terms E-Commerce, benchmarking and E-Commerce benchmarking at BASF. Furthermore, the utilization of each method at BASF has been highlighted and the importance of each subject was emphasized. The last section of this chapter will describe the implications of the use and importance of benchmarking, E-Commerce and E-Commerce benchmarking at BASF for this thesis.

2.5 Implications for this thesis

Benchmarking and E-Commerce separately are already an integral part of BASF’s day-to-day business. Over many years each tool has been developed into what it is today. On the contrary, E-Commerce benchmarking has had a comparatively short lifecycle. However, initial efforts show that the significance of this tool will increase at BASF. The research from the contextual part of this thesis has three important implications for this thesis. They are listed as follows:
Firstly, E-Commerce is a key feature of BASF's 2015 strategy and as such, a crucial growth area for BASF. Because of that, it seems reasonable to analyze E-Commerce benchmarking as a subject in this thesis. To achieve even better transparency of processes related to E-Commerce business, E-Commerce benchmarking could support finding best practices to avoid a demise of E-Commerce at BASF similar to that of the dotcoms.

Secondly, BASF intends to further grow its E-Commerce business. However, it seems as if the expansion of cyberspace business within BASF has not yet reached the desired level of 50% of the business being E-Commerce business. It needs to be determined how this can be achieved. Considering the results that have been achieved with traditional benchmarking in traditional businesses at BASF, it seems reasonable to conclude that E-Commerce benchmarking could have similar benefits on E-Commerce.

Thirdly, benchmarking traditional businesses seems to have spread across all business units at BASF. However, the concept of E-Commerce benchmarking has not yet been equally developed. Consequently, it is worthwhile to support the development of E-Commerce benchmarking with this thesis. BASF uses E-Commerce benchmarking mainly in the area of web-site functionalities and uses indicators that track the E-Commerce share within the overall business. Furthermore, order related indicators are measured. Considering the opportunities of benchmarking, it is crucial that this thesis also studies other application opportunities for E-Commerce benchmarking.

This chapter provided the reader with the contextual situation of this thesis. The next chapter of this thesis, the literature review, will examine two main bodies of theory, E-Commerce and benchmarking, as well as the research theory E-Commerce benchmarking. The purpose of this next chapter is to establish the theoretical foundation on which this thesis will be built.
3 Literature review

This chapter reviews the theories related to this thesis and discovers the research issues that were pursued. The literature review is divided into three parts. Two main bodies of theory and one subsequent research theory will be presented. They will be reviewed with the aim of collecting a sound body of knowledge on those topics. For this thesis "E-Commerce" and "benchmarking" represent the main bodies of theory while "E-Commerce benchmarking" represents the research theory. Illustration 8 shows how the research theory emerged from the main bodies of theory.

Illustration 8: Structure of chapter 3

In section 3.1 and section 3.2 of this chapter, existing literature on E-Commerce and benchmarking will be examined to determine if and how these two theories can be merged with each other. Each of them has been researched separately multiple times, but they have not yet been connected with each other thoroughly.
Furthermore, the two bodies of literature have reached different stages of evolution. While traditional benchmarking as a concept has matured significantly, E-Commerce is still at an early stage of its lifecycle. It will be of interest, therefore, to determine how those two main bodies of theory can be linked.

Consequently this chapter will proceed to combine the two main bodies of theory in section 3.3 to investigate how much exploration has been conducted on the research theory E-Commerce benchmarking. This chapter will conclude with an examination of the implications from the literature review for this thesis, including gaps emerging from the literature and related research questions (Cooper, 1984). The following section will review existing literature on the first main body of theory, E-Commerce.

3.1 First main body of literature: E-Commerce
The aim of this section is to provide solid knowledge of E-Commerce. This review is important as it develops an understanding of this topic to which benchmarking will later be connected to, as shown illustration 8. Without a detailed understanding of E-Commerce it will be very difficult to conduct a successful benchmarking study in this area. This section is divided into four parts as can be seen in illustration 9.
The expansion of the Internet enabled E-Commerce to emerge as a new business model. Hence, a discussion on the Internet will commence the literature review on E-Commerce. This will be followed by E-Commerce basics, including a definition of the term E-Commerce, research on Business-to-Business E-Commerce and information on transaction costs. A description of the impact that E-Commerce has made onto the business world will indicate important areas for future benchmarking activities. An analysis of success factors and benefits will conclude this section of chapter 3. The suggested topics are important as they may support the selection of the right E-Commerce benchmarking features. The next section of this chapter will explain the origin of E-Commerce and will show how E-Commerce itself evolved.
3.1.1 E-Commerce: Origin and evolution

The Internet is key to the application of E-Commerce. Hence, any discussion on the origin of E-Commerce needs to start with a discussion of the Internet itself. The Internet is a collection of computer networks which connects computers all over the world (Kambil, 1995). It provides an inexpensive means for reaching customers (Burke, 1997). The Internet is a pull medium in which consumers usually extract the information they need (Foley et al, 1998). According to Simeon (1999), the Internet has been the fastest ever growing medium even compared to other communication systems such as telephone or television. Manner-Romberg et al (2000) emphasize this viewpoint by stating that no former technology penetrated the market as fast as the Internet has.

Today, the Internet is a widely accepted business tool (Cotter, 2002). Companies are investing very high resources into online marketing while consumer use of the Internet is increasing accordingly (O'Cass and Fenech, 2003). The following data on the expected development of E-Commerce turnover in Europe exemplify the acceptance of E-Commerce in business (Simon Kucher & Partners, 2001).

Illustration 10: E-Commerce turnover in Europe by 2007

<table>
<thead>
<tr>
<th>Year</th>
<th>E-Commerce turnover development in Europe (in bn €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td></td>
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<tr>
<td>2003</td>
<td></td>
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<tr>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
</tr>
</tbody>
</table>
However, the opinion of researchers on Internet opportunities is divided. For one school of thought (e.g. Hoffmann et al, 1996) the Internet is a phenomenal marketing opportunity, for the other school of thought (e.g. Lehmann, 1997) it is simply another communication improvement. Nevertheless, those in the latter school of thought are, at best, a minority compared to those scholars who see the exceptional opportunities that accompany the Internet. Cairnoss (2000) for example, believes that the Internet is not a new way to communicate, but a market place, an information system and a tool to manufacture goods and services.

There are other researchers though who emphasize the importance of information and communication in connection to the Internet. According to Bettis et al (1995), the changes that come along with the Internet affect the ways in which the exchange of information can be achieved beyond what has been envisioned years ago. The source for growth of E-Commerce markets is the development of modern information- and telecommunication-technology (Schmid, 2000). Hence it can be expected that availability of information is also a key part of E-Commerce benchmarking.

The evolution of E-Commerce started in 1995 when marketers began to promote and sell goods as well as services online (Freemann, 1997). Electronic Data Interchange (EDI) can be considered the origin of E-Commerce (Senn, 1996). The impact of the transformation from terrestrial business to cyberspace business has been examined in the literature since the beginning of the 1970s (e.g. Bell, 1973; Toffler, 1980; Salvaggio, 1989; Negroponte, 1995), but earlier scholars had difficulties with describing the full scope of this new era (Toffler, 1980). Hasan and Tibbits (2000) mention a first wave and a second wave of E-Commerce applications. The focus of the first wave of E-Commerce was to conduct business electronically. The focus of the second wave of E-Commerce was to change business on the Internet.
Table 6 summarizes how E-Commerce progressed over time from an exchange of information platform to a medium through which business partners could engage with each other across the value chain. As can be seen in the below table, E-Commerce evolved in four phases (Morgan Stanley Dean Witter, 2000). It also highlights how each system features regarding flexibility, costs, process and transparency.

**Table 6: Evolution phases of E-Commerce**

<table>
<thead>
<tr>
<th>Phase / feature</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electronic data interchange (EDI)</td>
<td>Basic E-Commerce</td>
<td>Community E-Commerce</td>
<td>Collaborative Commerce</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Costs</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Process</td>
<td>Batch orders</td>
<td>Catalogue orders</td>
<td>Auctions</td>
<td>B2B interactions</td>
</tr>
<tr>
<td>Transparency</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: Developed from Morgan Stanley Dean Witter (2000)

Another way of looking at the evolution of E-Commerce is presented by Fischer (2001) who believes that electronic markets are the final stage of an evolution of four generations of electronic applications: (1) web-sites: customer self service, online branding, (2) E-Commerce: E-Shops, individual interaction, (3) E-Business: integrated products and services, customer relationship management and (4) E-Markets: B2B exchanges, B2C portals.

From both point of views it can be concluded that the degree of complexity as well as the transparency and flexibility increased over time while the running costs for the system decreased. But even though there is a lot of information available on the various phases that E-Commerce went through, including related features, there seems to be little, if any, information on how the success of the different E-Commerce applications has been measured. This thesis intends to shed light on this specific matter.
During the previous section of this chapter the origin and the evolution of E-Commerce were outlined. The Internet has provided E-Commerce with the technical opportunity to evolve from a simple information exchange platform to a system by which business partners can interact with each other across all parts of the value chain. The next section of this chapter will provide an insight into the definition of the term E-Commerce. Furthermore, it will investigate a particular type of E-Commerce and discuss transaction costs.

3.1.2 E-Commerce: Basics

According to Wamser (2000), there is a need for a general definition of E-Commerce as there is not yet one. E-Commerce seems to have different meanings for different people (Wilder et al, 1997). Wigand (1997) further adds that the term is not well understood and frequently used to denote different meanings. Moreover, the term E-Commerce has been overused in research and in business (Hermanns et al, 1999). The following section of this chapter will provide a selection of existing definitions for the term E-Commerce and conclude with a working definition for this thesis.

3.1.2.1 Definition of the term

Defining E-Commerce is not as simple as it seems. The definition is continuously changing to include greater parts of the economy while the influence of electronic communication increases (Whinston et al, 1997). Consequently, there is a need to decide on a working definition of E-Commerce for this thesis. The following table provides an overview of past and current definitions of E-Commerce.
Table 7: Quotations on E-Commerce definitions

<table>
<thead>
<tr>
<th>Quotation</th>
<th>Key feature</th>
<th>Author</th>
<th>Page</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>“E-Commerce is the sharing of business information, maintaining business</td>
<td>Network</td>
<td>Zwass</td>
<td>3</td>
<td>1996</td>
</tr>
<tr>
<td>relationship, and conducting business transactions by means of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>telecommunications networks&quot;.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“The buying and selling of information, products and services via computer</td>
<td>Network</td>
<td>Kalakota and</td>
<td>3</td>
<td>1996</td>
</tr>
<tr>
<td>networks&quot;.</td>
<td></td>
<td>Whinston</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“E-Commerce is the use of internetworked computers to create and transform</td>
<td>Network</td>
<td>CommerceNet</td>
<td>Not</td>
<td>1998</td>
</tr>
<tr>
<td>business relationships&quot;.</td>
<td></td>
<td></td>
<td>applicable</td>
<td></td>
</tr>
<tr>
<td>“Electronic Commerce can be simply described as doing business electronically&quot;.</td>
<td>Electronics</td>
<td>E-Centre UK</td>
<td>Not</td>
<td>2000</td>
</tr>
<tr>
<td>“E-Commerce is the process of conducting business electronically among</td>
<td>Conducting</td>
<td>Gunasekaran et al</td>
<td>186</td>
<td>2002</td>
</tr>
<tr>
<td>various entities in order to satisfy an organizational or individual</td>
<td>business</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>objective“.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“The electronic conduct of at least the initiation and agreement phase of</td>
<td>Conducting</td>
<td>Delfman et al</td>
<td>208</td>
<td>2002</td>
</tr>
<tr>
<td>an economic transaction via electronic networks that allow the automated</td>
<td>business</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>processing of transaction data”.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“The use of computing and communication technologies to engage in a wide</td>
<td>Engage in</td>
<td>Chang et al</td>
<td>664</td>
<td>2003</td>
</tr>
<tr>
<td>range of activities up and down the value-added chain, both within and</td>
<td>activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outside the organization”.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“E-commerce applications support and execute business processes for various</td>
<td>Business</td>
<td>Zou et al</td>
<td>837</td>
<td>2007</td>
</tr>
<tr>
<td>business domains such as call centres and online retail stores&quot;.</td>
<td>processes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

As can be seen from the above table, the main features of the E-Commerce definition have changed over time. Whereas in the beginning, the focus of E-Commerce was on networking and executing business electronically, E-Commerce later evolved into conducting business and executing business processes.
Hasan and Tibbitz (2000, p 441) point out that “E-Commerce is the subject of research in many disciplines and is such a rapidly growing field of study that a universally accepted definition is difficult”. It usually excludes applications which are not strictly commercial such as administration or communication (Greenstein and Feinmann, 2000; Laudon and Laudon, 2002). On the contrary, Yeak (1997) explains that the definition of E-Commerce should not be limited to buying and selling, but enhanced to social and intellectual interchange also.

As this thesis is conducted in the environment of a company that sells to other companies and not to individuals, the working definition of E-Commerce for this thesis should incorporate this point. From the above selection the definition of Kalakota and Whinston (1996, p 3) offers the best fit in this regard. Hence, for this thesis, E-Commerce is defined as:

“The buying and selling of information, products and services via computer networks”

E-Commerce occurs in different types, depending on the kinds of parties which are involved in the interaction. One distinct type of E-Commerce is Business to Business E-Commerce. This topic will be explained in the following section.

3.1.2.2 Business to Business E-Commerce

E-Commerce is an umbrella which covers different forms of electronic trading (Greek, 1998). There are six subcategories of E-Commerce (Ahmed et al, 2006): (1) Business to Business (B2B), (2) Business to Consumer (B2C), (3) Government to Consumer (G2C), (4) Government to Business (G2B), (5) Government to Government (G2G) and (6) Consumer to Consumer (C2C). These subcategories highlight the different parties that can potentially engage in E-Commerce activities with each other.
However, scholars usually embrace only three kinds of E-Commerce (Kalakota et al, 1996; Kalakota and Whinston, 1997; CommerceNet, 1998; Mougayar, 1998): (1) business between companies (Business to Business / B2B), (2) business between companies and consumers (Business to Consumer / B2C) and (3) business within an organisation (intra-organisational E-Commerce). As this thesis is undertaken in the environment of a business corporation, the focus of this thesis will be on B2B E-Commerce. Hence, this section will specifically feature B2B E-Commerce. To achieve greater clarity on this subject, B2B E-Commerce will also be differentiated from B2C E-Commerce.

B2B E-Commerce represents the business between companies (Hildebrand, 2000). Due to perceived price pressure, many sellers have avoided B2B E-commerce (Baumgartner et al, 2001). However, sales between companies are by far the most intense segments in E-Commerce (Ott, 1999). McKinsey (2000) estimates that the share of B2B E-Commerce of the total E-Commerce revenue is approximately 90%. B2B E-Commerce occurs in three main types: (1) E-procurement, (2) E-bidding / auctions and (3) portals.

So far, E-marketplaces have focused mainly on E-Procurement (Agrawal et al, 2001). According to Claussen (2000), E-Procurement is a segment of B2B E-Commerce for which experts forecast great potential. In addition to catalogue buying, E-Procurement includes other features such as E-Sourcing tools which simplify order requests for suppliers. One additional target is to increase the comparability of offers.

E-Bidding or reverse auctions enhance the level of activity between suppliers and existing or potential customers. This kind of online bidding greatly improves price transparency. For many companies, therefore, reverse auctions represent the worst side of E-Commerce because suppliers with the lowest bid are awarded the order (Lehmann Brothers, 2000).
Larson (1999) describes three kinds of auction sites: (1) commodities, (2) independent and (3) private auction sites. On the contrary, portals contain sites that refer users to other sites (Larson, 1999). An example is Elemica which BASF also uses.

EDI is defined as a computer-to-computer exchange of standard business documents (Senn, 1996). Since the beginning of the seventies many bigger companies have practised EDI, a very efficient kind of E-Commerce (Ott, 1999). The following differentiation between B2C and B2B E-Commerce will lead to an even better understanding of the term E-Commerce itself. According to Rohrbach (1999) and Morgan Stanley Dean Witter (2000) this can be achieved with the features shown in table 8.

<table>
<thead>
<tr>
<th>Type / feature</th>
<th>B2B E-Commerce</th>
<th>B2C E-Commerce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order size</td>
<td>75,000 $</td>
<td>75 $</td>
</tr>
<tr>
<td>Pricing</td>
<td>Negotiated, contracts</td>
<td>Fixed, catalogue</td>
</tr>
<tr>
<td>Character of relation</td>
<td>Prices depend on volume</td>
<td>Low complexity, fixed prices</td>
</tr>
<tr>
<td>Participants</td>
<td>Multiple companies</td>
<td>Single customers</td>
</tr>
<tr>
<td>Logic of transaction</td>
<td>Tailor-made solutions</td>
<td>Print out for order confirmation</td>
</tr>
<tr>
<td>Strategical focus</td>
<td>Decreased transaction costs</td>
<td>Deleting intermediaries</td>
</tr>
<tr>
<td>Customer benefit</td>
<td>Just in time delivery</td>
<td>Price transparency, 24hr ordering</td>
</tr>
</tbody>
</table>

The above features also give an indication of the level of complexity and the degree of sophistication for both types of E-Commerce. B2B E-Commerce is surely the more advanced system. However, most probably the differentiation between B2C E-Commerce and B2C E-Commerce will be obsolete in a few years. It does not make sense to differentiate between large and small customers in a market where distributors are fast disappearing from the value chain (Ott, 1999). A possible industry, in which B2B E-Commerce and B2C E-Commerce could merge into one, is the PC industry because large and small customers receive the same type of computer components.
This section of chapter 3 has described the term B2B E-Commerce, the most popular type of E-Commerce. It has utilised features of B2C E-Commerce to fine-tune the definition of B2B E-Commerce itself too. One additional term which is closely linked to E-Commerce is transaction costs. This area may be an interesting feature of E-Commerce benchmarking. Hence a more detailed explanation will be given in the following section.

3.1.2.3 Transaction costs

For transaction costs to occur, at least two agents must be willing to engage in a transaction (Schmid, 2000). For B2B E-Commerce, transactions happen in the process of executing an agreement between two companies. According to Schmid (1993 and 1998), transactions run through four phases: (1) information exchange, (2) target definition, (3) agreement and (4) processing of the agreement. Table 9 describes the activities executed in each phase and indicates the level of support which is necessary for each of them.

Table 9: Phase description of market transactions

<table>
<thead>
<tr>
<th>Feature / phase</th>
<th>Description</th>
<th>Support levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Exchange of products, prices, conditions and legal questions between the agents.</td>
<td>High</td>
</tr>
<tr>
<td>Intention</td>
<td>During this phase the agents build up specific exchange intentions.</td>
<td>Medium</td>
</tr>
<tr>
<td>Agreement</td>
<td>Now the negotiation takes place and if successful a contract follows.</td>
<td>Medium</td>
</tr>
<tr>
<td>Processing</td>
<td>Here the contract will be fulfilled as the agreed performance is being implemented.</td>
<td>Low</td>
</tr>
</tbody>
</table>

Transactions have associated costs, the so-called “transaction costs”. Transaction costs are those costs that occur during the purchase or sale of a product or service (Kambil, 1995). Three different kinds of transaction costs have been identified (Wamser, 2000): (1) supply-side costs (costs for the supplier), (2) demand-side costs (costs associated with the customer) and (3) product related costs (e.g. production costs). More specifically, Wigand (1997) mentions: (1) search costs, (2) contracting costs, (3) monitoring costs and (4) adaptation costs. Those categories are confirmed by Downes et al (1998) who also add implementation costs as a category for transaction costs. Additionally, transaction costs that are linked to the investment to make transactions possible have to be differentiated from costs that occur during transactions (Schmid, 2000).

Today, transaction costs represent a substantial part of the price the customer has to pay for a product (Schmid, 1999). Schmid believes that E-Commerce can significantly decrease transaction costs. Once markets are executed electronically, transaction costs can be decreased dramatically (Malone et al, 1987; Berryman et al, 1998). This is further emphasized by Wigand (1997), who points out that companies significantly decrease transaction costs by using E-Commerce. As transaction costs seem to play quite an important role for E-Commerce, it will be crucial to benchmark factors associated with the transaction of goods or services. In particular, the high support levels during the information gathering phase of a transaction can be quite costly.

The previous section of this chapter provided a working definition of E-Commerce. It continued with an elaboration of E-Commerce types, in particular B2B E-Commerce, which represents the most popular kind of E-Commerce. One of the key terms associated with E-Commerce are transaction costs. Consequently, the term itself and its features, along with a discussion on the phases of transactions, concluded the discussion. The next section will show how E-Commerce has impacted onto the business world.
3.1.3 E-Commerce: Its impact onto the business world

The importance of E-Commerce for the business world has been underlined by scholars multiple times. For example, Ahmed et al (2006, p 68) state: "the expansion of E-Commerce has led to redefining almost all aspects of businesses". According to Tapscott (1995), the business world has changed from an industrial economy based on assets to a new economy based on computers and networks. One relevant quotation refers to Lowes (2000, p 46).

"E-Commerce will be more than just a streamlining of established exploration and production, it has the potential to change fundamentally the structure of the industry and the business models adopted by the industry".

Moreover, it is certain that over the past two decades business has changed dramatically in response to powerful forces that increased globalisation (PriceWaterhouseCoopers, 2000). Hence, at the beginning of the 21st century, the strategic and operative management in nearly all businesses had to cope with these big challenges (Wamser, 2000). Furthermore, the importance of E-Commerce for companies is quite significant. Van der Merve and Bekker support this viewpoint with the following statement (2003, p 330):

"The Internet and E-Commerce have become extremely important avenues for firms in many industries to interact with their customers and other stakeholders".

The level of importance of E-Commerce, however, differs between industries. While some industries found it easier to capitalize on E-Commerce opportunities (e.g. media), others are still attempting to catch up (e.g. cars). The following illustration shows an industry comparison of the use of E-Commerce by German businesses (anonymous, 2000).
From the above illustration it becomes obvious that the chemical industry belongs to those industries that display a below average E-Business quotient. PriceWaterhouseCoopers (2000) confirm that the significance of E-Commerce differs from one industry to another. According to their source, 53% of customers stated that E-Commerce had only had a modest impact on their companies. Furthermore, some companies have applied E-Commerce because of a request from their customers and not because they wanted to (Power and Amrik, 2002).

Moreover, 39% of the companies that run E-Commerce businesses cannot even assess the success of their own E-Commerce activities (Arthur D. Little, 2000). This may be one of the reasons for the relatively low penetration rate of E-Commerce in the chemical industry. This lack of quantifiable success proves that there may be a need for performance measures supported by E-Commerce benchmarking.

Nevertheless, it cannot be argued that E-Commerce made no impact on businesses. According to existing research, popular areas of E-Commerce impact are: (1) value-chains, (2) pricing and (3) customer expectations. Those three areas will now be discussed in more detail.
3.1.3.1 Impact on value-chains

E-Commerce provides the opportunity to optimize business processes in a company (Schmid, 1997). Processes will be simplified and linked to suppliers and customers (Sauter, 2000). Traditional value chains and business processes lose their importance and others get created because principally, all functions can benefit from E-Commerce (Sauter, 2000). According to Nenninger et al (1999), E-Commerce delivers potential savings on transaction costs in any kind of automation of information processing. There is enormous potential to streamline inter-company processes, eliminate redundancies and manual procedures, co-ordinate logistics, and intelligently plan for changing market conditions (Morgan Stanley Dean Witter, 2000).

The development of new and innovative supply chain business models is driving the growth of the chemical digital economy (CheMatch, 2000). However, it is one matter to take an order, but it is quite another to offer the customer accurate delivery dates and continuous product availability. Hence, co-ordination of multiple order line items to minimize shipping costs and real-time shipping status is a key challenge and opportunity at the same time (Morgan Stanley Dean Witter, 2000). Furthermore, the penetration of E-Commerce applications into the value chain can still be further enhanced. As Power and Amrik (2002, p 191) point out: "Despite the apparent opportunities, the adoption of technology to enable the more efficient management of supply chains has been slow".

In addition, due to the fragmentation of the chain of commerce, the fulfilment process has two costly blind spots (Morgan Stanley Dean Witter, 2000): (1) the demand chain and (2) the supply chain where manufacturers cannot tell what need, inventory and manufacturing capacity is available. Those key performance indicators might also be included in a related E-Commerce benchmarking study. E-Commerce benchmarking may be an appropriate tool to transfer best practices across all functions. Only then can savings in transaction costs be achieved (McKinsey, 2000).
Following this further, the impact of E-Commerce on supply chains also affects other parts in the value chain such as segmentation, price erosion, legal challenges, user trust, general efficiency gains or pricing. From those subjects, the impact of E-Commerce on the pricing of a company will now be discussed.

3.1.3.2 Impact on pricing

The impact of E-Commerce on prices is one of the vital questions for companies that go online because price changes can influence businesses on a large scale. Most scholars believe that prices will drop as a consequence, but others see chances for price increases as well. According to Kerrigan (2001), B2B E-Commerce generates lower prices for buyers. However, McKinsey (2000) believes that the degree of price transparency depends on the sales channel and does not necessarily result in price erosion.

The biggest price deterioration will happen during E-Auctions, whereas E-Storefronts and E-Customer integration will maintain their price levels (McKinsey, 2000). Morgan Stanley Dean Witter (2000) believes that prices will become more predictable but not necessarily move downwards. Pursuing this further, if companies successfully differentiate, price comparisons will be more difficult and hence price levels can be maintained (Strauss et al, 1999). On the contrary Hermanns et al (1994) state that differentiated pricing and condition strategies are significantly limited by the Internet.

The Internet does, however, offer opportunities for differentiating prices and selling standard products at low prices, while new products are sold significantly above cost (Skiera, 2000). Wamser (2000) adds that the new technology opens new product cycles and hence the opportunity for differentiation. Price volatility itself will also increase because of greater pricing transparency, but the amplitude of the price changes will decrease (ChemConnect, 1999).
Regarding price volatility, Lehmann Brothers (2000) state that volatilities will increase short term as a reflection of changes in the demand/supply situation, but they will decrease on a long term basis across the cycle. The pricing of products is also linked with customer expectations in an E-Commerce environment. Those customer expectations will be discussed in the next section.

3.1.3.3 Impact on customer expectations

According to Mishina (1998) and Pyne (2000) E-Commerce is reshaping customers' expectations. Hamel et al (1998, p 83) also believe that the web will "fundamentally change customers' expectations about convenience, speed, comparability, price and service". However, Bovet et al (2000, p 32) are of the opinion, that so far "most shoppers now find that E-Commerce is unable to meet their expectations". Ordered items arrive late or not at all or possibly not always be the correct items. In 2001, McNamee explained that each E-Commerce sale creates a customer expectation that orders will be coped with exactly as they would have been coped with in terrestrial business. Feare (2001) believes that a sharp focus on customer expectations is certainly a key for success in E-commerce. Generally speaking, customers are going to expect companies to at least provide some sort of web-site even if it is only for providing information (Yeack, 1997). Since the introduction of E-Commerce, customer expectations increased (anonymous, 2000a).

Bradley (2001) is one scholar who comments more specifically on the impact of E-Commerce on customers' expectations. For him, E-Commerce increases expectations in the following areas: (1) greater all time access to information, (2) bigger convenience and choice, (3) speed, flexibility and reliability of service as well as (4) mass customisation. Mishina (1998a) and Krauss (1998) support this viewpoint and believe that the Internet is enhancing product and service expectations in general.
According to Yeack (1997), E-commerce customers want the power to order 24 hours a day and in response, companies have to provide something of value (e.g. order tracking after office hours). However, immediate customer satisfaction is not only confined to the E-Commerce world, but to businesses and customers in general (Feare, 2001). Hence, it might be questioned whether or not there is a difference in customer expectations in terrestrial business compared with cyberspace business.

The rise of client expectations over time is also emphasized by Cheng (1999), who believes that while the initial excitement of E-commerce kept customers happy at the beginning, this is no longer enough. Hence it seems reasonable to conclude that E-Commerce did increase the level of customer expectations. Benchmarking in this instance can be used to establish the indicators of customer satisfaction (Cavallo et al, 1989).

Some other matters related to the impact of E-Commerce have not been featured so far in this section as they were not mentioned as regularly in existing literature. To those topics belong the impact of E-Commerce on (1) company strategies, (2) human resources, (3) value chains, (4) organizational matters and legal topics. All those issues have also been affected quite intensely by the introduction of E-Commerce.

This section of chapter 3 has aimed at providing an overview of the impact of E-Commerce onto the business world. It has highlighted three areas which are frequently featured in the literature: (1) value chains, (2) pricing and (3) customer expectations. E-Commerce offers opportunities for simplifying value chains. While the impact of E-Commerce on pricing did seem to be assessed differently by researchers, there was a common agreement that the implementation of E-Commerce does increase customer expectations. Consequently, it can be assumed that customer expectations need to be included in an E-Commerce benchmarking system. The next section will focus on key features of E-Commerce.
3.1.4 E-Commerce: Key features

Key features have been chosen as subjects in this thesis because they may
highlight focus areas and indicators for an E-Commerce benchmarking system.
The next section will introduce five success factors for the implementation of E-
Commerce. At the end of the next section, a table summarizing the success
factors will be provided. The second part of this section will refer to four
benefits that are usually associated with B2B E-Commerce.

3.1.4.1 Success factors

According to Rißmann et al (1999) the same success factors that apply to a
traditional business, also apply to E-Commerce. PriceWaterhouseCoopers
(2000) believes that companies which view E-Commerce merely as a
technology solution or a marketing initiative cannot hope to realize its full
potential. Hence PriceWaterhouseCoopers and Stiphout (2001) mention re-
engineering of internal processes (1/5) as a precondition for successful E-
Commerce implementation.

From a technology point of view, successful companies have redesigned their
business processes by integrating their partners, suppliers and customers in all
production-levels and service-levels (Priess et al, 1999). They also established
an extended supply chain management and started co-operating with internal
and external interfaces on scheduling level already (Gormley et al, 1998).
Kanter (2001) confirms that it is first of all important to rework all business
processes.

Müller et al (2000) believe that a schedule has to be established on how the
different interfaces can be run more efficiently by the use of the Internet. Kanter
(2001) furthermore indicates clear responsibilities, sound processes behind the
web-site, a solid investment plan and employee training as key success factors.
Hence, despite all enthusiasm for E-Commerce, the analysis of business
processes is vital in E-Commerce (Basinski, 2001).
According to Schwänzel (2000) the most critical part of E-Commerce are the logistics (2/5). Currently, even large customers who generally believe in the benefits of E-Commerce are not satisfied with its implementation (Asche, 2000). As an example, the Internet food delivery service company Peapod could neither handle the inbound- nor the outbound-logistics and because of that its shares lost more than half of its value (Müller et al, 2000). The importance of logistics is also emphasized by Arthur D. Little’s (2000) survey within the chemical industry in which the importance of co-operating with logistics companies was ranked highest among the participants.

Thus, it is not sensible to build up an Internet portal if the logistics cannot cope with the new technology (Rickens, 2000). Therefore it is crucial not to forget the logistic costs. If the logistic costs of the business are higher than the price can ever be, the business is unlikely to be successful (Simon Kucher & Partners, 2001).

Furthermore successful companies offer simplicity of their web-site (3/5). They provide easy to understand price structures, make access and ordering for repeat customers very convenient, make critical information available and offer customers the optional facility to give their credit card number over the phone (Kadison et al, 1998). Through a special customer profile gathered via E-Commerce, it is possible to send special offers to clients (Priess et al, 1999).

Successful companies aim to achieve a very high visitor/buyer quote on their web-site. This can be achieved with a strong customer relation concept and a high degree of service (Priess et al, 1999). Leading Internet traders have up to 700,000 visitors per month on their web-site, but only up to 5% of them decide to place an order (Rißmann et al, 1999). Additionally, speed is crucial (Schneider, 1999). Customers will move to suppliers, offering channels that suit them best (Anderson Consulting, 2000). Hence, it is crucial to be first on the market with interfaces, ready to deal with clients.
Furthermore, E-Commerce can only be successful if there is somebody on Board level who supports (4/5) the project (Rickens, 2000). Today, in 63% of the companies, the responsibility for E-Commerce is in the hands of the Board, followed by 32% of companies, which delegated the responsibility to sales and marketing departments (Arthur D. Little, 2000). The picture is different in the chemical industry, where 40% of the companies run their E-Commerce mainly from sales and marketing, followed by 30% of the responsibility at Board level.

For Rickens (2000), the precondition for successful E-Commerce is the foundation of a company's own E-Commerce subsidiary to enable a business to cope with the speed of small start-up companies. Especially larger corporations find it difficult at times to connect to fast moving start-ups as the expectations and capabilities of those different types of entities might be too difficult to match.

The next success factor in this sequence is specifically related to this thesis. Lesjak and Vehovar (2005, p 422) highlight the view that:

"The majority of the companies believe that the lack of time for proper economic evaluation (5/5) is the greatest among the problems they face when implementing E-Commerce".

It can therefore be said that a sound economic evaluation increases the likelihood of successful implementation of E-Commerce projects. This economic evaluation could be supported by E-Commerce benchmarking.

The following table provides an overview of success factors which have been mentioned most often by different authors. Assuming that the implementation of these success factors will enhance the performance of E-Commerce applications, it will be very important to include those aspects within the E-Commerce benchmarking process.
Table 10: E-Commerce success factors

<table>
<thead>
<tr>
<th>Authors / success factors</th>
<th>Selection of authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic evaluation (5)</td>
<td>Lesjak and Vehovar (2005)</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

But even though the success factors for the implementation of E-Commerce applications seem to be obvious, “most organizations are still learning about E-Commerce and what is required for success” (McGaughey, 2002, p 482). Consequently, it can be assumed that the list of success factors is a living document which progresses in line with the progression of E-Commerce.

This section of chapter 3 described key success factors for the implementation of E-Commerce applications. Five success factors emerged from the literature review: (1) re-engineering of business processes, (2) logistics, (3) simplicity of the web-site, (4) Board level support and (5) economic evaluation. Those success factors are not ranked and consequently need to be seen as a package of topics that need to be executed well in order to turn an E-Commerce application into success.

While it is important that those key success factors are measured in an E-Commerce benchmarking system, the benefits of an E-Commerce system are of equal importance for the search of potential E-Commerce benchmarking areas. Hence, E-Commerce benefits will be described in the next section of this chapter. Four areas of benefits will be introduced.
3.1.4.2 Benefits

In B2B E-Commerce, companies achieve savings in terms of time and costs as well as in the expansion of their sales volumes (Forrester Research, 1997; PriceWaterhouseCoopers, 2000; Schwänzel, 2000). Besides that, suppliers use the Internet to network with other producers to manage inventories and capacity utilization (Morgan Stanley Dean Witter, 2000). Those four specific benefits are very popular within the research community and practitioners. Illustration 12 summarizes those benefits and allocates different terms to them. Those terms will be explained in the following paragraphs by referencing them to different scholars.

**Illustration 12: E-Commerce benefits**

<table>
<thead>
<tr>
<th>Costs (1)</th>
<th>Time (2)</th>
<th>Sales (3)</th>
<th>Network (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions</td>
<td>Orders</td>
<td>New customers</td>
<td>Co-operation</td>
</tr>
<tr>
<td>Production</td>
<td>Developments</td>
<td>New products</td>
<td>Differentiation</td>
</tr>
<tr>
<td>Storage</td>
<td>-</td>
<td>Market share</td>
<td>Profitability</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis from Sauter (2000)

The reduction of costs (1/4) is usually referred to first as a benefit of E-Commerce. Simon Kucher & Partners (2001) point out that the biggest E-Commerce potential is actually not the additional turnover or more customer benefit, but in lower transaction costs. The potential of a decrease in transaction costs is also pointed out by Rohrbach (1999) and Lehmann Brothers (2000) who state that E-Commerce achieves faster transactions and so, lower transaction costs. These cost cuts are realized by better information technology that allows more information to be transferred in a shorter time span (Malone et al, 1987). Furthermore, Chemconnect (1999) emphasizes that producers and distributors will move their smaller customers to web-based ordering systems, thus reducing costs for storage and production. Morgan Stanley Dean Witter (2000) adds that reduction of small orders, lower customer acquisition costs and convenient ordering are further E-Commerce benefits.
According to Claussen (2000), radical time savings (2/4), due to process optimisations and enormous material cost savings, are likely to be realised in the near future too. In addition, increases in delivery capability, reduction of stocks and material replacing times are also possible. Furthermore, higher sales (3/4) levels can be achieved because more customers can be approached with E-Commerce as a business model (McKinsey, 2000).

Additionally, Internet based exchanges enhance market liquidity and lower transaction costs by aggregating buyers and sellers in a single network (4/4) (Morgan Stanley Dean Witter, 2000). Schmid (2000) adds that, by enabling internal and external co-operation among all parties of the supply chain, the Internet allows companies to cut product costs by as much as 10 to 15% - a huge impact on profitability. This number could be proven within a benchmarking study. To do so, an E-Commerce benchmarking system needs to focus on measuring the intended benefits in order to track whether or not the investment in E-Commerce applications pays off.

Pallass (2000) looks at the above statements more critically. According to him, business via the Internet is nothing new. It is just another means for conducting business. Being cheaper and quicker is not a competitive edge for a long time. Alshawi et al (2003, p 416) further point out that:

"Although the last few years have witnessed phenomenal growth in web-based business activities, many studies show that benefits from the Internet use are considerably less than expected".

Pursuing this further, Power (2005, p 96) believes that:

"Although the vision (of E-Commerce) is seductive, evidence suggests that the reality of adoption and use even of long established technologies (such as EDI) for the management of supply chains falls short of expectations".
Porter (2001, p 36) reveals the underlying challenge and reasoning as to why the implementation of E-Commerce applications at times falls short of expectations:

"The great paradox of the Internet is that its very benefits – making information widely available, reducing the difficulty of purchasing, marketing and distribution, allowing buyers and sellers to find and transact business with one another more easily – also make it more difficult for companies to capture those benefits as profits".

Nevertheless, Morgan Stanley Dean Witter (2000) represents the school of thought that believes both buyers and suppliers will win because buyers get real time information on availability and suppliers can more intelligently plan production and reduce stocks. In addition to that, E-Commerce has the potential to significantly change business transactions and so can deeply initiate changes in society and business life (Hermanns et al, 1999). Overall, business via the Internet will not get easier, but faster and more information-intense (Wißmeier, 1999).

This part of chapter 3 related to E-Commerce. It was divided into four sections. The first section indicated the origin and evolution of E-Commerce. It was followed by a discussion on key terms including the term E-Commerce itself, B2B E-Commerce as the most popular E-Commerce type and transaction costs as one of the key topics related to E-Commerce. One further section was dedicated to assessing the impact of E-Commerce onto the business world. The supply chain, pricing and customer expectations are key issues that have evolved from this thesis. Lastly, five success factors and four benefits have been discussed. Most prominently, the redesign of business processes and cost savings respectively have been mentioned as success factors. Savings in costs and time featured as the most prominent benefits of E-Commerce. The focus of the next section of chapter 3 will be benchmarking, the second main body of literature in this thesis.
3.2 Second main body of literature: Benchmarking

"Throughout the literature, E-Commerce has often been studied from the technical, organizational, managerial or legislative aspects, while there are fewer studies that deal with the economic aspects and with the corresponding evaluation" (Lesjak and Vehovar, 2005, p 409).

Hence the aim of this section is to provide an understanding of the literature related to benchmarking, based on which an E-Commerce benchmarking system could be established. The topics of this section include a definition of benchmarking, an overview of popular benchmarking types, processes and procedures as well as success factors and benefits. The discussions on success factors and benefits will indicate possible areas for E-Commerce benchmarking. Illustration 13 highlights the sequence of this section.

Illustration 13: Structure of section 2 of chapter 3

```
Chapter 3.2.1: Benchmarking: Origin and evolution
Chapter 3.2.2: Benchmarking: Basics
  Chapter 3.2.2.1: Definition of the term
  Chapter 3.2.2.2: Types
    Chapter 3.2.2.2.1: Objects: With whom to benchmark
    Chapter 3.2.2.2.2: Subjects: What to benchmark
  Chapter 3.2.2.3: Processes and procedures
Chapter 3.2.3: Benchmarking: Key features
  Chapter 3.2.3.1: Success factors
  Chapter 3.2.3.2: Benefits
```

Source: Developed for this thesis
The importance of the above sections is related to the set up of an E-Commerce benchmarking system. Without a thorough understanding of benchmarking in traditional businesses, possible options to do so in cyberspace business might be overlooked. Hence, this section of chapter 3 will also serve as a best practices section for potential E-Commerce benchmarking applications. The next section of this chapter deals with the origin and evolution of benchmarking.

3.2.1 Benchmarking: Origin and evolution

Benchmarking is not new (Schott, 1941; Krömke 1958). The Greek philosopher Aristotle benchmarked various currencies to the Athenian one in the 4th century BC (Murdoch, 1997). Records from the ancient Egyptians also point out the use of benchmarks in construction works to determine heights and distances (Codling, 1992). Bendell et al (1993) further mention medieval craftsmen who were responsible for maintaining standards in relation to quality during the medieval ages. Looking at Germany after the Second World War, the United States provided modern production methods to Germany which can be considered as benchmarking at that time (Rau, 1996). Henry Ford for example is also said to have invented his assembly line production after a visit to one of Chicago's slaughter houses that already separated working steps (Bogan et al, 1994).

Major exponents in the use of benchmarking as a technique to set challenging targets have been the databases of Profit Impact of Market Strategies (PIMS) that arose during the 1950s (Codling, 1992). Hence, benchmarking is a method that evolved from business practice (Weber et al, 1999). Xerox Corporation is said to be the benchmarking pioneer, starting benchmarking activities in the late 1970s as a reaction to growing competitive pressure from Japanese companies (Spendolini, 1992; Leibfried, 1993; Rau, 1996). Originally termed competitive benchmarking, Xerox found out that their manufacturing costs were too high compared to the costs of the Japanese (Cross et al, 1995).
However, other authors such as Watson (1993), Ohinata (1994) or Hague (1998) have argued that in fact the Japanese industry was the starting point of this concept and Xerox just copied it. This view is also supported by Bendell et al (1993) who state that Japanese business people visited many American production sites and transferred good practices and technologies into completely different business areas.

Generally speaking, since the early 1980s in particular, British and North American organizations have also become increasingly occupied with the implementation of benchmarking studies across their organizations (Brabazon and Brabazon, 2000). Nevertheless, Bendell et al (1993) think that, Xerox is recognised as the leader in the benchmarking field. In the US, companies do not currently get orders from the government without having implemented benchmarking (Serfling et al, 1997).

Camp (1992) and Horvath et al (1992) add that benchmarking so intensively turned Xerox's manufacturing operation around, that they adopted benchmarking as a corporate effort in 1981. Also Braue et al (1998) and Hanser (1994) present the school of thought that underlines Xerox's important role of developing benchmarking. According to Bendell et al (1993), the Japanese have turned benchmarking into a management tool and Xerox gave it a name.

Robert C. Camp, CEO of Xerox, issued one of the first important publications on benchmarking in 1989. This publication is also considered to be one of the main events that contributed to the spread of benchmarking in the business world (Spendolini, 1992). In addition to that, other corporations (e.g. BASF) use Camp's definition of the term benchmarking for internal purposes, which underlines the importance of this particular publication. Benchmarking, the tool formerly known as "Betriebsvergleich" (Gloger, 1999), consequently reached a renaissance with the American term of benchmarking.
Although benchmarking reached its peak in the US during the 1980s (Meyer, 1996), the benchmarking boom did not reach Germany before the beginning of the 1990s (Ulrich, 1998). At the time, this development was partly supported by translations of important American publications (Warbeck, 1998). While in the early 1990s, benchmarking was virtually unknown in Europe (Codling, 1992), with the inclusion of benchmarking into current management topics, such as TQM, benchmarking had a much wider spread by the end of the 1990s (Walgenbach et al, 2000; Weber et al, 1999).

Moreover the foundation of various benchmarking institutions, e.g. the International Benchmarking Clearinghouse (IBC), pushed this matter further. Its chairman, C. Jackson Grayson Junior, identifies three principal drivers for the benchmarking boom (Bendell et al, 1993): (1) global competition, (2) quality awards and (3) breakthrough improvements. The increase of publications and examples of benchmarking studies also reflects the expectations of top managers with regard to benchmarking (Jentner, 1998). The advances of the computer industry throughout the 1960s and 1970s also brought further development to the use of benchmarking, as the analysis of data became easier (Codling, 1992). Today, thanks to technological evolution in the 1990s, benchmarking is seamless and real-time because of the use of relational databases offered by service providers (Barnet, 2000).

One of the consequences of the start of mass production at the beginning of the 20th century was the need for more inspection and standards in the production process, that is, the birth of quality control (Bendell et al, 1993). Looking at the status of E-Commerce today, the two situations are similar. E-Commerce, even though not being entirely new, has not yet fully matured. Hence, a standard for implementation may help to speed up the maturing process of E-Commerce as well. According to Kreuz et al (1997) one can only be a successful manager in Germany if one practises benchmarking. Kreuz does not mention particular applications for benchmarking, but it is fair to assume that his statement is targeted at E-Commerce industries as well.
To summarize, it can be said that benchmarking evolved over time. From examining competitors' products it moved to including competitors' objectives and even leading companies in unrelated industries (Wiersema, 1998). To further continue the research, it is necessary to find out how the term benchmarking is defined.

3.2.2 Benchmarking: Basics

Dictionaries, researchers and companies have frequently defined the term benchmarking in the past. This section of chapter 3 will provide an overview of existing research on the meaning of benchmarking and from this overview decide on a working definition of benchmarking for this thesis. Afterwards, different types of benchmarking will be highlighted to enhance the understanding of the term itself. The different types of benchmarking are an important part of this thesis as they could indicate different E-Commerce benchmarking types. Furthermore, important processes and procedures related to benchmarking will be outlined.

3.2.2.1 Definition of the term

As lined out in the previous section, the term benchmarking has first been applied by Japanese managers that attempted to re-gain competitiveness by analyzing products from leading companies in certain industries. In Japanese the word “dantotsu” has been in use for a long time which means “the attempt to be the best”, or “striving to be best of the best” (Camp, 1989, p 3). Benchmarking was initially related to engineering activities to determine differences in heights of mountaintops (Krogh, 1992; Ulrich, 1998). The term benchmarking is therefore also used as a geographical or topological source (Ulrich, 1998; Rau, 1996). In regards to definitions of the word benchmarking, the most frequent researchers when considering the number of their citations in other textbooks, are Camp (1989), Spendolini (1992) and Codling (1992).
However, it seems as if there has not been much progress in terms of new definitions of benchmarking since those times. The below table gives further insight into different benchmarking definitions, including some more recent ones. Furthermore, some key features are indicated which will also be discussed in the following paragraphs.

**Table 11: Overview of definitions of benchmarking**

<table>
<thead>
<tr>
<th>Quotation</th>
<th>Key feature</th>
<th>Author</th>
<th>Page</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Benchmarking is the search for industry best practices that lead to superior performance&quot;.</td>
<td>Best practices</td>
<td>Camp</td>
<td>12</td>
<td>1989</td>
</tr>
<tr>
<td>&quot;An ongoing process of measuring and improving products, services and practices against the best that can be identified world-wide&quot;.</td>
<td>No one time effort</td>
<td>Codling</td>
<td>7</td>
<td>1992</td>
</tr>
<tr>
<td>&quot;Benchmarking is a continuous, systematic process for evaluating products, services and work-processes of organizations that are recognized as representing best practices for the purpose of organizational improvement&quot;.</td>
<td>Systematic</td>
<td>Spendolini</td>
<td>23</td>
<td>1992</td>
</tr>
<tr>
<td>&quot;Benchmarking is a tool that provides businesses with information that allows them to develop action plans to improve their processes&quot;.</td>
<td>Improvement</td>
<td>Hicks</td>
<td>12</td>
<td>2002</td>
</tr>
<tr>
<td>&quot;A process by which one measures and compares the performance of one entity against another&quot;.</td>
<td>Comparisons</td>
<td>Lapide</td>
<td>6</td>
<td>2002</td>
</tr>
<tr>
<td>&quot;A systematic process for investigating and comparing performance, allowing companies to look at and analyze key processes to enhance performance, add profit and eliminate waste and redundancy&quot;.</td>
<td>Systematic comparisons</td>
<td>Spencer and Shadrin</td>
<td>43</td>
<td>2002</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

As can be seen in the previous table, there has not been as much progress in the definition of the term benchmarking compared to the definition of the term E-Commerce. Best practices, improvement, comparisons and 'systematic' seem to be popular features with the above scholars. Consequently, it can be said the features of more recent definitions of benchmarking do not differ significantly from initial definitions.
Nevertheless, Spendolini's (1992) efforts in defining the term are particularly remarkable. After collecting forty-nine definitions of benchmarking, Spendolini developed a scheme that allows the creation of a benchmarking definition from the ones that already existed (Ulrich, 1998). Spendolini extracted nine clusters of words that should be included in such a definition and asked test groups to build up definitions by choosing words from these clusters. However, due to its versatility and because of Camp's (1989, p 12) definition being an ongoing reference point in the literature, his understanding of benchmarking will be considered as the working definition for this thesis:

"Benchmarking is the search for industry best practices to achieve top performances"

To highlight another important component of benchmarking which does not explicitly form part of Camp's (1989) definition, McGaughey's (2002) list of benchmarking features is utilised: (1) the benchmarking process is continuous, (2) performance must be measured, (3) different things can be benchmarked, (4) companies should compare themselves against world-class performance and (5) benchmarking is about learning. Particularly the learning aspect within benchmarking needs to be addressed in a benchmarking study. Otherwise, the best practices can not be transferred from current best in class companies to followers.

Codling is one of the scholars who address this matter as well. He states that "whatever it is that you decide you want or need to improve, you....learn from what they are doing to achieve that performance" (1992, p 3). Codling (1992, p 38) further points out that "one of the benefits....could be learning from such positive gaps how to improve their process still further". Mc Donald and Tanner (1998) belong to those scholars, who also consider learning a key element of a benchmarking effort.
Additionally, Zairi (1996) specifically highlights the learning aspect in benchmarking with the subtitle "continuous learning through sustainable innovation" of his book "Benchmarking for Best Practise". However, the content and focus of his work seems to be best practices, which are not a contradiction to learning, but here learning does not appear as explicitly as in Codling's work. In any case, learning "should be a continuous and frequent experience that is part of a person's work and not separate from it" (Bramham, 1997, p 69).

Hence, one of the reasons that learning does not appear as frequently like "top performance" or "exchange of best practices", might be that it is taken as given along the benchmarking process. For example, Zairi (1996a, p 1) believes that "it (benchmarking) instigates continuous learning and dismisses the myth of not invented here". According to Codling (1992, p 83) benchmarking helps to "speedily disseminate and transfer learning and best practices". Therefore, best practices and learning can be seen in one context, which might be one of the reasons why learning does not feature that prominently in various benchmarking definitions. As Watson (1993a, p 3) points out:

"Although benchmarking is a measurement process and results in comparative performance measures, it also describes how exceptional performance is attained".

In conclusion, despite the fact that none of the given benchmarking definitions seem to explicitly include the learning aspect of benchmarking, learning is certainly a key part of any benchmarking exercise. Therefore, learning via exchange of best practices needs to be part of an E-Commerce benchmarking guideline as well.
To better understand the meaning of benchmarking it is also useful to differentiate it from other management topics like process reengineering, market research or competitive analysis. According to Goldwasser (1995), benchmarking is complementary to business re-engineering as it provides a method of learning in which direction processes might develop. Hammer et al (1995) concur with that and mention that benchmarking can be the starting point for re-engineering processes. As the term benchmarking itself has been clarified, different types of benchmarking can be introduced.

3.2.2.2 Types
The list of benchmarking types displayed in the literature is quite long and related features depend very much on the author and their respective schools of thought. However, in principle, there are two distinct types of benchmarking: (1) benchmarking subjects (what to benchmark) and (2) benchmarking objects (with whom to benchmark). Nevertheless, those two distinctions are not always adhered to exactly. For example, Leibfried et al (1993) mention internal, competitive, branch and best in class benchmarking as their choice, which mixes up benchmarking subjects and benchmarking objects.

One of the first researchers who explicitly differentiated between types of benchmarking was Camp (1989). One of the scholars who also looked at benchmarking, both from a subject and object point of view, was Pettersen (1995). Consequently, benchmarking subjects and benchmarking objects will now be discussed separately. The following table provides an overview of the most popular benchmarking objects.
Table 12: Benchmarking objects

<table>
<thead>
<tr>
<th>Benchmarking objects</th>
<th>Author</th>
</tr>
</thead>
</table>

Source: Developed for this thesis

From the pure number of scholars allocated to each benchmarking object, it can be concluded that internal benchmarking and external benchmarking are the most significant types of benchmarking objects. Consequently four different benchmarking objects will now be discussed in greater detail.

3.2.2.2.1 Objects: With whom to benchmark

The most popular benchmarking objects are inside an organization. Hence, this type of benchmarking is called internal benchmarking (1/4). For Codling (1992, p 9) internal benchmarking needs to be seen as the “nursery for developing the approach”. Internal benchmarking is a way of introducing the benchmarking method to a company and a means of getting people used to this tool (Füser, 1999).

Camp (1989) is also of the opinion that a comparison of internal business units is key to establishing starting points for additional benchmarking exercises. Especially inexperienced companies usually start with internal benchmarking (anonymous, 1998). Furthermore, internal knowledge is most often under-utilised as companies are tempted to look outside (Smith, 1997). However, an internal focus allows quick implementation of the findings of the benchmarking study (Morwind, 1995).
In addition to that, internal benchmarking represents a first step to encourage change within an organisation (Karlöf et al., 1994). Internal benchmarking is also referred to as the easiest type of benchmarking because managers do not have to look outside their own company (Langner, 1994; Rau, 1996). In addition, Bendell et al. (1993, p 69) state that "this type of benchmarking is usually straightforward to arrange and fairly common". However, this view is not shared by Kühne (1995) who argues that even in internal benchmarking, comparable data can hardly be found, for example, due to different depreciation methods or different product mixes.

Camp (1989) adds that internal benchmarking also helps to build the basis for possible external benchmarking studies, but it is certainly not a replacement for external or functional benchmarking (Spendolini, 1992). Following this further, a company that wants to get the full benefit of benchmarking has to look outside its own business and conduct external benchmarking (Münzberg, 1995). Many companies progress from internal to external benchmarking (Codling, 1992).

In contrast to internal benchmarking, **external / competitive benchmarking** (2/4) seeks state of the art performances outside their own organisation (Spendolini, 1993; Camp, 1989). External benchmarking is about using the processes of the external benchmarking partner to increase their own performance or even set new up new processes (Rau 1996).

According to Spendolini (1992), competitive benchmarking involves the identification of the products, services, and work processes of direct competitors. In competitive benchmarking, a firm's performance is measured against that of best-in-class companies to determine how to achieve performance levels (Shetty, 1993). The move from internal to external benchmarking furthermore increases the understanding of the benchmarking process and its benefits (Beasley, 1995).
One of the difficulties of external benchmarking is that competitors hesitate to enter into a direct dialogue with each other (Codling, 1992; Spendolini, 1992). Bendell et al (1993) even state that it might be completely impossible to get a comprehensive overview as to how a direct competitor operates. This is also strongly argued by Harkleroad (1992, p 27) who states that "especially direct competitors are reluctant to enter into benchmarking agreements, or limit their benchmarking activities due to the time involved and the large number of requests received".

Additionally, Camp (1989) believes that, even more difficult than gaining comparability, is actually receiving information from competitors. To overcome these initial difficulties, the first step of external benchmarking is usually to set up a legal framework within which it is agreed that specific insights into the competitor's operation will be allowed (Codling, 1992). Furthermore, it is important to determine the targets of the study in order to create trust between the participants (Spendolini, 1992).

External benchmarking also provides the opportunity to position an organization in the market (Spendolini, 1992). As Spendolini points out, one advantage of external benchmarking is that competitors usually have a lot of processes in common. However, Pieske (1995) highlights this point as one of the difficulties of external benchmarking, stating that it is not easy to find a suitable benchmarking partner with a high degree of comparability of processes. Treadwell (1998) adds that open communication is hard to achieve in any case.

Nevertheless, no company is world-class in every part of its business. Both parties, therefore, have a strong reason to participate in benchmarking studies to gather ideas for improvements (Sänger, 1997). For Camp (1989), it is not necessary to concentrate on direct competitors alone, but also on companies that are world-class regardless of the branch. This can be achieved through functional benchmarking (3/4).
Functional benchmarking involves the identification of products, services and work processes of organisations that do not belong to direct competitors' companies (Spendolini, 1992; Töpfer et al, 1997). According to Tucker et al (1987) and Langner (1994), functional benchmarking with non-competitors has to be preferred, as external benchmarking with direct competitors does not enable companies to get ahead of competition.

In 1995, Beasley described "non-competitive" benchmarking as fashionable. Xerox can be highlighted as an example, as they have learned from sport clothing manufacturer L.L. Bean how to run logistics efficiently (Tucker et al, 1987; Camp, 1989). Especially for secondary activities, e.g. IT or HR, functional benchmarking makes sense as these activities are similar, regardless of an industry (Warbeck, 1998).

The word 'functional' is used because benchmarking at this level most often involves business activities within a given functional area such as manufacturing or order processing (Spendolini, 1992). Benchmarking firms from outside the industry identifies best practices and can incorporate technological advances that are not recognised in an industry. For example bar coding which originated in the grocery industry but has since been applied in many other industries (Shetty, 1993).

To determine best practices, comparisons between processes are conducted (Pieske, 1997). According to Camp (1989), this is the only way to find innovative methods that have not been invented in the same industry. Thus, functional benchmarking reveals the biggest savings potential and is considered as the most effective kind of benchmarking (Karlöf, 1994; Rau, 1996).
Generic benchmarking (4/4) goes one step further than functional benchmarking as it compares business processes which cut across various functions and different industries (Bendell et al, 1993). The differentiation between functional and generic benchmarking is difficult (Rau, 1996). This is possibly one of the reasons why most authors tend to consider functional and generic benchmarking as one (Spendolini, 1992; Pettersen, 1995).

According to Stausberg (2000) or Andersen (1999) generic benchmarking is a comparison that is conducted regardless of the branch with a focus on core-processes. Similarly, Vollmuth (1997) believes that generic benchmarking searches for best practices in all areas and all branches. In terms of the impact of generic benchmarking, Bendell et al (1993) point out that opportunities discovered by generic benchmarking are likely to be the most innovative and the ones to create quantum leaps. Best practices usually can be identified with either functional or generic benchmarking (anonymous, 1998).

This section of this chapter 3 gave an overview about four potential benchmarking objects. It became obvious that the number of benchmarking objects is quite large. Furthermore, it is reasonable to say that, regardless of the industry any benchmarking process should start with internal benchmarking as this lays the foundation for any other benchmarking study. Consequently, internal benchmarking also needs to be a key part of E-Commerce benchmarking. An overview of possible benchmarking subjects will now be provided.
3.2.2.2.2 Subjects: What to benchmark

Basically everything can be subjected to a benchmarking study (Pieske, 1997; Patterson, 1996 and Spendolini, 1992). Generally speaking, not even the most successful corporations are benchmarks for their industry or segment (Jentner, 1998). Hence benchmarking is also applicable for every company. Table 13 provides an overview of three popular benchmarking subjects. Afterwards each benchmarking subject will be discussed in more detail.

Table 13: Benchmarking subjects

<table>
<thead>
<tr>
<th>Benchmarking subjects</th>
<th>Author</th>
</tr>
</thead>
</table>

Source: Developed for this thesis

Mertins et al (1995) consider *process benchmarking* as benchmarking which examines processes for manufacturing goods or providing services. For Smith (1997), benchmarking must be process based to achieve the necessary clarity of the performance of a subject. Münzberg (1995) further argues that process benchmarking not only allows the identification of current gaps, but also provides the means to learn about possible future gaps concerning re-engineered processes.

Pettersen (1995) states that within process benchmarking it is attempted to find out why someone is better. He further explains that the best pay-off from a benchmarking project occurs when either focussing on processes or making comparisons with other companies. According to Stausberg (2000), process benchmarking is the type of benchmarking with the largest potential, as all branches are examined for best practices and thus, solutions can be gathered from all branches.
Pursuing this further, the focus of process benchmarking is the identification and implementation of superior business processes (Schmitz, 1998). Process benchmarking is also a means of assessing the achievement of objectives in terms of total quality management (Spendolini, 1992). The advantage of benchmarking which looks at processes rather than outputs is that many companies share a certain number of general processes that can possibly be benchmarked, e.g. purchasing (Codling, 1992). According to Bauer (1994), process benchmarking preconditions structured processes and appropriate data.

Another benchmarking subject is strategy. Börner (1999) explains strategic benchmarking (2/3) as being related to a company's position on the market or competitor's behaviour. For Andersen (1999, p 289), strategy benchmarking is a "comparison of strategic decisions and dispositions at a higher level". Strategy benchmarking is a tool to determine future core competencies (Stausberg, 2000). It examines specific business performance of leading industry participants and helps to evaluate different market strategies (Camp, 1989). According to Rau (1996), strategy benchmarking helps to identify value-generating forces within a branch or a selected group of companies. Andersen (1999) believes that this variant of benchmarking is a less frequent one, which might be the reason why only few scholars mention it. Watson (1993) is one of the few who does so. A more popular type of benchmarking is product benchmarking.

Mertins et al (1995) define product benchmarking (3/3) as benchmarking related to features of different products. An efficient method of benchmarking products is the so-called reverse engineering. This kind of benchmarking dismantles a company's own and a competitor's product into pieces to compare their features (Stausberg, 2000).
Further kinds of benchmarking subjects are costs (Rau, 1996; Markin, 1992), methods (Mertins et al, 1995) or performance (Andersen, 1999). Braue et al (1997) also introduce open and hidden benchmarking, depending on whether the benchmarking partners are in direct contact or not. As mentioned earlier, basically everything can be benchmarked (Beasley, 1995). It is consequently not attempted to outline every possible benchmarking subject, but rather provide an overview of what has mainly been benchmarked in the past.

In principle, each type of the benchmarking subject and each type of benchmarking object can be combined into a benchmarking study, but some types will be more relevant than others, e.g. an internal strategy benchmarking would be rather meaningless (Andersen, 1999). It needs to be stated though, that the opportunities for combining benchmarking objects and benchmarking subjects depend very much on the company itself.

Larger companies (e.g. BASF SE) have plenty of opportunities for meaningful internal benchmarking due to the large number of different business units. Illustration 14 shows possible combinations of benchmarking objects and subjects and their suitability to each other (Hague, 1998).

**Illustration 14: Possible combinations of benchmarking objects and subjects**

<table>
<thead>
<tr>
<th>Object / Subject</th>
<th>Internal</th>
<th>External</th>
<th>Functional</th>
<th>Generic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Process</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Strategy</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

From the above table it becomes obvious, that for each benchmarking subject there are several opportunities for benchmarking objects and vice versa. However, for each subject there is one benchmarking object that seems most suitable.
The type of benchmarking that an organisation chooses depends very much on the situation a business finds itself in, e.g. whether or not it is already recognised as an industry leader or whether it is falling behind (Bendell et al, 1993). Treadwell (1998) states that the full portfolio of opportunities should be considered in order to achieve an optimum view of how a company is competing against other business units, competitors and industries in general.

This section and the previous one discussed different benchmarking objects and different benchmarking subjects. Internal, external, functional and generic benchmarking belonged to the most common benchmarking objects. Product, strategy and process benchmarking belonged to the most common benchmarking subjects. Each of these benchmarking objects and benchmarking subjects can potentially be combined with each other. However, it was established that each benchmarking object has a preferred benchmarking subject and vice versa. Regardless of the kind of benchmarking that a company is conducting, the study has to follow a strict order (Braue et al, 1997). The processes and procedures involved in any benchmarking study will be explained in the next section of chapter 3.

3.2.2.3 Processes and procedures

To provide structure and common language for benchmarking, most scholars try to formalize the benchmarking approach (Spendolini, 1992). These attempts have in common, that the procedures are written for practitioners and thus the emphasis is on describing sub-activities within a process (Camp, 1989; Codling, 1992; Leibfried et al, 1993). The researchers can be divided into two schools of thought. The one school refers to different phases (e.g. Camp, Codling, Leibfried et al) while the other school of thought refers to different steps (e.g. Spendolini, Watson, Bendell).
The following table provides an overview of the most popular phases and steps, together with the researchers that advocate them. In the following paragraphs each phase will be introduced in more detail.

### Table 14: Overview of benchmarking phases

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>Form a benchmarking team.</td>
<td>Determine information sources.</td>
<td>Conduct the research.</td>
<td></td>
</tr>
<tr>
<td>Integration</td>
<td>Identify benchmarking partners.</td>
<td>Determine performance gap.</td>
<td>Analyse the data.</td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>Collect and analyse benchmarking information.</td>
<td>Identify reasoning for the gap.</td>
<td>Implement findings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Take action.</td>
<td>Performance forecast.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Targets / Actions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Implementation / feedback.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Comparing earlier publications (e.g. Camp, 1989) with more recent ones (e.g. Stork et al, 2001), it can be said that researchers did not change the benchmarking process much but instead, they split the process into more sub-processes or mentioned some items under different phases or not even at all. Andersen (1999), for example, establishes a benchmarking team in the planning phase, whereas Codling (1992) does not even emphasise that.

Every author, nevertheless, attempts to formalize the process and this trend is still continuing. To understand the process better it is necessary to go into more detail for each phase. The different phases will be referred to in the order indicated in Camp's (1989) process, as it seems to be the most representative of all the processes. After each phase of the four phases has been discussed separately, table 15 will provide an overview for the content of each phase.
The planning phase (1/4) contains the determination of the scope of the analysis, the choice of benchmarking partner and the finalization of figures that are to be compared (Rau, 1996). According to Cross et al (1995), this phase is frequently identified as the most important and time consuming. However, "the quality of result achieved is directly related to the effort invested at the outset" (Codling, 1992, p 52). There are various researchers that could be quoted on the content of the different actions to be taken in the planning phase. The next paragraphs will refer to Codling (1992), Camp (1989), Leibfried (1993) and Spendolini (1992).

According to Codling (1992) and Camp (1989) the definition of benchmarking areas, benchmarking subject, benchmarking object and data sources are identified as important steps in this phase of the benchmarking process. Leibfried et al (1993) list the determination of scope, the identification of key people and potential organizations for this phase. Spendolini’s (1992) five step model features similar content for the planning phase. Hence it can be said that the features of this benchmarking phase are seen similarly by the above authors. Strittmatter (1996) particularly highlights the importance of a benchmarking team. Part of the planning effort should be to set up a strong team to execute the benchmarking study. A benchmarking team should ideally be composed of three to five people: the process owner, the head of the department and possibly a moderator. Once the team is set up and the planning is concluded, the data gathering and related analysis can begin.

The analysis phase (2/4) includes data collection within the benchmarking company and other secondary sources (Watson, 1993). Harkleroad (1992) points out that collecting and analysing current information from different sources can make a big difference for the study at a later stage for it remaining theoretical or offering a practitioners' guideline for the successful implementation of best practices. Usually this phase is also concerned with understanding competitors' strengths (Cross et al, 1995).
During the analysis phase of the benchmarking process it also necessary to determine the gaps with regard to the best performance (Pieske, 1997). Once these gaps have been determined, the causes for the gaps have to be established (Reichardt, 1998). Afterwards, the best practices have to be understood and not purely copied (Schmidt-Bischoffshausen, 1996). Codling (1992) suggests data collection, gap determination and process comparisons to be part of the analysis phase.

Kollmar et al (1994) emphasize that information gathering is far easier in the US than in Europe because of the large number of benchmarking clearing houses that were founded in the US. They have the sole purpose of sharing any information relevant to benchmarks. Burckhardt (1995), who states that in Germany there still is a lot of resistance to publishing relevant data, confirms this viewpoint.

Furthermore, Leibfried et al (1993) include asking employees, collecting internal data, preparing questionnaires, conducting external discussions, analysing and comparing data and finally writing a report in this phase of the benchmarking process. However, according to Bauer (1994) one should not look for incremental differences in the figures but for differences bigger than 20 percent, where real performance differences might be revealed.

During the integration phase (3/4), Camp (1989) suggests communicating benchmarking findings, gaining acceptance and establishing functional goals. Also Cross et al (1995) see the development of goals and action plans happening during the integration part of the benchmarking process. For Leibfried et al (1993) target setting, development of action plans, reporting of results and implementation of actions are key parts of this phase of the benchmarking process. Referring to Rau (1996) in this part of the process, it is crucial to convince the organisation of the findings of the study and to gain support for the implementation. Hence the term 'acceptance' is of significance in this step.
Once the results of the benchmarking study have been integrated into the business, the implementation of actions (4/4) to improve the current situation can start. For this last phase of the benchmarking process, Codling (1992) suggests to communicate findings and results of the study throughout the organization, to adjust company goals in light of the results of the benchmarking study, to implement and monitor agreed actions and to review the progress continuously. Additionally, the performance gap has to be closed (Karlöf, 1994).

Referring to Spendolini (1992), taking action can mean producing a report or a set of recommendations including the continuation of the benchmarking process. According to Codling (1992), review and recycle is not a matter to be executed only once after the whole process, but continuously during every step of the benchmarking sequence. This step marks the end of the first calibration of the implementation phase. The following table provides an overview of the actions that need to be taken in each phase.

**Table 15: Content of each benchmarking phase**

<table>
<thead>
<tr>
<th>Planning (1)</th>
<th>Analysis (2)</th>
<th>Integration (3)</th>
<th>Action (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select benchmarking object / subject.</td>
<td>Collect data.</td>
<td>Communicate findings to the organization.</td>
<td>Implement action plan.</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Concerning the importance of each phase, Stork (2000) points out that in the past, benchmarking projects focussed on the first three phases of benchmarking. Today, however, the focus is on action and implementation.
Baker (1995) also emphasizes the importance of the action phase because if the implementation is not completed, no benefit will derive from the study. According to Camp (1993), although several distinct phases can be described, benchmarking is not a cookbook where looking for certain ingredients will lead to success. Although the core of the benchmarking processes described in this chapter may be similar, most of the organisations using the process have tailored their definitions and approaches to their own needs and environments (Spendolini, 1992).

This section of chapter 3 has described different phases that need to be implemented within a benchmarking study. Benchmarking follows a four step approach including planning, analysing, integrating and actioning. As these steps have not been limited to any particular industry or application, it is reasonable to assume that E-Commerce benchmarking will follow a similar pattern to benchmarking traditional businesses.

This might be an interesting topic to be addressed in the data collection phase of this thesis. The following section of this chapter will focus on key features of benchmarking such as success factors and benefits.

3.2.3 Benchmarking: Key features

The aim of this section of chapter 3 is to establish an understanding of success factors and benefits associated with benchmarking. Those areas of research have been chosen because they might highlight focus areas and key indicators for an E-Commerce benchmarking system. The next section will introduce four success factors for the implementation of benchmarking. The second part of this section will refer to five benefits that are usually associated with benchmarking.
3.2.3.1 Success factors

Despite the general surge of interest, the benchmarking process is full of challenges for practitioners who don’t have the necessary knowledge about it (Codling, 1992). To overcome these challenges, it is of interest to determine which success factors constitute the success of a benchmarking study. This will subsequently be of great importance for the determination of an E-Commerce benchmarking model. The portfolio of success factors that are associated with benchmarking is quite diverse. Equally numerous are the references that can be found related to benchmarking success factors. The following table provides an overview of the most popular success factors. Each factor will be explained in more detail in the following paragraphs.

**Table 16: Benchmarking success factors**

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Authors</th>
</tr>
</thead>
</table>

Source: Developed for this thesis

Without **top management involvement (1/4)** in a benchmarking study, success rates of benchmarking will be low. Especially for the implementation of actions derived from the benchmarking study, management involvement and approval is important. Of course, top management involvement relates to any change project in any business. It is consequently not surprising that top management involvement also features on the list of success factors for the implementation of benchmarking.
Equally important is the involvement of the employees (2/4). The employees who execute day to day activities on an operational level, very close to the customer interface, most often have the best knowledge of matters that go well and those which might need improvement. Furthermore, the employees probably have to implement actions from the benchmarking study. Hence they need to be part of the process from the beginning so that the implementation of actions to proceed smoothly.

The same level of importance is given to the procedural follow up (3/4). As shown in section 3.2.2.3 of this chapter, a sound process needs to be followed in order for benchmarking to be implemented successfully. In this case however, it is not decisive which of the available processes is implemented. It is key though, that a process is implemented.

Moreover, different researchers refer to the data quality (4/4) as a factor for successful benchmarking implementation. In this particular case, Camp (1989) refers to a clear understanding of the internal processes of a company. Rau (1996a) further emphasizes that the amount of data accumulated in the data gathering phase needs to be kept at a minimum level. Clear and challenging targets further add to the list of success factors related to data quality (Kienbaum, 1997; Deger, 1997).

However, even if all success factors are adhered to during the implementation of a benchmarking study, the concept still has its limitations. If the benchmarking goal is only to learn and copy what others have implemented and not to improve the own performance of your company, benchmarking will become a vicious circle as corporations will not advance their knowledge (Glanz, 1993). This viewpoint is also shared by Ohinata (1994) who believes that a decline of profitability in ‘me-too’ products can also be the result of a benchmarking study.
However, according to Jentner (1998), benchmarking studies that failed did not do so because of flaws in the method itself, but because the studies were not well conducted. The lack of good quality data, especially within competitive benchmarking, limits the potential for significant performance enhancements (Harkleroad, 1992). Bästlein et al (1997) further argue that benchmarking is appropriate for diminishing gaps within a given technology, but it is less appropriate for revealing unknown best practices. Also, when all market participants implement the relevant best practices, branches or products will converge and declining margins will follow (Nattermann, 2000). However, regardless of potential limitations, benchmarking has many benefits which will be explained in the next section.

3.2.3.2 Benefits

Just as there are numerous success factors, so there are many potential benefits of benchmarking. Five key benefits of benchmarking will be identified in this section. The below table provides an overview of possible benefits and the authors who highlighted them. Each factor will be explained in more detail in the following paragraphs.

Table 17: Benefits of benchmarking

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Authors (selection)</th>
</tr>
</thead>
</table>

Source: Developed for this thesis
One key benefit of benchmarking is the increase in performance which leads to **competitive advantage** (1/5). Karlöf et al (1994) consider benchmarking as a means of conducting comparisons with a certain benchmark and emphasise the opportunities that benchmarking provides to companies which are not competitive. In addition, Horvath et al (1992) point out the competitive orientation of benchmarking as they state that competitive targets and measures to reach these targets could be developed.

Benchmarking, if properly implemented, can identify competitor’s strengths and weaknesses, determine the key factors of success and utilise this information to surpass the competition (Shetty, 1993). According to Gloger (1999), companies try to improve themselves because of increasing external, competitive pressure. Consequently, benchmarking is a direction setting process and a means of reaching new, external legitimised goals. Finally it is a tool to gain competitiveness (Camp, 1992). However, according to Nattermann (2000), benchmarking strategies do not lead to superior performance but to declining margins. He states that benchmarking is not a tool for strategic decision making at all because if competitors all try to go in the same direction, declining margins will follow.

According to Pettersen (1995), benchmarking, in contrast to other management tools, provides the opportunity to learn about the reasons for performance differences in order to determine **best practices** (2/5). This is further emphasised by Murdoch (1997, p 65) who argues that “benchmarking is not about comparing figures but about how somebody else is doing something”. The learning aspect of benchmarking is also pointed out by Leibfried et al (1993) and Vollmuth (1997). Benchmarking is supposed to be an instrument to learn and understand others (anonymous, 1996). In 1998, Brunold added that besides comparing figures, the far more important part of benchmarking was the search for the reasons in case performances differed.
The following benefit which is associated with benchmarking could be a result of the implementation of best practices. Balm (1992) believes that world class performance (3/5) represents the ultimate benefit of benchmarking. The determination of challenging targets and the development of measures support this benefit (Weber, 1998).

For Camp (1989), benchmarking is in the first instance a target setting process. Each strategy needs a target and benchmarking supports the target setting (4/5) process with targets that are realistic and not established by guessing or extrapolations from previous achievements (Bendell et al, 1993). Strategic planning and target setting requires a thorough knowledge of the marketplace and benchmarking is a useful tool for gathering information in this area (Spendolini, 1992). Benchmarking starts from the business targets with which weaknesses and improvement potentials are identified (Börner, 1999). Furthermore, benchmarking contributes to reaching the targets by identifying and implementing best practices (Brunold, 1998).

Lastly, the planning / forecasting (5/5) process is supported by benchmarking when benchmarking information is used to assess a future marketplace. According to Leibfried et al (1993), one can answer strategic questions by gaining market information to prioritize projects in order to increase corporate value for all participants. Additionally, benchmarking identifies features or areas that support long-term company success (Leibfried et al, 1993).

This section, benchmarking, of chapter 3 has been divided into three parts. The first section explored the origin and evolution of benchmarking. Developed during ancient times and by architects in the medieval ages, benchmarking evolved into a standard management tool in day-to-day business. The term 'benchmarking' has been defined, using a definition provided by Camp (1989, p 12). This is, “benchmarking is the search for industry best practices that lead to superior performance".
Next, benchmarking types have been highlighted. Benchmarking types have to be divided into benchmarking objects and benchmarking subjects. A popular benchmarking subject is represented by product benchmarking. A subsequent benchmarking object is represented by internal benchmarking. Furthermore, this section also introduced the phases in which benchmarking needs to be implemented in order to be successful. This process approach was one of the key success factors that were also mentioned. The establishment of best practices and subsequent gain of competitiveness belonged to one of the four benefits of benchmarking which concluded this section of chapter 3.

The next section of this chapter will focus on the research discipline of this thesis, E-Commerce benchmarking. E-Commerce and benchmarking represented the main bodies of theory from which the research theory, E-Commerce benchmarking, emerges.

### 3.3 Research discipline: E-Commerce benchmarking

With the increase in Internet users and use of E-Commerce as a way of conducting business, the evaluation of business efficiency has become more and more important (Wen et al, 2003). However (Wieder, 2000a, p 58):

"When companies first began to make their transitions to the Web, their main concern was getting their operations up and running".

Once their operations have been established, benchmarking could be an important methodology for establishing suitable performance standards to guide companies in developing strategies and systems for the successful implementation of E-Commerce (McGaughey, 2002). Nevertheless, this was difficult in the past and still proves a challenge today. As highlighted in the following paragraphs, a lack of focus seems to be one of the reasons for that. Webb and Webb (2004, p 430) can be quoted to highlight the suggested lack of focus to evaluate E-Commerce applications:
"The primary focus of E-Commerce research in the 1990s was on the development of technologies and architectures that enable the construction of web-sites to link businesses and consumers in the new economy".

Nevertheless, considering the competitive nature of the E-Commerce industry in particular, the importance of E-Commerce benchmarking is clear (Hasan and Tibbits, 2000). Specifically, the importance of assessing the effectiveness of information transformation is emphasized by Barua et al (1996, p 37). However, they also refer to a lack of focus in regards to E-Commerce evaluations:

"Many companies, however, are less focused on tracking e-business measures, including the percentage of an organizations' total business that has been transacted online".

It will now be investigated how E-Commerce benchmarking has evolved, which different types of E-Commerce benchmarking exist and which success factors can be identified. The below illustration highlights the structure of this section.

Illustration 15: Structure of section 3 of chapter 3

<table>
<thead>
<tr>
<th>Chapter 3.3.1: E-Commerce benchmarking: Origin and evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 3.3.2: E-Commerce benchmarking: Basics</td>
</tr>
<tr>
<td>Chapter 3.3.2.1: Definition of the term</td>
</tr>
<tr>
<td>Chapter 3.3.2.2: Types</td>
</tr>
<tr>
<td>Chapter 3.3.2.2.1: Web-sites</td>
</tr>
<tr>
<td>Chapter 3.3.2.2.2: Subjects</td>
</tr>
<tr>
<td>Chapter 3.3.3: E-Commerce benchmarking: Success factors</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
3.3.1 E-Commerce benchmarking: Origin and evolution

Any company which starts an E-Commerce application should first understand its market position as well as its position relative to its competitors (Jeffcoate et al, 2002). During the first phase of the Internet age, most companies focused on setting up a web-site rather than setting up new business processes (Brown et al, 2006; Frost, 1999). For E-Commerce, web-sites are the most important interfaces which allow companies and individuals to engage with existing and potential customers (Kim et al, 2003). It is consequently fair to assume that the first types of E-Commerce benchmarking were related to benchmarking web-sites.

At the beginning, E-Commerce benchmarking needed to include the performance measurements of web-sites in addition to those used for a traditional business format. This ensured that web-sites were set up as efficiently as possible (Liu and Arnett, 2000; Liu et al, 2001; Phan and Stata, 2002). Web-site benchmarking, in most cases, started with the comparison of web-site functions which aimed at documenting the impact of the Internet on business processes (Boisvert and Caron, 2006). However, considering the relatively small amount of references available for generic E-Commerce benchmarking, it can be said that E-Commerce benchmarking is still at its infancy stage. The next section will refer to E-Commerce benchmarking basics.

3.3.2 E-Commerce benchmarking: Basics

A large number of references on both E-Commerce and benchmarking is available. However, the same cannot be said about E-Commerce benchmarking as it is still a relatively young topic. However, the term E-Commerce benchmarking needs to be explained and a definition needs to be decided upon. This will be achieved in the next section. In addition to that, different E-Commerce benchmarking types will be explained.
3.3.2.1 Definition of the term

The broader term E-Commerce benchmarking has not received much attention in early or more recent publications. In fact, the term E-Commerce benchmarking has mostly been associated with benchmarking web-sites. Nevertheless, in an attempt to define E-Commerce benchmarking, Wieder (2000a, p 58) explains: "E-Commerce benchmarking is used to help companies compare the costs and performance of their online operations with those of other companies".

However, there is no dedicated definition of benchmarking in relation to E-Commerce. Thus, as a working definition of E-Commerce benchmarking for this thesis, the working definition of benchmarking will also be used for E-Commerce benchmarking (Camp, 1989, p 12): "E-Commerce benchmarking is the search for industry best practices to achieve top performances", the key words are 'best practices' and 'top performances'.

The lack of a broad definition of E-Commerce benchmarking also indicates that there has not been much research conducted in this area. Considering the fast pace with which E-Commerce is developing over time, it seems that E-Commerce benchmarking needs to step up to the next level as well to grow from being a web-site comparison to a tool that supports the implementation of all E-Commerce related processes.

In this thesis it will not be attempted to generate a generally accepted working definition of E-Commerce benchmarking but rather to show ways in which the tool can be used in areas other than web-sites. Regardless of the lack of a generally accepted E-Commerce benchmarking definition, there are different types of E-Commerce benchmarking which do already exist. These will be explained in the following section.
3.3.2.2 Types

Thus far E-Commerce benchmarking types have followed a trail which was laid down by the implementation of different E-Commerce applications. The kind of E-Commerce benchmarking which companies chose depended, for example, on organizational goals, whether they were internal or external (McGaughey, 2002). So far, most of the E-Commerce benchmarking publications have been focused on web-site benchmarking, internally or with competing applications and portals. Table 18 provides an according overview. Most of the publications look either at the functionalities of web-sites or they compare the design of one web-site with another.

**Table 18: Publications related to E-Commerce benchmarking**

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmarking: a tool for website evaluation and improvement</td>
<td>Msic and Johnson</td>
<td>1999</td>
</tr>
<tr>
<td>Web-site design benchmarking within industry groups</td>
<td>Kim et al</td>
<td>2003</td>
</tr>
<tr>
<td>Site Qual: an integrated measure of web-site quality</td>
<td>Webb and Webb</td>
<td>2004</td>
</tr>
<tr>
<td>Home-page usability and credibility</td>
<td>Brown et al</td>
<td>2006</td>
</tr>
<tr>
<td>Web-site performance measurement: promise and reality</td>
<td>Welling and White</td>
<td>2006</td>
</tr>
<tr>
<td>The Internet practices of hotel companies: An analysis from Greece</td>
<td>Zafiropoulos et al</td>
<td>2006</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

However, Hasan and Tibbits (2000) claim that measuring the value of E-Commerce and evaluating its performance is becoming more and more important to managers as the role of E-Commerce in achieving business objectives is increasing. Nevertheless, according to Lesjak and Vehovar (2005, p 422):

"A large majority of companies with sizeable E-Commerce projects do not use any formal methods of evaluating them".
Brown et al (2006) suggest that even high growth organizations from the fortune 500 list do not evaluate their homepage design through a systematic process. This point is further highlighted by Kalakota and Whinston (1996) who argue that there is a major need for the development of instruments which allow for the evaluation of customer preferences and their effect on web-site design. Following this further, there is a growing interest in benchmarking in particular business areas, such as the call-centre sector (Batiz-Lazo, 2004). According to Hasan and Tibbits (2000), E-Commerce introduces new business objectives, which implies that old measures of success no longer apply. And although it is clear that the use of IT applications is quite widespread around the world, Closs and Xu (2000, p 870) state that:

"There is limited empirical evidence investigating the applications and benefits of certain IT characteristics and capabilities".

Furthermore, despite the surge in number of Internet users and B2B applications, "little is known about the effectiveness in terms of achieving marketing and customer service goals" (Levenburg, 2006, p 356). In addition to that, many of the qualities of IT applications, such as convenience, variety and ease of information are difficult to measure (OECD, 1997).

Hasan and Tibbits (2000) believe that, regardless of the increase in use of web-based systems, there is no ongoing evaluation of its efficiency and effectiveness. Strassmann (1999) even points out that there is limited knowledge about how to evaluate the costs and benefits of information technology to a business. Looking at the considerable investment that companies make in E-Commerce, the need for a convincing measurement tool has become obvious (Kim et al, 2003). Patron (2008) and Edlund (2000) further request that benchmarking be implemented in order to avoid re-inventing the wheel.
Thus it can be concluded that E-Commerce benchmarking received relatively little attention compared to the widespread introduction of E-Commerce application or the benchmarking of web-sites. The following section will provide a more detailed discussion of web-site benchmarking.

3.3.2.2.1 Web-sites

"The content and the design of web-sites is a matter of great concern for any company" (Jenamani et al, 2002, p 391). The first formal approach to evaluating web-sites dates back to the year 1995 when Boyd Collins established the so-called info filter. At that time, using common Internet search engines revealed hundreds of web-sites claiming to contain evaluation criteria for site assessment (Shim et al, 2000). However, "managers need information on web-site performance in order to improve effectiveness and usability (van der Merwe and Bekker, 2003, p 330)."

Regardless of the web-site being a promotional web-site, a transactional web-site or a relational web-site, benchmarking could support an assessment of the site (Boisvert and Caron, 2006). Considering that the Internet is the primary structure for E-Commerce, it has become clear why so many studies focus on comparing web-sites (Kim et al, 2003). A poorly constructed web-site can lead to loss of business from non-realized transactions (Zona Research, 2000).

Alpar et al (2001), however, mention that measuring the success of a web-site is difficult because the purposes for which a web-site exists differ significantly. An even stronger statement is provided by Sexton et al (2002) and Kim et al (2003) who believe that performance standards for web-sites have not been widely researched in the literature. Furthermore, van der Merwe and Bekker (2003) add that no generally accepted method exists for the conclusive assessment of web-site efficiency and effectiveness.
Other studies have focused on the usability of an Internet site (Brown et al., 2006). This fact has become even clearer considering that the introduction of E-Commerce to the business world evolved in two phases (Viehlan, 1999). The theme of the first phase was conducting business on the Internet, whereas the theme of the second phase was to change business by means of the Internet.

Despite the number of publications "no formula yet exists for measuring the overall impact of a web-site on a business" (Welling and White, 2006, p 658). Even though the evaluation of web-sites has received some attention in the past, there is still a need for a more comprehensive approach (van der Merwe and Bekker, 2003; Webb and Webb, 2004).

D'Angelo and Little (1998) as well as Bauer and Scharl (2000) and Misic and Johnson (1999) all add different viewpoints to the evaluation of web-sites in terms of qualitative descriptions, an automatic classification or user defined criteria. Nevertheless, literature that focuses specifically on E-Commerce sites is scarce (van der Merwe and Bekker, 2003).

In addition to benchmarking web-sites, there are other forms of E-Commerce benchmarking too. Those typically relate to other parts of the value chain and hence relate to potential benchmarking subjects. The next section presents an overview of those potential E-Commerce benchmarking subjects.

3.3.2.2.2 Subjects

Further to the previous discussion on benchmarking web-sites, additional E-Commerce benchmarking subjects can be found. Seven different E-Commerce benchmarking subjects will be presented in this section. The below table highlights some of the E-Commerce benchmarking subjects which occurred in recent literature. Each subject will be explained in more detail in the following paragraphs.
Table 19: E-Commerce benchmarking subjects

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs (2)</td>
<td>Bergstein et al (1998)</td>
</tr>
<tr>
<td>Delivery performance (3)</td>
<td>Davidson (2001)</td>
</tr>
<tr>
<td>Call-centres (4)</td>
<td>Batiz-Lazo (2004)</td>
</tr>
<tr>
<td>E-Learning (7)</td>
<td>Mistry (2008)</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

One subject of E-Commerce benchmarking relates to the different partners (1/7) engaged via E-Commerce. As E-Commerce provides opportunities for an extended enterprise (Lee et al, 1998), external partners should also be included in E-Commerce benchmarking. As the choice of partner is a crucial part in the formation of an extended enterprise, the partner selection process also needs to be benchmarked (Lau et al, 2005). A different subject is added by Bergstein et al (1998) who suggest comparing costs (2/7) of email applications. Another E-Commerce benchmarking dimension is represented by the delivery performance (3/7) (anonymous, 2001). As an example, Davidson (2001) states that, when looking for a potential web partner, transportation carriers should look at the logistic performance as an important part of an E-Commerce partnership.

Areas such as call-centres (4/7) are also popular targets for E-Commerce benchmarking because benchmarking offers great potential for efficiency gains (Batiz-Lazo, 2004). Similarly, Atkinson et al (2000) highlight that sharing information (5/7) is an area for exchanging best practices that is related to E-Commerce. According to Wieder (2000a), this can be executed in a three step approach that examines business processes, determines costs for these processes and then compares these costs with those of other businesses.
One of the more specific examples is displayed by Puschmann and Alt (2005) who focus their efforts on benchmarking E-procurement (6/7) systems. In most companies so far, procurement has not had a lot of attention (Kaufmann, 1999). However, recently more and more companies have realized that procurement is an effective way of improving bottom line results due to its leverage effect (Kalakota and Whinston, 1997). E-learning (7/7) has also been added recently to the list of E-Commerce benchmarking opportunities to prove that almost no area of business is excluded from benchmarking (Mistry, 2008). However, each opportunity is very specific and has not yet reached the quality and depth of benchmarking studies in terrestrial business.

As potential subjects of E-Commerce benchmarking have been highlighted now, it is of interest to address the success factors of E-Commerce benchmarking. This will also help to validate an E-Commerce benchmarking system at the end of this thesis. It will be of keen interest to understand how E-Commerce benchmarking can be progressed into all E-Commerce related areas, not just in the area of web-sites.

3.3.3 E-Commerce benchmarking: Success factors

In general, the success factors of benchmarking E-Commerce should be similar to those of benchmarking terrestrial businesses. However, one of the key limitations of E-Commerce benchmarking is that there are very few studies available which deal with the economic implications and related evaluation of E-Commerce (Lesjak and Vehovar, 2005). This viewpoint is confirmed by Chong (2002), Kleist (2003) and Cummings (2004). At this point, there does not seem to be a generally accepted list of success factors for E-Commerce benchmarking other than the one already available for benchmarking a traditional business. Additionally, it could be argued that differences of success factors between E-Commerce benchmarking and “brick and mortar benchmarking” might not be so significant.
Section 3.3 of this chapter was aimed at providing information on the research theory, E-Commerce benchmarking. It concluded that E-Commerce benchmarking was first applied in the area of web-site benchmarking from which it consequently originated. Because there is no commonly accepted definition for E-Commerce benchmarking itself, the working definition of traditional benchmarking has been applied for E-Commerce benchmarking. Once web-site benchmarking was discussed in detail, this section of chapter 3 analysed potential success factors and concluded that those do not seem to be different from success factors of traditional benchmarking. After both main bodies of theory and the research theory have been reviewed, it is now important to show their respective implications for this thesis.

3.4 Implications of the literature review for this study
In summary, the literature review chapter has established the conceptual and theoretical foundation for both bodies of theory and the research theory. From that, the research issues which are worth pursuing have been developed. This section of chapter 3 will synthesize the literature and bring together the overall research aim and research questions derived from the literature and its context. This will be achieved by a two step approach. Firstly, the identification and justification of the research aim will be highlighted. Secondly, the identification and justification of the research questions will be provided.

3.4.1 The identification and justification for the selection of E-Commerce benchmarking to be examined in this thesis
While benchmarking and E-Commerce have been researched separately from each other quite exhaustively, there seems to be no comprehensive approach from scholars as to how to benchmark E-Commerce in its entirety. In the past there has been a clear focus on benchmarking web-sites. However, E-Commerce has left its infancy stage now and progressed into a subject that significantly changes the way in which companies operate.
It is therefore crucial for benchmarking to step up accordingly so that the successful implementation of E-Commerce can be supported by it. Levenburg states a key challenge (2006, p 357):

"While many organizations have some familiarity with the Internet, they have often ventured into E-Commerce blindly or with limited guidance".

Thus the overarching research aim for this thesis is:

"Benchmarking the implementation of E-Commerce"

**A Case Study Approach**

There are five main reasons why this particular question has been chosen as the research aim for this thesis. The following table 20 provides an overview those reasons that justify the research aim. A short description of the justification and information on subsequent actions taken for this thesis will also be provided. Reference will be made to the research questions which tackle each justification together with reference to the relevant sections of this thesis. Each justification will be explained in more detail in the following paragraphs.
Table 20: Justification of the research aim

<table>
<thead>
<tr>
<th>Justification</th>
<th>Identified in section (heading)</th>
<th>Description of the justification</th>
<th>Subsequent action taken in this thesis</th>
<th>Relevant research question (RQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased customer expectations (1)</td>
<td>3.1.3.3 (The impact of E-Commerce on customer expectations)</td>
<td>Customer expectations have not been matched in all areas of E-Commerce. In particular order fulfilment was seen as an issue.</td>
<td>Customer satisfaction will be included in the studies of this thesis to understand if and how E-Commerce benchmarking can measure customer satisfaction criteria.</td>
<td>RQ 1 RQ 2</td>
</tr>
<tr>
<td>Lack of standardized evaluation methods (2)</td>
<td>3.3.2.2 (E-Commerce benchmarking types)</td>
<td>There is a lack of evaluation methods to assess the status and progress of E-Commerce applications. The focus of E-Commerce benchmarking has been on web-site benchmarking.</td>
<td>It will be assessed if and how E-Commerce benchmarking can include other parts of the value chain in addition to benchmarking websites.</td>
<td>RQ 1 RQ 3 RQ 4</td>
</tr>
<tr>
<td>Few accepted standards (3)</td>
<td>3.3.2.2 (E-Commerce benchmarking types)</td>
<td>Very few standards for the implementation of E-Commerce have been developed. Standards which have been developed, mostly relate to web-site benchmarking.</td>
<td>It will be analyzed if and how E-Commerce benchmarking can provide information to establish standards for the implementation of E-Commerce.</td>
<td>RQ 4</td>
</tr>
<tr>
<td>Need for a management tool (4)</td>
<td>3.1.3 (E-Commerce: Its impact onto the business world)</td>
<td>In the past, practitioners focused on implementing E-Commerce. However, they did not pay the same amount of attention to support the launch of E-Commerce by developing an appropriate management tool.</td>
<td>The research for this thesis will aim to establish a guideline that supports practitioners in the implementation of E-Commerce benchmarking.</td>
<td>RQ 2 RQ 4</td>
</tr>
<tr>
<td>Development stage of E-Commerce benchmarking (5)</td>
<td>3.3.1 (E-Commerce benchmarking: Origin and evolution)</td>
<td>E-Commerce benchmarking as a management tool has not yet reached its full potential. Web-site benchmarking has progressed continuously, but other areas of E-Commerce have not been addressed to the same extent.</td>
<td>To further develop existing theory on E-Commerce, differences between traditional benchmarking and E-Commerce benchmarking will also be addressed to support the natural progression of this management tool.</td>
<td>RQ 3 RQ 4</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
The implementation of E-Commerce applications went hand in hand with an increase in customer expectations (1/5). Customers expected to benefit from these new ways of conducting business. While processes were restructured to be executed electronically, suppliers did not always manage to fulfil or even measure customer expectations. Especially at the beginning of E-Commerce, orders were not supplied in the right quantity or quality. Furthermore, the user friendliness of some web-sites did not meet customer expectations.

Additionally, the literature review revealed existing gaps related to E-Commerce benchmarking. As E-Commerce and E-Commerce benchmarking in particular are new business topics, there is comparatively little evidence available. As Power (2005, p 97) points out:

"The lack of models developed to try to explain the dynamics within organizations of the relationship between availability and opportunities presented by established technologies on the one hand, and their limited historical adoption on the other, represents a significant gap in the literature".

Hence, the lack of standardized evaluation methods (2/5) for E-Commerce applications presents a major challenge at this stage. Managers will find it more difficult to approve certain investment in this area unless the investment is justified by supporting numbers. Furthermore, the evaluation of risks and opportunities will also influence the opinion of key stakeholders for an E-Commerce project. Consequently, this area of research needs to be seen as very important.

As for E-Commerce benchmarking, E-Commerce also suffers from too few accepted standards (3/5). The need for an E-Commerce benchmarking method therefore, not only stems from the area of E-Commerce benchmarking, but also from a need for standardization in the area of E-Commerce itself.
To further enhance the development of E-Commerce applications, a management tool (4/5) needs to be developed to provide a frame in which E-Commerce can progress even further. Clearly, this tool could be E-Commerce benchmarking. Existing literature has not yet identified differences between E-Commerce benchmarking and benchmarking traditional businesses. Therefore, there are opportunities to provide further input for existing E-Commerce benchmarking applications to supply the desired management tool for E-Commerce applications.

As E-Commerce benchmarking is a fairly young topic, the early development stage of E-Commerce benchmarking (5/5) justifies the research aim as well. With the exception of web-site benchmarking, little progress has been made in benchmarking other areas of E-Commerce. Looking at the potential benefits of E-Commerce which have been identified in section 3.1.4.2 of this chapter, it becomes obvious that the complete value chain needs to be analyzed, not just the interface with the customer. E-Commerce has the potential to improve factors related to costs, process times or turnover. Consequently, it needs to be addressed if and how other parts of the value chain can be addressed with E-Commerce benchmarking.

Once the overall research aim of this thesis has been selected and justified, it is important to support the research aim with related research questions. Those will be identified and justified during the following section.

3.4.2 The identification and justification of the research questions

To explore the research aim it is necessary to develop relevant research questions. The four research questions for this thesis are shown in table 21. A detailed explanation of the content of each research question and the reasoning for their selection will be provided in the following paragraphs.
Table 21: Overview of the research questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How is the benchmarking of E-Commerce business operations undertaken at BASF?</td>
</tr>
<tr>
<td>2</td>
<td>What are the benefits of benchmarking E-commerce business operations at BASF?</td>
</tr>
<tr>
<td>3</td>
<td>What are the differences between benchmarking E-commerce business operations and traditional forms of benchmarking at BASF?</td>
</tr>
<tr>
<td>4</td>
<td>What are the most appropriate ways of implementing the benchmarking of E-commerce business operations at BASF?</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Research question 1 is key to generating a sound understanding of the way in which E-Commerce applications are benchmarked today. The literature review indicated that, most frequently, web-sites are benchmarked against each other. Other areas which have been mentioned are call-centre comparisons. However, it seemed as if not all companies who engage in E-Commerce have assessed its effectiveness or efficiency. Hence it will be analysed if that is also the situation at BASF.

Research question 2 is vital in the exploration of insights into potential benefits of E-Commerce benchmarking. The underlying assumption of this part of the thesis is that benchmarking traditional businesses has certain benefits. Numerous benefits have been identified in section 3.2.3.2 of this chapter. To achieve competitive advantage, the development of best practices and the support for target setting belong to those benefits which emerged frequently from the literature review. It is therefore of interest to analyse if those benefits apply to E-Commerce benchmarking too.

Research question 3 is crucial to support the model development of an E-Commerce benchmarking system. The literature does not explicitly provide guidance as to whether or not E-Commerce benchmarking is following the same principles like benchmarking traditional businesses. Hence, this research question will help to establish guiding principles.
Research question 4 is important to generate advice on how to establish an appropriate E-Commerce benchmarking system. While there is a strong request for the development of E-Commerce benchmarking, there is very little, if any, guidance offered on how to achieve that. Consequently, the responses to this research question will support the aim of this thesis to benchmark the implementation E-Commerce.

The previous chapters set the foundation for further research by identifying the context and extant literature. As the gaps in existing literature have been identified, the following chapter will provide a detailed overview of the research methodology that was utilised to establish the data from which the analyses and conclusions were derived.
4 Methodology

The purpose of this chapter is to elaborate on the approach that was used to collect data related to the research questions and justify the subsequent choice of methodologies. Consequently, this chapter should allow other researchers the possibility to replicate this study (Lindsay, 1995). This study follows a single-case-study exploratory research design. Hence the first section will provide an overview of different research paradigms and justify the choice of the realist paradigm. The next sections give a detailed insight into the research aims and methodologies, the methods of data analysis and the model development for this research. In addition to that, a detailed overview of the three studies of this thesis is provided. The following illustration shows the suggested structure of this chapter.

**Illustration 16: Structure of chapter 4**

<table>
<thead>
<tr>
<th>Chapter 4.1: Research paradigms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Overview, selection and justification for the use of realism</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4.2: Research aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 4.3: Case study methodology (4.3.1-4.3.5)</td>
</tr>
<tr>
<td>• Definition, justification, limitations, reliability / validity, research plans, ethical considerations, language</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4.3.6: Study 1: Semi-structured interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Purpose, justification, limitation, description, data analysis, implications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4.3.7: Study 2: Questionnaire survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Purpose, justification, limitation, description, data analysis, justification for SPSS, implications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4.3.8: Study 3: Focused expert interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Purpose, description, implications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4.4: Conclusions</th>
</tr>
</thead>
</table>

Source: Developed for this thesis
During the course of this chapter, special attention will also be paid to maximizing the four conditions related to design quality (Yin, 2003): (1) construct validity, (2) internal validity, (3) external validity and (4) reliability. As the case study methodology does not have a similar history of guidelines for implementation compared with other research methods, the design quality in particular will be thoroughly addressed.

Before the methodology can be identified it is necessary to discuss potential research paradigms and justify the usage of the chosen one. This will be undertaken during the following sections of this chapter.

4.1 Overview of research paradigms, selection and justification for the use of realism

According to Easterby-Smith et al (1991) and Guba and Lincoln (1994) four research paradigms can be identified: (1) positivism, (2) critical theory, (3) constructivism and (4) realism. A research paradigm is "a world-view or a set of linked assumptions about the world which is shared by a community of scientists investigating that world" (Desphande, 1983, p 101). Kuhn (1962) highlights, that paradigms are important for the day-to-day work of any science. They can be characterized by features exhibited in the following table.

Table 22: Three dimensional framework for categorizing research paradigms

<table>
<thead>
<tr>
<th>Paradigm / feature</th>
<th>Deduction / Induction</th>
<th>Commensurable / incommensurable</th>
<th>Objective / subjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivism</td>
<td>Deduction</td>
<td>Commensurable</td>
<td>Objective</td>
</tr>
<tr>
<td>Critical Theory</td>
<td>Induction</td>
<td>Commensurable</td>
<td>Subjective</td>
</tr>
<tr>
<td>Constructivism</td>
<td>Induction</td>
<td>Incommensurable</td>
<td>Subjective</td>
</tr>
<tr>
<td>Realism</td>
<td>Induction</td>
<td>Commensurable</td>
<td>Objective</td>
</tr>
</tbody>
</table>

The differentiation of research paradigms into deductive and inductive originate from Parkhe's work. However, he believes that in reality there is no competition "but rather an essential continuity and inseparatability between inductive and deductive approaches to theory development" (Parkhe, 1993a, p 237). Bourgeois (1979) confirms this point of view. The next combination of features relating to research paradigms has been defined by Perry (1998, p 787). He defines commensurability as "knowledge claims which can be evaluated through common measures, like reliability and validity issues, careful evaluation of the research topic and methodology and thorough review by examiners". The opposite of commensurability would then be incommensurability.

Furthermore, Larson (1999) categorizes paradigms into objective and subjective. However, those terms derive primarily from the work of Burrell and Morgan (1979). Even earlier, in 1953 Skinner had already pointed out that an objectivist view has a concern for knowledge that describes a specific structure about social phenomena. The subjective view emphasizes the importance of the process through which human beings develop their relationship to the world (Morgan and Smircich, 1980).

According to Healy and Perry (2000) each paradigm has three elements: (1) ontology, (2) epistemology and (3) methodology. Ontology is the reality that researchers investigate, epistemology is the relationship between the researcher and that reality and methodology is the way in which the researcher looks at this reality (Guba and Lincoln, 1994).

In the following section, each paradigm will be described including the aforementioned elements from Healy and Perry (2000), ontology, epistemology and methodology. At the end of the next section, the appropriate research paradigm for this thesis will be selected. Positivism is the first research paradigm to be discussed.
4.1.1 Positivism

According to Guba and Lincoln (1994) and Tsoukas (1989) positivism is predominantly used in research science and measures independent facts about a particular reality. Orlikowski and Baroudi (1991) even refer to positivism as the paradigm widely used for business school research. In positivism data do not change while they are observed (Healy and Perry, 2000). Guba and Lincoln (1994, p 110) refer to this phenomenon as the “one way mirror". Positivism is usually characterized as a deductive way of seeking theory confirmation in value-free generalization (Desphande, 1983; Hirschman, 1986; Tsoukas, 1989). Its primary concern is to test the applicability of a theory to a particular population (Healy and Perry, 2000). The following table shows critical elements of positivism which highlight the focus of positivism on reality.

Table 23: Elements of positivism

<table>
<thead>
<tr>
<th>Paradigm / element</th>
<th>Ontology</th>
<th>Epistemology</th>
<th>Common methodologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivism</td>
<td>Reality is real and apprehensible.</td>
<td>Objectivist findings true.</td>
<td>Experiments, surveys; chiefly quantitative.</td>
</tr>
</tbody>
</table>


However, positivism is inappropriate for analysing social science phenomena such as marketing networks which involve human beings and their personal experiences as it treats respondents as being independent and non reflective objects (Healy and Perry, 2000; Sobh and Perry, 2006). As this research is an exploratory single-case-study design, positivism is inappropriate for this research. In the following section, the critical theory paradigm will be explained.

4.1.2 Critical theory

Critical theory “assumes apprehendable social, political, cultural or economic realities incorporating a number of virtual or historical structures of these realities that are taken as real” (Riege, 2003, p 77).
It emphasizes social realities incorporating historically situated structures (Healy and Perry, 2000). Assumptions in this case are essentially subjective and therefore this approach is not value-free (Guba and Lincoln, 1994). In critical theory each individual's constructed reality is so powerful that any external reality remains relatively unimportant (Sobh and Perry, 2006). The following table provides an overview of the elements of the critical theory paradigm that highlight what has been said by the aforementioned scholars.

**Table 24: Elements of critical theory**

<table>
<thead>
<tr>
<th>Paradigm / element</th>
<th>Ontology</th>
<th>Epistemology</th>
<th>Common methodologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical theory</td>
<td>Virtual reality shaped by social, economic, ethnic etc. values.</td>
<td>Subjectivist: Value mediated findings.</td>
<td>Dialogic / dialectical: Researcher changes the world within the participant's life.</td>
</tr>
</tbody>
</table>


However, this paradigm is also inappropriate for benchmarking research as it does "aim for critique and transformation of social, political, cultural...by engagement in confrontation" (Guba and Lincoln, 1994, p 113). This intention clearly does not fit the exploratory intentions of this thesis. Additionally, the incommensurability of perceptions makes this paradigm a road with an end for many researchers (Sobh and Perry, 2006). In the following section, the constructivism paradigm will be explained.

4.1.3 Constructivism

The essence of constructivism is multiple apprehendable realities which are intangible mental constructs of individuals (Riege, 2003). In line with this viewpoint, Healy and Perry (2000) mentioned that constructivism is a specific belief system held in a specific context. The constructivism paradigm is usually suitable for behaviour research (Hunt, 1991). The following table provides an overview of elements related to the constructivism paradigm.
Table 25: Elements of constructivism

<table>
<thead>
<tr>
<th>Paradigm / element</th>
<th>Ontology</th>
<th>Epistemology</th>
<th>Common methodologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructivism</td>
<td>Multiple local and specific constructed realities.</td>
<td>Subjectivist created findings.</td>
<td>Researcher is a passionate participant within the world being investigated.</td>
</tr>
</tbody>
</table>


Sobh and Perry (2006, p 1199) believe that constructivism is particularly inappropriate for business research issues because “managers have to deal with a world that is external...and do not necessarily care about the perceptions of a particular manager”. It is inappropriate for management because this approach excludes concerns about economic and technological dimensions of business (Hunt, 1991).

Additionally, in business a company’s outside environment is always more important than the internal (Gummesson, 2000). Consequently the constructivism research paradigm is inappropriate for this study because not only mental realities are examined but also realities like the Internet. The next section will provide an overview of features related to the realism research paradigm.

4.1.4 Realism

Realists believe that natural and social sciences are capable of discovering reality, although not with complete certainty (Riege, 2003). Realism assumes that there is a "real" world to be discovered, even though it is only imperfectly apprehensible (Guba and Lincoln, 1994; Tsoukas, 1989). According to Perry (1998) research problems addressed in a realism approach are descriptive rather than prescriptive. Furthermore, the realism paradigm is theory building rather than theory testing (Healy and Perry, 2000). The following table provides an overview of elements in the realism paradigm.
Table 26: Elements of realism

<table>
<thead>
<tr>
<th>Paradigm / element</th>
<th>Ontology</th>
<th>Epistemology</th>
<th>Common methodologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realism</td>
<td>Reality is real but only imperfectly and probabilistically apprehensible.</td>
<td>Modified objectivist: findings probably true.</td>
<td>Case studies / convergent interviewing; triangulation, interpretation of research issues by qualitative and some quantitative methods.</td>
</tr>
</tbody>
</table>


The philosophical view of realism is that reality exists independently from the researcher’s mind, that is, there is a reality (Bhaskar, 1978). The external view consists of abstract things that have emerged from people's minds but exist independently from any one of them (Maggee, 1985). Thus realism is looking to achieve an understanding of a reality in which many people operate independently from each other (Sobh and Perry, 2006).

According to Healy and Perry (2000) realism is one of the most important research approaches for business research. Consequently realism will be the research paradigm adopted for this thesis. The next section will provide the justification for the use of realism in this thesis.

4.1.5 Justification for the use of realism

According to Sobh and Perry (2006), there is no objective way of choosing a research paradigm. They suggest researchers to choose a paradigm that is most consistent with a researcher’s own presumption. Realism is the preferred paradigm for case study research for three reasons (Boing, 1994): (1) case study research is usually contemporary, (2) realism does not suffer from the limitations of relativism that constructivism and critical theory do, (3) the commensurability of realism is not so evident in constructivism and critical theory paradigms.
Realism is also a much more appropriate guide for case study research compared to positivism because positivism requires that only observable phenomena can and should be researched (Hunt, 1991). The realist approach is also more suitable for practitioners (Riege, 2003). Furthermore, realism is a relevant paradigm for qualitative researchers in business (Healy and Perry, 2000).

Even though realism is described as being inductive rather than deductive, Sobh and Perry (2006) suggest that prior theory and theory emerging from the data will always be included. Hence the literature review part of this thesis falls in line with the realism approach as well. Furthermore, the qualitative methods that will be used in this thesis suit the realism paradigm and with the quantitative questionnaire survey, triangulation will be reached. The next section highlights the intended research aim and subsequent research questions.
4.2 Research aims

The overarching research aim of this thesis is:

Benchmarking the implementation of E-Commerce
A Case Study Approach

The research questions of have been developed from the literature review and the practical view of E-Commerce at BASF. They are as follows:

1. How is the benchmarking of E-Commerce business operations undertaken at BASF?

2. What are the benefits of benchmarking E-Commerce business operations at BASF?

3. What are the differences between benchmarking E-commerce business operations and traditional forms of benchmarking at BASF?

4. What are the most appropriate ways of implementing the benchmarking of E-commerce business operations at BASF?

The next section of this chapter will highlight the case study methodology.
4.3 Case study methodology

Next to experiments, surveys, histories or other ways of conducting research, the case study methodology is an important way to research social science. All research methods have associated advantages and disadvantages depending on: (1) the type of research question, (2) the control of the investigator has and (3) the focus of the study being contemporary or historical (Yin, 2003). The case study is a way of investigating an empirical topic by following a certain set of procedures (Yin, 2003). Case studies are familiar to both educators and researchers alike as such studies are emotionally involved and at the same time provide action related analysis to learn about complex situations (Christensen and Hansen, 1987).

Nevertheless, according to Parkhe (1993), Tsoukas (1989) and Yin (1993), case study approaches can be used as a research methodology. Yin (1994) emphasizes that this methodology is used when an investigation of a contemporary phenomenon within its real life context is requested and the borders between the phenomenon and the context are not very clear. This seems to be the case for this thesis. Thus a single-case study approach will be implemented. A definition and description of the case study methodology will now be provided together with measures regarding reliability and validity.

4.3.1 Definition of the case study methodology

“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. The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points and as one result it relies on multiple sources of evidence, with data needing to converge in a triangulating fashion” (Yin, 1994, p13).
Stoecker (1991) furthermore points out that the case study approach is not exclusively a data collection tactic or a design feature alone but a comprehensive research strategy. In other words, the case study comprises "an all encompassing method covering the logic of design, data collection techniques and specific approaches to data analysis" (Yin, 2003, p14). Even though there are no generally accepted definitions of case studies in the literature, Yin (1994) suggests the following content for this type of study: (1) empirical enquiry, (2) investigation of a contemporary phenomenon, (3) multiple variables of interest and (4) convergence of data in triangulating fashion.

According to Yin (2003) there are three different kinds of case studies: (1) explanatory case studies, (2) descriptive case studies and (3) exploratory case studies. While explanatory case studies aim to explain what is happening within a certain set of data, the descriptive case studies usually describe particular events. Allison's description of the Cuban Missile Crisis published in 1971 is one of the most well known of these.

When little knowledge has been gained on a particular topic, an exploratory approach is necessary. The usage of exploratory case study design is suggested when it is necessary to gather understanding and knowledge on a topic rather than hypotheses testing (Yin, 1994). As this is the case of E-Commerce benchmarking, a single-case-study exploratory design will be adopted.

Within this case study process, triangulation was achieved by using two rounds of interviews and one questionnaire survey. Study 1 consisted of 20 semi-structured interviews, study 2 contained a questionnaire survey which aimed at generating data from 150 individuals, and study 3 executed six focused expert interviews. The sequence of those three sub-studies is highlighted in the following illustration.
Illustration 17: The research design for this exploratory case study

Building upon knowledge gained during the literature review, the focus of study 1 will be exploratory (Yin, 1993). Study 2 will utilise the insights into the research areas provided in study 1 and build further knowledge based on this information. The right hand side of the above illustration shows the exploratory and confirmatory focus of study 3 (Miles and Huberman, 1994). The split in three studies also provided a maximum degree of triangulation for this thesis.

This three-step exploratory and confirmatory approach based on theory derived from the literature review is also consistent with the realism paradigm of this thesis as it searches for analytic generalization rather than statistical generalization (Easton, 1994; Yin, 1994). Case studies can include a mix of qualitative and quantitative methods (Yin, 2003). Hence the approach of this thesis is in line with the suggested framework of the case study methodology. This use of different sources of evidence also is a major strength of the case study approach (Yin, 2003). The following section of this chapter will provide the justification for the use of the single-case-study approach.
4.3.1.1 Justification for the use of the single-case-study methodology

Case studies have been a common research strategy in areas of psychology, sociology and political science and in particular in business (Ghauri and Gronhaug, 2002). This is the case for E-Commerce benchmarking. Case study approaches should be used when answering "how" and "why" questions. According to Yin (1994) these kinds of questions are more exploratory as is the case in this thesis with the research aim being: "benchmarking the implementation of E-Commerce". This viewpoint is also shared by Parkhe (1993a) who states that "how" and "why" questions are more exploratory and suited to the utilization of a case study approach. In contrast "what", "who" and "where" questions should be analyzed by experiments, survey or archival analyses (Hedrick et al, 1993).

Apart from the type of research question, the research paradigm also plays a role in determining the research approach. According to Perry (1994), case study research fits within the realism paradigm which is the chosen paradigm for this thesis. Perry et al (1999) and Hunt (1991) add that realism is an appropriate paradigm to research social science phenomena. As the topics E-Commerce, benchmarking and E-Commerce benchmarking relate to organizations and managerial processes, a case study approach is seen as a good fit. Yin (2003) believes that the case study method permits researchers to retain complete and meaningful characteristics of real life events. Besides that case study approaches commonly also follow realistic modes of inquiry (Riege, 2003).

The choice for a single case study design is also justified when one of the following three conditions applies (Yin, 2003): (1) it represents the critical case in testing a well formulated theory, (2) it represents an extreme or unique case or (3) it represents a representative or typical case. As BASF is described as "The Chemical Company" it can be argued that condition number 3 can be applied. Hence a single case study will be chosen.
As the focus of the study will be sales and marketing organizations, it can be argued that the single-case-study is the appropriate one for this research. However, even though the multiple case approaches are favoured by some researchers (Eisenhardt, 1989; Yin, 1994), Yin agrees that a single-case-study approach can be applied if the appropriateness of two or more theories can be tested within this one case. The following section of this chapter indicates limitations of the case study methodology.

4.3.1.2 Limitations of the case study methodology

Although the number of case studies conducted has increased over the years, case studies are a subject of scepticism in the scientific community (Parkhe, 1993). The two most popular concerns are the lack of rigor and the weak foundation for scientific generalization (Yin, 1994). The lack of rigor is also emphasized by Eisenhardt (1991), because case studies seem to rely on telling stories rather than scientific research from his point of view. However, Rosenthal (1966) and Dillmann (1978) believe that sloppiness of logic, inappropriate documentation and investor bias can occur in experiments or surveys as well.

To achieve theory generalization from a case study approach, replication is a crucial part. However, as Blalock (1984) points out, those replications are rarely observed as almost all funding is short term in nature. In any case, Eisenhardt (1989) suggests that, if faced with a large quantity of data, researchers are tempted to develop theories which capture everything from one study only. In addition to that, for cases in which only one case study is used, Leedy and Ormrod (2005) point out that any generalizations which are made are only of tentative nature and must await support from future studies. The reliability of a case study approach might be challenged as people are not as static as measurements (Riege, 2003). Additionally, they require preliminary research of the history, culture and language of the people who are investigated (Wright et al, 1988).
According to Parkhe (1993) a single approach to theory development as in case studies is not sufficient enough and not capable of establishing solid theory that maximizes the quality criteria of construct validity, internal validity, external validity and reliability. Consequently, validity and reliability issues need to be addressed with extra care. Easterby-Smith et al (2008) point out that a clear research design prior to any data collection enhances the degree of validity of case-study approaches to those of other, more positivist approaches.

Despite the limitations, a systematically executed case study approach helps to build a chain of triangulated evidence and makes replications by other researchers possible (Parkhe, 1993). Some authors (e.g. Eisenhardt, 1989) have published case studies with results that “are equal in credibility, rigor and persuasive power to any other research method” (Parkhe, 1993a, p 259).

Hence the suitability of the case study approach for this thesis is not questioned at this point. According to Reynolds (1971) good research design and good research questions take priority over tidy statistics in any case. Nevertheless, as mentioned before validity and reliability concerns need to be addressed for this study to deal with those concerns that have been expressed by the aforementioned scholars. The way in which this will be achieved is described in the following section.

4.3.2 Validity and reliability concerns

The data that will be collected during studies 1-3 has to be reliable and valid (Kamenz, 1997; Leedy, 1989). Obeying these two key conditions will ensure that this research can come to a valid and reliable conclusion. The types of validity include construct-, internal- and external validity (Kidder and Judd, 1986). The discussion on validities is not straight forward though. Lincoln and Guba (1985) as well as Creswell (1998) have actually suggested that the term validity should rather be replaced by words like credibility, dependability, confirmability and transferability instead. Guba and Lincoln (1988), Lather (1991) and Wolcott (1994) have also questioned the relevance of validity to qualitative design in general.
Regardless of the research methodology that is used, any researcher must think about the validity and reliability of his study (Leedy and Ormrod, 2005). DeVellis (1991) states that various tests should be conducted to prove that the measurement actually measures what it intends to measure. Incorrect measurements that affect the validity and reliability of a study can be caused by characteristics of respondents, the situational factors of the research environment or the field researcher himself (Strydom et al, 2000).

According to Easterby-Smith et al (2008) there is an underlying anxiety amongst researchers that their studies do not withstand challenges from outsiders. Hence specific attention needs to be given to this area. Table 27 provides an overview of strategies that generally support the validity of a research project (Leedy and Ormrod, 2005). It also shows which actions have been taken for this thesis.

**Table 27: Five generic strategies to generally support validity**

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Description</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive time in the field</td>
<td>Study phenomena and hypotheses in the field extensively with others.</td>
<td>Extensive literature review and business experience of researcher.</td>
</tr>
<tr>
<td>Negative case analysis</td>
<td>Search for cases which contradict existing hypotheses.</td>
<td>Critical review of the literature.</td>
</tr>
<tr>
<td>Thick description</td>
<td>Sufficient description of the situation so that conclusions become apparent.</td>
<td>Appropriate choice of methodology and extensive analysis.</td>
</tr>
<tr>
<td>Feedback from others</td>
<td>Exchange of opinions with colleagues to test agreement or disagreement.</td>
<td>Choice of triangulative approach.</td>
</tr>
<tr>
<td>Respondent validation</td>
<td>Review of conclusions with parts of the sample or selected individuals.</td>
<td>Questionnaire development and conclusion check with the President.</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis from Leedy and Ormrod (2005)

As can be seen in the above table, a number of actions have been executed for this thesis to ensure that the conclusions are valid. Among those actions has been an extensive literature review to identify relevant gaps, the selection of the triangulation approach for this thesis and the feedback discussions with the President of the business unit "XYZ" at BASF.
A high degree of validity and reliability does not only boost the confidence of the researcher in the data presented, it also allows using this data efficiently during the decision taking process (Riege, 2003). Yin (2003) suggests the following three principles that help establishing a maximum degree of validity and reliability for this thesis: (1) using multiple sources of evidence (triangulation), (2) creating a case study database and (3) maintaining a chain of evidence. Those principles will be addressed in more detail during the sections relating to specific types of validity and reliability. The next section of this thesis will discuss construct validity.

4.3.2.1 Construct validity

As case studies have often been criticized for failing to develop a sufficient set of operational measures, construct validity in particular is of importance for case studies (Yin, 2003). For the credibility of this case study approach it is crucial that the survey is based upon empirical substantiation. Therefore the so-called construct validity, which can be defined as the extent to which an operationalisation measures the concept it is supposed to measure (Bagozzi et al, 1991), will play an important part for the quality of the outcome of the thesis.

Construct validity indicates “whether operational variables adequately represent theoretical constructs” (Steckler and McLeroy, 2008, p 9). It shows the degree to which the scale represents the concept it is supposed to measure (Davis, 2005). It is interested in the degree to which the construct itself is actually measured as well (Leedy, 1989).

To enhance construct validity in case study approaches, researchers need to refrain from making subjective statements which are likely to occur as researchers usually have close contact with the organizations that are examined (Riege, 2003). Table 28 provides an overview of actions that have been taken for this thesis to enhance construct validity. Those actions will be explained in more detail in the paragraphs following the table.
Table 28: Three actions to maximize construct validity

<table>
<thead>
<tr>
<th>Criteria / validity</th>
<th>Suggested actions</th>
<th>Research phase</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct validity</td>
<td>Triangulate (1/3) multiple resources of evidence to test for convergence.</td>
<td>Data collection</td>
<td>Usage of open-ended interviews.</td>
</tr>
<tr>
<td></td>
<td>Establish chain of evidence (2/3).</td>
<td>Data collection</td>
<td>Explicit links between the questions or sections; quotation highlights.</td>
</tr>
<tr>
<td></td>
<td>Have key informants (3/3) review draft of the case study report.</td>
<td>Composition / Conclusion</td>
<td>Involvement of respondents of the studies and the President.</td>
</tr>
</tbody>
</table>


The use of multiple sources to enhance construct validity is mentioned by Flick (1992) and Peräkylä (1997). Hirschman (1986) further confirms the use of a chain of evidence as an additional measure to increase construct validity. **Triangulation (1/3)** in the case of this thesis has been achieved by using qualitative data from the semi-structured interviews as well as quantitative data from the third study, the questionnaire survey.

**A chain of evidence (2/3)** supports construct validity by enabling other researchers "to follow the derivation of any evidence from initial research question to the ultimate case conclusion" (Yin, 2003, p 105). The chain of evidence in the case of this thesis has been achieved by (1) providing citations, (2) documentation of both qualitative and quantitative interviews and (3) quotations from scholars and respondents of the studies.

Furthermore **key informants (3/3)** were asked to review the minutes of the interviews after they had been typed up. Additionally, the President of the business unit "XYZ" was involved in setting up the questionnaire based on a presentation that provided information on the conclusions from study 1. Also, a draft of the questionnaire for study 2 was presented and finally approved by the President of the business unit. The next section of this chapter will highlight how internal validity was enhanced.
4.3.2.2 Internal validity

Internal validity refers to the extent to which a researcher can draw conclusions from the data (Leedy and Ormrod, 2005). It represents the freedom from bias in forming the conclusions (Leedy, 1989). Internal validity can be defined as the degree of confidence that the results are true under the given circumstances (Davis, 2000). It focuses on determining if the findings of the study make sense (Miles and Huberman, 1994) and relates to systematic factors of bias (Easterby-Smith et al, 2008). Internal validity should be the main priority for research (Steckler and Mc Leroy, 2008). However, internal validity does not have the same degree of importance for case study design as construct validity because it is only related to explanatory cases (Yin, 2003). Nevertheless, the internal validity might be affected by events outside the investigation, the timing of the interviews, the sample composition or physical conditions of the respondents (Davis, 2000). The following table shows actions which increased internal validity in this thesis. Those actions will be explained in more detail in the paragraphs following the table.

<table>
<thead>
<tr>
<th>Criteria / validity</th>
<th>Suggested actions</th>
<th>Research phase</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal validity</td>
<td>Do within case analysis (1/2).</td>
<td>Data analysis</td>
<td>Pattern matching.</td>
</tr>
<tr>
<td></td>
<td>Do explanation building (2/2), search for &quot;why&quot; evidence.</td>
<td>Data analysis</td>
<td>Usage of diagrams on emerging theory while ruling out alternatives.</td>
</tr>
</tbody>
</table>


Even though internal validity relates to explanatory causal studies only (Yin, 1994), pattern matching in particular has been utilised for case analysis (1/2) in this thesis to ensure internal validity regardless of the fact that this study is of exploratory nature. For explanation building (2/2) purposes, the use of diagrams and illustrations has been added to the analysis phase of this study (Miles and Huberman, 1994).
Together with a cross check of results (Yin, 1994), the internal validity of this thesis has been maximized. As for all other types of validity, measurement, study design and representative sampling are other standard options for increasing internal validity (Bernard, 2000). Those have also been applied in this single-case-study design. The next section will describe how the external validity has been supported.

4.3.2.3 External validity

External validity describes the extent to which the conclusions drawn from the study can be generalized (Leedy and Ormrod, 2005). It is concerned with the external extrapolation of research findings beyond the actual study itself (Riege, 2003; Easterby-Smith et al, 2008). External validity addresses if the conclusions of a study are transferable to other contexts (Lincoln and Guba, 1985).

The external validity problem has been a major barrier for conducting case studies as critics usually state that case studies offer only an insignificant basis for generalization (Yin, 2003). Table 30 provides an overview on how external validity was maximized. More detailed information on those matters will be presented in the paragraphs following the below table.

Table 30: Three actions to maximize external validity

<table>
<thead>
<tr>
<th>Criteria / validity</th>
<th>Suggested actions</th>
<th>Research phase</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>External validity</td>
<td>Avoid bias for the research topics by sampling appropriately (1/3).</td>
<td>Study design</td>
<td>Appropriate mix of respondents.</td>
</tr>
<tr>
<td></td>
<td>Theoretical sampling (2/3) from specified population to constrain variation.</td>
<td>Study design</td>
<td>Choice of experts for study 3.</td>
</tr>
<tr>
<td></td>
<td>Comparison of evidence (3/3) with themes that emerged from the literature.</td>
<td>Data analysis</td>
<td>Overview of themes and conclusions.</td>
</tr>
</tbody>
</table>

Source: Parkhe (1993a) developed from Yin (1994) and Eisenhardt (1989); Easterby-Smith et al (2008)
To avoid bias, the **appropriate sampling** (1/3) of candidates for study 1, 2 and study 3 has been related to the nature of each study. For study 3, the background of the respondents was very closely related to the topic E-Commerce, the so called **theoretical sampling** (2/3). For the exploratory study 1 and study 2, the choice of participants has been more flexible and included business background and experience at BASF.

To increase the level of external validity, the **evidence** that was highlighted during the data collection phase was **compared** (3/3) with existing literature and vice versa. Similar topics from research findings and literature helped to increase the likelihood of generalisation opportunities. Marshall and Rossman (1989) further point out the importance of the definition of scope and boundaries which need to achieve analytical generalizations rather than statistical generalizations. According to Nunnally (1978) reliability is a necessary precondition for the validity of a study. Hence it will now be discussed how reliability has been secured.

4.3.2.4 Reliability

Reliability refers to the repeatability of a study by another researcher with the same or similar results (Riege, 2003). Reliability is differentiated from validity in that it relates to accuracy rather than consistency (Leedy, 1989). It refers to the consistency and stability of a score from a measurement scale (Davis, 2000). It is a key factor in determining the precision and coherence of a survey (Hair et al, 1998).

The underlying issue in this case is whether the process selected for this study is stable over time and across researchers and methods (Miles and Huberman, 1994). A key feature to enhance the reliability of any study is documentation (Yin, 2003). The below table shows further actions that have been undertaken to increase the reliability of the study. More detailed information on those actions will be presented in the following paragraphs.
Table 31: Three actions to maximize reliability

<table>
<thead>
<tr>
<th>Feature / reliability</th>
<th>Suggested actions</th>
<th>Research phase</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Develop case study database (1/3).</td>
<td>Data collection</td>
<td>Formally assembled qualitative and quantitative evidence.</td>
</tr>
<tr>
<td></td>
<td>Use case study protocol (2/3).</td>
<td>Data collection</td>
<td>Protocol of interviews based on tape records.</td>
</tr>
<tr>
<td></td>
<td>Alternative test (3/3).</td>
<td>Data collection</td>
<td>Perform the same kind of measurement to the original measurement.</td>
</tr>
</tbody>
</table>


A case study database (1/3) was set up recording the minutes of the interviews from study 1, 2 and study 3. Furthermore all responses from the questionnaire survey were saved in the order they were received. Le Compte and Goetz (1982) pay particular attention to this matter and state that observations and actions should be recorded as concrete as possible to increase reliability.

Yin (1994) further pointed out that the use of a semi structured case study protocol (2/3) supports the reliability of a study too. Both these points were implemented during this thesis. Besides that, the triangulative approach of this study can be considered as the alternative testing (3/3) of similar measurements during the course of the case study. Additionally, the recording of data mechanically on a tape recorder was yet another measure to support reliability (Riege, 2003).

The previous sections of this thesis discussed general reliability and validity concerns for this thesis. In this context 11 actions have been implemented to increase both reliability and validity for the case study approach. Those actions included appropriate sampling methods, the usage of case study databases, explanation building and evidence comparison. The following section of this thesis will focus on the research plan that was established.
4.3.3 Research plan for the case study methodology

According to Yin (2003) six basic sources of evidence are available within a case study approach: (1) documentation, (2) archival records, (3) interviews, (4) direct observations, (5) participant observation and (6) physical artifacts. For this thesis three sources have been chosen: interviews, a survey study and internal documentation on the research topic. A display of the research plan for this thesis including the features of this combined approach followed through to the conclusion is presented in illustration 18. Afterwards, each of the different phases will be explained in more detail.
Illustration 18: Research model of this thesis

<table>
<thead>
<tr>
<th>Research methods</th>
<th>Sample</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature review</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phase 1 Secondary research</td>
</tr>
<tr>
<td>Questionnaire survey (study 2)</td>
<td>Managers from different business units</td>
<td>Phase 2 Primary data collection (exploratory)</td>
</tr>
<tr>
<td></td>
<td>Members of the sales department in business unit “XYZ”</td>
<td>Phase 3 Primary data collection (exploratory)</td>
</tr>
<tr>
<td></td>
<td>E-Commerce experts from different business units</td>
<td>Phase 4 Primary data collection (confirmatory)</td>
</tr>
<tr>
<td></td>
<td>Presentation of results for studies 1, 2 and 3</td>
<td>Phase 5 Analysis and presentation of data collection</td>
</tr>
<tr>
<td></td>
<td>Discussions of findings for research questions 1, 2, 3 and 4</td>
<td>Phase 6 Conclusions, limitations, further research</td>
</tr>
<tr>
<td></td>
<td>Conclusions and implications</td>
<td></td>
</tr>
</tbody>
</table>
In **phase 1** of the research model, the literature review addressed the two main bodies of literature, E-Commerce and benchmarking as well as the research theory E-Commerce benchmarking. According to Yin (2003), theory development in this phase is essential in case study design. Additionally, emerging gaps in the literature have been identified. Based on those gaps, research questions have been formulated.

In **phase 2** of this research, the semi-structured interviews were executed. These were primarily designed to further explore the areas of E-Commerce, benchmarking and E-Commerce benchmarking. As a sample, managers with strong work experience from different backgrounds were selected. During this phase, one objective was to generate additional topics which were to be analysed further during the questionnaire survey.

Once the semi-structured interviews were executed, the research questions were again addressed in **phase 3** with a questionnaire survey conducted at business unit "XYZ". A pre-test of the questionnaire has been conducted with the President of the business unit “XYZ” before phase 3 was started. Furthermore, once the results of the questionnaire survey have been determined, they have been presented again to the President of the business unit to test if additional themes for study 3 would emerge. The literature review and semi-structured interviews in combination formed the basis for the next part of the research, the focused expert interviews.

During **phase 4** the third step of data collection was implemented. Focused expert interviews with key E-Commerce personnel were implemented to further the knowledge on E-Commerce benchmarking in particular. The insight which was gained during phase 2 and phase 3 of the study was utilised to establish the set of questions used during phase 4 in an attempt to ensure a high level of triangulation for this thesis.
Phase 5 presented the results of each study based on an analysis conducted on the data which has been generated. This phase of the study then discussed the findings in accordance to each of the four research questions.

Phase 6 completed this thesis by highlighting conclusions and implications from the analyses of study 1, study 2 and study 3 and by presenting the limitations and areas for further research. Important parts of this thesis are ethical considerations and quotation referencing. They will be explained in more detail in the following section.

4.3.4 Ethical considerations and quotation referencing

Whenever human beings are subjected to research, the question of ethical standards needs to be raised (Leedy, 1989). Ethics in this particular case means "the proper conduct of the research process in business inquiry-rights and responsibilities of the various parties involved in the research" (Davis, 2005, p 460). According to Perry (1998) openness with the interviewees and appropriate treatment of confidential information are key in respect to ethical considerations of any paper. Emory and Cooper (1991) mention that those and other business ethics need to be considered at the beginning of the study because ethics ultimately affect the quality of data that can be collected (Davis, 2005).

To ensure that ethical standards are met within the frame of this thesis, the researcher took the following measures: (1) respondents were informed of the purpose of this thesis by receiving a print-out version of the thesis at the time or with an electronic version of the table of contents, (2) respondents have been asked if the interviews can be taped, (3) a typed version of the taped interview was sent to the respondent to ascertain whether their views are reflected in the protocol and (4) the confidentiality and privacy of the interviewees was ensured by not stating their names and respective organizations in this thesis.
Simple considerations like fairness, honesty, openness of intent or disclosure of methods also belong to those key features that can ensure a high level of ethical standards within research (Leedy, 1989). These principles do apply both to the researcher and the respondent at the same time (Davis, 2000). In addition to the adherence to those principles, quotations will be referred to with numbers (e.g. "interview 1", "interview 2" etc.).

The previous sections of chapter 4 addressed validity and reliability issues for this thesis. Actions to ensure validity and reliability have been introduced too. The choice of a single-case-study approach has been justified and the overall research plan has been presented. The next section takes a look at the role of language in this thesis.

4.3.5 The role of language in this thesis

When undertaking primary data collection, researchers must be aware of some specific issues to make sure that the quality of analysis and conclusions gathered from the information is of highest standards. Language, local customs or culture represent opportunities and concerns to the researcher at the same time. According to Davis (2005, p 319):

"If international or multicultural data collection is needed, be sure that the aspects of culture, language, and customs are taken into consideration in the design and conduct of the study".

As this thesis has been conducted at an international company across various sites and subsidiaries, the aforementioned aspects could be relevant for the process of data gathering. Considering that the interviews and questionnaire were conducted in English within a sample of mostly non-native English speakers, the language particularly can become a problem.
However, as English is the official language of the company, it was felt that issues connected to the understanding of and response to questions in English did not pose a threat to the quality of information. However, there are some aspects which possibly could have been addressed both for the questionnaire (1/2) of study 2 as well as the interviews (2/2) of study 1 and study 3.

According to Del Greco et al (1987, p 817), “translation of questionnaires (1/2) is required when information is collected from people of different language groups”. This can be achieved by translating and back-translation of the questionnaire (Chang et al, 1999). Nevertheless, due to the fact that study 2 was conducted across Europe, it did not seem feasible to translate and retranslate the questionnaire into every possible language, or even the major ones (e.g. German, Spanish, French and Italian).

In any case, even if a questionnaire is translated, it would be wrong to assume that “the translated items are valid simply because they have been translated” (Griffie, 2001, p 3). Furthermore, Pena (2007, p 1255) points out that “the establishment of linguistic equivalence through translation techniques is often not sufficient to guard against validity threats”. Consequently, after consideration, this option ultimately was rejected by the researcher.

Additionally, even with a good knowledge of both English and the techniques of translation/re-translation of a questionnaire, there can still be inaccuracies in meaning. This can be the case even when the word is written in almost exactly the same way. According to Leplege, especially in French / English translations, the aforementioned issue can arise (1998, p 1019):

"It is extremely common for a word in English to have an equivalent in French in terms of form (being from the same root) but for the two words to cover different areas of meaning, following divergent evolution from the historical root".
Should this occur either in French or any other native language of the sample, the response to a question could be wrong because the question might be misunderstood. In such a case, the quality of the questionnaire design is crucial to minimize the number of potential errors by using clear language, closed questions and avoidance of abstract terms. Those measures were implemented especially for study 2. However, even with perfect translations, misunderstandings can occur which is one of the intrinsic downsides of questionnaires compared to interviews.

In case of the interviews (2/2), the choice of language can also become an issue. The researcher being German poses a potential validity and reliability concern as well, e.g. when initial thoughts in German were translated into English. Additionally, English questions from the questionnaire were translated into German if this was the respondent's first language. In this case, the interviews were conducted in German as it would have created a strange atmosphere for the conversation if two native German speakers expressed their thoughts in English. Generally, the language issue was not significant for the following three reasons.

Firstly, the English of all respondents in study 1 and study 3 was either native or very fluent. The non-native respondents use English on an almost daily basis as their job role demands from them to be in touch with colleagues from across the world and so use English as their working language.

Secondly, the language was not considered to be a problem by any of the participants. They were able to express their views quite fluently and never needed to ask for clarification of a term or for rewording of a question. This could be seen as proof of sufficient English levels within the sample.
Thirdly, during the preparation phases of study 1 and study 3, the President of the business unit "XYZ" did not express any concern about the English capabilities of his team. Theoretically, for all studies, the participants could have been asked to provide the researcher with the result of their last English proficiency test. However, because the English capabilities of all participants were very good, it was felt that this type of request could have created an atmosphere of mistrust or surprise. To conclude the validity and reliability of the study was not considered threatened due to matters associated with the use of the English language.

However, to ensure the best possible understanding of the questions and the questionnaire as well as the responses, three additional measures were implemented during and after the interviews: (1) the researcher specifically asked the respondents if the questions were understood, (2) the researcher repeated the answers of the respondents to make sure their response had been correctly understood and (3) after the interview had been completed, the researcher re-established contact with selected respondents where necessary. The following section provides detailed information about the semi-structured interviews in study 1.

4.3.6 Study 1: Semi-structured interviews

For study 1, semi-structured interviews have been chosen as the means to collect data related to the research questions. Interviews are the most common way of gathering information in research (Kamenz, 1997). The interview is considered as the most flexible and versatile of all communication methods. According to Yin (2003) they are also essential sources of case study information. Brown (1980) states that an interview might either be on individual or group basis. He identifies the later as the focus group interview. Even though it might be the most expensive way of research, the advantages ultimately outweigh the costs (Watson, 1988).
The interviews for this thesis were conducted in a semi-structured way which is a fluid rather than rigid kind of interviewing (Rubin and Rubin, 1995). Semi-structured interviews were also an important part of the triangulation approach of this thesis. The semi-structured interview will be explained in more detail with the sequence shown in the following illustration.

**Illustration 19: Structure of chapter 4.3.6**

This section of chapter 4 will start with an explanation of the purpose of study 1. Next, the justification for the choice of semi-structured interviews will be presented including limitations and actions to overcome those limitations. A detailed description of study 1 will also be given. Additionally, the type of data analysis will be explained. This section closes with an overview on implications of study 1 for the general findings of this study.
4.3.6.1 Purpose study 1

One to one discussions between the researcher and the responded are the most common form of interview in research theory. Essentially, interviews comprise of a non-directed discussion in which the informant is rather encouraged to talk freely about the topic instead of simply answering "yes" or "no" (Chisnal, 1992). Nevertheless, the format of such an interview can vary from a highly structured approach to something of a free conversation (Sampson, 1996).

In case of this thesis, the author attempted to keep the conversations as fluent as possible and only restrict or guide the interview in a certain direction when absolutely necessary. The questions of the semi-structured interviews were of an open nature and the emphasis was on the respondent to explain his views on the topics E-Commerce, benchmarking and E-Commerce benchmarking. It was attempted to gain a more practical insight into those three topics. The nature of the semi-structured interviews was exploratory.

The results of the semi-structured interviews provided reassurance of the sensefulness of the research questions that later on during the quantitative part will be referred to. Consequently, study 1 can also be considered as a test run for study 2. In the following section the selection of semi-structured interviews for study 1 will be justified.

4.3.6.2 Justification for the use of semi-structured interviews

The main aim of an interview generally speaking is to gather an understanding on a particular topic from a respondent's perspective including their viewpoint and the reasoning for their viewpoint (King, 2004). As Kvale (1996) adds, interviews aim for collecting information which captures the meaning and interpretation of a topic related to the research questions.
A semi-structured interview is an appropriate method for generating data when it is necessary to understand the constructs that the respondents use as a basis for their opinion and when the aim of the interview is to develop an understanding of the respondent's world (Easterby-Smith et al, 2008). According to Miles and Huberman (1994), the advantages of semi-structured interview also include the ability to study processes for the data collected over a reasonable period of time as well as the ability to allow adjustments for issues that might evolve during the study.

Semi-structured interviews are furthermore used because of the nature of the research questions and the very limited existing theory available to answer them. Semi-structured interviews are very appropriate in cases when accurate information is necessary like for this thesis (Easterby-Smith et al, 2008). Hence the semi-structured interview technique is considered a perfect fit for this thesis. Possible limitations of study 1 will now be explained.

4.3.6.3 Limitations study 1

Interviews can be exposed to issues of bias, poor recall and poor or inaccurate articulation (Yin, 1994). Another limitation is that interviews emphasize validity while downplaying reliability (Desphande, 1983). During any personal interview, avoiding bias is one of the key challenges (Easterby-Smith et al, 2008). In order to achieve that, the process of the interviews must be set up in a way that it does not influence the respondents. Furthermore, interview evidence must be triangulated with multiple data sources (Parkhe, 1993a).

Table 32 provides an overview of options to overcome the limitations of semi-structured interviews and also indicates the chosen ones for this thesis. These actions will be elaborated further in section 4.3.6.4.2 (planning study 1).
Table 32: Actions to overcome the limitations of semi-structured interviews

<table>
<thead>
<tr>
<th>Feature / phase</th>
<th>Suggested actions</th>
<th>Author</th>
<th>Applied in this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Determine specific timeframes (1/3) for conducting the interview.</td>
<td>Davis (2005)</td>
<td>Interview dates were concluded early and reconfirmed prior to the interview.</td>
</tr>
<tr>
<td>Planning</td>
<td>Prior introduction (2/3) of the interviewer to the respondents.</td>
<td>Alwin (1973)</td>
<td>The researcher did introduce himself long before the interview and again at the event.</td>
</tr>
<tr>
<td>Implementation</td>
<td>Appropriate language (3/3), good location, awareness of social interaction.</td>
<td>Easterby-Smith et al (2008)</td>
<td>Semi-structured questionnaire with open questions was used.</td>
</tr>
<tr>
<td>Implementation</td>
<td>Call-backs (recontacting refused interviews).</td>
<td>Dunkelberg and Day (1974)</td>
<td>It was not necessary to implement this action, but it was remembered as an option.</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

The successful implementation of a semi-structured interview also depends very much on the social skills of the researcher as well as his or her capacity to organize and structure the interviews accordingly. Researchers furthermore refer to the higher costs and effort that goes hand in hand with the implementation of semi-structured interviews as being limiting, e.g. to the sample size of the study (Easterby-Smith et al, 2008). However, with the combined qualitative and quantitative approach of this thesis, the limitations of the semi-structured interview technique can be minimized (Yin, 2003). Study 1 will now be described in more detail.

4.3.6.4 Description study 1

This section of chapter 4 is divided in three parts. The first part will describe how the sample has been chosen for study 1. The second part will aim at providing information on how the series of interviews have been planned. The third section will focus on how the interviews have been managed.
The semi-structured interview contained 29 questions as a guideline for the interviewer without them being a framework for the respondents. The respondents were given the opportunity to speak freely about the relevant topics and the questions served more as kick-off questions rather than a list to be ticked off.

The questioning framework for the semi structured interviews was divided into four parts: (1) general introduction, (2) benchmarking, (3) E-Commerce and (4) E-Commerce benchmarking. For detailed information about the semi-structured questionnaire, please refer to appendix 1. All interviews were recorded with a tape recorder and typed after the interview had been conducted to make it most convenient and least time consuming for the respondent. The following section will provide information on the sample selection for the semi-structured interviews.

4.3.6.4.1 Sample selection study 1

As stated by Brown (1980), a sample result is subject to error. For practicality reasons and because of availability issues, the number of respondents needed to be reasonable. Hence the sample had to be kept both reasonably small but still big enough to approve or disapprove the research questions. Strydom (1997) states that there are no fixed rules concerning the number of units that needs to be included. Brown (1980) points out that the decision maker must be confident with the sample size. Qualitative researchers usually do work with small samples (Miles and Huberman, 1994).

The sample size of study 1 was determined to be 20. As outlined by Eisenhardt (1989) and Glaser et al (1967), at some point during interviews, incremental learning is minimal as the researcher is observing phenomena seen before. The choice of the informants was guided by purposeful selection (Patton, 1990).
This approach uses criteria (e.g. work experience on the topic) to ensure that the respondent can answer the research questions (Maxwell, 1996). Respondent recruitment was conducted within working circles of the topics benchmarking and E-Commerce. The literature calls this procedure a non-probability sample (Kamenz, 1997).

Additionally, the researcher looked for individuals who had been educated on business matters as for their background. As E-Commerce, benchmarking and E-commerce benchmarking are mostly business related the respondents preferably had an according background. Nevertheless, some respondents from other backgrounds have also been interviewed in order to include potentially different viewpoints as well.

Furthermore, the participants of the study needed to have a work experience with BASF of more than 10 years because the use of benchmarking traditional businesses goes back many years. Again, some respondents did not fulfil this requirement. A small number of respondents with a smaller number of years of experience within BASF Group had also been included in study 1. Once the sample size was set, the interview could be planned.

4.3.6.4.2 Planning study 1

Before each interview could be conducted, a timeframe (1/3) and a place had to be agreed upon with the informants. To make this exercise most convenient for each respondent, the location of the interview has always been the location of the office of the individual. The consideration of location of the interview also related to one of the measures that are suggested to overcome the limitations of semi-structured interviews. As can be seen from the below table, study 1 has been executed internationally.
Table 33: Locations of interviews

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASF South Africa Pty ltd</td>
<td>Johannesburg</td>
<td>4</td>
</tr>
<tr>
<td>BASF AG</td>
<td>Ludwigshafen</td>
<td>5</td>
</tr>
<tr>
<td>BASF Coatings SA</td>
<td>Clermont (near Paris)</td>
<td>3</td>
</tr>
<tr>
<td>BASF Österreich GmbH</td>
<td>Vienna</td>
<td>2</td>
</tr>
<tr>
<td>BASF Coatings AG</td>
<td>Münster</td>
<td>6</td>
</tr>
</tbody>
</table>

The subsequent timing of the interviews has been agreed upon via email or telephone and depended very much on the travel schedule of both the researcher and the respondent. A few days prior to each interview, the researcher re-confirmed time and place with the respondent to make sure that late changes in the agenda of the respondent did not co-inside with the initial time and date agreed upon with the researcher. Should that have been the case, the interview time and date could have been changed in due time accordingly. However, this option never had to be chosen.

To be able to tape the interviews, the researcher has acquired a recording device. This device ensured that no information was lost while the interview progressed. The previously mentioned interview guideline has been developed very much in advance to the interview to make sure that it was ready on time. Once the planning of the interview has been completed, study 1 could begin.
4.3.6.4.3 Managing study 1

The implementation of the interview phase started in August 2003 and finished with the execution of interview number 20 in July 2004. This comparatively long time-frame of the study was due to the availability of the respondents and the travel schedule of the researcher. As the interviews needed to be executed face to face, finding agreement on a time and location proved very challenging.

The first step during the interviews was to connect with the respondent. As lined out by Lopez (1975) and Sekaran (1992), establishing an initial rapport increases the respondent’s receptiveness to the interview. The connection to the participant was achieved firstly by the interviewer introducing himself. This action also refers to one of the measures implemented to overcome the limitations of semi-structured interviews. In addition the purpose of the thesis and the contribution of the respondent were explained. The researcher also showed a print out sample of this thesis at that time. Furthermore the informant was assured full anonymity as suggested by Cannell et al (1966).

It was also ensured that the respondent and the researcher have the same understanding of the key terms in the questionnaire (e.g. transaction costs or competitive advantage). Appropriate language has also been used, utilising familiar business terms and “business-like” conversation style. This action also refers to one of the measures implemented to overcome the limitations of semi-structured interviews. Overall it was attempted to create an environment in which the responded felt free to speak openly. An interview did last between 30 minutes and 45 minutes.

Because the interviews needed to be taped, the participants were also asked if this was acceptable to them. Dick (1990) as well as Lincoln and Guba (1985) belong to those researchers who created some controversy about the advisability to use a tape recorder during an interview in case interviewees might feel uncomfortable because of that.
The purpose of the tape recorder for this thesis was to be able to reproduce the interview afterwards and it did not sidetrack or reduce the researcher's attention to the interviewee during the process as suggested by Yin (2003). During the interview, the tape recorder was placed visibly in the middle of the table so that the respondents could switch it off, if they felt necessary to do so. However, during all interviews, this option has never been chosen by any of them.

At the end of each interview the responded was asked to mention any other matter relevant to the topic from his or her point of view. In case these has been neglected during the interview, this last step presented an opportunity for the respondent to make it complete. Shortly after each interview, the interviewer used the audio tape to create a steno-type protocol from each interview. Together with the minutes the researcher took during the interviews, it was ensured that all information that has been given was concluded in the protocol.

Additionally, the minutes of the interviews have been sent to the respondents within two working days to ensure one more time that the data presented in the protocol reflects the course and content of the interview as well. The respondent has also been given the opportunity to correct the minutes of the interview. No respondent did chose to do so.

Moreover, if at any stage during the process of 20 interviews, the result of one particular interview indicated an additional and / or different set of questions was needed for the next interview, the researcher would have changed his set of questions accordingly. However, this did not seem necessary. Once all 20 interviews have been conducted, the analysis of the data could be implemented. The way in which this has been achieved will be elaborated in the next section of this chapter.
4.3.6.5 Data analysis study 1

To draw correct conclusions from data generated during the semi-structured interviews, it is key to choose an appropriate method for analysing this data. However, qualitative data is very often presented over different pages, sequentially and not well ordered (Miles and Hubermann, 1994). This can become quite problematic for the reader (Mulhauser, 1975). Table 34 provides an overview of different ways in which qualitative data can be analysed.

Table 34: Options for analysing qualitative data

<table>
<thead>
<tr>
<th>Feature / type of analysis</th>
<th>Description</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content analysis</td>
<td>Searches for content, has causally linked variables and aims for clarity and unity.</td>
<td>Historical artefacts.</td>
</tr>
<tr>
<td>Grounded analysis</td>
<td>Understands context and time, has holistic associations and is more inductive.</td>
<td>Interview data.</td>
</tr>
<tr>
<td>Discourse analysis</td>
<td>Does not focus exclusively on conversations but also its surroundings.</td>
<td>Broader social content of a conversation.</td>
</tr>
<tr>
<td>Argument analysis</td>
<td>Reflection on how managers describe events.</td>
<td>Management events.</td>
</tr>
<tr>
<td>Narrative analysis</td>
<td>Analysis how people describe events.</td>
<td>Organizational studies, sequences of events.</td>
</tr>
<tr>
<td>Conversation analysis</td>
<td>Analysis how conversations evolve.</td>
<td>Transcripts of dialogues between two or more people.</td>
</tr>
</tbody>
</table>

Source: Developed from Easterby-Smith et al (2008)

No specific prescriptive approach to analyse data of semi-structured interviews is given by the literature. Strauss (1987) even believes that standardisation of methods would rather constrain the research process. A preference for a flexible way of analysing data is also emphasised by Leyder (1993). Because this is an underresearched area, a combination of different analyses is seen most appropriate. Thus the researcher will draw upon features of content analysis and grounded analysis in particular. Other features can be included when feasible.
An important role for the analysis of qualitative data from the semi-structured interview is also the way in which the analysed data is displayed. The following table shows four main types of descriptive display for qualitative data.

Table 35: Types of display for qualitative data

<table>
<thead>
<tr>
<th>Feature / display type</th>
<th>Tool</th>
<th>Description</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partially ordered displays</td>
<td>Context chart</td>
<td>Mapping interrelationships of people in graphic form.</td>
<td>When context of people is important.</td>
</tr>
<tr>
<td></td>
<td>Checklist matrix</td>
<td>Format for analysing field data on a major variable or domain.</td>
<td>When exploring new domains.</td>
</tr>
<tr>
<td>Time ordered displays</td>
<td>Event listing</td>
<td>Matrix that arranges and sorts a series of events chronologically.</td>
<td>When the chronological sequence is key.</td>
</tr>
<tr>
<td></td>
<td>Time ordered matrix</td>
<td>Time periods are arranged in columns to provide chronology per category.</td>
<td>When data is fairly complete.</td>
</tr>
<tr>
<td>Role ordered displays</td>
<td>Role ordered matrix</td>
<td>Sorts data in rows and columns to and roles of respondents.</td>
<td>When roles of participants are crucial.</td>
</tr>
<tr>
<td></td>
<td>Conceptually clustered matrix</td>
<td>Rows and columns are arranged to bring items together.</td>
<td>When conceptual themes emerged in a group of people.</td>
</tr>
<tr>
<td>Conceptually ordered displays</td>
<td>Cognitive map</td>
<td>Displays a person’s representation of concepts about a particular domain.</td>
<td>When it is key to display topics across several people.</td>
</tr>
<tr>
<td></td>
<td>Effects matrix</td>
<td>Displays data in as many differentiated ways as the study requires.</td>
<td>When cases are complex.</td>
</tr>
</tbody>
</table>

Source: Miles & Huberman (1994)

In general, matrices allow researchers to integrate large amounts of data quickly (Cleveland, 1985). Once the matrix structure was selected for this thesis, subsequent data was coded, entered and summarized in short words related to the research question. In this case Gheradi and Turner (1987) refer to data transformation because data is condensed, clustered, sorted and linked over time if appropriate.
Looking at the features of this study it is reasonable to assume that the display of data will focus on **partially ordered** forms of display. Neither the roles of individuals nor the order of events did play a role in this study. Hence role-, time- or conceptually ordered display will play a minor role in this thesis.

Furthermore, in order draw the correct conclusions from the data generated, a 5 step approach was taken to analyse the data which were gathered in study 1 and study 3. The following illustration highlights the sequence of this approach. The individual steps will be discussed in the following paragraphs.

**Illustration 20:** 5 step approach for qualitative analysis

```
<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take notes</td>
<td>Reflect on notes</td>
<td>Use tables / matrices</td>
<td>Achieve triangulation</td>
<td>Draw conclusions</td>
</tr>
<tr>
<td>Gather / verify data</td>
<td>Visualise data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source: Developed for this thesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 1 and step 2:** Take notes and reflect on notes

The first step in the analysis process occurred shortly after the interview was conducted. While the interview was still fresh in the mind of the researcher, reflecting thoughts on each interview were written down with the intention of identifying consistent themes that emerged. In the case that topics appeared unclear in retrospect, relevant questions were noted and shortly afterwards re-addedressed to the respondent.
Step 3: Use tables / matrices
In order to systematically analyse the qualitative data, tables and matrices have been used (see appendix 2 and appendix 3). Firstly, important interview quotes were extracted from the interview protocol and pasted into a table to assist explanation building (Miles and Hubermann, 1994). Secondly, the level of intensity of the conversation was highlighted. Thirdly, emerging themes from the interview quotes were summarized in a separate column.

Fourthly, a matrix has been utilised to connect emerging themes with the interviews on aggregated level. It became even more apparent, that some themes were more popular than others. In some selected cases the researcher also discussed the matrix with respondents to ensure the correct understanding of the interview.

Step 4: Achieve triangulation
To further enhance the quality of analysis and to set the ground for sound conclusions, another matrix was introduced (see table 56 of the original PhD document). This matrix compared the themes across studies 1, 2 and 3 and as such supported the triangulation effort of the researcher which was at the heart of the case-study approach.

Step 5: Draw conclusions
With the aforementioned tools at hand, the researcher was in a position to revert to the research question. The interview protocols and the process of reading them time and time again also supported the validity and reliability of the conclusions.

The next section of this chapter gives an insight into the implications of study 1 for the general findings of this research and for study 2.
4.3.6.6 Implications of study 1 for the general findings of this research and for study 2

There are three major implications that emerge for the questionnaire survey from the semi-structured interviews. Firstly, the findings of the semi-structured interviews will be used to set up the quantitative questionnaire, hence giving it necessary guidance. Consequently the quality of study 2 will be increased by the input gathered from study 1.

Secondly, the data generated within study 2 will be analysed each during the presentation of findings and presentation of results sections in chapter 5 and chapter 6. Therefore study 1 will contribute to the triangulation approach of this thesis. Thus it will also increase the degrees of reliability and validity for this research.

Thirdly, the experience gathered from conducting study 1 will also help to increase the quality of study 3 even further. Because both studies are qualitative, they can be analysed in a similar fashion. Additionally, the interview guideline from study 1 can serve as a starting point for the interview guideline of study 3.

The previous sections of chapter 4 presented the process and procedures that have been implemented to complete study 1. This section started describing the purpose of study 1 and delivering a justification for the choice of semi-structured interviews. The justification was followed by a list of actions that aimed at overcoming certain limitations which are associated with interviews.

To those actions belonged the determination of a timeframe early enough prior to the interview. A detailed description of the implementation of study 1 was provided too. The implications of study 1 for the general findings of this thesis did finalize this part of chapter 4. The next sections will focus on study 2.
4.3.7 Study 2: Questionnaire survey

Surveys collect data from selected individuals by means of a set of questions (Marx et al., 1989). They gather primary data from respondents by mail, telephone or in person (Strydom, 1997). Surveys can be part of a case study, like in this thesis (Yin, 2003). Most survey research is quantitative (Perreault, 1996). As this is an exploratory single-case-study design, the analysis is very descriptive. Hence the identification of key themes will be the focus of the analysis. The structure of chapter 4.3.7 can be seen in the following illustration.

Illustration 21: Structure of chapter 4.3.7

| Chapter 4.3.7.1: Purpose study 2 |
| Chapter 4.3.7.2: Justification for the use of questionnaire survey |
| Chapter 4.3.7.3: Limitations study 2 |
| Chapter 4.3.7.4: Description study 2 |
| Chapter 4.3.7.4.1: Sample selection study 2 |
| Chapter 4.3.7.4.2: Planning study 2 |
| Chapter 4.3.7.4.3:Managing study 2 |
| Chapter 4.3.7.5: Data analysis of study 2 |
| Chapter 4.3.7.6: Justification for the use of SPSS |
| Chapter 4.3.7.7: Implications of study 2 for the general findings of this research and for study 3 |

Source: Developed for this thesis
Once the purpose of the questionnaire has been described, one section of this chapter will illustrate the justification for the use of a questionnaire survey and its limitations. Furthermore a detailed description of how the questionnaire survey was conducted will be given. Afterwards a description of the way in which the data were analyzed will be provided. The justification for the use of SPSS for this data analysis will be outlined as well. The implications of study 2 for the general findings of this thesis and for study 3 will conclude this section.

4.3.7.1 Purpose study 2

As part of the exploratory single-case-study design, the purpose of the questionnaire survey was to explore additional themes related to E-Commerce, benchmarking and E-Commerce benchmarking. Study 2 also exposed a much larger sample to the main bodies of theory and to the research theory. Being one of the three sub-studies within this single-case-study approach, study 2 represented one part of the combination of qualitative and quantitative means of data collection for this thesis. Surveys are usually referred to as being quantitative (Strydom et al, 2000).

The purpose of study 2 was not to test theory, but to give direction for study 3 by providing themes related to the two main bodies of theory and the research theory. Findings from this study helped to direct the attention of the researcher to certain key themes which were then to be addressed in study 3. Hence the purpose of study 2 was also to narrow this research into certain areas. The selection of a questionnaire survey will now be justified.

4.3.7.2 Justification for the use of a questionnaire survey

A questionnaire survey was chosen for study 2 because surveys represent a good way of collecting data about the opinions and behaviours of larger numbers of people, assuming they are implemented well (Easterby-Smith, 2008). Despite their potential drawbacks, e.g. low response rate, they are the most effective and efficient way of generating data.
Surveys are furthermore a commonplace tool to gather information from respondents which are out of physical reach of the researcher (Leedy, 1989). Questionnaires are widely used by business researchers to obtain data on various topics (Davis, 2000). One big advantage is that the respondents can complete the questionnaire in their own time and anonymity as well as without any interviewer bias (Hart, 1987). In addition, survey research is best suited for gathering descriptive information (Kotler et al, 1994).

However, the researcher has little control over whether the targeted person is actually capable and willing to answer the questions, unless the selection of the sample is conducted purposefully. Furthermore, checking the data both from a completeness and accuracy point of view will be of particular importance (Easterby-Smith, 2008).

Nevertheless, the use of a questionnaire survey is also fully in line with the qualitative and quantitative approach of this thesis as outlined by Perreault (1996). Together with the semi-structured interviews and the focused expert interviews, it supported the desired triangulated approach for this thesis. The next section of this chapter will introduce limitations of the questionnaire survey.

4.3.7.3 Limitations study 2

The major criticism of mail surveys is the relatively low response rate (Perreault, 1996). According to Clifton et al (1992) a normal response rate lies in the range of 10%. Erdos (1974) believes that low response rates are a potential source of bias as randomness and representativeness of the study might get destroyed. However, as this study is conducted within BASF with the support of the President, the response rate should be comparatively high.
Boyd et al (1996) outline unwillingness of respondents to provide information, the inability to answer the question, unrepresentative sampling and the influence of questioning process as further key limitations. However, Desphande (1983) believes that reliability issues are overemphasised in mail surveys for a lack of validity. Nevertheless, one of the limitations of questionnaire surveys is that researchers are attempting to put the world into an artificial frame (Parkhe, 1993a).

In qualitative interviews, key people are asked about particular topics related to a study which give the researcher additional opinions and insights about certain events (Eisenhardt, 1989; Yin, 1994). Mail surveys typically sacrifice this richness as they do not offer the same degree of flexibility (Parkhe, 1993a). Additionally, questionnaire surveys usually take longer (Lublin, 2005). For Davis (2005) it is crucial to understand if the people who do not respond have the same opinion than those who do respond.

But despite these disadvantages, the economical advantages and the convenience of its use make the survey very popular in research and provided the questionnaire is short, the speed of the response is also quick (Watson, 1988). While implementing the measures suggested in table 36 (guidelines for effective survey implementation), it is considered probable that the above mentioned limitations do not affect the quality and quantity of the study severely. It will now be aimed at providing a more detailed overview of the content of study 2.

4.3.7.4 Description study 2

This section of chapter 4 is divided in three parts. The first part will describe how the sample was chosen for study 2. The second part will aim at providing information on how the implementation of the survey was planned. The third section will focus on showing how the survey was managed.
The questionnaire survey contained 21 questions which were set up in the same sequence like the questions in study 1: (1) a general introduction including warm-up questions, (2) benchmarking, (3) E-Commerce and (4) E-Commerce benchmarking. For detailed information about the questionnaire survey, please refer to appendix 4. All 146 usable responses were saved on a file in the order in which they were received. The following section will provide information on the sample selection for questionnaire survey.

4.3.7.4.1 Sample selection study 2

In some cases, a research project involves collecting data from each and every member of a particular group of people. In this case a sample selection would not be possible due to the large size of BASF Group as a corporation of 95,175 employees (BASF company report, 2007). In cases in which parts or fractions of a group of people can be handled for data generation, a sample needs to be determined. Easterby-Smith et al (2008) refer to a sample as a group of people from a certain entity from which the evidence for the research question needs to be generated. A sample can be a proportion of employees in a particular organization.

Generally speaking, the purpose of gathering data from a sample is to enable the researcher to make statements about the group of people from which the sample is drawn (Easterby-Smith, 2008). In the case of this thesis the researcher desired to be able to make statements about a group of people who had experience with E-Commerce, benchmarking and E-Commerce benchmarking. To draw good conclusions from the questionnaire, the study was conducted within the business unit “XYZ” at BASF at which the researcher received the support of the responsible President. As a sample from the business unit “XYZ”, the study focused on a particular department at which E-Commerce has been introduced approximately three years ago. Hence it was good timing to assess the situation in terms of E-Commerce but in particular for E-Commerce benchmarking too.
The questionnaire was provided to the President of the business unit who sent the file to his managers with the request that around 250 responses should be received. As the President of the business unit supported this study, the return rate was expected to be quite high. However, as the respondents were given full anonymity, the final number depended on the willingness of the employees to be part of such a study. Once the sample size had been decided upon, it was necessary to plan the implementation of the questionnaire survey. This will be the content of the next section.

4.3.7.4.2 Planning study 2

The execution of a questionnaire survey needs to be supported by several guidelines (Leedy, 1989). Two matters are of particular importance for questionnaire surveys, the quantity and the quality of the study.

To enhance the quantity of this study, the response rate needs to be maximised. According to Forsgren (1989) the use of follow up letters and reassurance of anonymity are two means with which response rates can be increased. Thus a dedicated cover letter was sent together with the questionnaire, giving information of the background of the study, the expected time-frame for this completion and re-assuring the anonymity of this study.

For further reference in regards to the cover letter, please refer to appendix 5. This approach was also suggested by (Dillmann et al, 1974). As all BASF employees have email, a freepost envelope was not necessary and all questionnaires were distributed via email. However, responses of course could be sent via postal mail to ensure confidentiality. Once the first responses were being received, a follow up letter might have further enhanced the response rate. In this case Cavusgil et al (1998) point out that it is senseful to mention the informants who have responded already in the covering letter as a means to encourage response.
The President of the business unit “XYZ” has committed himself to do that if necessary. In order to determine if that is the case, the President received a weekly report on the number of responses from the researcher. However, during the course of study 2 it was never felt necessary to support the response with another cover letter. Instead the President of the business unit “XYZ” directed personal emails to his team to achieve a maximum response rate.

In order to enhance the quality of this study, the questionnaire must be set up in a way that minimizes errors and makes it most easy to use. The design of the questionnaire itself determines the success of the study because mistakes during the design phase of the survey are usually followed by a series of mistakes later on as well (Kotler, 1994). Tull et al (1990) provide the following seven steps for designing questionnaires: (1) initial consideration, (2) question content, (3) question phrasing, (4) types of response formats, (5) question sequence, (6) questionnaire layout, (7) pre-test and revision.

Once the initial consideration (1/7) of the survey has been provided, Marx et al (1989) believe that, for the design of the questionnaire careful consideration must be given to the question content (2/7). Especially the type of questions (open or closed), their wording, format and sequence need to be considered carefully. Kotler et al (1994) believe that the form of a question can even influence the answer of the informant. Particularly the first few questions need to be easy to answer so that the respondent will be enabled to feel comfortable with the study.

Because of that, the questionnaire began with six questions related to the profile of the respondent. For the remainder of the questionnaire questions were kept short and limited to one particular topic only. Furthermore, closed questions were used to a large extent. This enhanced the user friendliness of the questionnaire (Easterby-Smith et al, 1991). However, there is a danger in this technique as overuse of the same type of question might lead to common method variance (Campbell et al, 1959).
This phenomenon occurs when different variables are collected from the same source one at a time which might contaminate each variable if the source has a defect (Parkhe, 1993). Additionally, Henderson et al (1987) point out that this kind of technique may lead to important issues being omitted. However, the researcher felt that with the combined effort of both quantitative and qualitative methods this argument was not a strong one in the context of this thesis. Furthermore, the researcher was of the opinion that there was still enough variance in the questionnaire in order to avoid pitfalls like the common method variance.

According to Oppenheim (1992) the main reason for following certain principles in questionnaire design is to facilitate response and avoid errors. When phrasing the questions (3/7), abstract terms or jargon should be avoided (Bourque et al, 1995). As the attitudes and opinions of the informants played an important role in this study, the response format (4/7) needed particular attention.

The questionnaire contained point Likert-scales measuring the level of agreement or disagreement. In this case the respondent will have a choice of answers ranging from "strongly disagree" to "strongly agree". According to Perreault (1996) this is a common approach in research management. This approach will also contribute to the user-friendliness of the questionnaire. This type of attitude response scale is called an ordinal scale. Ordinal scales measure the terms of value such as more or less (Leedy, 1989). They are used to measure attitudes and opinions (Easterby-Smith et al, 2008). As the opinions and in particular their degrees are important for this study, the choice of Likert-scales for the questionnaire seemed justified. The scale is very reliable in regards to ordering people in terms of their attitude towards a particular topic (Davis, 2000).
Especially the question sequence (5/7) was expected to be important for this thesis. The sequence was determined by the evolution of the topics researched in this thesis. As benchmarking is the topic with the longest history, questions related to benchmarking were the starting point. E-Commerce related questions and E-Commerce benchmarking related questions followed. The layout (6/7) of the questionnaire aimed at being short enough so that the time for completion of the questionnaire did not exceed 30 minutes.

The questionnaire was also pre-tested (7/7) by the President of the business unit "XYZ". This step is a very important one to enhance the quality of the questionnaire. "Pre-testing...is the use of a questionnaire in a small pilot study to ascertain how well the questionnaire works" (Hunt et al, 1982, p 269). However, there does not seem to be a generally accepted way of achieving that. According to Presser and Blair (1994, p 73):

"Pre-testing is generally agreed to be an indispensable stage in survey questionnaire development, yet we know very little about how well different pre-testing methods identify different types of problems".

Czaja (1998, p 58) adds:

"How much and what type of pre-testing is needed, depends, of course, on the goals and complexities of the survey and the number of new questions".

However, Presser et al (2004) and Rothgeb et al (2001) select cognitive interviews, expert evaluation, behaviour coding and forms appraisal as popular and suitable ways of pre-testing questionnaires. The sample, to which the aforementioned methods need to be applied, had to be selected too. Colleagues, students, focus groups or expert panels represent some of the options available.
Of course, each of the methods and sample combination contributes differently to the identification of issues in the questions (Rothgeb et al, 2001). Hence the methods and the sample need to be chosen carefully to further improve validity and reliability of this thesis.

The pre-testing conducted for study 2 followed a pragmatic approach that was both practical and valuable at the same time. While a pre-test with parts of the sample was considered by the researcher, the President of business unit “XYZ” indicated that for workload reasons, he would prefer the pre-test to be conducted only with himself. However, as an extra check the supervisors of this thesis were asked for their feedback by the researcher. Additionally, an external statistics expert was asked to comment on the questionnaire. This type of sample can be considered an expert panel which represents one of the ways to pre-test questionnaires thoroughly.

Furthermore, the researcher asked the above individuals particularly to (1) critically review the questionnaire, (2) provide feedback on the form and content of the questions and (3) assess if the questions provided the information needed for study 2. To allow them to do so, the individuals received an email containing the questionnaire and were asked to complete it. Once they had completed and reviewed the questionnaire, the researcher received feedback, either through a telephone conversation or in face to face meetings. Especially the personal face to face meetings were useful in providing an opportunity for behaviour coding with those individuals.

Ideally, some more rigorous pre-testing could have been conducted within the target sample. However, considering the level of research and management expertise of individuals who participated in the pre-test, it was felt that the pre-testing process was sufficient enough to provide valid and reliable results. Hence the impact of the chosen pre-testing process on this thesis was considered to be the desired one despite its pragmatic approach.
Because the pre-test was subsequently approved by the President, a revision (7/7) was not necessary. The full version of the questionnaire can be seen in the appendix 4. The below table highlights how the quality and quantity of the questionnaire study was enhanced in this thesis.

**Table 36: Guidelines for effective and efficient survey implementation**

<table>
<thead>
<tr>
<th>Feature / category</th>
<th>Applied In this thesis</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity / response rate</strong></td>
<td>Use concurrent techniques: (1) personalization, (2) monetary incentives, (3) return postage and (4) source sponsorship.</td>
<td>Dillmann et al, 1984</td>
</tr>
<tr>
<td></td>
<td>Covering letter.</td>
<td>Dillmann, 1974; Leedy, 1989</td>
</tr>
<tr>
<td></td>
<td>Follow up letter.</td>
<td>Forsgren, 1989</td>
</tr>
<tr>
<td></td>
<td>Reassure anonymity.</td>
<td>Easterby-Smith, 1991</td>
</tr>
<tr>
<td></td>
<td>Closed questions.</td>
<td>Bourque et al, 1995; Leedy, 1989</td>
</tr>
<tr>
<td></td>
<td>No abstract terms, clear language.</td>
<td></td>
</tr>
<tr>
<td><strong>Quality / questionnaire design</strong></td>
<td>Response format Likert-scales.</td>
<td>Perreault, 1996</td>
</tr>
<tr>
<td></td>
<td>Question sequence according to the evolution of the management topic.</td>
<td>Tull et al, 1990</td>
</tr>
<tr>
<td></td>
<td>Pre-test.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Once the planning of the questionnaire survey was completed, the study could be implemented. The way in which study 2 was managed will be addressed in the next section.
4.3.7.4.3 Managing study 2

On 24 January 2005, the questionnaire and a cover letter were given by the President of the business unit "XYZ" to his Senior Management. The suggested deadline for returns was set for 28 February 2005, leaving the respondents approximately 5 weeks to complete the questionnaire. Two weeks before the end of the deadline he sent out a personal reminder to all parties concerned, to make sure that the number of responses reached the desired levels. As the number of responses that reached the researcher was below 100 responses at the day of the deadline, the timeframe was extended by another 4 weeks by the President. The very last questionnaire reached the researcher at the end of April 2005. After that time it was evident that no more completed questionnaires were to be expected.

Illustration 22 provides an overview about the sequence in which the completed questionnaires reached the researcher. During the initial four weeks before the first deadline the responses have reached a reasonable level. The graph also shows the impact of the personal follow up of the President after week 4 when the number of responses increased again.

**Illustration 22: Timing of questionnaire responses**

![Bar chart showing number of responses received per week](image)

Source: Developed for this thesis
Once the data has been collected and transferred into an Excel spreadsheet, it was further processed using the computer programme SPSS. The first quantitative results from the questionnaire survey were presented as a sneak preview to the President of the business unit in May 2006. He appreciated the information and asked for additional details. Further information on this particular matter will be presented in chapter 5. The ways in which data generated from the questionnaire survey can be analysed will now be described.

4.3.7.5 Data analysis study 2
To analyse the data from the questionnaire survey, two different approaches were available: (1) descriptive statistics and (2) inferential statistics. While descriptive statistics “describe and characterize the sample under study” (Davis, 2005, p 352), inferential statistics allow to draw conclusions from the sample (Leedy and Ormod, 2005). While descriptive statistics utilise means or standard deviations, inferential statistics utilise t-tests or chi² test in order to determine significance levels for the information provided (Kamenz, 1997).

The standard deviation represents the standard measure of variability in many statistical measures (Kotler, 1998). The mean indicates the weighted average of a set of figures (Davis, 2000). The chi² test applies to discrete variables and is concerned with the question of whether or not the differences between an observed set of frequencies of occurrences of events and a theoretically expected set of frequencies are significant (Greensted et al, 1974). The t-test is another way of significance testing. It helps to determine whether a statistically significant difference exists between two means (Leedy and Ormrod, 2005).
Those more advanced techniques could have been adopted. However, the focus of the analysis of study 2 was descriptive statistics. Further analyses by means of inferential statistics were deemed to add only limited understanding to the research questions. As study 2, along with studies 1 and 3, was exploratory in nature, the objective was to highlight general themes related to this research.

Questions related to significant differences within the sample were not considered relevant. One of the reasons for this was that the sample of study 2 had relatively little experience of E-Commerce benchmarking. Therefore it was very questionable if differences in opinion within the group of respondents would provide further research avenues. Additionally, the findings of the descriptive statistics were so evident, that even significant differences in opinions, would have not led to different conclusions from those presented.

To support the process of analysing the data generated from study 2, the computer programme SPSS was used. The justification for the use of this programme will be presented in the following section.

4.3.7.6 Justification for the use of SPSS

As a research tool, computer programmes are now commonplace. Throughout the study various computer programmes can be used to assist its implementation. Leedy and Ormrod (2005) suggest using software packages to categorize and analyze various types of data. The complexity and quantity of the data generated during the data collection process required the researcher to look for computer based programmes to analyse the gathered information. Several software packages were available to do so, as indicated in the following table.
Illustration 23: Selected statistical analysis packages and vendors

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Research Systems</td>
<td>The Survey System</td>
<td>A software solution that includes interviewing techniques, data entry, analysis etc.</td>
</tr>
<tr>
<td>Minitab</td>
<td>Minitab</td>
<td>Provides general-purpose systems for solving statistical problems.</td>
</tr>
<tr>
<td>NCSS</td>
<td>NCSS</td>
<td>Performs a wide range of statistical procedures for research purposes.</td>
</tr>
<tr>
<td>Manugistics</td>
<td>STATGRAPHICS</td>
<td>Easy-to-use programme with more than 250 parametric and nonparametric procedures.</td>
</tr>
<tr>
<td>StatPac</td>
<td>STATPAC</td>
<td>Integrated, user-friendly and comprehensive survey analysis system.</td>
</tr>
</tbody>
</table>

Source: Davis (2005)

The use of complex computer programmes for statistical evaluation makes it easier to design and analyse more complex and comprehensive questionnaires. During the process of this research project, SPSS (Statistical Package for the Social Sciences) for Windows software was used. One reason for choosing SPSS was the fact that this programme was already available to the researcher. Hence costs for the execution of this thesis could be kept within budget. However, precaution while using SPSS or any other computer based programme needs to be practised. The researchers need to be in control of the data else it will be challenging to interpret the printout (Krathwohl, 1993).

This viewpoint is also shared by Weitzman and Miles (1995) who state that the software does not provide conclusions, but focuses solely on the aggregated presentation of submitted data. However, SPSS is one of the most popular statistical analysis products (Davis, 2005) and was used to calculate means and frequencies, and to carry out cross tabulations, and t-tests.

Once the process of implementation of the questionnaire survey and the appropriate tool to analyse the data is clear, impact of study 2 for the general findings and for study 3 can be highlighted.
4.3.7.7 Implications of study 2 for the general findings of this research and for study 3

The implementation of the questionnaire survey is very crucial for the result of the study overall. **Firstly**, the larger sample can be seen as an attempt to be able to generalize the findings of this research at least to some extent. **Secondly**, findings from this study were used during the analysis chapter and hence support the triangulation approach of this thesis. This ensured a higher degree of reliability and validity. **Thirdly**, the responses of the questionnaire survey also gave good indications on areas for additional research within study 3.

The previous sections of chapter 4 presented the process and procedures that were implemented to complete study 2, the questionnaire survey. This section started describing the purpose of study 2 and delivering a justification for the choice of the questionnaire survey. Study 2 supports the triangulation of this thesis and implements the combined approach of qualitative and quantitative methods of data generation. The justification of a survey was based on a mixture of practicality reasons and popularity of this method in research in general. It was followed by a list of actions that aimed at overcoming certain limitations which are associated with surveys.

To those actions belonged questionnaire design and follow up to increase the response rate, the most popular limitation related to questionnaire surveys. A detailed description of the way in which study 2 has been executed was provided as well. Finally, the implications of study 2 for the general findings of this thesis and study 3 did finalize this part of chapter 4. The next section of this chapter will introduce study 3 of this thesis.
4.3.8 Study 3: Focused expert interviews

Once the questionnaire survey was completed, study 3 was set up to further explore themes related to the four research questions of this thesis. To support the refinement of themes that emerged from the first studies, E-Commerce experts from different business units were interviewed in study 3. This person was most likely to be very knowledgeable about E-Commerce benchmarking. To address other individuals within a business unit very probably would have provided similar results to study 2. Hence the choice to select experts for study 3 seemed reasonable. Illustration 24 shows the structure of those sections. Each section will be explained briefly in the following paragraphs.

Illustration 24: Structure of chapter 4.3.8

Chapter 4.3.8.1: Purpose of study 3
Chapter 4.3.8.2: Description study 3
  Chapter 4.3.8.2.1: Sample selection study 3
  Chapter 4.3.8.2.2: Planning study 3
  Chapter 4.3.8.2.3: Managing study 3
Chapter 4.3.8.3: Implications of study 3 for the general findings of this research

Source: Developed for this thesis

Firstly, the purpose of study 3 will be highlighted. Secondly, a detailed description will be provided including the sample selection, planning and management of the focused expert interviews. Lastly, the implications for the general findings of this thesis will be emphasized.
As (semi-structured) interviews have already been explained in depth in chapter 4.3.6, the justification for the use of semi-structured interviews, the type of data analysis for semi-structured interviews and related limitations of this interviewing technique will not be re-iterated again. The reader is kindly asked to refer to this information in sections 4.3.6.1 to 4.3.6.3. The next section of this chapter will describe the purpose of study 3.

4.3.8.1 Purpose study 3

While the study 1 and study 2 have been set up to explore themes around E-Commerce, benchmarking and E-Commerce benchmarking, study 3 was conducted slightly different. It continued an exploratory mode as shown in the research plan of this thesis. However, confirmation of the themes which emerged from the first two studies was also sought for. Hence study 3 did take the results of the previous studies into account and at the same time elaborated further on key issues related to E-Commerce benchmarking. The focused expert interviews also contributed to the effort of triangulating this thesis as much as possible to further enhance the exploration of themes in particular on E-Commerce benchmarking.

Most of the respondents of the two prior studies did contribute to all three topics (benchmarking, E-Commerce and E-Commerce benchmarking) but the conversations and feedback on E-Commerce benchmarking specifically needed to be developed further. Hence to add even more depth to the statements gathered from study 1 and study 2, study 3 was set up with a focus on respondents with a strong focus on E-Commerce and tracking of relevant key performance indicators. The next section will describe how the focused expert interviews were executed.
4.3.8.2 Description study 3

The focused expert interviews were similar in their set up to the semi-structured interviews in study 1. As a general guideline for the interview, again a set of open questions were concluded. This time 29 questions were addressed, similar to 29 different questions during study 1. An overview of the interview protocol for study 3 is given in appendix 6. Similar to study 1, the respondents were given the opportunity to speak freely. The researcher did interfere with the flow of words of the respondents as little as possible. As a result, the respondents had a far greater share in talking during the interview while the researcher did listen closely to capture all information.

Compared to the semi-structured interviews of study 1, the interviews in study 3 followed a more focused pattern in terms of the topic E-Commerce benchmarking. Hence they are referred to as “focused expert interviews”. They differ from the semi-structured interviews in one particular point. The set of questions which will be followed was stricter than during the semi-structured interviews (Yin, 2003). The interviews still had an open end and were conducted in a conversational manner. However, the conversation ranged much more closely around E-Commerce benchmarking and the scope was not as broad as in study 1.

The questioning framework for the focused expert interviews was again divided into four parts, but this time directly related to each of the four research questions and not generally to the topics benchmarking, E-Commerce and E-Commerce benchmarking. Themes that evolved during study 1 and study 2 were included in study 3 and incorporated as questions in the interviewing guideline (e.g. the importance of web-site benchmarking). Certainly, the questioning framework also included a short section with some key data relating to the individual (e.g. age, BASF work experience etc.).
Similar to study 1, the interviews were recorded with a tape recorder and typed after the interviews were concluded to make it most convenient and least time consuming for the informant. The following section will provide information on the sample selection for the focused expert interviews.

4.3.8.2.1 Sample selection study 3

The sample selection for study 3 was conducted purposefully (Patton, 1990). To gain further knowledge on E-Commerce benchmarking, it was crucial to get in touch with E-Commerce experts within BASF. Hence several very senior managers of different business units were contacted by the researcher to locate those experts. As a result, five key individuals in several business units in Asia and Europe were identified and soon afterwards they were contacted by the researcher to set up an interview date.

After the first five interviews have been concluded, it was intended to further interview other individuals. In this case, three experts from interviews 1-5 have been asked for further potential reference respondents. They all referred to one particular expert within a functional unit. Consequently the last interview has been conducted with this individual. Once the sample size was determined, the interviews could be planned.

4.3.8.2.2 Planning study 3

During the planning phase of study 1 it proved difficult to agree on a time and more importantly a location which suited both the researcher and the respondent. As the respondents were spread across various locations in Europe and Asia, the researcher decided to conduct the interviews in study 3 as telephonic interviews. Nevertheless, two interviews have been done face to face as the schedules of the interviewer and the respondent allowed this.
Even though telephonic interviewing has disadvantages over personal interviews, as they do not allow establishing the same degree of rapport, telephonic interviews allow the researcher to clarify answers and require for additional information if necessary (Leedy and Ormrod, 2005). Hence the switch in interviewing technique did not seem to pose a problem for this thesis.

A few days prior to each interview, the researcher re-confirmed time and phone number with the respondent to make sure that late changes in the agenda of the informant did not co-incide with the initial time and date agreed upon with the researcher. Once the interview guideline has been determined and the timing of the interviews was confirmed, the interviews were conducted. The way in which this was implemented is explained in the following section.

4.3.8.2.3 Managing study 3

While the interviews were being conducted, both participants, the researcher and the respondent, did make sure that the environment in which they were located allowed for uninterrupted interview time. The interviews were executed over a period of three months, starting in November 2008 and finishing in January 2009. Even though the telephone interviewing saved time and costs compared to face to face interviewing, the Christmas period 2008 did slow down the interviewing process. Additionally the availability of some individuals before the Christmas break was limited. The respondents belonged to different operational and functional divisions of BASF Group in Europe and Asia.

Prior to the interview, the respondents received a copy of the latest table of content of this thesis via email as an early opportunity for their preparation of the interview. As for study 1, the first step during study 3 was to connect with the respondent to establish the initial rapport. The connection to the participant was developed firstly by the interviewer introducing himself. Furthermore the purpose of the study has been explained and the table of content has been lined out too.
Additionally the respondents have been reassured about the confidentiality of the information they provided. While the telephone has been put on loudspeaker so that the interview could be taped, the informant has been informed about both (1) the loudspeaker function and (2) the tape recorder. Furthermore it has been mentioned to the respondent that no other person was attending the interview.

Each participant was asked if they wished the tape recorder not to be part of this exercise. None of the respondents chose this option. The participants were assured that the tape was to be deleted after the interview was documented. At the end of each interview each respondent was asked if there was anything to be added to the interview. However, this option has never been chosen. Shortly after each interview, the interviewer used the audio tape to create a steno-type protocol from each interview. Together with the minutes the researcher took during the interviews, it has been ensured that all information that has been given is concluded into the protocol.

Furthermore, the protocol has been sent to the respondent within 2 working days after the completion of the interview to ensure one more time that the data presented in the protocol reflects the course and content of the interview as well. The correctness and completeness of the minutes has been confirmed by all participants for study 3. The next section of this chapter gives an insight into the implications of study 3 for the general findings of this thesis.

4.3.8.3 Implications of study 3 for the general findings of this research

The importance of study 3 for the general findings of this research was threefold. Firstly, study 3 acted as a spectrometer in combination with the results of study 1 and study 2. While emerging themes of study 1 and study 2 were incorporated in study 3, the focused expert interviews were utilised to explore further themes and to prove or disprove findings of the semi-structured interviews and the questionnaire survey.
Secondly, the purpose of study 3 was also to add a deeper body of knowledge related to E-Commerce benchmarking. Assuming that the E-Commerce experts had a strong insight into all E-Commerce related matters of their respective business unit, it was believed that the focused expert interviews would achieve that.

Thirdly, study 3 also aimed at upgrading this thesis as it added very recent information from business experts related to E-Commerce benchmarking. Hence study 3 helped to ensure that this thesis presents up-to-date results. As E-Commerce is a fast moving subject, this study needed to move with it in time as well. With the introduction of study 3 being completed, the conclusions of the methodology chapter will now be presented.

4.4 Conclusions
Chapter 4 provided an insight into the approach the researcher chose to address the research questions. Out of four possible research paradigms, the realist paradigm was chosen as it was considered to be the best fit to those four business related research questions. Various measures have been implemented to enhance the validity and reliability of this thesis. Language issues have been discussed and ethical considerations have been included into this chapter as well to ensure that respondents feel comfortable with providing information to this thesis. With regard to study 1 and study 3, further reference has been provided to the way quotations were treated.

A single-case-study design has been chosen as the umbrella for this thesis under which three studies have been implemented. The focus of study 1 was explorative in form of a qualitative semi-structured interview. The focus of study 2 was explorative in form of a quantitative questionnaire survey. The focus of study 3 was again explorative, but also confirmatory, this time focused instead of semi-structured.
The combined approach of qualitative and quantitative methods of data generation has been chosen to maximize the advantages and minimize the limitations of both forms of data collection. The combined approach did attempt to maximize the triangulation of this study too. During the following chapter it will be aimed at presenting the reader with the results of the three studies.
5 Presentation of the results for studies 1 - 3

This thesis so far has provided an insight into the two main bodies of literature and the research problem literature. Additionally, it has given an overview of possible research methodologies and justified the choice of the combined qualitative and quantitative approach for this thesis. This chapter presents the results that have emerged from the three studies conducted within the given methodological framework. The sequence is shown in the following illustration.

Illustration 25: Structure of chapter 5

Chapter 5.1: Presentation of the results of study 1: semi-structured interviews
  - Chapter 5.1.1: Respondents' profiles study 1
  - Chapter 5.1.2: Key themes from study 1

Chapter 5.2: Presentation of the results of study 2: questionnaire survey
  - Chapter 5.2.1: Respondents' profile study 2
  - Chapter 5.2.2: Key results from study 2
    - Chapter 5.2.2.1: Impact of benchmarking
    - Chapter 5.2.2.2: Exploration of E-Commerce success levels
    - Chapter 5.2.2.3: Applications and perceived importance of E-Commerce

Chapter 5.3: Presentation of the results of study 3: focused expert interviews
  - Chapter 5.3.1: Respondents' profile study 3
  - Chapter 5.3.2: Key themes from study 3

Chapter 5.4: Conclusions

Source: Developed for this thesis
The aim of this chapter is to provide an overview of the results that were achieved in each of the studies. Before the key themes of each study are presented, the profile of the respective participants in each study will be shown. Following this sequence for each study, the conclusions of this chapter will be presented. The next sections will present the results achieved in study 1.

5.1 Presentation of results of study 1: Semi-structured interviews

Study 1 consisted of 20 semi-structured interviews which have been conducted face to face with each participant. The aggregated profile of those participants will be presented in the following section. The purpose of study 1 was to establish different themes with regard to E-Commerce, benchmarking as well as E-Commerce benchmarking. The profile of the sample in study 1 will now be explained.

5.1.1 Respondents' profiles study 1

As can be seen in the below table, the vast majority of the participants in study 1 were male (95%). A large part of this group (65%) had more than 10 years of business experience at BASF. Furthermore, 80% of the group had business as their educational background.

Table 37: Respondents' profile study 1

<table>
<thead>
<tr>
<th>Gender</th>
<th>%</th>
<th>n</th>
<th>BASF experience</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>95</td>
<td>19</td>
<td>&lt; 5 years</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>1</td>
<td>5 – 10 years</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10 years</td>
<td>65</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>%</th>
<th>n</th>
<th>Education</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 30 years</td>
<td>0</td>
<td>0</td>
<td>Business</td>
<td>80</td>
<td>16</td>
</tr>
<tr>
<td>31 – 40 years</td>
<td>40</td>
<td>8</td>
<td>Engineering</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>41 – 50 years</td>
<td>40</td>
<td>8</td>
<td>Chemistry</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 50 years</td>
<td>20</td>
<td>4</td>
<td>Others</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
The respondents were all employees of BASF group companies, from sales representative level to President level. Their age ranged from 28 to 60 years. A majority of the respondents had been employed at BASF for more than 10 years. The following table provides the age profile of BASF employees in 2007 in comparison to the profile of the sample of study 1.

**Table 38: Employee profile of BASF 2007**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>%</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25 years</td>
<td>7.3</td>
<td>7.3</td>
</tr>
<tr>
<td>26 – 39 years</td>
<td>37.3</td>
<td>44.6</td>
</tr>
<tr>
<td>40 – 54 years</td>
<td>46.3</td>
<td>90.9</td>
</tr>
<tr>
<td>&gt; 55 years</td>
<td>9.1</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: BASF annual report 2007

Comparing the age profile of BASF in 2007 and that of the respondents of the semi-structured interviews, it can be said that both groups have a similar age distribution. The educational backgrounds represent a mixture of chemists, engineers and business degrees. They all had experienced benchmarking and E-Commerce in a more or less intense form. All employees knew about E-Commerce applications at BASF and had methodological knowledge of benchmarking.

The size of the business that the respondents were responsible for, varied between 1 mio and 1 bn Euros in terms of turnover. The composition of the functions of the respondents was spread across various parts of the value chain. In this case, marketing, engineering, information technology, sales, logistics and controlling functions have been represented. Furthermore, different business units have been represented, such as leather, car refinish coatings, fine chemicals, technical engineering, plastics, marketing services, key account management, research and development. The number of managers reporting to the respondents ranged from zero to 12. The next section will explore key themes that emerged from study 1.
5.1.2 Key themes from study 1

This section of chapter 5 examines the results from the semi-structured interviews undertaken with 20 participants. The below table provides an overview of the key themes that emerged during study 1. Each of the four key themes has certain elements attached to them which will be elaborated in more detail in the following paragraphs.

Table 39: Emerging themes from study 1

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>Theme 2</th>
<th>Theme 3</th>
<th>Theme 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Commerce benchmarking types</td>
<td>E-Commerce benchmarking benefits</td>
<td>E-Commerce benchmarking features</td>
<td>Perception of E-Commerce benchmarking</td>
</tr>
<tr>
<td>E-Share (1)</td>
<td>Best practices (4)</td>
<td>Same process (8)</td>
<td>“unknown” (12)</td>
</tr>
<tr>
<td>Customer surveys (2)</td>
<td>Target setting (5)</td>
<td>Higher frequency (9)</td>
<td>“not benchmarking” (13)</td>
</tr>
<tr>
<td>Web-sites (3)</td>
<td>Customer satisfaction (6)</td>
<td>Different indicators (10)</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>Cost reductions (7)</td>
<td>External benchmarking (11)</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

- Theme 1: “E-Commerce benchmarking types” -

Three elements can be allocated to this theme

The first element related to theme number 1 is the way in which E-Commerce benchmarking is currently implemented. According to various participants, the most popular way in which E-Commerce benchmarking is undertaken is by tracking the so-called “E-Share (1)”, the share of business conducted via E-Commerce compared to the overall amount of business. For example: “we measure the turnover and how the turnover via E-Commerce grows over time” (interview 3) and “we measure the percentage of turnover via E-Commerce” (interview 4).
The following quotation from interview 6 supports the identification of element number one, benchmarking E-Commerce by tracking the E-Share over time: "Right now the E-Commerce turnover ratio compared to the overall turnover is the benchmark used most often", and "within the chemical industry we did a survey on which percentage of their overall turnover do our competitors use their E-Commerce systems" (interview 11).

A similar statement has been made in interview 18 in which the respondent stated that "to my knowledge we measure the percentage of our overall turnover that is run through the portals". However, this particular participant did not know about other ways of benchmarking E-Commerce as he mentioned "I am not aware of other methods or figures". In addition to that, the participant in interview 6 highlighted the importance of customer surveys compared with other E-Commerce benchmarking indicators. From his point of view, the customer survey is the ultimate indicator, as other quantitative indicators are not comprehensive enough. The following quotation from interview 6 illustrates this.

"I think the current E-Commerce benchmarking of turnover ratios or cost comparisons over time are too simplistic. For me the main indicator is the level of customer satisfaction especially with long term customers".

The conduct of customer surveys (2) can be identified as the second element that emerged under theme 1. Customer surveys are already part of BASF’s E-Commerce benchmarking efforts. A quotation from interview 16 underlines this point: "We also try to assess the degree of customer satisfaction with customers that use our E-Commerce applications". This viewpoint has also been shared during interview 17 in which the participant expressed the view that “…to some extent customer analyses are already done. E.g. the customers are asked how happy they have been with the purchasing process".
Furthermore, in study 1 it became obvious that E-Commerce benchmarking should focus on the customer. Even though already implemented at BASF, the participants of the interviews used the opportunity to highlight the importance of those customer related E-Commerce indicators. For example, interview 14:

"It is important to let our customers tell us how satisfied they are with our E-Commerce services. So far the benchmarks that I saw have been very much technically and academically orientated in a negative sense and not so much customer orientated. Hence for me it would be most important to make the benchmarking of our E-Commerce applications more customer focused."

And interview 16:

"First functionality of the application, second cost benefit analysis and third use of the application for the customer. In general I would also just benchmark the figures which I already mentioned earlier which are the figures that we follow up over time already".

Or interview 19:

"We have to listen to our customer. Having said that, very often it is very difficult to find out what the customers want. Sometimes they don't know themselves either".

These statements represent clear indications of the importance of customer surveys. Other than customer related indicators, the respondents frequently mentioned the functionalities of web-sites (3) as important indicators for E-Commerce benchmarking. As those are directly linked to customer satisfaction, the third element does not only stand alone as a theme but also supports the identification of element number two in this thesis.
The following quote from interview 6 illustrates why functionalities have been identified as a theme within this thesis: "Also I did hear that some departments benchmark the functionalities of their portals compared to the ones from opposition", and "we also analysed the functionalities of the different portals that are running currently" (interview 11).

The previous three elements were identified under theme 1 "E-Commerce benchmarking types". They included the E-Share (1), customer surveys (2) and web-site benchmarking (3). Those elements indicated which kinds of E-Commerce benchmarks are already executed. The following paragraphs refer to theme 2 that emerged from study 1.

- Theme 2: "E-Commerce benchmarking benefits" -

Four elements can be allocated to this theme.

To foster the exchange of best practices is the fourth element developed from study 1. The exchange of best practices (4) can be particularly important for businesses which start to engage with E-Commerce for the first time. The following quotations refer to interview 8:

"As for the old-fashioned businesses, benchmarking of E-Commerce applications can serve as a continuous learning experience. Especially for business units that start their E-Commerce efforts these days it is important to avoid making the same mistakes that have been done by other business units".

"The learning experience from the benchmarking study together with the ability to track and observe opposition applications will put any business in a position of being able to act and react its E-Commerce efforts in any way necessary. That can create a huge advantage to that business".
The following quotation further adds to this viewpoint: "Whether it is E-Commerce or not, it surely helps to improve the efficiency of our system and would help to avoid making mistakes that somebody else did already" (interview 2). Hence the learning experience and avoiding mistakes are important results of the exchange of best practices as a benefit of E-Commerce benchmarking.

The respondent in interview 18 added to the exchange of best practices that the level of learning a company can achieve depends very much on the type of benchmarking which is conducted. For example, the learning from external benchmarking might be more helpful than the conclusions that one can draw from internal benchmarking. "If external benchmarking is applied, the exchange of experience might be a little richer than if you exchange experience on BASF level" (interview 18).

The following statement from interview 2 connects the exchange of best practices with the next theme that emerged from study 1. "It (E-Commerce benchmarking) should be done so that you can learn from other people and put it into targets immediately". Hence, a result of best practices could be a conclusive target setting process. Consequently, the target setting (5) itself is a benefit and emerged as element number five from study 1.

Because the target setting for E-Commerce applications has been addressed as an area for improvement, the identification of the target setting process as element number five is highlighted. The following quotation (interview 14) supports this statement:

"Looking back at our implementation of E-Commerce, the implementation of E-Commerce could have been a bit easier as in some cases the targets have not been that clear to everybody. If the targets and opportunities would have been a bit clearer, people would have been less disappointed with the results".

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Additionally, a statement from interview 17 emphasizes the importance of target setting from a different perspective. "You cannot wait for the whole process to kick off and only then ask yourself where you want to go". Hence there is a forward view and a backward view attached to the target setting process.

Remarkably, the customer was quoted again in relation to the possible benefits of E-Commerce benchmarking. As customer surveys have been mentioned as theme number two during the earlier part of study 1, when it comes to potential benefits of E-Commerce benchmarking, logically, the customer satisfaction (6) should emerge as element number 6.

Customer satisfaction emerged as one of the key themes mentioned in different interviews. The following quotations provide an overview of that. For example interview 19:

"What matters is the feedback from the customers and not so much what we think about the performance of our E-Commerce application".

Another respondent ranked the importance of customer satisfaction highly. "As long as I see that my customers use the system I would not be too worried about it" (interview 20). According to the respondent in interview 3, the benefits of E-Commerce benchmarking will be more intangible than tangible. "Reduction of problems and complaints and increase in customer satisfaction, so the effect will be more on the soft facts side and not so much on the hard facts".

In addition, the cost development related to E-Commerce applications also seemed to be at the forefront of the minds of the participants. "In general we measure the development of the costs..." was stated in interview 1. Also, "the success of E-Commerce is measured in terms of the costs before and after the E-Commerce application" (interview 5).
Compared with the discussions about the previous themes, the conversations on cost developments were comparatively weak. However, as they add another dimension to the portfolio of E-Commerce benchmarking avenues, cost reductions (7) are added to the list as the seventh element. The following quotation from interview 5 gives a real life example as to how cost benchmarking within E-Commerce environments can be undertaken.

"What you can do, for example, is to compare the number of employees who are responsible for order processing before and after the E-Commerce application."

In this particular case, reference was made to the number of employees who are occupied with certain business processes. Apparently the number of people appointed to execute order processing was reduced after the implementation of E-Commerce.

The previous part of this section revolved around the elements 4-7 and referred to theme 2 “E-Commerce benchmarking benefits”. Best practices (4), target setting (5), customer satisfaction (6) and cost comparisons (7) belonged to this theme. The following paragraphs refer to theme 3 that emerged from study 1.

- Theme 3: “E-Commerce benchmarking features” -

Four elements can be allocated to this theme

The following table provides an overview of quotations related to differences of E-Commerce benchmarking and traditional forms of benchmarking.
Table 40: Quotations related to benchmarking and E-Commerce benchmarking differences

<table>
<thead>
<tr>
<th>Source</th>
<th>Quotation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 2</td>
<td>&quot;Hence in order to be useful, benchmarking E-Commerce has to be done very regularly and very quickly&quot;.</td>
<td>Higher frequency</td>
</tr>
<tr>
<td>Interview 4</td>
<td>&quot;There are no major differences&quot;.</td>
<td>Same process</td>
</tr>
<tr>
<td>Interview 8</td>
<td>&quot;The same principle that is applied to benchmarking of old fashioned business processes can be applied to benchmarking of E-Commerce applications as well&quot;.</td>
<td>Same process</td>
</tr>
<tr>
<td>Interview 9</td>
<td>&quot;I think benchmarking E-Commerce should follow the same process as benchmarking traditional businesses&quot;.</td>
<td>Same process</td>
</tr>
<tr>
<td>Interview 10</td>
<td>&quot;I would benchmark it in the same way I benchmark traditional business models&quot;.</td>
<td>Same process</td>
</tr>
<tr>
<td>Interview 12</td>
<td>&quot;I believe that you can benchmark E-Commerce in the same way as you benchmark normal applications&quot;.</td>
<td>Same process</td>
</tr>
<tr>
<td>Interview 15</td>
<td>&quot;I would say it will be different parameters but the structure of the benchmarking will be similar to traditional business&quot;.</td>
<td>Same process, different KPIs</td>
</tr>
</tbody>
</table>

As can be seen from the above table there are two different elements that have emerged from study 1. The first element in this regard and as such element number 8 from study 1 is that E-Commerce benchmarking follows the same process (8) as traditional benchmarking. On the other hand, there are some differences that have been identified by the respondents. One difference relates to the nature of E-Commerce itself. The following quotation from interview 2 highlights the background of this statement.

"E-Commerce is very fast. So are the changes within E-Commerce. So I am not sure that the figures and comparisons that are generated today are a sound basis for possible solutions for tomorrow".

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Therefore **element number 9** relates to the **higher frequency (9)** in which E-Commerce benchmarking has to be conducted in order to be efficient. The time gaps in between two E-Commerce benchmarking studies seem to be much closer to each other than those of benchmarking traditional businesses.

Even though the following statement has only been mentioned within one of the 20 semi-structured interviews it needs to be mentioned as **element number 10** because it relates back to the different nature of E-Commerce business itself compared to traditional businesses. In terms of the kind of performance indicators that need to be tracked, the participant in interview 15 stated that "due to the fact that E-Commerce is running virtually there must be different factors".

Therefore the portfolio of **indicators (10)** that are used for E-Commerce benchmarking will be **different** from the ones that are used for benchmarking traditional businesses. Costs per order (interview 17), web-site clicks (interview 15), the number of lost calls (interview 13) and delivery accuracy (interview 5) have also been mentioned as indicators which would increase the depth of E-Commerce benchmarking indicators.

The following themes that did emerge during study 1 relate to possible ways of E-Commerce benchmarking. In addition to ways of E-Commerce benchmarking that are already implemented at BASF, **element number 11** emerged as a key request from different participants of study 1, external E-Commerce benchmarking. **External benchmarking (11)** is considered a worthy E-Commerce benchmarking approach. "I think it would be really interesting to see how we do compare to others" (interview 5), even though this might be a challenge as indicated in the same interview: "it might be very difficult to get competitors figures or figures from other industry's companies". Because of that, the respondent in interview 17 considers external benchmarking as "something which would be the icing on the cake".
External benchmarking would also support the general set up of a benchmarking system as such. "But more importantly, first we should get an overview of which companies are doing benchmarking activities and based on the result of that initial overview you could set up a benchmarking system" (interview 15).

The need for an external benchmarking system has also been addressed in interview 16. "For me what is decisive is our position compared to opposition". Additionally, benchmarking with traditional businesses was indicated as an area of E-Commerce benchmarking in interview 17. "By the way, not only do you have to benchmark against other portals or opposition, you also have to benchmark against terrestrial sales channels as well".

The previous part of this section was headed by "E-Commerce benchmarking features" as the key theme. Four elements emerged from the discussion related to this theme. (1) Same process, (2) higher frequency, (3) different indicators and (4) external benchmarking. The following paragraphs refer to theme 4 that emerged from study 1.

- Theme 4: “Perception of E-Commerce benchmarking” -
  Two elements can be allocated to this theme

Despite the intense discussion around E-Commerce and subsequent publication of E-Shares with the company, it became apparent that E-Commerce benchmarking was unknown (12) to some individuals of the sample, which represents element number 12. The following quote supports this viewpoint: "Right now, I am not aware of such an E-Commerce benchmarking tool at BASF" (interview 10), and "we have only put very little effort into the benchmarking of E-Commerce so far" (interview 14). A possible explanation for this theme was given in interview 13:
"I think so far the departments are still too busy with the implementation of E-Commerce itself. Hence, they do not have the time or the mindset to think about the follow up, even though that part of the implementation is just as crucial as the implementation itself".

The next statement originates from interview 14:

"I think that, in the past, we were too busy with the introduction of E-Commerce at various levels that we did not have the time or focus as to how to benchmark our E-Commerce systems".

Consequently, while looking at the E-Commerce benchmarking efforts of a particular unit, the stage of development that E-Commerce itself has reached needs to be taken into consideration too. It seems as if E-Commerce and E-Commerce benchmarking did not necessarily start at the same time but rather in a sequential fashion in which E-Commerce benchmarking follows the trail of E-Commerce.

**Element number 13** to emerge from the data collected in study 1 questions whether E-Commerce benchmarking actually exists at all at BASF. Some respondents challenged whether or not those efforts can be described as E-Commerce benchmarking and claimed that the existing efforts are not benchmarking (13). Examples include interview 1:

"So we compare the development over time but we do not compare business areas with each other so there is no real benchmarking approach within E-Commerce applications".

A similar statement can be quoted from interview 2:

"Right now I don’t really see that happening in the way benchmarking is done in other non-E-Commerce parts".

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A further quotation that supports the point of view from those statements and further exemplifies theme number 4 include "...it's not really a structured approach it's more just looking at the figures" (interview 3). In one particular interview (interview 14) the respondent shared some customer feedback as he mentioned "in some cases even our customers asked us about satisfaction levels at BASF or customer level which we were not able to answer".

The previous section of chapter 5 presented the profile of the participants of study 1 and provided an overview of emerging themes and elements belonging to those themes. Overall 13 elements have been identified. The next section of chapter 5 will implement the same sequence as in the previous section. First the profile of the respondents in study 2 will be highlighted, and then the results of study 2 will be presented.

5.2 Presentation of the results of study 2: Questionnaire survey

Study 2 consisted of an explorative quantitative survey which was conducted within one of BASF's business units, the business unit "XYZ". The purpose of study 2 was to test the information that was gained in study 1 with a broader sample at BASF. In addition, an attempt was made to determine the status of E-Commerce, benchmarking and E-Commerce benchmarking as well as the impact those topics made on BASF. The questionnaire was sent to 250 potential respondents. After the deadline for completion of the survey had passed, 146 usable questionnaires were received. This equates to a response rate of 58 percent. The respondents had the following profile.

5.2.1 Respondents' profile study 2

The following table summarizes the major demographics of the respondents in terms of age, gender, number of years at BASF Group, education, degrees and product group affiliation. Afterwards each feature will be described briefly to provide further back up information.
Table 41: Respondents' profile study 2

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>Work experience</th>
<th>n</th>
<th>%</th>
<th>Products</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>106</td>
<td>73</td>
<td>&lt; 5</td>
<td>26</td>
<td>18</td>
<td>Commodities</td>
<td>45</td>
<td>31</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>27</td>
<td>5 – 10</td>
<td>42</td>
<td>29</td>
<td>Specialties</td>
<td>101</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>%</th>
<th>Degrees</th>
<th>n</th>
<th>%</th>
<th>Education</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 30</td>
<td>28</td>
<td>19</td>
<td>University</td>
<td>59</td>
<td>41</td>
<td>Business</td>
<td>83</td>
<td>57</td>
</tr>
<tr>
<td>31 – 40</td>
<td>42</td>
<td>29</td>
<td>University of applied sciences</td>
<td>49</td>
<td>34</td>
<td>Engineering</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>41 – 50</td>
<td>53</td>
<td>36</td>
<td>Business School</td>
<td>18</td>
<td>13</td>
<td>Chemistry</td>
<td>43</td>
<td>32</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>23</td>
<td>16</td>
<td>Doctorate</td>
<td>18</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

**Age:** The sample was not dedicated to a particular age group of people. However, considering that 46% of BASF's employees are between 40 and 54 years of age, it was not surprising that the age distribution of respondents, who were above 41 years of age, was also more than 50%.

**Gender:** The male respondents outnumbered their female counterparts by 73% to 27%. This is a figure which is typical for BASF where the number of male employees outnumbers the female employees by a similar degree.

**Years of experience at BASF:** In terms of their years of experience at BASF, more than two thirds of the respondents have at least 5 years of experience. Considering the average age of the respondents (question 1), the sample is typical of the population.
**Education:** The majority (57%) of the sample have an educational background in business. Chemistry (32%) is the second strongest background in this research. Looking at the overall educational background of BASF, which is dominated by chemists and engineers, this result might look surprising. However, as this research has been conducted in marketing and sales departments of the business unit "XYZ", it represents a normal split.

**Degrees:** With regard to degrees, the respondents who hold a University degree are the strongest group in this study (41%). The respondents with degrees from a University of applied Sciences represent 34% of the sample.

**Product groups:** The specialities departments outrank the commodities department by 69% to 31%. This result is not surprising as the unit of analysis includes commodities and specialties with a similar sales split.

Considering the features of this sample it can be concluded that the profile of the participants in study 1 are similar to those in study 2. On average, a participant in either study 1 or study 2 is very experienced, male, with a business background and older than 41 years.

As the profile of the sample has now been explained, the following sections of chapter 5 present the results achieved with this quantitative and exploratory questionnaire survey in study 2. The way in which the results of study 2 are presented will involve tables to direct the reader to significant information that has been generated from the study.

5.2.2 Key results from study 2

The objective of study 2 was to gain further insight into the three topics E-Commerce, benchmarking and E-Commerce benchmarking. In contrast to study 1, which was qualitative and semi-structured in its approach, study 2 was aimed at generating knowledge from a broader base of people.
Furthermore it attempted to gain an even deeper insight into the current situation of BASF with regard to E-Commerce, benchmarking and E-Commerce benchmarking.

Consequently, study 2 aimed to complete three targets:

1. **Determine the impact of benchmarking.**
2. **Explore the level of success of E-Commerce.**
3. **Identify applications and the perceived importance of E-Commerce Benchmarking.**

The underlying assumptions are that (1) benchmarking helps to improve business performance, (2) E-Commerce has achieved success, but not in all areas and (3) E-Commerce benchmarking is seen as a necessity for cyberspace business. Those topics will now be discussed in three separate sections. The first of those sections will discuss the status and impact of benchmarking at BASF. For a complete overview of the results of the questionnaire survey, please refer to appendix 7.

**5.2.2.1 Impact of benchmarking**

Benchmarking is a well-used tool within BASF. It has been a standard in almost every department for many years. Frequently managers are measured against an appropriate industry standard or internal BASF standard. In the literature review of this thesis, most benefits that have been associated with benchmarking are related to planning, SWOT analyses, target setting and subjects around product development. However, turnover related matters have also been addressed. The impact of product development is associated with the revenue generated by those products. During study 2 this has also been expressed by the participants as can be seen in table 42. This following table highlights that 94.2% of the sample agreed that due to a product analysis conducted within a benchmarking study, the turnover of a business unit did increase at least by 5%.
Table 42: Benchmarking and turnover

<table>
<thead>
<tr>
<th>Increased turnover by:</th>
<th>n</th>
<th>%</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5%</td>
<td>83</td>
<td>68.6</td>
<td>68.6</td>
</tr>
<tr>
<td>5% - 10%</td>
<td>25</td>
<td>20.7</td>
<td>89.3</td>
</tr>
<tr>
<td>More than 10%</td>
<td>6</td>
<td>5.0</td>
<td>94.2</td>
</tr>
<tr>
<td>Decreased turnover</td>
<td>7</td>
<td>5.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

The above table also illustrates that 94 percent of the respondents have experienced an increase in profitability after the implementation of a benchmarking study within their area of responsibility. There was a mean score of 2.25 (n = 121; SD 0.636) on a five point Likert-scale (1 = strongly disagree, 5 = strongly agree). This showed that the additional business generated from actions related to a benchmarking study increased the overall turnover by approximately 3%. New products have also been developed as a result of benchmarking studies. Q 10.2 related to this statement and showed a mean of 3.43 (n = 138; SD = 0.383). Thus, it can be concluded that benchmarking impacts the product management of a company in a positive way.

Additionally, the control and subsequent reduction of costs have been of equal importance. Therefore, the impact of benchmarking on the costs has also been addressed. Similar to the statements regarding the development of the revenues, the feedback from the participants was positive regarding the impact on costs. There was a mean score of 2.28 (n = 123; SD 0.693).
Thus the respondents experienced a decrease in costs by approximately three percent after a benchmarking project was implemented. However, 14 of the 123 respondents, or 11%, quoted that the costs actually increased after the implementation of the benchmarking study. Hence it needs to be assumed that some of the benchmarking studies have not fulfilled their targets.

As a result of improved revenues and a decreased cost base, it was of interest to evaluate the impact of benchmarking on the overall profitability of the company. Overall, the perception of the sample relating to the implementation of benchmarking leading to profitability was positive. As indicated in the below table, there was a mean score of 2.24, (n= 122: SD 0.631). This showed that benchmarking can increase profitability in the region of 3%.

**Table 43: Benchmarking and profitability**

<table>
<thead>
<tr>
<th>Profits from the product group increased by:</th>
<th>n</th>
<th>%</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5%</td>
<td>82</td>
<td>67.2</td>
<td>67.2</td>
</tr>
<tr>
<td>5% - 10%</td>
<td>27</td>
<td>22.1</td>
<td>89.3</td>
</tr>
<tr>
<td>More than 10%</td>
<td>5</td>
<td>4.1</td>
<td>93.4</td>
</tr>
<tr>
<td>Profits decreased</td>
<td>8</td>
<td>6.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

Another area of interest related to benchmarking is market- or competitor-intelligence. In SWOT analyses in particular, information about the market, its suppliers and competitors are key to drawing the right conclusion from the study. Hence, a sequence of questions related to market intelligence was part of the questionnaire survey. The responses to those questions are shown in the following table.
Table 44: Benchmarking and market intelligence

<table>
<thead>
<tr>
<th>Benchmarking leading to the development of market intelligence</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clients of competitors</td>
<td>134</td>
<td>3.73</td>
<td>.717</td>
</tr>
<tr>
<td>Competitors' products</td>
<td>144</td>
<td>4.17</td>
<td>.506</td>
</tr>
<tr>
<td>Ingredients</td>
<td>139</td>
<td>3.17</td>
<td>.842</td>
</tr>
<tr>
<td>Features</td>
<td>140</td>
<td>3.72</td>
<td>.778</td>
</tr>
<tr>
<td>Selling price</td>
<td>139</td>
<td>3.34</td>
<td>.952</td>
</tr>
<tr>
<td>Suppliers</td>
<td>129</td>
<td>3.82</td>
<td>.655</td>
</tr>
<tr>
<td>Dealers</td>
<td>125</td>
<td>3.57</td>
<td>.744</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

As can be seen, the responses of the participants of study 2 relating to benchmarking and market intelligence are positive. The lowest mean related to product ingredients of competitors (mean = 3.17, n = 139; SD = 0.842). Considering that competitors' products might be difficult to fully analyse, this result is not surprising. However, there is a very positive general consensus within the sample that benchmarking helped to generate market intelligence for competitors' products. In this case there was a mean = 4.17 (n = 144; SD = 0.506).

Lastly, benchmarking was also seen to have a strong impact on the value chain by showing opportunities to implement best practices. In particular sales and marketing (mean = 4.03; n = 137; SD = 0.499) as well as production (mean = 3.91; n = 132; SD = 0.531) and logistics (mean = 3.89; n = 132; SD = 0.626) were identified as key recipients of benchmarking benefits. The overall mean for this question was 4.10 (n = 139; SD = 0.529).
This section aimed at determining the impact of benchmarking at BASF. In summary it can be concluded that benchmarking supports the business development at BASF positively both for top-line and bottom-line results. Additionally the generation of market intelligence and implementation of best practices have been identified as key support that benchmarking provides to the business. The next section will focus on providing data that are related to the status and level of activities of E-Commerce at BASF.

5.2.2.2 Exploration of E-Commerce success levels

Since the introduction of E-Commerce to the business world, a lot has been written on the benefits associated with it. Crucial success factors have been listed in chapter 3, the literature review. To evaluate how many of E-Commerce’s benefits have been achieved, the questionnaire survey addressed issues related to the level of success that E-Commerce delivered at BASF. One of the key areas that E-Commerce addresses is efficiency of the supply chain of a company. Hence, particularly the delivery accuracy was addressed in the survey. The following table provides an overview of the data connected to this topic.

Table 45: E-Commerce and delivery accuracy

<table>
<thead>
<tr>
<th>Since the order processing is run via E-commerce the delivery accuracy increased by:</th>
<th>n</th>
<th>%</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5%</td>
<td>94</td>
<td>74.4</td>
<td>74.4</td>
</tr>
<tr>
<td>5% - 10%</td>
<td>20</td>
<td>15.5</td>
<td>89.9</td>
</tr>
<tr>
<td>More than 10%</td>
<td>12</td>
<td>9.3</td>
<td>97.7</td>
</tr>
<tr>
<td>Delivery accuracy decreased.</td>
<td>3</td>
<td>2.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis
Looking at the previous table it becomes apparent that the overall experience of the sample with the development of delivery accuracy is positive due to the introduction of E-Commerce. With a mean of 2.32 (n = 129; SD = 0.673) it can be concluded that the delivery accuracy did seem to increase in the area of 3.5%.

However, the workload related to tracking the status of customer complaints did not seem to have decreased as a result of the improved delivery accuracy. An important figure on this topic related to Q14.3. This question asked if the amount of time spent on control work related to orders has decreased. It showed a mean of 2.91 (n = 138; SD = 0.833). Additionally, according to Q15.3 (mean = 2.81; n = 145; SD = 0.748) the number of customer complaints did not drop either. Hence, it does seem as if E-Commerce did not automatically solve this kind of customer related issue.

Nevertheless, the participants in study 2 indicated that order taking (mean = 3.88; n = 145; SD = 0.644) and order processing (mean = 3.59; n = 145; SD = 0.804) are areas in which improvements have been achieved. Further data related to customer satisfaction has been generated from Q17.2. In this question the sample was asked whether or not the degree of customer satisfaction increased compared to previous years, due to E-Commerce. The following table shows the relevant data.

<table>
<thead>
<tr>
<th>The degree of customer satisfaction in the following areas has been increased compared with previous years</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of product information.</td>
<td>145</td>
<td>3.77</td>
<td>0.697</td>
</tr>
<tr>
<td>Accuracy of deliveries.</td>
<td>143</td>
<td>3.03</td>
<td>0.621</td>
</tr>
<tr>
<td>Timing of deliveries.</td>
<td>144</td>
<td>3.10</td>
<td>0.687</td>
</tr>
<tr>
<td>Competence of BASF staff.</td>
<td>141</td>
<td>3.08</td>
<td>0.622</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis
It can be concluded that the customers are more satisfied with the availability of certain information. As E-Commerce offers the opportunity to provide information at any time, it is not surprising that customers use and appreciate this opportunity.

To assess whether it is possible to generate more business with customers that could not be serviced so far, one question of the survey addressed whether, due to E-Commerce, BASF can now do business with more customers. With a mean = 3.06 (n = 142; SD = 0.832) this was seen neither / nor.

By using a t-test (t = 0.807; significance = 0.421) it can be said that the delivery quality and availability of information for customers has been improved due to the introduction of E-Commerce. On the other hand, the effort undertaken to manage the supply chain in particular has neither decreased nor increased. At the same time, the number of customer complaints did not drop. However, the customers were happier with the access to and provision of information (n = 144; mean = 3.77; SD = 0.697). Additionally, employees seemed to agree that they were satisfied with BASF’s E-Commerce applications as pointed out in Q19.3 (mean: 3.36; n = 135; SD = 0.592).

In summary, the impact of E-Commerce on BASF was two-fold. Certain areas did develop well over time while others did not fulfil all their potential. The next section of this chapter identifies how E-Commerce benchmarking is applied and how its importance is perceived within the organization.

5.2.2.3 Identification of applications and the perceived importance of E-Commerce Benchmarking

In order to understand the applications of E-Commerce benchmarking at BASF, key questions were included in this explorative survey. The following table provides an overview of the data that have been generated.
Table 47: E-Commerce benchmarking applications

<table>
<thead>
<tr>
<th>BASF does benchmark its E-Commerce applications against:</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional business process.</td>
<td>138</td>
<td>3.80</td>
<td>0.594</td>
</tr>
<tr>
<td>Other E-Commerce applications.</td>
<td>138</td>
<td>3.78</td>
<td>0.659</td>
</tr>
<tr>
<td>The development of E-Commerce applications over time.</td>
<td>132</td>
<td>3.63</td>
<td>0.659</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

As can be seen from the previous table, BASF engages in three different types of E-Commerce benchmarking. The most popular one seems to be benchmarking against traditional processes, followed by other E-Commerce applications and the development of E-Commerce business over time. Generally speaking, the sample agrees that E-Commerce benchmarking is as important as benchmarking traditional business processes. In this case, Q20.1 provided the relevant data with a mean = 3.73 (n = 145; SD = 0.659).

The development of best practices has been identified as a key benefit of benchmarking in traditional businesses. In E-Commerce benchmarking the same results were indicated by the participants of study 2. There was a mean = 3.95 (n = 145; SD = 0.531). Hence the sample agrees that E-Commerce benchmarking does help to develop commonly accepted E-Commerce best practices.

Because increased customer satisfaction has been mentioned as a potential benefit of E-Commerce itself, it is of interest to analyse whether E-Commerce benchmarking can help to measure customer satisfaction. The following table provides an overview of the data which have been generated in study 2 related to customer satisfaction.

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Table 48: E-Commerce benchmarking and customer satisfaction

<table>
<thead>
<tr>
<th>Question</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Commerce benchmarking permits to determine customer satisfaction.</td>
<td>140</td>
<td>3.65</td>
<td>0.645</td>
</tr>
<tr>
<td>The following indicators provide BASF with important information about customer satisfaction levels.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simplicity of the use of a web-site.</td>
<td>144</td>
<td>4.02</td>
<td>0.724</td>
</tr>
<tr>
<td>Response time of a web-site.</td>
<td>142</td>
<td>4.04</td>
<td>0.883</td>
</tr>
<tr>
<td>Quality of information accessible to the customer.</td>
<td>144</td>
<td>4.12</td>
<td>0.609</td>
</tr>
<tr>
<td>Actuality of the information.</td>
<td>144</td>
<td>4.17</td>
<td>0.637</td>
</tr>
<tr>
<td>Number of clicks on a web-sites.</td>
<td>139</td>
<td>3.57</td>
<td>0.799</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

As can be seen, different questions related to customer satisfaction. The sample indicated that to determine and improve customer satisfaction via E-Commerce benchmarking is possible. The means in the above table belong to the most positive ones so far. To understand how E-Commerce benchmarking is conducted generically, the sample was asked about general E-Commerce benchmarking topics. These questions are shown in the following table.

Table 49: Ways of conducting E-Commerce benchmarking

<table>
<thead>
<tr>
<th>Question</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The performance indicators of E-Commerce benchmarking will be different from the performance indicators of benchmarking traditional businesses.</td>
<td>140</td>
<td>3.32</td>
<td>0.908</td>
</tr>
<tr>
<td>The lifecycle of E-Commerce benchmarks will be shorter than the ones of traditional benchmarks.</td>
<td>140</td>
<td>3.60</td>
<td>0.794</td>
</tr>
<tr>
<td>The benchmarking procedure of E Commerce will follow the same pattern as the benchmarking procedure of traditional commerce.</td>
<td>142</td>
<td>3.27</td>
<td>0.816</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis
While there seems to be clear agreement on whether or not the lifecycle of E-Commerce benchmarks will be shorter than benchmarks for traditional businesses, it looks as if there is a smaller degree of agreement on E-Commerce benchmarking indicators and procedures. However, the views on those two subjects are positive in both cases. Hence, it can be said that the sample believes in different indicators of E-Commerce benchmarking compared to benchmarking in traditional businesses. Nevertheless, the processes of E-Commerce benchmarking and benchmarking traditional businesses do follow a similar pattern.

Once these two general principles had been addressed by the sample, it was identified how E-Commerce benchmarking should be conducted. Q20.3 of the survey specifically addressed this topic. The responses of the sample can be seen in the following table.

**Table 50: E-Commerce benchmarking subjects**

<table>
<thead>
<tr>
<th>E-Commerce benchmarking should contain:</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer satisfaction.</td>
<td>143</td>
<td>4.20</td>
<td>0.620</td>
</tr>
<tr>
<td>Functionalities of E-Commerce applications.</td>
<td>144</td>
<td>4.11</td>
<td>0.489</td>
</tr>
<tr>
<td>Cost developments.</td>
<td>143</td>
<td>4.03</td>
<td>0.549</td>
</tr>
<tr>
<td>Comparisons with traditional business models.</td>
<td>143</td>
<td>3.99</td>
<td>0.650</td>
</tr>
<tr>
<td>Turnover developments.</td>
<td>141</td>
<td>3.65</td>
<td>0.738</td>
</tr>
</tbody>
</table>

Source: Study 2 of this thesis

Again, customer satisfaction seems to be foremost in the minds of the sample. The individual mean of 4.20 is the most positive in this thesis. The functionalities of the E-Commerce applications are a close second in terms of ranking of the mean.

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As the functionalities of the E-Commerce applications also reflect on the customer satisfaction levels, it is not surprising to find this topic being assessed by the sample in this way. Furthermore, the group of respondents support the suggestion of including both cost- and turnover-developments. The comparison with traditional business models was also responded to very positively.

In summary of this section, BASF has applied E-Commerce benchmarking in the area turnover developments, comparisons with other E-Commerce applications and with traditional businesses. The perception of E-Commerce benchmarking is positive because the sample associated benefits with it. To further improve E-Commerce benchmarking, different indicators are used. However, a similar process compared to benchmarking traditional businesses is followed. In terms of future E-Commerce benchmarking opportunities, topics related to costs, turnover, customer satisfaction, functionalities and traditional business models have been identified. The next statements will summarize the results of study 2. Afterwards, the results of study 3 will be highlighted.

Study 2 aimed to complete three targets:

1. **Determine the impact of benchmarking.**
2. **Explore the level of success of E-Commerce.**
3. **Identify applications and the perceived importance of E-Commerce Benchmarking.**

After the completion of study 2, the following can be concluded in regard to those targets:

1. **Benchmarking helps to improve business performance.**
2. **E-Commerce has achieved good success in some areas, but other areas still need to improve.**
3. **E-Commerce benchmarking is seen as an appropriate tool to measure and compare the performance of E-Commerce applications.**
5.3 Presentation of the results of study 3: Focused expert interviews

The purpose of study 3 was to explore further themes related to the research topic and to confirm themes which emerged from study 1 and study 2. Hence, the sample that has been chosen for this purpose is represented by dedicated experts who have in-depth knowledge of E-Commerce and E-Commerce benchmarking in particular. The following section presents the profile of the sample in study 3.

5.3.1 Respondents' profile study 3

In total six interviews were conducted within study 3. The following table summarizes the major demographics of the respondents in terms of age, gender, number of years at BASF Group and educational background. The initial intention of the researcher was to interview 10 experts. However, during the course of the first four interviews it became apparent that theoretical saturation was about to be reached. Hence the number of six interviews was seen sufficient. The sample had the profile shown below.

Table 51: Respondents' profile study 3

<table>
<thead>
<tr>
<th>Gender</th>
<th>%</th>
<th>n</th>
<th>BASF experience</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>100</td>
<td>6</td>
<td>&lt; 5 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>0</td>
<td>5 – 10 years</td>
<td>33</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 10 years</td>
<td>66</td>
<td>4</td>
</tr>
<tr>
<td>Age</td>
<td>%</td>
<td>n</td>
<td>Education</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>20 – 30 years</td>
<td>0</td>
<td>0</td>
<td>Business</td>
<td>83</td>
<td>5</td>
</tr>
<tr>
<td>31 – 40 years</td>
<td>33</td>
<td>2</td>
<td>Engineering</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>41 – 50 years</td>
<td>66</td>
<td>4</td>
<td>Chemistry</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 50 years</td>
<td>0</td>
<td>0</td>
<td>Others</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Study 3 of this thesis
Compared with the two other studies the participants in the sample for study 3 were older. Additionally, their educational background was more focused on business. Furthermore these managers were more experienced. The job functions of the individuals were all related to E-Commerce. The key themes that were addressed by this sample during the interviews will be shown in the following section.

5.3.2 Key themes from study 3

This section of chapter 5 examines the results from the focused expert interviews undertaken with 6 participants. The below table provides an overview of the key themes that emerged during study 3. Each of the four key themes has certain elements attached to them which will be elaborated accordingly. The below paragraphs refer to the first theme that emerged from study 3.

Table 52: Emerging themes from study 3

<table>
<thead>
<tr>
<th>Theme 1: E-Commerce benchmarking types</th>
<th>Theme 2: E-Commerce benchmarking benefits</th>
<th>Theme 3: E-Commerce benchmarking features</th>
<th>Theme 4: Future E-Commerce benchmarking applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order lines (1)</td>
<td>Best practices (6)</td>
<td>Internal / external (9)</td>
<td>E-Fax</td>
</tr>
<tr>
<td>Customer surveys (2)</td>
<td>Target setting (7)</td>
<td>Similar process (10)</td>
<td>SAP / customer related</td>
</tr>
<tr>
<td>Web-sites (3)</td>
<td>Visibility (8)</td>
<td>“not benchmarking” (11)</td>
<td>Process steps</td>
</tr>
<tr>
<td>E-Share (4)</td>
<td></td>
<td></td>
<td>Customer stocks</td>
</tr>
<tr>
<td>E-Value (5)</td>
<td></td>
<td></td>
<td>Insight knowledge from outside</td>
</tr>
</tbody>
</table>

Source: Study 3 of this thesis

- Theme 1: “E-Commerce benchmarking types” -

Five elements can be allocated to this theme
The first element related to theme number 1 is the way in which E-Commerce benchmarking is currently implemented. Order lines (1) seem to be one topic which received the attention of the management. The following statement from interview 21 supports this statement “What we have done is a comparison of line items”. It is further explained in the same interview how this indicator is analyzed.

“When I say line item as an indicator, the more line items are done, the more savings there are for the company as a whole. The idea is that our customer service will spend half of their time typing orders. Once E-Commerce is implemented, they have more time to focus on other important matters”.

From the indicator order lines, another key number is also measured as mentioned in interview 22. “In our case the number of orders is also important. Next step is to track the share of orders that are changed after they have been entered into the system”. This indicator relates to the changes a customer or the internal service department enters after the order has been submitted into the system. A change of this sort could cause major problems for a company, especially if a certain product is only produced for a particular customer. This viewpoint is shared by the respondent in interview 22. “The change of orders after the initial input is even more important because changing an order could be even more costly”.

Similar to the previous section of this chapter, customer surveys (2) have been addressed by the respondents, referred to as element number 2. The respondent in interview 21 highlights: “If I was to set up E-commerce benchmarking I would make sure that the customers like using the portal”. In terms of customer satisfaction levels at BASF, the same respondent mentioned that “the results (of a customer survey) came back quite positively in terms of functionalities. We provide more functions than others”. A similar viewpoint was shared in interview 24. “Most of our customers appreciate our web-sites”.

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In addition to those statements, the respondent in interview 26 mentioned that "considering all stakeholders I think we are doing well. Look, nobody today is really questioning the importance and significance of E-Commerce any more". However, "in my opinion there is still something that can be improved" (interview 21).

The need for improvement of web-sites was also highlighted during interview 22. "Customers prefer easier usage. I think our systems need to be as simple and user friendly as possible". The respondent in interview 23 added that "in essence, E-Commerce benchmarking needs to track the level of customer interaction with our systems so that we can track the customer satisfaction and also get a better understanding of our customers' preferences".

Nevertheless, the customers also need to be able to link up with the system or their supplier. "Some customers also need to upgrade their systems. Many times we find it very difficult to interact with them because of limitations related to their IT systems" (interview 22). Thus, the success of an E-Commerce application depends on the IT capabilities of suppliers and customers. Another perspective on improvement potential is given in the following quotation from interview 21.

"Today our Internet sites represent a lot of BASF processes, but it might not be user-friendly. Customers are used to Amazon-type friendliness, they need to get used to BASF terms etc. which is not so nice for them. My ideal situation would be to have the site self serviced by the customers too".

Regardless of the aforementioned improvement potential, the opinion of the sample on customer satisfaction is quite positive. Interview 23 provides evidence for this viewpoint. "I think we are doing relatively well. Our customers appreciate what we do and in particular in comparison with our competitors we are far more advanced".
A similar quotation can be found in interview 26. "I think BASF has done an excellent job in this regard. In particular our portals and our company web-sites have a very good reputation". As web-sites (3) are the key means of interaction between customer and supplier, they have emerged as a third element within the first theme of study 3. "We are also benchmarking web-sites. For example we want to make sure that if a customer needs to find us, our products are on top of the search list and not at the bottom" (interview 24).

The importance of web-site benchmarking has also been underlined in interview 26. The respondent pointed out that "we are also benchmarking the functionalities of our E-Commerce applications". The following quotation from interview 21 relates to the reasoning of the importance of the web-site benchmarking too.

"It's because the web-sites are the point of contact with the customers. Today more and more web-sites need to be interactive and include useful functions. For example, today we offer customers very comprehensive options to place an order, but that might not be appreciated by them. Most customers are more interested in supply chain information rather than convenience of order input. But the web-site still has to be convenient."

Further to the previous statement, the importance of web-site benchmarking is also illustrated in interview 21. "Well, it's because our Internet portal is not very user-friendly. But it's still the one-eyed under the blind. Competitors' web-sites are even worse". Hence there seems to be a need for improving the existing web-site even though BASF's portal might already be leading the way.

The so-called E-Share (4) emerged as element number four during study 3. "We do what probably other departments in BASF do, we measure our E-Share, the share of E-Commerce related business compared to the traditional business share" (interview 24).
This viewpoint was expressed in a similar way in interview 23: "E-Commerce benchmarking should start with E-Share, but then needs to go into more depth". Further statements underline the importance of the E-Share, for example interview 25: "Most importantly we measure the share of business we do via E-Commerce applications and compare that with the overall amount of business. We call this number our E-Commerce share". Another statement was provided in interview 26: "Well, we have our internal KPIs which are the amount of business that is run via E-Commerce as a percentage of the overall business".

Despite its popularity (interviews 22 and 23 support the E-Share as well) the E-Share also receives criticism. For example in interview 22: "Currently we mainly track one KPI, the E-Share, because it is easiest to measure. But this KPI is bothering me a bit. It goes in the wrong direction but the business unit will be measured against that".

This criticism is shared by the respondent from interview 23. "In our mind the turnover via E-Commerce is not the right indicator because it does not give the right information of the progress in E-Commerce". For example, if one order for one million Euros is placed or 10 orders for 100,000 Euros, the order value does not indicate the amount of savings achieved by the use of E-Commerce. The E-Value (5), element number five of study 3 does exactly that. It associates a certain saving of an electronic process compared to a traditional process.

The previous five elements belonged to the theme of "E-Commerce benchmarking types". They included the order lines (1), customer surveys / customer satisfaction (2) web-site benchmarking (3), E-Share (4) and E-Value (5). Those elements indicated which kinds of E-Commerce are already executed. The following paragraphs refer to theme 2 that emerged from study 3.
- Theme 2: “E-Commerce benchmarking benefits” -

Three elements can be allocated to this theme

One way of improving E-Share and E-Value at the same time is to exchange **best practices (6)** which emerged as the **sixth element** in study 3. One option in which this can be achieved is highlighted in interview 24. “It happens usually within the E-Commerce community. We bring people together that run E-Commerce and then they talk about the various projects going on”. However, it does not seem to be as easy as it looks at first sight.

“Exchange of best practices is very limited. A cross business unit exchange would be interesting. This year we had a global meeting on how to further develop IT tools. Hence we try to exchange best practices by getting E-Commerce experts together” (interview 22).

While the exchange of best practices proved to be challenging, the development of actions from the exchange of best practices seemed to be difficult too.

“From the comparisons with others we cannot develop that much action. The business units are too different. We are happy being able to track our own efforts” (interview 26).

Or interview 24:

“We have only recently started to use order lines as an indicator, hence we have not really produced visible results from that comparison”.

The target setting (7) for E-Commerce applications via E-Commerce benchmarking emerged as **element number seven**.
So far top-down target setting has been quite frequent in the area of E-Commerce as indicated in interview 24. "Target setting so far is rather top-down. It has been pretty much driven by the Board". A similar statement has been made in interview 25.

"One clear method for the target setting is, mostly top-down. As I mentioned before, there is a certain expectation from the Senior Management which they express to us via targets. Afterwards, we try to follow up on it. So far we did well. Maybe this can be mentioned as another benefit of E-Commerce benchmarking, it helps in the target setting process".

Alternative ways of target setting via E-commerce benchmarking have been indicated in interview 24. "It depends very much on the customer and market structure. Hence we did look at how much is possible theoretically and then decided what we could achieve realistically". Lastly, some units do not seem to have a clear method on how to set targets related to E-Commerce. "So far the targets have been set without a methodology" (interview 22).

One important benefit of E-Commerce benchmarking was highlighted in interview 25. E-Commerce benchmarking provides visibility (8) of E-Commerce facts to a larger group of people and as a result, the speed of implementation of matters related to E-Commerce will increase. The following quotation from interview 25 supports the finding of element number eight.

"Once certain numbers are visible to a larger group of Senior Managers, things tend to move faster. Secondly, we don't know if we are best in class, but at least we can track our progress. Lastly I would say, experts get a chance to talk to each other if they see certain discrepancies in some numbers. Once they talk with each other, things might improve. You actually can call that exchange of best practices".
The previous 3 elements, 6-8, belonged to the theme of "E-Commerce benchmarking benefits". They included the best practices (6), target setting (7) and visibility (8). The following paragraphs refer to theme 3 that emerged from study 3.

- Theme 3: "E-Commerce benchmarking features" -

Three elements can be allocated to this theme.

In terms of E-Commerce benchmarking subjects and E-Commerce benchmarking objects, there seems to be a two way approach for E-Commerce benchmarking. The first approach is represented by internal E-Commerce benchmarking, the second approach is represented by external E-Commerce benchmarking. This internal / external (9) distinction features as element number nine. The following table provides an overview of the relevant statements from the interviews in study 3.

Table 53: Quotations on benchmarking objects and subjects

<table>
<thead>
<tr>
<th>Source</th>
<th>Quotation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 21</td>
<td>&quot;We compare the turnover we generate with E-Commerce and compare that with the same number of our competitors&quot;.</td>
<td>Internal &amp; external</td>
</tr>
<tr>
<td>Interview 22</td>
<td>&quot;We only do internal benchmarking&quot;.</td>
<td>Internal</td>
</tr>
<tr>
<td>Interview 23</td>
<td>&quot;Overall BASF is compared against other players in the Chemical Industry&quot;.</td>
<td>External</td>
</tr>
<tr>
<td>Interview 24</td>
<td>&quot;So far almost exclusively internal E-Commerce benchmarking has been done. I think that for the external benchmarking of E-Commerce results are too early at this stage&quot;.</td>
<td>Internal</td>
</tr>
<tr>
<td>Interview 25</td>
<td>&quot;No, so far we do our comparisons exclusively internally&quot;.</td>
<td>Internal</td>
</tr>
<tr>
<td>Interview 26</td>
<td>&quot;We do mostly internal benchmarking, but we have some outside views on the world of E-Commerce too&quot;.</td>
<td>Internal &amp; external</td>
</tr>
</tbody>
</table>

Source: Study 3 of this thesis
In addition to those statements, the following challenges have also been mentioned in interview 24: “It seems as if E-Commerce benchmarking has not surfaced much into the business world even though I am sure many competitors actually do it”. The following statement from interview 25 further indicates that the development of E-Commerce benchmarking is still in its very early stages.

“And as mentioned, even the internal benchmarking is not yet fully developed. We are still at very early stages. Even though E-Commerce was implemented at BASF Group many years ago, the benchmarking efforts are still in its baby shoes”.

A possible explanation for this phenomenon was given in interview 25. “I think the focus was just not on benchmarking in the first place”. Further to the lack of focus, the issues that are usually related to external benchmarking are also associated with internal E-Commerce benchmarking. “The business units within BASF Group are so different, that it is probably very difficult to compare apples with apples to determine who is best in class” (interview 24). Additional feedback is given in interview 25.

“Maybe I would have an idea if we did external benchmarking. But I don’t expect much benefit from that. Even inside BASF the business units are very different. I find it hard to imagine that external benchmarking would help to improve our E-Commerce efforts. It’s actually similar to normal benchmarking. Most companies use internal benchmarking and I think that there are only a few examples in which external benchmarking did work in practice”.

An explanation of this opinion is given in the following quotation from interview 26.
"We don't do that. It would be too complicated. Things change too quickly and what would we do exactly if we find out that the costs structure is now more expensive than before? People would not question E-Commerce. There would be a huge discussion on comparing apples with pears and at the end a lot of efforts would have been spent on this subject without much effect".

Therefore it is questionable if external E-Commerce benchmarking can support the implementation of E-Commerce and if so, how can that be achieved. A key theme that has been discussed in study 3 is whether or not E-Commerce benchmarking would be executed in the same fashion as benchmarking traditional processes. It became apparent as element number ten that E­Commerce benchmarking is following a similar process (10). However, the indicators that are used are different and the frequency of benchmarking studies is higher. The following table highlights quotations on these topics.

Table 54: Quotations related to E-Commerce benchmarking and benchmarking differences

<table>
<thead>
<tr>
<th>Source</th>
<th>Quotation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 21</td>
<td>&quot;I am not sure if there are any differences. But it should be similar actually&quot;.</td>
<td>Similar</td>
</tr>
<tr>
<td>Interview 22</td>
<td>&quot;Currently it is done in the same fashion. We are not as far as talking about differences yet&quot;.</td>
<td>Similar</td>
</tr>
<tr>
<td>Interview 23</td>
<td>&quot;Well, I think there should not be so many differences. OK, the validity of E-Commerce benchmarks might be shorter than those of traditional benchmarks because of the fast nature of E-business&quot;.</td>
<td>Similar, different KPIs</td>
</tr>
<tr>
<td>Interview 24</td>
<td>&quot;It should follow the same path&quot;.</td>
<td>Similar</td>
</tr>
<tr>
<td>Interview 25</td>
<td>&quot;I could imagine that the process might be quite similar, however, the content or the KPIs that need to be tracked are probably different&quot;.</td>
<td>Similar</td>
</tr>
<tr>
<td>Interview 26</td>
<td>&quot;I don't think that there would be so many differences, if at all. The benchmarks of course will be different and probably the frequency in which they are measured&quot;.</td>
<td>Similar, different KPIs, higher frequency</td>
</tr>
</tbody>
</table>

Source: Study 3 of this thesis
Another element, number eleven, has been addressed in terms of whether or not the existing E-Commerce benchmarking efforts can be called benchmarking or not (11) compared to the working definition of benchmarking in this thesis. Only in few interviews this has actually been questioned. For example interview 22.

"Our benchmarking E-Commerce efforts started from the very early stages of the E-Commerce implementation. But as I mentioned before, it is actually not a real benchmarking. Currently it is more monitoring of certain numbers".

Or interview 23.

"It’s more a sharing of ideas rather than a structured approach to things. We don’t do standardized benchmarking. It is rather a kind of co-operation between the Business Units".

The point of some of the participants of study 3 in this regard is related to the question whether or not concrete actions are derived from those meetings, e.g. in interview 24.

"Looking at it, I think there are not so many concrete actions derived from the relatively little E-Commerce benchmarking we do. We exchange some ideas with other colleagues who have E-Commerce experience, but it is not managed in a very structured way".

The previous three elements 9-11 belonged to the theme of “E-Commerce benchmarking features”. They included “internal / external” (9), similar process (10) and “not benchmarking” (11). The following paragraphs refer to theme 4 that emerged from study 3.
Theme 4: "Future E-Commerce benchmarking applications"

The subjects do not feature as elements due to limited data being generated.

The following theme "Future E-Commerce benchmarking applications" highlights examples of possible developments of indicators for E-Commerce benchmarking. Table 55 provides an overview of ideas that have been expressed by the sample.

Table 55: Opportunities to improve existing E-Commerce benchmarking efforts

<table>
<thead>
<tr>
<th>Source</th>
<th>Quotation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 21</td>
<td>&quot;Fax to order will be new....Of course this should also be benchmarked then&quot;.</td>
<td>Fax</td>
</tr>
<tr>
<td>Interview 22</td>
<td>&quot;For E-Commerce benchmarking it is necessary to establish data points in SAP which is difficult and hence expensive&quot;.</td>
<td>Improve SAP</td>
</tr>
<tr>
<td>Interview 23</td>
<td>&quot;Further areas for benchmarking could be the various process steps&quot;.</td>
<td>Process steps</td>
</tr>
<tr>
<td>Interview 24</td>
<td>&quot;I would connect some of our KPIs to the quality of the replenishment of stocks at our customers. This is a new concept for some business units&quot;.</td>
<td>Customer stock levels</td>
</tr>
<tr>
<td>Interview 26</td>
<td>&quot;What we also do is use our experience as a buyer from our suppliers.... Also, one of the many side effects of acquiring new ventures is that we get a deep insight into what a former competitor has done&quot;.</td>
<td>Insights from outside</td>
</tr>
</tbody>
</table>

Source: Study 3 of this thesis

Despite the above areas for improvement, the participants of study 3 partly believe that the E-Commerce benchmarking system is a "good system" (interview 25). According to the respondent in interview 23, "still in its early days, but has progressed since it started. At least we don't just simply track our E-Shares anymore but also support those with other more specific KPIs". 

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Three previous sections of this chapter attempted to analyse key themes and elements which have been highlighted by the respondents in study 3. Overall 4 themes have emerged to which 11 elements could be allocated. The following section of this chapter will summarize the themes which emerged from study 1 and study 3 and present the quantitative results from study 2 as well.

5.4 Conclusions

This chapter presented the results of the quantitative and qualitative studies that have been conducted to address the research questions. For each study the profile of the sample has been provided. A representative participant of each study would be male, with a business background, a long work history at BASF and between 40 and 50 years of age. Furthermore, in each study certain themes and related elements have been identified.

The below table provides an overview of those themes and their related elements that emerged from the three studies. Furthermore the table illustrates additional elements which have not been discussed in depth due to the fact that they have only been highlighted in one study. Those elements are shown slightly indented and in a different font. The results of all studies will be summarized briefly in the following paragraphs.
Table 56: Overview of themes and elements which emerged from study 1-3

<table>
<thead>
<tr>
<th>Themes</th>
<th>Elements</th>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Share</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>E-Value</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Web-site functionalities</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Customer surveys</td>
<td><em>Benchmarking against E-Commerce applications</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Number of order lines</em></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Changes in order lines</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Tracking of costs</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Call centre (Number of lost calls)</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Delivery accuracy</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>E-Commerce benchmarking types</td>
<td>Target setting</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Best practices exchange</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Identify areas for improvements</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>*Determine best in class</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Track progress</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>E-Commerce benchmarking benefits</td>
<td>Higher frequency</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Different indicators</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Same process</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>E-Commerce benchmarking features</td>
<td>Competitive benchmarking</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Process benchmarking</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>External benchmarking</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Use of the system by the customer</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Benchmarking against traditional applications</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Order development</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Costs per order</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>*“Once off” and “running costs”</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Customer stock levels (VMI)</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Costs of the system</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><em>Profitability</em></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Future</td>
<td>Perception of Not real E-Commerce benchmarking</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>E-Commerce benchmarking applications</td>
<td>Perception of No information on E-Commerce benchmarking</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Studies 1, 2 and 3 of this thesis
For both qualitative studies, study 1 and study 3, emerging elements have been clustered in different themes. For study 1 and study 3, four different themes emerged. Those themes related in both studies to (1) E-Commerce benchmarking types, (2) E-Commerce benchmarking benefits and (3) E-Commerce benchmarking features. For study 1 the fourth additional theme included the perception of E-Commerce benchmarking while future E-Commerce applications emerged as the fourth additional theme in study 3.

Measuring the E-Share / E value, customer survey, web-site benchmarking, best practice exchange and target setting have been amongst the most popular elements in study 1 and study 3. According to these two studies, E-Commerce benchmarking would follow a similar process as benchmarking traditional businesses, but with a different set of indicators and at a higher frequency. To mirror the steps of a business process in an E-Commerce benchmarking system has been highlighted as one of the opportunities for improving the set up of E-Commerce benchmarking itself. Furthermore external benchmarking within E-Commerce businesses has been highlighted.

Study 2 connected benchmarking, E-Commerce and E-Commerce benchmarking information to BASF. It became apparent that BASF has already applied benchmarking and E-Commerce benchmarking successfully. Its E-Commerce applications did improve some business areas. However, the entire potential of the application has not yet been fulfilled. E-Commerce benchmarking has been confirmed to be a tool to further improve the performance of E-Commerce applications. Hence the importance of this thesis has been confirmed from a theoretical point of view in the literature review and from a practical point of view in study 2.

This chapter will be followed by discussions of the findings related to research questions 1-4. Chapter 6 will identify key themes and elements presented in chapter 5 and allocate them to each of the research questions.
6 Discussions of the findings

Chapter 5 presented the results that were generated in studies 1-3. It also provided information about the profile of the sample in each of the studies. Emerging themes and results from each study were presented and a summary was provided at the end of the chapter. This chapter will refer to these results and relate them to each research question. The four research questions for this thesis are:

1. How is the benchmarking of E-Commerce business operations undertaken at BASF?

2. What are the benefits of benchmarking E-commerce business operations at BASF?

3. What are the differences between benchmarking E-commerce business operations and traditional forms of benchmarking at BASF?

4. What are the most appropriate ways of implementing the benchmarking of E-commerce business operations at BASF?

Each of the themes that emerged from study 1, 2 and 3 will be discussed in relation to every research question. The selection of the themes will be based on whether or not they did emerge from all studies. To establish the significance of each theme, table 56 in chapter 5 will be used as a reference. The most popular themes will be further highlighted and connected to the appropriate research question. An exception was made for research question 4. In this case the choice of themes was based on the feasibility of implementation of a particular benchmarking approach and on the degree of sophistication which the particular approach adds to E-Commerce benchmarking. The flow of this chapter is presented in the following illustration.
With the continuing penetration of E-Commerce applications, the importance of measuring the efficiency of such applications increases in significance (Wen et al, 2003; Barua et al, 1996). Therefore, it is vital to understand how E-Commerce benchmarking is currently conducted. Following the sequence of the above figure, the themes related to research question 1 will now be presented.
6.1 Themes related to research question 1: How is benchmarking of E-Commerce operations undertaken at BASF?

The following illustration provides an overview of themes that have emerged from the three studies in relation to this research question: "How is benchmarking of E-Commerce operations undertaken?"

**Illustration 27: Themes related to research question 1**

As can be seen from this illustration, three key themes have emerged from the qualitative and quantitative studies related to research question 1: (1) measuring the E-Share / E-Value, (2) conducting customer surveys and (3) analysing web-site functionalities. Each of these three themes will be referred to in the following sections.

6.1.1 Theme 1 related to research question 1: E-Share / E-Value

Measuring the E-Share as part of an E-Commerce benchmarking exercise has been addressed as a topic in each of the three studies of this thesis. It has been mentioned in the very early stages of both the semi-structured interviews and the focused expert interviews. The participants in the questionnaire survey also "strongly agreed" or "agreed" with 79% that the E-Share is important for implementing E-Commerce benchmarking. The E-Share is also "the easiest (indicator) to measure" (interview 22).
The E-Share is a popular indicator for E-Commerce businesses internally and externally because it allows a simple comparison of the level of E-Commerce activities in a company. However, measuring the E-Share only does not provide a complete picture of E-Commerce. "In our mind the turnover via E-Commerce is not the right indicator because it does not give the right information of the progress in E-Commerce" (interview 23).

The E-Share is affected by the amount of business that is conducted via E-Commerce applications. Hence, an increase in the E-Share of a company can be achieved when the value of business with one particular customer increases. However, that does not mean that improvement potentials along the value chain are better exploited than before. Instead, in the aforementioned case it means that the customer portfolio of the company has changed.

Therefore, to get a more complete overview of the status of E-Commerce, the E-Value needs to be included also. The E-Value attaches a certain amount of savings to an electronic order process compared with the same order process conducted in a traditional way. These savings will be multiplied with the overall number of orders that have been received via E-Commerce applications and added up to measure the overall savings generated from the use of the E-Commerce application, the E-Value.

However, compared to the E-Share, the E-Value has not been widely introduced by E-Commerce practitioners. In fact it was only mentioned by one expert in study 3. A possible reason is the relative ease with which the E-Share can be calculated compared to the calculation which is necessary to establish the E-Value. In addition to this challenge, it might not always be possible to calculate the E-Value because of difficulties in generating the right figure for each step of the process. Nevertheless, the E-Value is of strategic importance. The smaller customers are the ones that offer potential to reduce the complexity of the supply chain. To measure the progress of customer portfolio development correctly, the E-Value is crucial (interview 23).
The next key theme which was identified regarding research question 1 is customer surveys. While the E-Share in particular can be considered the "entry-indicator" for E-Commerce benchmarking, the customer viewpoint needs to be included in the portfolio of E-Commerce benchmarking too. The following section will explain how this can be achieved.

6.1.2 Theme 2 related to research question 1: Customer surveys

Customer surveys are a crucial part of E-Commerce benchmarking. This is clearly highlighted in interview 6: "For me the main indicator is the level of customer satisfaction especially with long term customers". According to Feare (2001) meeting customer expectations is a crucial requirement for success in an E-Commerce environment. Hence, it appears logical that customer surveys are one of the key themes with regard to research question 1. In addition, the need for customer feedback was strongly highlighted in study 1 and study 3 (e.g. interview 16, 18, 19, and 20).

Customer surveys are also strongly identified as important in study 2. The participants of this study expressed their agreement that E-Commerce benchmarking permitted customer satisfaction to be determined as shown by a mean of 3.65 (n = 140; SD = 0.645). This highlights the importance of customer surveys to determine customer satisfaction. It is suggested that a customer survey be introduced before and after a certain change has been implemented to ensure that the impact of a new measure can be monitored.

A key topic related to customer surveys which has been addressed, particularly in the focused expert interviews, is the capabilities of the IT systems. In some cases customer satisfaction did not reach the desired levels because the IT systems of BASF and its customers did not match with each other perfectly. The ultimate goal is "...that the customers like using the portal" (interview 21). Hence one of the features that have been addressed in customer surveys to achieve customer satisfaction is the response time of the portal.
One of the important functions of a customer portal is the provision of information. Customers need information that is updated and easy to be accessed. Hence, the actuality of information and simplicity of the use of a portal need to be addressed in a customer survey. This viewpoint was shared by the sample in study 2 especially in Q19. The agreement of the sample has been expressed with a mean = 3.58 (n = 142; SD = 0.88).

However, as portals are the technical intermediators between a customer and a supplier, web-sites received specific attention from all three samples. The importance of information provision during the execution of a transaction has also been highlighted in the literature review. During the knowledge building phase of a transaction the support levels from a supplier usually peak. Hence, this part of the transaction requires particular attention from E-Commerce benchmarking to ensure customer satisfaction during this early but crucial phase of a potential purchase.

A web-site contains features that ensure actuality of information, response time or delivery accuracy. Those features that enable an engagement of two parties to form a business agreement can generally be clustered under “web-site functionalities”. Consequently, web-site functionalities feature as theme number three in response to research question 1. Web-site functionalities will be discussed in the following section.

6.1.3 Theme 3 related to research question 1: Web-site functionalities
Portals are one of the means by which customers and suppliers can communicate with each other. Undoubtedly, they need to feature within an E-Commerce benchmarking framework. Indeed, web-site comparisons are featured very prominently in existing literature (Brown et al, 2006; Welling and White, 2006; Kim et al, 2003a). Moreover, Zona Research (2000) stipulates that a poorly designed web-site can be detrimental to any business leading to the potential loss of customer confidence or business opportunities.
Consequently, E-Commerce applications leave little room for complacency. Because web-site simplicity is one of the key factors for success in the implementation of E-Commerce, it is not surprising that this feature is also part of a performance measurement system like E-Commerce benchmarking.

A key area that was addressed under the umbrella of web-site functionalities is the web-address of a company itself. "We want to make sure that if a customer needs to find us, our products are on top of the search list and not at the bottom" (interview 24). Due to the amount of information that is available on the Internet, it is important that a potential client can find the desired information easily. For a company portal though, the importance of this feature is not so crucial if the customer already knows where to look for the required information.

The general user friendliness is also of concern regarding web-site functionalities. Some respondents in study 3 addressed the importance of website benchmarking because they were under the impression that there were opportunities for improving the existing systems at BASF. However, the general impression of BASF’s E-Commerce applications was good due to the sample’s experience of E-Commerce benchmarking indicators or external benchmarking information. Interview 23 specifically referred to an award that BASF’s web-site had recently won, which underlined the positive opinion of stakeholders at BASF in this area.

Despite of the opportunities for web-site benchmarking, certain features of E-Commerce applications, such as convenience, variety and ease of information, are difficult to measure (OECD, 1997). As for the customer survey and customer satisfaction issues, the IT system capabilities also affect web-site functionalities. However, this subject was neither addressed in the literature nor during the semi-structured interviews nor as part of the questionnaire survey. However, as the IT set-up emerged as an element during the focused expert interviews, it was subsequently added to the findings.
It is however important to note, that each of the three themes that emerged from research question 1 only addressed the top-line development of a business. Surprisingly, there was very little evidence of indicators that also addressed the bottom-line results of a company. It seems as if that part of a profit and loss statement did not feature foremost on the minds of the respondents.

The types of indicators that could at least be related to the costs of an E-Commerce application were those items related to orders. Tracking the costs per order, or the costs per order line represent two areas of cost focus too. However, they have not been displayed prominently by the respondents in the studies. Consequently, it can be concluded that the importance of profitability related indicators has partly been neglected by all three samples.

This section of chapter 6 provided an overview of the key themes related to how E-Commerce benchmarking is conducted. Measuring the E-Share and the E-Value, implementing customer surveys and conducting web-site comparisons emerged from the data as key themes for this question. The next section of this chapter will identify key themes related to this research question: “What are the benefits of benchmarking E-Commerce business operations”?

6.2 Themes related to research question 2: What are the benefits of benchmarking E-Commerce business operations at BASF?

Overall, the findings from this section are encapsulated in the following quote: “The same advantages benchmarking offers for traditional business processes, these advantages will apply to E-Commerce systems as well” (interview 14). The following illustration provides an overview of the themes that have emerged during the three studies in relation to this research question 2.
Illustration 28: Themes related to research question 2

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>Best practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 2</td>
<td>Target setting</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

As can be seen from the above illustration, two key themes have emerged from the qualitative and quantitative studies related to research question 2: (1) sharing best practices and (2) supporting the target setting process.

Remarkably, the improvement of top-line numbers or profitability has not emerged as benefits from E-Commerce benchmarking. This might indicate a particular perception of the samples for E-Commerce or E-Commerce benchmarking. It may be that the mindset of the respondents is not yet set on improving profitability but rather on increasing the E-Commerce penetration for top line results, which has been the norm for E-Commerce projects in their start-up phase. Neither did any of the three studies indicate that concrete financial targets had been set.

Thus, it is not surprising that financial indicators do not feature on the list of E-Commerce benefits. The two themes that did emerge will be referred to in the following subsections. The first of those two themes is best practices. The exchange of best practices as a theme also relates back to one of the key features of benchmarking that was identified in the literature review. Here the learning experience has also been highlighted as an important feature of benchmarking.
6.2.1 Theme 1 related to research question 2: Best practices

The exchange of best practices is related to any form of benchmarking. According to Patron (2008) E-Commerce benchmarking needs to be conducted for the exchange of best practices to avoid re-inventing the wheel. Referring to Camp’s (1989, p 12) definition of benchmarking, it becomes apparent that the exchange of best practices is inherent in the working definition of benchmarking for this thesis which is: "benchmarking is the search for industry best practices to achieve top performances". Thus it was expected that the exchange of best practices would also feature as a benefit of E-Commerce benchmarking. The importance of the exchange of best practices is also highlighted in the following quotation.

"The learning experience from the benchmarking study together with the ability to track and observe opposition applications will put any business in a position to be able to act and react on its E-Commerce efforts in any way necessary" (interview 8).

The exchange of E-Commerce best practices can be implemented by inviting E-Commerce experts to attend a conference to discuss such best practices. However, because E-Commerce benchmarking is still a relatively new topic, the exchange of best practices has not yet been formalized as much as the exchange of best practices for traditional benchmarking. So far the exchange of best practices has also been limited in that E-Commerce benchmarking is mostly conducted internally with little input from outsiders. In addition, it seems fair to assume that currently, the exchange of best practices relates to internal best practices rather than industry best practices or process best practices. Furthermore "there is a need to make a distinction between what is and what is not considered best practices benchmarking" Batiz-Lazo (2004, p 432). Respondents in study 3 indicated that the level of actions developed from E-Commerce benchmarking is not as sophisticated as the action plans based on results from traditional benchmarking.
Consequently, it could be argued that current E-Commerce benchmarking activities cannot be considered as "real" benchmarking. In addition, during the interviews of study 1 and study 2, different topics were reported as benchmarking. These included qualitative and quantitative performance comparisons or simply copying ideas from other units. To side-step this supposed problem of inconsistencies, reference is made to the definition of benchmarking for this thesis (Camp, 1989, p 12). The "search for...best practices" has been a key part of that definition and the learning aspect has also been identified as a key feature of benchmarking. Consequently, current E-Commerce benchmarking activities are in line with the definition of benchmarking.

Pursuing this further, with the fast moving pace, continuing changes and frequent iterations of E-Commerce, it has become questionable how much contribution E-Commerce benchmarking can make. Undoubtedly the lifecycles of E-Commerce benchmarks will be shorter. "The validity of E-Commerce benchmarks might be shorter than those of traditional benchmarks because of the fast nature of E-business" (interview 23). Therefore, setting up the same process for best practice exchange in traditional business might not be suitable for E-Commerce businesses. Moreover, "the benchmarks of course will be different and probably the frequency with which they are measured" (interview 26). In light of these obvious differences between E-Commerce benchmarking and benchmarking traditional businesses, it could be argued that E-Commerce best practices could never reach the same level of depth and sophistication they have achieved in traditional businesses.

As it took years to establish a holistic exchange of best practices concept for brick and mortar businesses, it is expected that E-Commerce best practices will need more time to evolve even though supporting IT tools being available. Therefore the negative notion of some of the respondents related to the quality of E-Commerce best practices needs to be seen in a different light.
Theme number two which related to research question 2 was target setting. "You cannot wait for the whole process to kick off and only then ask yourself where you want to go", a quotation from interview 17, underlines the importance of target setting for E-Commerce applications. In retrospect, looking at the failure of the dotcoms, support for the target setting of such companies could have avoided the break down of the New Economy at that time. The sky seemed to be the limit and with that came unrealistic target setting and wrong expectation management, which almost destroyed an entire industry.

Target setting, therefore, does not only have to be considered as a benefit of E-Commerce benchmarking, but also as a key feature of success of E-Commerce as a whole. Target setting as a benefit of E-Commerce benchmarking emerged as theme number two with regard to research question 2. Hence, target setting will be discussed in the following section.

6.2.2 Theme 2 related to research question 2: Target setting

Customer expectations of E-Commerce applications continue to rise (Bovet et al, 2000; Mc Namee, 2001). This emphasizes the importance of target setting in the management of those increased customer expectations. However, target setting as such seems not yet to have been addressed within existing literature. In contrast, target setting as a benefit of E-Commerce benchmarking was a popular theme across all three studies.

As a consequence of better target setting, the subsequent planning process is also positively impacted. This relates to company targets as well as targets for individuals. E-Commerce is a tool that can improve a company’s business performance. Given the fact that target setting is a key part of any manager’s main tasks, E-Commerce benchmarking can be of great support in this process. A target setting process also connects E-Commerce activities to the company target and consequently ensures that the E-Commerce strategy and the company strategy are in line.
A solid target setting process would also help to establish an E-Commerce benchmarking system. This viewpoint was expressed by the respondent in interview 15 who stated that "based on the result of that initial overview you could set up a benchmarking system". This statement specifically relates to external E-Commerce benchmarking. Once an overview of E-Commerce benchmarking efforts of other companies has been established, an internal E-Commerce benchmarking system can be established as well. Hence target setting not only benefits the implementation of E-Commerce, but also the implementation of E-Commerce benchmarking itself. Remarkably, none of the three samples seemed to have knowledge of the E-Commerce benchmarking efforts of competitors or other external companies.

Looking back at the literature review, five benefits of traditional benchmarking were highlighted in chapter 3: (1) competitive advantage, (2) best practices, (3) world class performance, (4) target setting and (5) planning / forecasting. From this selection of benefits only two have emerged from the data related to E-Commerce benchmarking. To understand the reasoning for this, it is necessary to revert back to gaps that were identified in the literature review of E-Commerce benchmarking.

One of the key omissions in the area of E-Commerce benchmarking is standardized evaluation methods and very few generally accepted standards. This lack of standards and evaluation methods make the determination of competitive advantage or even world class performance difficult. It is therefore not surprising that those two subjects did not feature on the list of themes that emerged from the research for this thesis.

The previous section of this chapter provided an overview of key themes related to the benefits of E-Commerce benchmarking. The exchange of best practices and support for the target setting process emerged from the data generated by the three samples. The next section of this chapter will identify key themes related to this research question 3.
6.3 Themes related to research question 3: What are the differences between benchmarking E-Commerce business operations and traditional forms of benchmarking at BASF?

Research question 3 addresses potential differences between E-Commerce benchmarking and benchmarking traditional businesses. In the early stages of E-Commerce applications, only a few companies focused on measuring the success of their E-Commerce applications (Brown et al, 2006; Frost, 1999). The ones that did measure their applications applied E-Commerce benchmarking based on their experience with benchmarking traditional processes. This seems logical as the fundamentals of traditional benchmarking and E-Commerce benchmarking are the same (McGaughey, 2002).

However, E-Commerce contains features and processes that are unique and which differ fundamentally from those involved in traditional businesses. Consequently, specific E-Commerce benchmarking subjects only developed at a later stage. The following illustration provides an overview about the themes that have emerged during the three studies in relation to research question 3.

**Illustration 29: Themes related to research question 3**

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>Theme 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
<td>Frequency</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

The themes that emerged from studies 1-3 regarding research question 3 referred to (1) E-Commerce benchmarking indicators and (2) E-Commerce benchmarking frequency. Each of these themes will be explained in more detail in the following sections.
6.3.1 Theme 1 related to research question 3: Indicators

There is almost no visible evidence in the literature about a distinct differentiation between E-Commerce benchmarking and benchmarking traditional businesses. As the literature focuses mostly on web-site benchmarking, indicators mostly related to web-sites can be found. For example, the clicks on a web-site or comparisons of certain navigational features are emphasized by researchers (Brown et al, 2006; Misic and Johnson, 1999). However, information on different indicators, specific E-Commerce processes or frequencies in which E-Commerce benchmarking needs to be conducted are not highlighted.

However, it can be said that E-Commerce benchmarking needs to create different indicators compared to traditional ways of benchmarking. This statement presents a train of thought which can be followed easily. As cyberspace business is fundamentally different from brick and mortar business, surely the indicators that measure the performance will also be different. Q21.3 of study 2 confirmed this point statistically. In this case, the sample was asked if the performance indicators of E-Commerce benchmarking were different from the performance indicators of benchmarking traditional businesses. The sample responded with a mean of 3.32 (n = 140; SD = 0.908) and so "agreed" to this question.

For E-Commerce benchmarking indicators, reference can also be made to research question 1 which enquired about existing E-Commerce benchmarking opportunities. (1) E-Value / E-Share, (2) customer surveys and (3) web-site functionalities emerged at the time. While customer surveys have been measured as an indicator in traditional benchmarking, E-Value and E-Share or web-site functionalities are typical for E-Commerce benchmarking and as such, are different from traditional benchmarking. One of the key themes of research question 3 has therefore already been confirmed as a theme in research question 1.
6.3.2 Theme 2 related to research question 3: Frequency

The second theme that has been allocated to research question 3 is the frequency with which E-Commerce benchmarking needs to be conducted. Again, this subject relates back to the nature of E-Commerce itself. Electronic business is driven by the speed and ease with which information can be exchanged. Thus, its support systems need to be equally fast. This means that an E-Commerce application needs to change more frequently than a traditional business application. In consequence, E-Commerce benchmarking needs to be conducted more frequently too.

The respondents, however, did not seem to have a preference with regard to the frequency. E-Commerce benchmarking applications could be implemented weekly, monthly, bi-monthly, quarterly, annually or on an ad-hoc basis. None of those frequencies were specified. Consequently the term “more frequently” cannot be specified any further. It is also uncertain if it is reasonable to suggest a general frequency for E-Commerce benchmarking. As Power and Sohal point out (2002, p 192):

"The increased rate of changes (of technologies) promotes obsolescence. Systems that were recently state of the art, can become outdated legacy systems quite quickly".

The fact that the respondents did not elaborate on specific E-Commerce benchmarking frequency also highlights a particular perception which the researcher developed while conducting the interviews. There did not seem to be the same level of interest expressed by the respondents in E-Commerce benchmarking. Even though the literature review strongly indicated the need for standardization or support systems to further expand E-Commerce applications, the respondents did not exhibit the same level of urgency. E-Commerce benchmarking initiatives seemed generally popular but there did not seem to generate the same level of excitement as there was with E-Commerce.
The previous section of this chapter provided an overview of key themes how E-Commerce benchmarking differed from benchmarking traditional processes. Two differences were noted: (1) it entails different indicators and (2) E-Commerce benchmarking is conducted more frequently. The next section of this chapter will identify key themes related to this research question 4.

6.4 Themes related to research question 4: What are the most appropriate ways of implementing the benchmarking of E-Commerce business operations at BASF?

Research question 4 addresses the way E-Commerce benchmarking could be best implemented. The following illustration provides an overview of the themes that have emerged during the three studies in relation to research question 4.

Illustration 30: Themes related to research question 4

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>External benchmarking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 2</td>
<td>Process benchmarking</td>
</tr>
<tr>
<td>Theme 3</td>
<td>Additional indicators</td>
</tr>
</tbody>
</table>

Research question 4

Source: Developed for this thesis

The themes that emerged from studies 1-3 regarding research question 4 referred to: (1) external benchmarking, (2) process benchmarking and (3) additional indicators. Each of these themes will now be explained in more detail in the following subsections.
6.4.1 Theme 1 related to research question 4: External benchmarking

Theme 1, external benchmarking, was highlighted differently by participants of the studies. On the one hand, external E-Commerce benchmarking would add depth to the existing internal knowledge of E-Commerce. On the other hand, it was felt there were certain disadvantages associated with any form of external benchmarking, which of course apply to external E-Commerce benchmarking too.

As quoted from interview 5 "it might be very difficult to get competitors' figures or figures from other industries' companies". This point was also addressed by Camp (1989) who stated that external benchmarking could become quite challenging, depending on how strong the relationship with a particular benchmarking partner was. Therefore, like in traditional benchmarking, participants in an E-Commerce benchmarking study are exposed to the paradox of cooperation and competitive at the same time.

The question arises whether it is actually enough for a company to rely on internal E-Commerce benchmarking only, or if there is a need to include an external partner in this exercise as a principle condition. If a company does not have much experience in the application of E-Commerce, there might be little opportunity for internal benchmarking. Consequently external E-Commerce benchmarking needs to be encouraged.

However, today most E-Commerce benchmarking exercises are executed internally. Internal benchmarking is usually conducted first before it progresses to external benchmarking (Codling, 1992). In consequence, E-Commerce benchmarking should enlarge its scope from being internal to being external also. Industry organizations, technology suppliers or vendors of E-Commerce benchmarking information could help to facilitate this progression.
It can be seen from looking at competitors’ web-sites, that external benchmarking can be very simple. A web-site is accessible from any PC with an Internet connection. Therefore, certain features can be benchmarked quite easily. Examples of how to implement web-site benchmarking appear frequently in literature (Webb and Webb, 2004; Welling and White, 2006; Patron, 2008).

However, to analyse the fundamentals of a web-site or even customer related data would certainly remain difficult. One way of solving this challenge was expressed in interview 26. In this case, the acquisition of a former competitor allowed insights into areas which were formerly not accessible. Furthermore, the purchasing experience of a company at their supplier's web-site also adds to the external benchmarking experience. The next section addresses the second theme that emerged in relation to research question 4.

6.4.2 Theme 2 related to research question 4: Process benchmarking

Because E-Commerce processes extend across functions or even companies or suppliers and customers, process benchmarking seems a very appropriate way of benchmarking E-Commerce. However, it is very difficult to implement it. One of the key issues addressed by an expert in study 3 was how the right conclusions could be drawn from existing E-Commerce benchmarking indicators. Comparing the E-Share or the E-Value only, does not lead to indications for areas of improvement.

However, current IT systems usually do not permit benchmarking electronic processes as these are not reflected correctly by the IT system. Therefore, “a key challenge is to be able to generate the right number” (interview 23). Once the correct indicators along the business process have been determined, process benchmarking can be implemented.
It needs to be stated though, that the level of knowledge about the processes which are executed behind the curtain of a web-site of a competitor is extremely limited. This will, for the time being, remain a big challenge for companies, as stated by van der Merwe and Bekker (2005, p 339), "their ability to compare their performance with other companies in the same industry is restricted". Because of that, the likelihood for implementation of process benchmarking cannot be considered very high. However, for the exchange of actionable best practices, it remains crucial. "Other indicators" allow the gap to be filled should process benchmarking not become a reality.

6.4.3 Theme 3 related to research question 4: Other indicators

"Additional" indicators are necessary for creating a more complete portfolio of numbers that measure E-Commerce from different angles. The views which have been presented by all samples were quite creative. Their thoughts on potential E-Commerce benchmarking indicators varied across the value chain, from customer stock levels, via the cost per order, to profitability or benchmarking against traditional applications.

The lack of existing financial indicators to assess the performance of E-Commerce benchmarking and the lack of perceived financial benefits of E-Commerce benchmarking, has been emphasized already with regard to research question 1 and research question 2. However, the fact that no financial indicator related to profitability or return of investment was submitted in study 3 came as a surprise to the researcher. This could be related to the nature of E-Commerce business which is, at times, very complex due to the inter-organizational nature of E-Commerce. Furthermore, some of the benefits associated with E-Commerce are intangible and therefore difficult to assess. Welling and White (2006, p 658) even call a return on investment calculation for a web-site an "elusive goal". On a more naïve note one could argue that the benefits of E-Commerce applications are so obvious, that no evaluation is needed.
Those statements also highlight an intrinsic problem related to assessing E-Commerce applications. The existing evaluation methods from traditional benchmarking are not suitable because cyberspace business is different from brick and mortar business. On the other hand, existing methods of measuring financial information related to E-Commerce might not yet be sufficiently advanced to do so. One possible way of solving this issue is given by Vehovar and Lesjak (2005) who suggest the use of quantitative and qualitative indicators.

Lastly, in a response to very recent development of E-Commerce applications, online training, online technical support or customer contact services need to be included in the portfolio of E-Commerce benchmarking even though they have not been addressed specifically by any participant in this study. While the array of activities that is offered via electronic applications grows, benchmarking efforts need to support the roll-out of those activities by providing appropriate indicators which are measured frequently enough so that the exchange of best practices can push for further developments in the area of E-Commerce and E-Commerce benchmarking.

However, as can be seen from the variety of indicators it becomes obvious that one size will never fit all E-Commerce applications. The diversity of E-Commerce applications and the variety and sheer number of companies involved in cyberspace business would make this simply impractical. The next section of this chapter will highlight conclusions of chapter 6.

6.5 Conclusions

This chapter presented findings from the research and related them to each of the four research questions. The selection of themes that emerged from the data was based on the degree of significance that was associated with them across studies 1, 2 and 3. Overall 10 themes have been discussed.
Research question 1 addressed how E-Commerce benchmarking is currently conducted at BASF.

Measuring the E-Share and E-Value was the most popular way of benchmarking the top-line developments of the companies which engage in E-Commerce applications. Web-site benchmarking emerged as the key topic from the literature review with regard to E-Commerce benchmarking. Therefore web-site benchmarking also emerged a number of times during the course of this thesis and consequently ranked as an important way of E-Commerce benchmarking. Customer surveys were highlighted with equal importance by all samples. Furthermore, it became obvious that financial indicators on bottom-line developments do not seem to feature regularly as part of an E-Commerce benchmarking effort.

Research question 2 identified benefits of E-Commerce benchmarking at BASF.

Two themes emerged for this research question. Theme number 1 in this case was the exchange of best practices. Being at the heart of every benchmarking exercise in traditional or electronic businesses, the development of best practices is also part of the working definition of benchmarking for this thesis. A discussion emerged as to whether or not the exchange of best practices within a current E-Commerce benchmarking framework can be considered as “real benchmarking”.

It became apparent that some respondents had doubts about the degree of sophistication of existing E-Commerce efforts and related actions. This viewpoint was put into perspective because learning is a key feature of every benchmarking study. Hence existing efforts on E-Commerce benchmarking could be classified as such as well. Furthermore target setting has been highlighted as a key benefit. In this particular case E-Commerce benchmarking helps to connect the E-Commerce application targets with the company targets.
Research question 3 aimed at identifying differences of E-Commerce benchmarking when compared to traditional forms of benchmarking at BASF.

Two key differentiators emerged from the studies of this thesis: (1) indicators and (2) frequency. Because E-Commerce and traditional business processes are very different in their set up, the indicators which measure their performance need to be different too. The difference in speed of change between cyberspace business and brick and mortar business is reflected in the higher frequency with which E-Commerce benchmarking needs to be executed. Should the frequency not be in line with the changes of the E-Commerce application, E-Commerce benchmarking will lose some of its potential benefits. A subject of discussion has been the question of whether it is suitable to suggest a certain frequency of E-Commerce benchmarking studies. Due to the fast moving nature of E-Commerce, and for reasons related to the variety and number of E-Commerce applications, this has been refuted.

Research question 4 identified appropriate way of benchmarking E-Commerce at BASF.

In addition to the indicators which have been outlined under research question 1 (E-Share / E-Value, customer surveys, web-site benchmarking), external E-Commerce benchmarking has been identified as an opportunity to improve E-Commerce benchmarking to the next level. Traditional benchmarking itself has progressed from internal to external benchmarking. Hence, it was felt that E-Commerce benchmarking should follow the same path. Regardless of the challenges intrinsic to all types of external benchmarking, the need for external E-Commerce benchmarking is greater when compared with the external benchmarking of traditional businesses. Because E-Commerce has not yet fully developed standards for the implementation of evaluation, the exchange of best practices with an external benchmarking partner seem to be a condition for the successful execution of E-Commerce benchmarking.
Additionally, process benchmarking should be introduced. Process benchmarking will be as challenging as external E-Commerce benchmarking. However, it is seen as vital for the identification of areas for improvement in E-Commerce. Furthermore, some creative indicators have been added to the list for further opportunities of E-Commerce benchmarking such as customer stock levels, cost per order or comparisons against traditional ways of commerce. The lack of financial indicators has again been emphasised. This has been associated with three factors: (1) E-Commerce is too complex to be measured in this way, (2) current evaluation methods are not sophisticated enough to include bottom-line results and (3) no assessment is necessary as the benefits are too obvious.

This chapter provided an overview of the findings related to each research question. It identified 10 themes to answer the research questions. Now that the data have been analysed, the results discussed and findings presented in conjunction with each of the research questions, the next chapter will highlight conclusions and implications of this thesis.
Conclusions and implications

This study set out to investigate:

Benchmarking the implementation of E-Commerce

This study is framed around four research questions derived from a review of relevant literature. The thesis has followed a seven chapter structure. Each of these chapters will be highlighted briefly as follows.

Chapter 1 sets the platform for this research by outlining the research aim, its subsequent research questions and contributions that will be made. This chapter also highlighted the importance of E-Commerce benchmarking and furthermore indicated what type of methodology was used in order to generate relevant data sets to answer each research question. Chapter 1 also ringfenced the scale and scope for this research.

Chapter 2 aimed at connecting the methodological approach of this thesis to the context in which this research was undertaken. As this was a single-case-study exploratory investigation, BASF “The Chemical Company” in which the research was undertaken, was introduced in this chapter. Furthermore, the use of E-Commerce, benchmarking and E-Commerce benchmarking at BASF has been highlighted. In conclusion of chapter 2, the implications for this thesis have been discussed.

Chapter 3 presented a thorough review of the literature relevant for this thesis. Two main bodies of theory were reviewed, E-Commerce and benchmarking. From these two bodies of theory the research concepts of E-Commerce benchmarking evolved. The review of each topic included the origin and definition of the term itself, different types, success factors and important features.
After reviewing the research discipline, four literature gaps have been identified: Firstly, there was a lack of benchmarking methods for E-Commerce. Secondly, very few standards for the area of E-Commerce itself have been developed. Thirdly, very few management tools to support E-Commerce implementations were available and fourthly the development of E-Commerce benchmarking theory has not advanced much. Based on those gaps, the following research aim and research questions to have been identified. These are presented in the following table.

**Table 57: Research aim and research questions of this thesis**

<table>
<thead>
<tr>
<th>Research area</th>
<th>Research issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research aim</td>
<td>Benchmarking the implementation of E-Commerce: A case study approach.</td>
</tr>
<tr>
<td>Research question 1</td>
<td>How is the benchmarking of E-Commerce business operations undertaken at BASF?</td>
</tr>
<tr>
<td>Research question 2</td>
<td>What are the benefits of benchmarking E-commerce business operations at BASF?</td>
</tr>
<tr>
<td>Research question 3</td>
<td>What are the differences between benchmarking E-commerce business operations and traditional forms of benchmarking at BASF?</td>
</tr>
<tr>
<td>Research question 4</td>
<td>What are the most appropriate ways of implementing the benchmarking of E-commerce business operations at BASF?</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Once the research aim and the research questions have been established, chapter 4 explained and justified the methodology which enabled the investigation of the research aim and the research questions. After the research paradigm was chosen, a single-case-study approach was selected. As this thesis is an exploratory examination of E-Commerce benchmarking, the emerging subject, this methodology was seen as most appropriate. Within this single-case-study analysis a three-stage substudy research design was chosen. Additionally, for each of the three sub-studies a detailed study plan was developed.
For study 1, 20 semi-structured interviews were conducted with managers who had strong business experience and a wide range of educational backgrounds within BASF. Study 1 set the tone for study 2 as it indicated areas for further research on E-Commerce benchmarking. Consequently, study 1 was utilised to develop specific questions that were to be directed at the sample in study 2. The chosen sample has been the business unit “XYZ” at BASF. 146 responses have been received from members of this business unit which were then analysed.

The results of study 2 have been taken into consideration while setting up the stage for study 3. Focused expert interviews have been selected as a frame for this part of the thesis. The benefit of this approach was receiving expert feedback on the issues identified in study 1 and study 2. The three studies within the single-case-study design of this research were important to ensure appropriate triangulation for this thesis.

Chapter 5 presented the results of each study. Consequently chapter 5 comprised of three sections, each of them being dedicated to one study. For each of the three studies, emerging themes were presented. Once the results of each study have been presented, the chapter concluded with a triangulation of the findings between all studies.

Chapter 6 took the results from studies 1-3 and allocated them to each of the research questions. Thus chapter 6 contained four sections, one for each research question. Overall 10 themes have emerged from the data generated with the three studies. This chapter ended with a summary of findings for the research questions.

Chapter 7 highlights the conclusions and implications of this research. It will address general conclusions and specifically relate to implications for theory and for practise. This chapter will conclude with the limitations of this thesis and further research areas.
The structure of this chapter is emphasized in the following illustration.

**Illustration 31: Structure of chapter 7**

<table>
<thead>
<tr>
<th>Chapter 7.1: General conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 7.2: Theoretical implications from research questions 1-4</td>
</tr>
<tr>
<td>Chapter 7.3: Practical implications from research questions 1-4</td>
</tr>
<tr>
<td>Chapter 7.4: Limitations of this research</td>
</tr>
<tr>
<td>Chapter 7.5: Further research</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

### 7.1 General Conclusions

The overall objectives of this thesis were outlined initially in chapter 1. They were as follows:

- **The enhancement of E-Commerce benchmarking theory.**

- **The development of a guideline for benchmarking the implementation of E-Commerce.**

Consequently one section of this chapter will be dedicated to enhancing E-Commerce benchmarking literature, and one section will be dedicated to providing a guideline on how to benchmark E-Commerce. This thesis was able to reach its research aim firstly by: developing additions to existing benchmarking theory in the area of potential benefits and existing differences compared to traditional benchmarking and secondly by: by identifying a guideline based on which an E-Commerce benchmarking project could be conducted.
This thesis concluded that further guidance for implementing E-Commerce benchmarking needs to be provided. It needs to be proposed into which direction E-Commerce benchmarking should progress in order to support the ongoing development of E-Commerce applications. In the past, potential benchmarking objects and benchmarking subjects have been ignored. This research highlighted external benchmarking and process benchmarking as key for E-Commerce benchmarking projects.

Furthermore, it was concluded that benchmarking still seeks for application opportunities in E-Commerce businesses. The opinions of practitioners and researchers on this issue seem to be different though. While the literature continuously highlights the need for evaluation systems of E-Commerce applications, managers seem to have hesitated to implement E-Commerce benchmarking as rigorously as they have implemented traditional benchmarking. Therefore, E-Commerce benchmarking as a concept has not progressed into other areas of the value chain at present. However, the transfer of some of the features of traditional benchmarking has been implemented successfully.

Nevertheless, transferring concepts from traditional benchmarking into cyberspace benchmarking remains difficult due to challenges typically associated with any type of benchmarking. The lack of industry standards or benchmarking partners has been identified as the main hurdles in this respect. Hence competitive benchmarking, lateral benchmarking or even external benchmarking have not yet been applied significantly or at all in the area of E-Commerce. From this point of view it almost seems as if benchmarking is not yet ready to be applied extensively in cyberspace business. However, a key reason for this lack of application is the very small number of precise guidelines, which this thesis supports to develop.
Therefore, another conclusion of this case study suggests that further developments in the area of E-Commerce benchmarking are necessary. Especially the fast moving pace of E-Commerce and its seemingly endless avenues for potential measurements require ongoing evolution. The nature of E-Commerce itself will require continuous updates from E-Commerce benchmarking developments.

This thesis also concluded that the nature and extent of E-Commerce benchmarking and benchmarking traditional business are different. While traditional benchmarking measures performances of assets that can be seen and touched, E-Commerce benchmarking measures indicators relate to matters that are executed electronically. This of course slows down the extension of benchmarking principles from traditional benchmarking to E-Commerce benchmarking.

In addition, this research concluded that companies are not evaluating their E-Commerce applications through a holistic process, but rather focus their efforts on benchmarking their web-sites. The initiatives to engage in such projects seem more popular for web-site benchmarking than for other areas of the value chain. Potential losses for companies in such a case would be a lack of transparency of their remaining business processes and consequently a loss of opportunity for appropriate management.

Looking at the number of benchmarking applications in traditional commerce, it became apparent that there are comparatively few studies conducted in benchmarking electronic commerce. It was concluded that those few which have been executed, do not match traditional benchmarking projects in scale and scope. Considering the high degree of sophistication which traditional benchmarking has reached, it is surprising to find out how little benchmarking has reached cyberspace applications. E-Commerce itself has just left its infancy. Consequently E-Commerce benchmarking, too, is currently rather underdeveloped.
The next sections of this chapter will refer to specific conclusions of each research question.

7.1.1 Conclusion for research question 1: How is the benchmarking of E-Commerce business operations currently undertaken at BASF?

Web-site benchmarking was found to be a key ingredient of existing E-Commerce benchmarking activities. With the widespread of Internet applications, many companies utilised this opportunity to set up a web-site for promoting their services and products. Hence it seems logical that practitioners would start comparing those web-sites. The ease of access to web-sites across the globe made it simple for practitioners to conduct web-site benchmarking.

Furthermore two key indicators have been identified as part of E-Commerce benchmarking projects: (1) the E-Share and (2) the E-Value. These indicators assist companies to track the progress of their E-Commerce application and allow comparisons with other corporations too. These two indicators are applied simultaneously because they are complementary to each other. The E-Share measures top-line results while the E-Value focuses on cost savings that are attached to an electronic process. The customer also features in existing E-Commerce benchmarking systems. The level of satisfaction is usually related to web-site functionalities or to experiences with the order fulfilment after a purchase has been executed.

Few studies, if any, examine the amount of business which is conducted electronically in a company or industry. Whilst it is possible to find industry quotients (anonymous, 2000), neither the importance of the E-Share or the E-Value, nor the terms itself have been highlighted. The importance of the E-Share is underlined by the fact that it is an "entry indicator" for any company engaging in the field of E-Commerce. Thus it was surprising to find so little evidence for this area in the existing literature.
7.1.2 Conclusion for research question 2: What are the benefits of benchmarking E-Commerce business operations at BASF?

The adoption of E-Commerce benchmarking seems to offer two types of benefits. Firstly the exchange of best practices is enhanced. Secondly, the target setting process is supported. Those benefits are also traditionally associated with benchmarking brick and mortar business. Hence it can be concluded that the benefits of traditional benchmarking seem to be similar to the benefits of E-Commerce benchmarking. There is also general agreement across all samples that E-Commerce benchmarking supports the successful implementation of E-Commerce.

However, dedicated literature on E-Commerce benchmarking benefits is not available. This point was surprising considering the large number of sources that is available on E-Commerce benefits. It almost seems as if this subject has been ignored by the research community. One possible reason could be that “widely accepted methods of interpreting the data gathered by web-site measurement software have not yet been developed” (Welling and White, 2006, p 666).

Nevertheless, some benefits of E-Commerce benchmarking can be extracted from existing literature, e.g. best practices exchange. Wen et al (2003, p 709) highlight one benefit by saying “E-Commerce benchmarking helps managers identify the inefficient operations and take the right remedial actions”. Similarly, van der Merwe and Bekker (2002, p 339) can be quoted saying “we use E-Commerce benchmarking to identify where they perform well and where there is room for improvement".
7.1.3 Conclusion for research question 3: What are the differences between benchmarking E-Commerce business operations and traditional forms of benchmarking at BASF?

Recent and earlier research did not indicate clear differences between the two types of benchmarking. There is only very little, if any, research that has been conducted to compare benchmarking of traditional processes and benchmarking E-Commerce applications. This research concluded that there are significant differences between traditional benchmarking and E-Commerce benchmarking.

Thus far the discussions identified two variables by which E-Commerce benchmarking and traditional benchmarking differ from each other: (1) frequency and (2) indicators. The frequencies in which either benchmarking type could be executed depend on the benchmarking project. The indicators distinguish E-Commerce benchmarking from benchmarking traditional business.

However, the emphasis on developing a set of indicators along the value chain was not very strong. In particular return on investment indicators or other financial indicators have not been included in E-Commerce benchmarking. Currently there is a weakness in existing literature on this type of measurement. Nevertheless, due to the different nature of E-Commerce and traditional forms of businesses, clearly they need to be benchmarked differently. To analyse differences between those two types of benchmarking supports the progression of E-Commerce benchmarking. Therefore this thesis explored this area.
7.1.4 Conclusion for research question 4: What are the most appropriate ways of implementing the benchmarking of E-Commerce business operations at BASF?

A mix of benchmarking objects and benchmarking subjects has been identified as appropriate future avenues for conducting E-Commerce benchmarking. From this research it appears that by using external benchmarking and process benchmarking, the aforementioned benefits, best practices and target setting, can be achieved. Benchmarking web-sites can be seen as one type of external benchmarking which has been conducted frequently. However, external benchmarking has not been applied much in other business areas. Process benchmarking was found out to be important because E-Commerce affects processes as a whole, and not just isolated sections of them.

Additionally, this thesis has contributed to the list of E-Commerce benchmarking indicators. Those indicators measure the suggested benefits of E-Commerce and subsequently can be categorized in the same way. This list is not complete though and never will be, while E-Commerce is continuing to develop.

The conclusions of this thesis harbour implications for theory and for practise. The theoretical implications of this research are described in the following section of this chapter.

7.2 Theoretical implications from research questions 1-4: Enhancement of E-Commerce benchmarking theory

The previous section of this chapter highlighted the conclusions identified for each research question. This section will highlight eight implications for theory which can be seen in the below table. They will be discussed in the following paragraphs.
Table 58: Implications for theory from research questions 1-4

<table>
<thead>
<tr>
<th>Findings from this thesis</th>
<th>Related to</th>
<th>Made explicit in the literature review</th>
<th>Made explicit in this thesis</th>
<th>Implication for theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web-site benchmarking</td>
<td>RQ1</td>
<td>Yes</td>
<td>Yes</td>
<td>Remain key indicator, further refinement (1).</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>RQ1</td>
<td>To some extent</td>
<td>Yes</td>
<td>To be integrated in E-Commerce benchmarking guideline (2).</td>
</tr>
<tr>
<td>E-Share</td>
<td>RQ1</td>
<td>To some extent</td>
<td>Yes</td>
<td>Develop tools to measure E-Value (3).</td>
</tr>
<tr>
<td>E-Value</td>
<td>RQ1</td>
<td>No</td>
<td>Yes</td>
<td>Additional benefits and success factors to be identified (4).</td>
</tr>
<tr>
<td>Combination of E-Share / E-Value</td>
<td>RQ1</td>
<td>No</td>
<td>Yes</td>
<td>Dedicated E-Commerce benchmarking system to be established (5).</td>
</tr>
<tr>
<td>Best practices</td>
<td>RQ2</td>
<td>To some extent</td>
<td>Yes</td>
<td>Object to be included in E-Commerce benchmarking (6).</td>
</tr>
<tr>
<td>Target setting</td>
<td>RQ2</td>
<td>No</td>
<td>Yes</td>
<td>Subject to be included in E-Commerce benchmarking (7).</td>
</tr>
<tr>
<td>Different frequencies</td>
<td>RQ3</td>
<td>No</td>
<td>Yes</td>
<td>Indicator checklist to be provided (8).</td>
</tr>
<tr>
<td>Different indicators</td>
<td>RQ3</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>External benchmarking</td>
<td>RQ4</td>
<td>To some extent</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Process benchmarking</td>
<td>RQ4</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Other indicators</td>
<td>RQ4</td>
<td>To some extent</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

Whilst there is only limited research available on E-Commerce benchmarking, benchmarking web-sites is a fairly well documented subject. However, despite its popularity, even this type of benchmarking is not implemented by every organization which has a web-site. In fact as stated by Levenburg (2006), there are huge knowledge gaps about the effectiveness and efficiency of such applications. Similarly, the need to set up tools to assess the performance of web-sites is quite large (Kalakota and Whinston, 1996).
Scholars need to ensure that web-site benchmarking is part of a benchmarking system and mechanisms exist for it to be undertaken. This statement also applies to customer satisfaction. Customer satisfaction at this point is frequently measured strongly and related to web-site functionalities too. Hence web-site benchmarking and customer surveys are intertwined and consequently need to be further refined and remain key indicator (1/8) of E-Commerce benchmarking.

The case for the E-Share, E-Value or the combination of both is slightly different. While the E-Share has been tracked by some companies, the E-Value is entirely new. Hence, the E-Share, the E-Value and the combination of both need to be integrated into an E-Commerce benchmarking guideline (2/8). The E-Share alone does not allow for a clear statement on the sophistication and customer involvement of E-Commerce activities at a company. Depending on the customer structure, the E-Share can be quite high even though only few customers use E-Commerce. On the contrary, the E-Share could be quite low even though many customers have already engaged in E-Commerce with their supplier.

Considering the potential efficiency gains which are associated with smaller customers and E-Commerce, the E-Share could actually be misleading. In this case the E-Share would suggest business improvements even though only the customer mix changed. As this indicator is quite important, theorists need to develop tools to measure the E-Value (3/8).

As a fourth implication for theory, additional benefits and key success factors need to be identified (4/8) to support the progression of E-Commerce benchmarking as a management tool. This additional refinement will also contribute to the development of more scholarly research and empirical evidence in the area of E-Commerce benchmarking.
The fifth implication relates to the type of indicators being used for an E-Commerce benchmarking project. Again, there has not been any specific statement related to this research question from existing literature. However, considering the variety of indicators that have emerged from the samples in study 1 and study 3 in particular, it seems reasonable to assume that the indicators which support either traditional benchmarking or E-Commerce benchmarking will be different. Thus traditional indicators will not be suitable in cyberspace environments. This needs to be considered while further developing E-Commerce benchmarking. Furthermore, an appropriate frequency to measure indicators needs to be agreed. This implies and highlights one more time that a dedicated E-Commerce benchmarking system needs to be established (5/8).

Apart from internal benchmarking, external benchmarking represents the most popular type of benchmarking. External benchmarking is of particular importance for topics which have not yet matured enough inside an organization. For the successful implementation of E-Commerce, the computer systems of two business partners need to be linked very efficiently. Hence it seems almost a necessity, that E-Commerce benchmarking is conducted with two partners, being internal or external. Only with the full co-operation of value chain participants, can the full potential of E-Commerce be exploited. Hence a sixth implication for theory can be mentioned. External benchmarking as an object needs to be included in E-Commerce benchmarking (6/8).

Once the benchmarking object has been identified, the benchmarking subject needs to be established. A key finding from this thesis is the need to focus on process benchmarking within an E-Commerce benchmarking framework. Process benchmarking has not yet been highlighted thoroughly, if at all, within recent literature. Hence it is crucial to relate E-Commerce benchmarking efforts to E-Commerce processes or transactions.
Transaction costs have been identified as one of the key improvement areas for E-Commerce compared to traditional business. Therefore the process of a transaction needs to be benchmarked as conclusively as possible as opposed to benchmarking individual steps along the value chain. Consequently, process benchmarking as a **subject needs to be included in E-Commerce benchmarking** too (7/8).

The additional indicators which have been developed in this thesis add to the portfolio of existing E-Commerce benchmarking indicators. The theoretical implication of this finding is that scholars need to be careful to establish the correct process for the selection of appropriate indicators to make sure that relevant ones can be chosen by practitioners. **To provide an indicator checklist (8/8) features as the implication for theory in this case.**

The next section of this chapter brings together the conclusions and findings of this thesis and establishes a guideline for implementing E-Commerce benchmarking.

### 7.3 Practical implications from research questions 1-4: Guideline for benchmarking the implementation of E-Commerce

Before establishing a guideline for E-Commerce benchmarking, the place of E-Commerce benchmarking in general management needs to be clarified. The following illustration indicates a basic management process and highlights the relevance of E-Commerce benchmarking for each step including a description of its content. The contribution of E-Commerce benchmarking to each phase will be discussed in the following paragraphs.
Illustration 32: Contribution of E-Commerce benchmarking to the management process

<table>
<thead>
<tr>
<th>No.</th>
<th>Phase</th>
<th>Impact (Y / N)</th>
<th>E-Commerce benchmarking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analysis</td>
<td>Yes</td>
<td>Benchmarks</td>
</tr>
<tr>
<td>2</td>
<td>Target setting</td>
<td>Yes</td>
<td>Benchmarks</td>
</tr>
<tr>
<td>3</td>
<td>Action plan</td>
<td>Yes</td>
<td>Best practices</td>
</tr>
<tr>
<td>4</td>
<td>Implementation</td>
<td>No</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Controlling</td>
<td>Yes</td>
<td>Indicators / frequency</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

**Phase 1, analysis:** During the analysis phase the contribution of E-Commerce benchmarking is of particular importance. Once internal and external benchmarks have been set, the position of the company in relation to other market participants or competitors can be determined. This will be of great help to execute a SWOT analysis to establish clarification on the strengths, weaknesses, opportunities and threats in regards to E-Commerce for the company. The results of the analysis are the starting point of the next step.

**Phase 2, target setting:** The target setting will utilise information gathered from the analysis phase. E-Commerce targets must be realistic. This point is one of the key lessons learned from the crash of the New Economy at the beginning of this millennium. If the target setting is not as close as possible to the truth, potential investors might either contribute too many resources or too few. In both cases the business will suffer.
Phase 3, action plan: Once targets for an E-Commerce application are set, appropriate measures need to be developed to reach them. One of the key benefits that come along with E-Commerce benchmarking is best practices. Those will support the company in developing the action plan to ensure that targets are met. The innovativeness of those measures will be influenced by the benchmarking object. External benchmarking is said to provide more opportunities for improving internal benchmarking.

Phase 4, implementation: The contribution of E-Commerce benchmarking in this phase of the management process is not as significant as in the other phases. Once best practices are developed, the responsible managers need to implement them. For this phase E-Commerce benchmarking does not provide strong assistance.

Phase 5, controlling: To support the controlling part of the management process, E-Commerce benchmarking needs to supply the correct indicators for further follow up as well as the appropriate sequence to monitor each indicator. Very probably there will be a mix of different frequencies in which those indicators will have to be measured. If the situation requests an update, ad hoc measurements will probably also be conducted.

"E-Commerce will continue as a maturing technology for the foreseeable future" (Brown et al, 2006, p 252). The lack of quantifiable success indicators proves the need for E-Commerce benchmarking systems (Arthur D. Little, 2000). As highlighted in the literature review, traditional benchmarking is executed following a sequence of phases. Even though it is not explicitly mentioned by theorists, it is reasonable to assume that E-Commerce benchmarking follows a similar path.
Consequently, as part of the E-Commerce benchmarking guideline, reference will be made to the process suggested by Camp (1989): (1) planning, (2) analysis, (3) integration and (4) action. Each of these phases will be explained in more detail to conclude the practitioners' guideline for the implementation of E-Commerce benchmarking. However, before introducing an E-Commerce benchmarking guideline, five basic principles have to be considered.

The results of this thesis indicate that the effectiveness and efficiency of E-Commerce cannot be determined only by measuring the E-Share or E-Value. All samples expressed that a portfolio of indicators (1/5) which spreads across the value chain needs to be implemented. Consequently, E-Commerce benchmarking needs to analyse different indicators across the value chain. As transaction costs seem to play quite an important role within an E-Commerce framework, it will be key to benchmark factors associated with the transactions of goods or services. In particular the high support levels during the information gathering phase of a transaction seem to require attention.

In addition, due to the fragmentation of the chain of commerce, the fulfilment process has two areas of concern (Morgan Stanley Dean Witter, 2000): the demand chain and (2) the supply chain because manufacturers can not tell exactly which inventory and manufacturing capacity is available compared to market demand. Consequently those matters need to be addressed. The general importance of logistics to fulfil online orders is quite high as well.

Even though the need for financial indicators has not been expressed significantly by the samples of this thesis, E-Commerce specific indicators need to be related to the top- and bottom-line values of a business (2/5). This is considered to be one of the biggest challenges of E-Commerce benchmarking. Some of the benefits of E-Commerce are intangible which makes them hard to measure.
Martinson et al (1999, p 73) even suggest that “evaluation methods that rely on financial measures are not well suited for E-Commerce where there is a need to include less tangible criteria”. Furthermore they might not be as objective as a plain business figure. E.g. the sample utilised to determine customer satisfaction of a web-site is subject to bias or response errors. Thus the results of the customer satisfaction survey might not be fully accurate.

Nevertheless, avoidance of poor web-site design demands a set of guiding principles from which a benchmarking system related to web-site design can be set up (Kim et al, 2003). Consequently, the use of traditional quantitative benchmarking methods should be combined with qualitative (3/5) approaches (Kleist, 2003). According to Chong (2002), Greencard (2000) and Martison et al (1999), the portfolio method, the loyalty value added method and balanced scorecards respectively represent such qualitative approaches that could also be utilised for E-Commerce benchmarking.

Multiple combinations (4/5) of E-Commerce benchmarking objects and E-Commerce benchmarking subjects will also add necessary depth to this tool. Companies may compare their current performance with their own past performance, they may compare their performance against the best internal performer or they may compare their performance to best practices in other organizations. It depends on the company goal. If a company wants to become world class in a particular aspect of their business, they should set up an external E-Commerce framework on top of an existing internal set up.

According to Camp (1989) this is the only way to find innovative methods that have not been invented in one’s own industry. Furthermore, functional benchmarking reveals the biggest savings potential (Karlöf, 1994; Rau, 1996). However, it is not advisable to compare E-Commerce performance with the performance of offline competitors (Kanter, 2001). In addition to that, past, present and future results also need to be part of the guideline.
Benchmarking E-Commerce models need to be flexible (5/5) as it is unlikely that standardization in E-Commerce applications and hence values can be achieved (Fink, 2006). However, the fundamentals of benchmarking E-Commerce are essentially the same than those of benchmarking traditional businesses (McGaughhey, 2002).

As the underlying principles for E-Commerce benchmarking have now been addressed, the implementation guideline for E-Commerce benchmarking can be introduced referring to the benchmarking phases provided by Camp (1989). It is intended that this framework will encourage companies which have not yet engaged in E-Commerce benchmarking to consider its implementation. An overview of the different phases and its related actions are provided in the below table. The actions that need to be executed are outlined in the following paragraphs.

Illustration 33: Guideline for successful implementation of E-Commerce benchmarking

<table>
<thead>
<tr>
<th>No.</th>
<th>Phase</th>
<th>Action 1</th>
<th>Action 2</th>
<th>Action 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>Choose subject</td>
<td>Choose indicators</td>
<td>Choose objects</td>
</tr>
<tr>
<td>2</td>
<td>Analysis</td>
<td>Determine gaps</td>
<td>Identify reasons</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Integration</td>
<td>Develop best practices</td>
<td>Establish learning log</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>Implementation</td>
<td>Implement actions</td>
<td>Monitor progress</td>
<td>--</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
Phase 1 of the guideline, planning: During this phase of the E-Commerce benchmarking guideline it is vital to choose the correct benchmarking subject, for example the number of users of a web-site. Those subjects then determine the choice of indicators. The indicators need to reflect the E-Commerce process from order input to order fulfilment or at least they need to reflect key bottlenecks along the business process. The entry subject for E-Commerce benchmarking is the E-Share in combination with the E-Value. Furthermore, financial aspects related to E-Commerce applications need to be measured as much as E-Commerce specific indicators like the user-friendliness of a web-site.

Table 59 provides more insight into possible E-Commerce benchmarking indicators. This overview should help practitioners to choose the appropriate ones for their E-Commerce project which seems to be a difficult task (Fink, 2006, p 90): “a review...indicated the ease with which constructs and variables could be defined for the key E-Commerce applications. However, far less agreement and information is available on what are appropriate metrics”.

E-Commerce benchmarking should measure the desired benefits of E-Commerce. Hence the first row of the below table reflects those E-Commerce benefits which have been identified in the literature review. Furthermore, partnership and financial indicators are added.

Table 59: Possible E-Commerce benchmarking indicators

<table>
<thead>
<tr>
<th>Cost</th>
<th>Time</th>
<th>Sales</th>
<th>Partnership</th>
<th>Financial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order lines</td>
<td>Web-site</td>
<td>E-Share</td>
<td>Customer</td>
<td>Turnover</td>
</tr>
<tr>
<td></td>
<td>functionalities</td>
<td></td>
<td>surveys</td>
<td></td>
</tr>
<tr>
<td>Changes in order lines</td>
<td>System availability</td>
<td>E-Value</td>
<td>Online training</td>
<td>Variable costs</td>
</tr>
<tr>
<td>Delivery accuracy</td>
<td>Process times</td>
<td>Number of orders</td>
<td>Technical support</td>
<td>Fix costs</td>
</tr>
<tr>
<td>Stock levels (VMI)</td>
<td>---</td>
<td>---</td>
<td>Target setting</td>
<td>Profit</td>
</tr>
</tbody>
</table>

Source: Developed for this thesis
As can be seen from the above table, the number of potential E-Commerce benchmarking indicators is quite big. Opportunity for further research is especially provided by the indicators related to web-site functionalities. The final selection of E-Commerce benchmarking indicators depends on the targets which the E-Commerce project needs to reach. However, the portfolio of E-Commerce benchmarking needs to consider E-Commerce specific indicators. The E-Value or financial indicators like variable costs ensure that E-Commerce is connected with the company strategy and not a stand-alone project. Another way of categorizing E-Commerce benchmarking indicators is shown in the following illustration.

**Illustration 34: Indicators for E-Commerce evolution stages**

<table>
<thead>
<tr>
<th>Evolution stage</th>
<th>Degree of sophistication</th>
<th>E-Commerce benefits</th>
<th>Costs</th>
<th>Sales</th>
<th>Profit</th>
<th>Expert indicators</th>
<th>Advanced indicators</th>
<th>Basic indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash cow</td>
<td></td>
<td>E-Commerce capitalized</td>
<td>Number of orders</td>
<td>Customer satisfaction</td>
<td>Return on investment</td>
<td>E-Value</td>
<td>E-Value Advanced</td>
<td>E-Share</td>
</tr>
<tr>
<td>Rising star</td>
<td></td>
<td>E-Commerce utilised</td>
<td>Number of registered users</td>
<td>Web-site traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question mark</td>
<td></td>
<td>E-Commerce established</td>
<td>System availability</td>
<td>Web-site functionalities</td>
<td>E-Share</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Developed for this thesis

As can be seen in the previous illustration, practitioners need to choose which indicators fit them best, depending on which stage of the evolution E-Commerce has reached on its lifecycle. They have a selection of "basic", "advanced" and "expert" indicators which can support their E-Commerce application. The level of indicator that fits best depends on whether E-Commerce currently is a "question mark", a "rising star" or a "cash cow".
If the E-Commerce application has just been established, it might be too challenging to measure the return on investment. However, especially during the start-up phase of E-Commerce it is crucial to measure key components of the E-Commerce application. The E-Share as the entry-indicator serves this purpose very well. To benchmark web-sites has also been a very popular benchmarking subject.

The choice of indicators will highlight which of the potential E-Commerce benefits are achieved. E-Commerce indicators can measure the cost impact or turnover impact first, depending on which area E-Commerce focused on. It is also possible of course to apply both cost- and sales-related indicators at the same time. Hence the above mentioned sequence represents a guideline, but not an instruction on the area on which the indicators should focus. In any case, the list of appropriate indicators is certainly not complete.

The choice of benchmarking objects marks the completion of the planning phase of the guideline for successful implementation of E-Commerce benchmarking. Currently companies are limited in their ability to compare their E-Commerce performance with those of other firms as external benchmarking is not yet frequently implemented. Hence it is suggested to expand existing E-Commerce benchmarking activities into external E-Commerce benchmarking. This will help to establish best practices especially when a company is starting up E-Commerce activities.

However, for the time being it will remain difficult to engage in external or competitive benchmarking. Hence it is suggested to develop closer relationships with potential external benchmarking partners. The way in which this could be achieved is suggested in the following illustration.
Illustration 35: Finding external E-Commerce benchmarking partners

The process to find an external benchmarking partner contains four steps. As a first step, a company which is interested in external E-Commerce benchmarking should exhibit an interest in such study on industry- or general E-Commerce-Conventions. A first connection to potential experts of other companies could be established so that the two parties get to know each other.

The purpose of step number 2 and step number 3 is to build up trust between the two partners so that their willingness to share best practices increases. This could be established first at expert level for selected topics and afterwards with a group of people on a wider range of subjects.

After some time, as step number 4, the partners have developed so much trust in each other that they are comfortable to conduct a joint E-Commerce benchmarking study to develop best practices together. Should the partners belong to the same industry and engage in competitive benchmarking, they need to ensure that compliance issues are adhered to.
Phase 2 of the guideline, analysis: Once appropriate E-Commerce benchmarking subjects, indicators and objects have been chosen, gaps between different indicators need to be determined. Afterwards, those gaps have to be analysed to ensure a sound understanding of the gaps. This will be an important precondition for the next phase. However, the implementation of best practices does not necessarily require a full understanding of the gaps between E-Commerce indicators. Nevertheless, the implementation and selection of best practices will be much simpler should a clear understanding of the current situation exist. Consequently, to identify the reasoning for gaps is an important part of phase 2 of the E-Commerce benchmarking guideline.

Phase 3 of the guideline, integration: To develop best practices represents the heart of any benchmarking exercise. Hence it features explicitly within E-Commerce benchmarking too. This part of the process will integrate the results of the analysis by developing actionable measures to improve the performance of an E-Commerce application. As learning features as a vital component within any benchmarking process, to establish a learning log for each unit tracks experiences over time and helps to further develop best practices.

Phase 4 of the guideline, implementation: The integration of results of the analysis into actions finally leads into the implementation of actions. Those actions should support the progress or initial set up of E-Commerce activities. To ensure that this is the case, close monitoring along the lines of agreed indicators needs to be executed. As benchmarking is a continuous process, all phases could be re-started at any time of the implementation of E-Commerce.

According to Leedy and Ormrod (1998) it is equally important to report the weaknesses along with the strengths of a research project. Hence, the next section of this chapter will discuss the limitations of this thesis.
7.4 Limitations of this research

There are five main limitations that need to be emphasized for this thesis. One limitation was the scope (1/5). This thesis has been conducted in one particular industry and was restricted to members of one organization. Whether the results would be consistent in other industries or other organizations would need to be verified through further research. It is possible that a broader sample of companies could have yielded different results.

The sample type (2/5) used in this thesis is another possible limiting factor. The participants of all three studies were targeted through the hierarchy or personal contact or reference. While the researcher believes that the sample was selected purposefully, critics might look at this sampling method as being convenient rather than purposeful. However, this sort of sample choice has been applied in other studies successfully too (Pathak and Baldwin, 2008).

In addition, the sample size (3/5) could also be limiting this thesis. However, this particular limitation does not look threatening. In both qualitative studies of this thesis, theoretical saturation has been achieved. Furthermore, differences in the results of the questionnaire survey were insignificant. It could also be argued that the sample size, especially for study 3, the expert interviews, was too small. However, the collection of data was halted after the sixth interview because significant repetition in the data was already apparent.

Nevertheless, a better method could be to add more professionals into the panel from different cultural groups or with specific E-Commerce benchmarking background, in particular for study 1. The mental, emotional and physical conditions of the participants might have affected the results as well (Miles and Hubermann, 1994). Potential response bias and the lack of a test-retest measurement was another possible limitation of this study.
This thesis has been executed as an exploratory research step in developing a framework for measuring the performance of E-Commerce applications. However, it is apparent from this exploratory study (4/5) that a single-framework of E-Commerce benchmarking that can be universally applied is unlikely to be achieved. A more realistic goal might be a series of frameworks each of which applies to a particular industry or segment. Although this thesis has provided practical advice on how to implement E-Commerce benchmarking, it has certainly not answered all relevant questions to this topic. This will enquire further research into this contemporary and important subject.

Another limitation of this thesis concerns representativeness and generalizability issues (5/5). Those features are usually argued against case study approaches. However, as this case was of exploratory nature, representativeness and generalizability are to be tackled in future studies. The focus of this study was to explore themes related to E-Commerce, benchmarking and E-Commerce benchmarking. By implementing various measures to enhance reliability and validity of this thesis, representativeness and generalizability issues have been addressed as much as possible under the circumstances. Areas for further research will now be highlighted.

7.5 Further research

Despite the contributions to literature and practise by this thesis, some areas offer opportunities for additional research. Eight key additional opportunities for research will be emphasized in this section. Although this thesis has found that there is room for improving E-Commerce benchmarking efforts, managers should not assume that their opposition is having similar difficulties. Instead, the conclusions and findings of this study should encourage researchers and practitioners to engage in studies to elaborate practical frameworks for E-Commerce benchmarking. This would further support the implementation of E-Commerce applications with E-Commerce benchmarking.
The importance of E-Commerce benchmarking is clear (Hasan and Tibbits, 2000, p 439):

"In the current competitive climate, senior managers seek practical techniques to guide their management of E-Commerce and to help them to decide where best to allocate company resources".

Of the many tools available to measure performance, benchmarking seems to be particularly well suited to assess the contribution of E-Commerce to the company’s bottom line (McGaughey, 2002). It would be very useful to conduct a multi-company or a multi-business unit comparison (1/8) to test the influence of factors such as company culture or features of different departments such as background of the employees or age. It would further be useful to test some specific theories in management literature such as web-site benchmarking against real life examples from specific companies or business units.

A potential avenue for further research is replication of this thesis in other industries (2/8). Such studies would provide additional empirical support for E-Commerce benchmarking. Additionally, such replications might also build even more theory on web-site benchmarking, the most popular application of E-Commerce benchmarking. According to Levenburg (2006) there are still huge knowledge gaps in benchmarking web-sites.

This thesis followed the analytic generalization instead of the statistic generalization approach lined out by Easton (1994) and Yin (1994). Because of the inductive theory building compared to theory testing nature of this thesis and its realism approach, the statistical generalizability could be tested at a later stage with more quantitative research (3/8).
It is also recommended that further research to be conducted in the wider field of E-Commerce. This thesis has been limited to B2B E-Commerce. The implementation of E-Commerce benchmarking to B2C E-Commerce applications (4/8) might lead to different results. Therefore research opportunities exist with respect to distinguishing between B2B benchmarking and B2C benchmarking.

Additionally it is recognized that further research is needed to increase the knowledge base of what actually takes place in practise. For example, baseline research should be conducted in E-Commerce benchmarking itself. So far there is a lack of research of a holistic E-Commerce benchmarking approach. It is crucial to develop theoretical models that satisfy the generic requirements of E-Commerce benchmarking as well (5/8).

An additional research opportunity is represented by the type of products the unit of analysis sells predominantly (6/8). In the case of this thesis, there was a mixture of commodities and specialties available in the product portfolio. It would be of interest to determine if specialty business differs from commodity business in terms of its E-Commerce benchmarking approach.

Another possible research stream is the validation of the E-Commerce benchmarking guideline (7/8) from this thesis. One way of achieving that would be to discuss the given model with practitioners and so receive even more practical feedback on the guideline. The target group could be sales and marketing managers. This sample would be a sound source of reference to market needs and a good opportunity to compare their feedback with what has emerged from interviews with functional and operational managers in this thesis.
Furthermore, the learning aspect (8/8) of E-Commerce benchmarking presents another area of further research. Whilst E-Commerce benchmarking offers opportunities for transferring best practices, those best practices can only be copied or even further improved, if the individuals who realize them, have learned how to achieve them. The development of a specific E-Commerce learning log could be an important way of supporting the implementation of E-Commerce. An E-Commerce training programme should be attached to the E-Commerce learning log as well to ensure the implementation of E-Commerce best practices.
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Appendix

Appendix 1: Set of questions study 1 (semi-structured interviews)

Please briefly introduce yourself:
- Age
- Educational background
- Number of years at BASF
- Job role
- No of employees reporting to the individual
- Critical issues impacting job role
- Success factors in job role
- Obstacles encountered in job role
- How job role might change over next 2-3 years

Benchmarking:
- Do you know of any benchmarking applications at BASF?
- Were they of any value? What was the outcome?
- What kind of benchmarking have you heard of/where you involved in?
- Do you consider benchmarking being a useful tool?
- What is the importance of Benchmarking at BASF?
- What will be the impact of benchmarking on the costs and the turnover of BASF?
- How would you characterize the use of benchmarking at BASF (Pioneer, Fast follower, Late follower)?
E-Commerce:

- Have you experienced/heard of E-commerce at BASF?
- What are the benefits of E-Commerce in general?
- Has E-Commerce delivered its promises?
- What E-Commerce topic is currently the most important at BASF (B2B, E-Procurement, Demand Chain Management..)?
- Why is E-Commerce important?
- What are the expectations towards E-Commerce?
- What kind of difficulties would you expect in an E-Commerce project?
- In your opinion, how important is an E-Commerce application for the success of BASF?

E-Commerce benchmarking:

- After the implementation of E-Commerce, which tool does BASF use to measure the success?
- In your opinion, how successful has E-Commerce been at BASF?
- Do you think that E-Commerce benchmarking will lead to competitive advantages?
- How critical is the application of benchmarking in an E-Commerce environment at BASF?
- What might be other benefits of E-Commerce benchmarking?
### Appendix 2 (part 1 of 2): Qualitative analysis study 1 (semi-structured interviews), RQ 1

<table>
<thead>
<tr>
<th>Interview</th>
<th>Quotation</th>
<th>Response intensity (w / m / s)</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;In general we measure the development of the share of the turnover in business areas in which E-Commerce has been implemented&quot;.</td>
<td>Strong</td>
<td>E-Share</td>
</tr>
<tr>
<td>2</td>
<td>&quot;Right now I don't really see that happening in a way like benchmarking is done in other non-E-Commerce parts&quot;.</td>
<td>Weak</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>3</td>
<td>&quot;Well we measure the turnover and how the turnover via E-Commerce grows over time&quot;.</td>
<td>Medium</td>
<td>E-Share</td>
</tr>
<tr>
<td>4</td>
<td>&quot;At first, we measure the percentage of turnover via E-Commerce. Second, of course whether the cost turnover relation is on par&quot;.</td>
<td>Medium</td>
<td>E-Share</td>
</tr>
<tr>
<td>5</td>
<td>&quot;No, there is no such thing as of today. There is no benchmark like the degree of selling of products via E-Commerce&quot;.</td>
<td>Strong</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>6</td>
<td>&quot;Right now the E-Commerce turnover ratio compared to the overall turnover is the benchmark used most often. Also I did hear that some departments benchmark the functionalities of their portals compared to the ones from opposition&quot;.</td>
<td>Strong</td>
<td>E-Share, functionalities</td>
</tr>
<tr>
<td>7</td>
<td>&quot;Well, we measure the turnover via our portals as a percentage from overall turnover&quot;.</td>
<td>Weak</td>
<td>E-Share</td>
</tr>
<tr>
<td>8</td>
<td>&quot;So far we benchmarked the usage of our portals with the ones from opposition in terms of the amount of turnover we generate through these new tools. We also use benchmarking to track the milestones in the various E-Commerce projects&quot;.</td>
<td>Medium</td>
<td>E-Share</td>
</tr>
<tr>
<td>9</td>
<td>&quot;As I said, the development of E-Commerce over time is tracked but right now I am not aware of any benchmarking system being in place for an E-Commerce application&quot;.</td>
<td>Medium</td>
<td>E-Share</td>
</tr>
<tr>
<td>10</td>
<td>&quot;Right now I am not aware of such an E-Commerce benchmarking tool at BASF&quot;.</td>
<td>Weak</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>11</td>
<td>&quot;Within the chemical industry we did a survey on which percentage of their overall turnover do our competitors use their E-Commerce systems. We also analysed the functionalities of the different portals that are running currently. We also did customer surveys and we did some research on the costs that are involved, both once off installation costs and running costs&quot;.</td>
<td>Strong</td>
<td>E-Share; functionalities; customers surveys</td>
</tr>
<tr>
<td>12</td>
<td>&quot;I don't know how they measure it. I think they do it via KPIs etc. but I do not know exactly&quot;.</td>
<td>Weak</td>
<td>KPIs</td>
</tr>
</tbody>
</table>
Appendix 2 (part 2 of 2): Qualitative analysis study 1 (semi-structured interviews), RQ 1

<table>
<thead>
<tr>
<th>Interview</th>
<th>Quotation</th>
<th>Response intensity</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>&quot;Good question. Well, I do not think so. I think so far the departments are still too busy with the implementation of E-Commerce itself hence not having the time or the mental mindset to think about the follow up even though that part of the implementation is just as crucial as the implementation itself&quot;.</td>
<td>Strong</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>14</td>
<td>&quot;We only did put very little effort into the benchmarking at E-Commerce so far. In some cases even our customers asked us about satisfaction levels at BASF or customer level which we were not able to answer. I think that in the past we were too busy with the introduction of E-Commerce at various levels that we did not have the time or focus of thinking how to benchmark our E-Commerce systems&quot;.</td>
<td>Strong</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>15</td>
<td>&quot;No, I am not aware of any of that&quot;.</td>
<td>Weak</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>16</td>
<td>&quot;What we do internally is a simple reporting of figures to assess a utilization rate of the E-Commerce business of the overall business. We also try to assess the degree of customer satisfaction with customers that use our E-Commerce applications&quot;.</td>
<td>Strong</td>
<td>E-Share; customer survey</td>
</tr>
<tr>
<td>17</td>
<td>&quot;What I can imagine doing, and what is to some extent done already are customer satisfaction analyses. Customers of BASF compared to customers of opposition or general portals&quot;.</td>
<td>Strong</td>
<td>Customer survey</td>
</tr>
<tr>
<td>18</td>
<td>&quot;To my knowledge we measure the percentage of our overall turnover that is run through the portals. Furthermore, in call centre, the number of calls and lost calls is measured&quot;.</td>
<td>Medium</td>
<td>E-Share, number of calls</td>
</tr>
<tr>
<td>19</td>
<td>&quot;Today there is no real benchmarking E-Commerce within our activities. Right now it does not exist. What I can observe is everybody trying to a better understanding of the performance of E-Commerce but nothing really methodologically exists yet&quot;.</td>
<td>Medium</td>
<td>No benchmarking</td>
</tr>
<tr>
<td>20</td>
<td>&quot;I think we measure the development of our delivery accuracy&quot;.</td>
<td>Weak</td>
<td>Delivery accuracy</td>
</tr>
</tbody>
</table>
### Appendix 3: Qualitative analysis study 1 (semi-structured interviews), RQ 1

| Interview number/Theme | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | Σ  |
|------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|  |
| E-Share                | X | X | X | X | X | X | X | X |   |    |    |    |    |    |    |    |    |    |    |    | 10 |  |
| Customer surveys       |   |   |   |   |   |   |   |   | X | X | X |    |    |    |    |    |    |    |    |    | 3  |  |
| Functionalities        |   |   |   |   |   |   |   |   |   |   |   | X | X |    |    |    |    |    |    |    | 2  |  |
| Call Centre            |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |    |    |    |    |    | 1  |  |
| Delivery accuracy      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X |    | 1  |  |
| No benchmarking        | X |   | X |   | X | X | X | X | X |   |   |   |   |   |   |   |   |   |   |    | 7  |  |
Appendix 4: Questionnaire study 2 (questionnaire survey)

**Introduction:**

**Q1** Which age group do you belong to?

<table>
<thead>
<tr>
<th>Age Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 30 years</td>
<td>X</td>
</tr>
<tr>
<td>31 - 40 years</td>
<td></td>
</tr>
<tr>
<td>41 - 50 years</td>
<td></td>
</tr>
<tr>
<td>&gt; 50 years</td>
<td></td>
</tr>
</tbody>
</table>

**Q2** You are?

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>X</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
</tbody>
</table>

**Q3** For how long have you been working at BASF Group?

<table>
<thead>
<tr>
<th>Working Years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 years</td>
<td></td>
</tr>
<tr>
<td>5 - 10 years</td>
<td>X</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td></td>
</tr>
</tbody>
</table>

**Q4** What is your field of education?

<table>
<thead>
<tr>
<th>Field of Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>X</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td></td>
</tr>
<tr>
<td>Others (please specify):</td>
<td></td>
</tr>
</tbody>
</table>

**Q5** What is your formal education? (Please tick one or more options).

<table>
<thead>
<tr>
<th>Formal Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td></td>
</tr>
<tr>
<td>University of applied sciences (Fachhochschule)</td>
<td>X</td>
</tr>
<tr>
<td>Business School</td>
<td></td>
</tr>
<tr>
<td>Doctorate</td>
<td></td>
</tr>
<tr>
<td>Others (please specify):</td>
<td></td>
</tr>
</tbody>
</table>

**Q6** How would you specify your product/product-group?

<table>
<thead>
<tr>
<th>Product/Product Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodities</td>
<td></td>
</tr>
<tr>
<td>Specialities</td>
<td>X</td>
</tr>
<tr>
<td>Others (please specify):</td>
<td></td>
</tr>
</tbody>
</table>
2. BENCHMARKING SECTION

Q7 Do you have personal real-life experience with benchmarking?
Yes, in the following studies:
- a) Human Resources
- b) Research and Development
- c) Purchasing
- d) Internal/external logistics
- e) Production
- f) Sales and marketing

No

If “No”, please answer the following questions with regards to your personal ATTITUDE or OPINION!

If “Yes”, please answer the following questions with regards to your own experience!

Q8 Please validate the following statements with regards to the impact of benchmarking on the products you are dealing with.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking provides knowledge of competitors products in terms of its:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Ingredients</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>b) Features</td>
<td></td>
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<tr>
<td>c) Selling price</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>II) The quality of BASF’s products has been improved due to the knowledge gained in benchmarking studies in terms of its:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>a) Ingredients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Features</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>c) Selling price</td>
<td></td>
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</tr>
<tr>
<td>III) After the implementation of the benchmarking study, the profit of your product/ product-group...:</td>
<td></td>
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</tr>
<tr>
<td>a) increased by:</td>
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<tr>
<td>• &lt; 5%</td>
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<tr>
<td>• 5% - 10%</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>• &gt;10%</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) decreased</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Q9 Please validate the following statements concerning the process improvement opportunities which are created by the results of a benchmarking study.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking results offer the opportunity to implement best practices.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) The benchmarking results indicated improvement opportunities in:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Human Resources</td>
<td></td>
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</tr>
<tr>
<td>b) Research and Development</td>
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<td></td>
</tr>
<tr>
<td>c) Purchasing</td>
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<td></td>
</tr>
<tr>
<td>d) Internal/external logistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Production</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>f) Sales and marketing</td>
<td></td>
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</tr>
<tr>
<td>III) After the implementation of the improvement opportunities, the costs for the following processes decreased:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Human Resources</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>b) Research and Development</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>c) Purchasing</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>d) Internal/external logistics</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>e) Production</td>
<td></td>
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<td></td>
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<tr>
<td>f) Sales and marketing</td>
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</tr>
</tbody>
</table>

Q10 Please validate the following statements with regards to the ability of benchmarking to provide competitive advantage to BASF.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) In general the implementation of best practices...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) decreased costs by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• &lt; 5%</td>
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<td></td>
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<tr>
<td>• 5% - 10%</td>
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<tr>
<td>• &gt;10%</td>
<td></td>
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<td></td>
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<tr>
<td>b) increased costs</td>
<td></td>
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<tr>
<td>c) increased turnover by:</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>• &lt; 5%</td>
<td></td>
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<tr>
<td>• 5% - 10%</td>
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<tr>
<td>• &gt;10%</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>d) decreased turnover</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>II) New products have been brought to the market due to the knowledge gained in the benchmarking study.</td>
<td></td>
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</tr>
<tr>
<td>III) Benchmarking helped to gain knowledge of:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>a) Clients of competitors</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>b) Competitors</td>
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<tr>
<td>c) Suppliers</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>d) Dealers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Others (please specify):</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IV) It has been easy to draw the relevant conclusions from a benchmarking study for the relevant department.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Q11  Please validate the following statements concerning the necessity of the quality of the planning and people oriented approach of benchmarking.

<table>
<thead>
<tr>
<th></th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) In successful benchmarking projects, milestones have been determined.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) In successful benchmarking projects, the targets have been communicated clearly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III) In successful benchmarking projects, the top management participated personally in the relevant meetings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV) In successful benchmarking projects, the quality of the figures of the benchmarking study has been appropriate.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q12  Please validate the following statements with regards to the ability of benchmarking to assist in the determination of future business targets.

<table>
<thead>
<tr>
<th></th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking helps to determine realistic business targets.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) Benchmarking provides understanding of variations in actual figures compared to target.</td>
<td></td>
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<tr>
<td>III) Benchmarking points out opportunities for additional business potentials.</td>
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</tr>
</tbody>
</table>
### 3. E-COMMERCE SECTION

**Q13** Do you have personal real-life experience with E-Commerce?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

If "No", please answer the following questions with regards to your personal ATTITUDE or OPINION!

If "Yes", please answer the following questions with regards to your own experience!

**Q14** Please validate the following statements concerning the reduction of transaction costs due to the introduction of E-Commerce.

<table>
<thead>
<tr>
<th></th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) <em>Since the order processing is run via E-Commerce the delivery accuracy...</em></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>a) increased by:</td>
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<tr>
<td>* &lt;5%</td>
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<tr>
<td>* 5%-10%</td>
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<tr>
<td>* &gt;10%</td>
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<tr>
<td>b) decreased</td>
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</tr>
<tr>
<td>II) In general the number of process interfaces has decreased.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>III) The amount of time spent on control work in the following areas has dropped:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Delivery dates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Status of orders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Status of customer complaints</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Q15** Please validate the following statements concerning E-Commerce's ability to enhance supply chain performance.

<table>
<thead>
<tr>
<th></th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) The availability of information increased.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) The cooperation between sales and marketing departments is easier.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III) The number of customer complaints dropped.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV) <em>Due to E-Commerce product contribution margins have...</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) increased by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* &lt;5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* 5%-10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* &gt;10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q16 Please validate the following statements with regards to the ability of E-Commerce to improve process efficiency.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) E-Commerce has increased the speed in which the customer can deal with BASF.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) Via E-Commerce every employee can deal with a larger number of clients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III) In the following areas the effort necessary today to assist customers is smaller than previously:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Order taking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Order processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Stock management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q17 Please validate the following statements with regards to the ability of E-Commerce to offer competitive advantage to BASF.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Due to E-Commerce, BASF can now do business with more customers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) The degree of customer satisfaction in the following areas has been increased compared to previous years:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Availability of product information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Accuracy of deliveries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Timing of deliveries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Competence of BASF staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Others (please specify):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III) After the implementation of E-Commerce, the following parties see BASF being more innovative rather than traditional in its business approach:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Suppliers</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>c) Employees</td>
<td></td>
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<tr>
<td>d) Stock exchanges</td>
<td></td>
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<td></td>
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<tr>
<td>e) Media</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Others (please specify):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q18 Do you have personal real-life experience with E-Commerce benchmarking?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

If "No", please answer the following questions with regards to your personal ATTITUDE or OPINION!

If "Yes", please answer the following questions with regards to your own experience!

Q19 Please validate the following statements with regards to the opportunity to determine customer satisfaction levels with E-Commerce benchmarking.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking E-Commerce permits to determine customer satisfaction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) The following indicators provide BASF with important information about customer satisfaction levels:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>a) Simplicity of the use of a web-site</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>b) Response time of a web-site</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>c) Quality of the information accessible for the customer</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>d) Actuality of the information</td>
<td></td>
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<tr>
<td>e) Number of clicks on a web-site</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>f) Others (please specify):</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>III) The following parties are satisfied with the performance of BASF's E-Commerce applications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Suppliers</td>
<td></td>
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<tr>
<td>c) Employees</td>
<td></td>
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<td></td>
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<tr>
<td>d) Others (please specify):</td>
<td></td>
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</tbody>
</table>
Q20 Please validate the following statements with regards to the necessity to assess the performance of BASF’s online applications via E-Commerce benchmarking.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking E-Commerce is as important as benchmarking traditional commercial activities.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>II) E-Commerce benchmarking helps to develop commonly accepted E-Commerce best practices.</td>
<td></td>
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<tr>
<td>III) E-Commerce benchmarking should contain:</td>
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<td></td>
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<tr>
<td>a) Cost developments</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>b) Functionalities of E-Commerce applications</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Customer satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>d) Comparisons with traditional business models</td>
<td></td>
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<tr>
<td>e) Turnover developments</td>
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<tr>
<td>f) Others (please specify)</td>
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<tr>
<td>IV) BASF does benchmark its E-Commerce applications against...</td>
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<td></td>
</tr>
<tr>
<td>a) traditional business processes</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>b) other E-Commerce applications</td>
<td></td>
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<tr>
<td>c) the development of the E-Commerce application over time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Others (please specify):</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q21 Please validate the following statements with regards to whether or not E-Commerce benchmarking offers the opportunity to compare traditional businesses with E-Commerce businesses.

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>neither/nor</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Benchmarking E-Commerce against traditional businesses is a crucial part of E-Commerce benchmarking.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II) In benchmarking E-Commerce you have to distinguish between once-off installation costs and running costs of the application.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III) The performance indicators of E-Commerce benchmarking will be different from the performance indicators of benchmarking traditional businesses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV) The lifecycle of E-Commerce benchmarks will be shorter than the ones of traditional benchmarks.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>V) The benchmarking procedure of E-Commerce will follow the same pattern than the benchmarking procedure of traditional commerce.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix 5: Cover letter study 2 (questionnaire survey)

Dear Sir or Madam 24 January 2005

Today more than ever, E-Commerce is an important means for businesses to keep costs low and offer products and services profitably to a wide range of customers. Once the initial difficulties have been overcome it is now of importance to determine how current E-Commerce applications can be improved even further.

One of the many ways to do that can be E-Commerce benchmarking. Even though benchmarking itself is a rather well known tool, its introduction into E-Commerce scenarios is still fairly new like the concept of E-Commerce itself. In order to assess the usefulness and applicability of benchmarking in an E-Commerce environment, a study is conducted about if, and how, the two concepts benchmarking and E-Commerce can be linked with each other.

Hence to gain more in depth knowledge in this area at BASF, I kindly ask you for your help. Please would you take some of your valuable time to answer the attached questionnaire? On 6 pages, it contains four sections with the topics “introduction”, “benchmarking”, “E-Commerce” and “E-Commerce benchmarking”.

The timeframe for the completion of the questionnaire has been assessed at being less than 30 minutes. The questions contain multiple choice answers only. To make the process as little time consuming for you as possible, the questions can be ticked with a mouse click once you saved the file under a name or description of your choice.

Of course the data you provide will be dealt with in utmost confidentiality and will only be referred to on an aggregated basis. Hence it will not be possible to track back any statement to any individual. Additionally the whole study itself will be kept confidential for the use at BASF Group only.

May I kindly ask you to return the questionnaire until the end of February 2005 via E-mail to:

colin.von.ettingshausen@coatings.basf.org

Many thanks in advance for your co-operation.
Appendix 6: Set of questions study 3 (focused expert interviews)

Please briefly introduce yourself:
- Age
- Educational background
- Number of years at BASF
- Job role

Questions related to RQ1:
- How is benchmarking E-Commerce currently undertaken in your area of responsibility?
- Since when do you implement E-Commerce benchmarking?
- What do you think of BASF’s benchmarking E-Commerce efforts?
- Where does the focus on Web-site benchmarking stem from?
- Which actions do you take from comparing order lines or turnover developments?
- With whom do you benchmarking your E-Commerce applications?

Questions related to RQ2:
- What are the benefits of benchmarking E-Commerce operations from your point of view?
- How do you set your E-Commerce targets?
- Which importance does E-Commerce benchmarking have in terms of determining customer satisfaction?
- How do you ensure the exchange of best practices of E-Commerce benchmarking?
- How do you rate your E-Commerce efforts compared to that of your competitors?
- What does your team think about current E-Commerce benchmarking efforts?
- Does the opinion of your team depend on their background, experience or business segment?
- How satisfied are customers, employees and BASF with E-Commerce today?

Questions related to RQ3:
- What are the differences between benchmarking E-Commerce business operations and traditional forms of benchmarking?
- Why are there any differences in E-Commerce benchmarking compared to benchmarking traditional forms of businesses?
- What is the frequency of E-Commerce benchmarking in your department?
- Which indicators do you use for benchmarking traditional businesses?
- How do you rate the stage of development that E-Commerce benchmarking has reached compared to benchmarking traditional businesses?

Questions related to RQ4:
- What are the most appropriate ways of implementing benchmarking of E-Commerce business operations?
- Which other performance measurements would you add to the current E-Commerce benchmarking efforts if you could?
- Which part of the value chain should E-Commerce benchmarking focus on?
- Which differences will occur between benchmarking E-Commerce businesses and benchmarking traditional businesses?
- How often do you change the performance indicators to benchmarking E-Commerce applications?
- Do you benchmark traditional businesses against your E-Commerce applications?
Appendix 7: Analysis study 2 (questionnaire survey)

Results on the introduction section

Overall 146 completed forms have been received over a period of 2 months. This represents a 58% response rate of the attempted 250 responses. All responses have been filled out correctly.

The following graphs will provide an overview of the basic statistics/features of the participants of the study.

Q1. Which age group do you belong to?

![Age split of the probates](chart)

Q2. You are?

![Gender of the probates](chart)

Q3. For how long have you been working at BASF Group?

![Years of experience at BASF](chart)
Q4. What is your field of education?

**Education of the probates**

- 32% Business
- 57% Engineering
- 11% Chemistry

Q5. What is your formal education?

**Degrees of the probates**

- 41% University of applied sciences
- 12% University
- 34% Business School
- 13%

Q6. How would you specify your product/product-group?

**Product groups**

- 31% Commodities
- 69% Specialties
Results of the Benchmarking Section

Q8. Please validate the following statements with regards to the impact of benchmarking on the products you are dealing with.

8.1 Benchmarking provides knowledge of competitors products in terms of its ...

<table>
<thead>
<tr>
<th></th>
<th>Ingredients</th>
<th>Features</th>
<th>Selling price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>12</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Agree</td>
<td>69</td>
<td>97</td>
<td>94</td>
</tr>
<tr>
<td>Neither/Nor</td>
<td>27</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Disagree</td>
<td>23</td>
<td>44</td>
<td>14</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

8.2 The quality of BASF’s products has been improved due to the knowledge gained in benchmarking studies in terms of its ...

<table>
<thead>
<tr>
<th></th>
<th>Ingredients</th>
<th>Features</th>
<th>Selling price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>4</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Agree</td>
<td>46</td>
<td>74</td>
<td>54</td>
</tr>
<tr>
<td>Neither/Nor</td>
<td>64</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>Disagree</td>
<td>20</td>
<td>71</td>
<td>23</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

8.3 After the implementation of the benchmarking study, the profit of your product/product-group increased by ...

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10%</td>
<td>5</td>
<td>27</td>
<td>82</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5% - 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5%</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q9. Please validate the following statements concerning the process improvement opportunities which are created by the result of benchmarking study

9.1 Benchmarking results offer the opportunity to implement best practices

![Bar chart showing the percentage of respondents who strongly agree, agree, neither/nor, and disagree with the statement that benchmarking results offer the opportunity to implement best practices.]

9.2 The benchmarking results indicated improvement opportunities in:

<table>
<thead>
<tr>
<th>Process</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>58%</td>
<td>19%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td>86%</td>
<td>18%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td>82%</td>
<td>7%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal/External logistics</td>
<td>94%</td>
<td>9%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>100%</td>
<td>2%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales &amp; Marketing</td>
<td>106%</td>
<td>1%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.3 After the implementation of the improvement opportunities, the costs for the following processes decreased:

<table>
<thead>
<tr>
<th>Process</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>25%</td>
<td>76%</td>
<td>15%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td>25%</td>
<td>68%</td>
<td>28%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td>52%</td>
<td>48%</td>
<td>9%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Internal/External logistics</td>
<td>66%</td>
<td>40%</td>
<td>9%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>64%</td>
<td>48%</td>
<td>9%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Sales &amp; Marketing</td>
<td>65%</td>
<td>51%</td>
<td>11%</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>
Q10. Please validate the following statements with regards to the ability of benchmarking to provide competitiveness advantage to BASF

10.1 In general the implementation of best practices decreased costs by...

- 3% > 10%
- 42% 5% - 10%
- 64% < 5%
- 14% Increased

10.2 In general the implementation of best practices increased turnover by...

- 6% > 10%
- 25% 5% - 10%
- 83% < 5%
- 7% decreased

10.3 New products have been brought to the market due to the knowledge gained in the benchmarking study

- 11% Strongly agree
- 61% Agree
- 46% Neither/Nor
- 17% Disagree
- 3% Strongly disagree
10.4 Benchmarking helped to gain knowledge of ...

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clients of competitors</td>
<td>11</td>
<td>85</td>
<td>30</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitors</td>
<td>32</td>
<td>106</td>
<td></td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>12</td>
<td>88</td>
<td>23</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dealers</td>
<td>71</td>
<td></td>
<td>37</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.5 It has been easy to draw the relevant conclusions from a benchmarking study for the relevant department

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>41</td>
<td>48</td>
<td>36</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Q11. Please validate the following statements concerning the necessity of the quality of the planning and people oriented approach of benchmarking

11.1 In successful benchmarking projects, milestones have been determined

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21</td>
<td>108</td>
<td>11</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.2 In successful benchmarking projects, the targets have been communicated clearly

11.3 In successful benchmarking projects, the top management participated personally in the relevant meetings

11.4 In successful benchmarking projects, the quality of the figures of the benchmarking study has been appropriate
Q12. Please validate the following statements with regards to the ability of benchmarking to assist in the determination of future business targets.

12.1 Benchmarking helps to determine realistic business targets

12.2 Benchmarking provides understanding of variations in actual figures compared to target

12.3 Benchmarking points out opportunities for additional business potentials

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Results of the E-Commerce Section

Q13. Do you have personal real-life experience with E-Commerce?

Do you have personal real-life experience with E-Commerce?

Q14. Please validate the following statements concerning the reduction of transaction costs due to the introduction of E-Commerce

14.1 Since the order processing is run via E-Commerce, the delivery accuracy increased by ...

14.2 In general, the number of process interfaces has decreased
14.3 The amount of time spent on control work in the following areas has dropped:

- Delivery dates: 2% Strongly agree, 56% Agree, 46% Neither/Nor, 36% Disagree, 0% Strongly disagree
- Status of orders: 4% Strongly agree, 68% Agree, 40% Neither/Nor, 27% Disagree, 2% Strongly disagree
- Status of complaints: 2% Strongly agree, 32% Agree, 60% Neither/Nor, 40% Disagree, 4% Strongly disagree

Q15. Please validate the following statements concerning E-Commerce's ability to enhance supply chain performance

15.1 The availability of information increased

- 15% Strongly agree, 94% Agree, 22% Neither/Nor, 6% Disagree, 5% Strongly disagree

15.2 The cooperation between sales and marketing departments is easier

- 28% Agree, 69% Neither/Nor, 42% Disagree, 4% Strongly disagree
15.3 The number of customer complaints dropped

- Agree: 24
- Neither/Nor: 42
- Disagree: 5

Q16. Please validate the following statements with regards to the ability of E-Commerce to improve process efficiency

15.4 Due to E-Commerce product contribution margins have increased by ...

- > 10%: 2
- 5% - 10%: 101
- < 5%: 11

16.1 E-Commerce has increased the speed in which the customer can deal with BASF

- Agree: 24
- Neither/Nor: 11
- Disagree: 9
16.2 Via E-Commerce every employee can deal with a larger number of clients

Q17. Please validate the following statements with regards to the ability of E-Commerce to offer competitive advantage to BASF

17.1 Due to E-Commerce, BASF can now do business with more customers
17.2 The degree of customer satisfaction in the following areas has been increased compared to previous years

<table>
<thead>
<tr>
<th>Area</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of product information</td>
<td>13</td>
<td>94</td>
<td>29</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Accuracy of deliveries</td>
<td>30</td>
<td>88</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing of deliveries</td>
<td>37</td>
<td>84</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence of BASF staff</td>
<td>83</td>
<td>86</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17.3 After the implementation of E-Commerce, the following parties see BASF being more innovative rather than traditional in its business approach:

<table>
<thead>
<tr>
<th>Party</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>8</td>
<td>91</td>
<td>45</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>8</td>
<td>67</td>
<td>75</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>8</td>
<td>58</td>
<td>75</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Stock exchanges</td>
<td>6</td>
<td>59</td>
<td>64</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Media</td>
<td>6</td>
<td>83</td>
<td>56</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Results of the E-Commerce-Benchmarking Section
Q18. Do you have personal real-life experience with E-Commerce benchmarking?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>192</td>
</tr>
</tbody>
</table>
Q19. Please validate the following statements with regards to the opportunity to determine customer satisfaction levels with E-Commerce benchmarking.

19.1 Benchmarking E-Commerce permits to determine customer satisfaction

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>9</td>
<td>35</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

19.2 The following indicators provide BASF with important information about customer satisfaction levels:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Percentage</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity of the use of a website</td>
<td>32</td>
<td>90</td>
<td>15</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Response time of a website</td>
<td>29</td>
<td>97</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Quality of the information accessible for the customer</td>
<td>34</td>
<td>85</td>
<td>13</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Actuality of the information</td>
<td>41</td>
<td>88</td>
<td>13</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Number of clicks on a website</td>
<td>12</td>
<td>76</td>
<td>42</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

19.3 The following parties are satisfied with the performance of BASF's E-Commerce applications:

<table>
<thead>
<tr>
<th>Party</th>
<th>Percentage</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither/Nor</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>4</td>
<td>95</td>
<td>38</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>50</td>
<td>76</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>1</td>
<td>74</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q20. Please validate the following statements with regards to the necessity to assess the performance of BASF's on-line applications via E-Commerce benchmarking:

20.1 Benchmarking E-Commerce is as important as benchmarking traditional commercial activities

- Strongly agree: 103
- Agree: 26
- Neither/Nor: 10

20.2 E-Commerce benchmarking helps to develop commonly accepted E-Commerce best practices

- Strongly agree: 116
- Agree: 12
- Neither/Nor: 4

20.3 E-Commerce benchmarking should contain:

- Cost developments: 112
- Functionalities of E-Commerce applications: 111
- Customer satisfaction: 89
- Comparisons with traditional business models: 89
- Turnover developments: 86

- Strongly agree: 7
- Agree: 23
- Neither/Nor: 33
- Disagree: 13
20.4 BASF does benchmark its E-Commerce applications against ...

- Traditional business processes
- Other E-Commerce applications
- The development of the E-Commerce application over time

Q21: Please validate the following statements with regards to whether or not E-Commerce benchmarking offers the opportunity to compare traditional businesses with E-Commerce

21.1 Benchmarking E-Commerce against traditional businesses is a crucial part of E-Commerce benchmarking

21.2 In benchmarking E-Commerce you have to distinguish between once-off costs and running costs of the application
21.3 The performance indicators of E-Commerce benchmarking will be different from the performance indicators of benchmarking traditional businesses.

21.4 The lifecycle of E-Commerce benchmarks will be shorter than the ones of traditional benchmarks.

21.5 The benchmarking procedure of E-Commerce will follow the same pattern than the benchmarking procedure of traditional commerce.