# Using the first customer as reference to convince subsequent industrial customers of a high-tech startup

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*Award date:*
2009

Eindhoven, August 2009

# Using the first customer as reference to convince subsequent industrial customers of a high-tech startup

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## Abstract

Previous research recommends high-tech startups to use their first customer as reference to convince subsequent customers. By investigating information seeking behavior during the buying process for new technology, this study aims to establish the relevance of the reference customer as information source for subsequent industrial buyers.

Keywords: reference customer, information seeking, buying behavior, industrial customer, high-tech startup, marketing, innovation, experimental design.

## Summary

Introduction

High tech start-ups are entrepreneurial technology driven companies that develop a new technology or new application of existing technology into new and innovative products. High tech start-ups often fail to commercialize their innovations and struggle with marketing and sales. Persuading potential customers is especially difficult for high-tech start-ups, since the market is unfamiliar with both the innovative product and its supplying company.

Several authors recognized the importance of the first customer to help to overcome these difficulties. Especially for high tech start-ups in industrial markets the first customer should be used as reference to reduce the perceived risk of potential buyers by communicating the product's performance benefits as well as the supplier's credibility, capabilities and commitment to the technology. The relevance of the first customer reference in the adoption decision making process of industrial customers needs further investigation.

Assignment

Organizational buying behavior research conceptualizes the decision making process of industrial buyers as a buying process consisting of several phases or stages. The use of references by subsequent customers is subject to the information needs of the buyer in this process. Therefore this study investigates the customer reference as information source as part on the buyer's search for information.

Conceptual Model

The cost-benefit paradigm reflects the information search process as the evaluation of benefits that can be gained from acquiring the information against the costs associated with conducting the information search (Ashford and Cummings, 1983). Morrison and Vancouver (2000) argued that the cost-benefit rationale does not only affect the decision of whether or not to seek information, but also affects decisions on what information to seek and from which source.

For this study the cost-benefit rationale is adopted. The study make a distinctions between different external information sources and the different information types presented by those sources. The used benefit parameters are credibility for the source and importance for the type of information. The used cost parameters are accessibility for the source and difficulty to obtain for the type of information.

Research Methodology

To study the relevance of the reference customer as information source using the cost-benefit rationale of information seeking, an experiment was conducted. The sample consisted of 14 industrial buyers from manufacturing companies within the Eindhoven region. The survey-based experiment described a purchase scenario for a technological product. The respondents were randomly assigned either the high-tech startup or an established company as the supplier. To seek the information within the assignment, the respondents were asked to select one of three information source: the supplier, the reference customer and publications. Each source offered two types of information to view, giving the respondent six options in total; meeting with the supplier, product brochure, visit reference customer, reference letter of recommendation, articles and a research report.

On each selection the benefits and costs parameters were measured. Then the information was presented to the respondent on the computer screen. The order and viewing time was recorded to serve as dependent variables.

Findings

The research concludes that the relevance of the reference customer as a source of information for subsequent buyers is subject to how the buyer perceives not only the credibility and accessibility of the reference customer, but also the importance and difficulty to obtain the type of information it offers. The reference customer as a source of information is more relevant if the information is provided in the form of a reference visit. However this means that even though the buyer perceives the ratio of credibility and accessibility favorable, the use of the reference customer is still subject to the perceived importance and difficulty to obtain a reference visit. Buyers often find information from a reference visit important but also difficult to obtain.

If the supplier is a high-tech startup it does not make the reference customer more relevant. Even if the supplier is an established company, the supplier is often a new supplier to the company and the buyer still faces the same level of uncertainty and risk with regards to the product. Therefore, provided that the buyer perceives the reference customer as credible and the information from a reference visit important, the reference customer is just as relevant to the buyer as an external source of information. Furthermore, buyers who find references unimportant and lacking credibility and accessibility will not be more likely to use the reference customer as a source of information when the supplier is a high-tech startup.

Practical Implications

Reference customers can provide a great deal of information to the prospective buyer as part of a reference visit. The reference customer can share knowledge that is more relevant to the buyer's application of the product in his business than the information a supplier can offer. Prospective customers have to be made aware of the possibility to visit a reference customer, as they often perceive the accessibility low. Some prospective customers also will have to be convinced of the benefits as it requires more effort.

Buyers expect the reference customer's case to be a success story and the information provided to be positively biased, they may need to be convinced that the reference visit also offers practical information and great insight into the functional properties of the product.

If high-tech startups have a first customer it is recommended to use it as reference customer, more specifically they should invite prospective customers to visit the reference's site. The reference customer is generally regarded as a credible source of information with regards to the product and can demonstrate the product in a real business setting. The reference customer can validate the high-tech startups claims with regards to the product and its own capabilities and improve its credibility.

As the high-tech startup is restricted to using the first and only customer as reference, the match between subsequent buyers and the first reference customer is not always there. The high-tech startup needs to understand the business and application of the product of both parties, but also the position in the organization and level of knowledge of the persons involved. If there is a mismatch, the high-tech startup should clearly address this prior to the visit so the prospective customer will not be disappointed.

## Foreword

This paper forms the final report of my graduation project, concluding my study at the Eindhoven University of Technology, completing the Industrial Engineering and Management Science five-year program. The research was conducted at the Innovation, Technology, Entrepreneurship and Marketing group (formerly known as Organizational Science and Marketing group).

I would like to thank my supervisors dr. ing. Joost Wouters and prof. dr. Ed Nijssen for their assistance. The received feedback and discussions that followed were important for me to decide on which direction to take during the various phases of the project. I also would like to thank the master thesis supervision group members for their feedback on my project during the meetings and for testing the survey.

Furthermore, I want to thank all the respondents for their participation. I would like to express my special gratitude to the interviewed professionals for welcoming me, for their time and for their openness during the interviews.

Finally, I want to thank my parents and friends for all their support, especially during my graduation project.

Niels Hillebrand
August 2009

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# 1 Introduction

## 1.1 Research subject

High tech start-ups are entrepreneurial technology driven companies that develop a new technology or new application of existing technology into new and innovative products. High tech start-ups are known to have positive effects on economic development (Aspelund et al, 2005) and show high growth rates (Storey and Tether, 1998). Entrepreneurial firms that engage in radical innovation are more likely to develop a long-term and substantial presence in the international arena, compared to firms that are more reactive or conservative (De Clercq et al, 2005).

Technology companies in general often struggle with the successful commercialization of new technology products (Popovic and Fahrni, 2004). High tech markets are fast-moving, expensive and risky (Beard and Easingwood, 1996) and can be characterized by market uncertainty, technological uncertainty and competitive volatility (Mohr et al, 2005). Because of the high risks, the market launch has to be right the first time (Beard and Easingwood, 1996) and start-ups need to ramp up their commercial revenue as rapidly as possible (Gomez-Aires and Montermoso, 2007).

High tech start-ups often fail to commercialize their innovations, as is reflected in the higher failure rate compared to start-ups in general (Falck, 2007). Compared to established companies, their business processes are less developed and they cannot rely on continuation of revenue creation by previous products (Ruokolainen and Igel, 2004; Gomez-Aires and Montermoso, 2007). Entrepreneurs possess specific resources for the recognizing new opportunities and assembling resources for creating the venture (Alvarez and Busenitz, 2001), but lack managerial, technical and marketing skills (Freel, 1999). Many small companies experience problems with marketing and sales (Huang and Brown, 1999). Persuading potential customers is especially difficult for high-tech start-ups offering radical innovations, since the market is unfamiliar with both the innovative product and its supplying company (Popovic and Fahrni, 2004). The market has to be educated in order for the company and its product to become part of the customer's knowledge structure (Rosa et al, 1999). Furthermore radical innovations are targeted at the early adopters, because they can help the innovation to cross the market chasm to the risk-averse mainstream market (Beard and Easingwoord, 1996; Moore, 1999). Early adopters have the insight to envisage the emerging technology as a strategic opportunity (Popovic and Fahrni, 2004) as it can provide competitive advantage and an innovative image (Gomez-Aires and Montermoso, 2007). But unlike innovators who are technology enthusiasts, the early adopters insist on quality evidence of the promised benefits (Beard and Easingwoord, 1996). Additionally customers face high switching costs because of commitments to preceding technology and suppliers (Moriarty and Kosnik, 1989). Therefore customers will also consider the supplier's chance of survival (Henderson, 1999). Industrial customers increase their reliance on existing suppliers when faced with uncertainty and high switching costs (Heide and Weiss, 1995).

Several authors recognized the importance of the first customer to help to overcome these difficulties (e.g. Ruokolainen and Igel, 2004; Salminen and Möller, 2006; Gomez-Aires and Montermoso, 2007; Popovic and Fahrni, 2004). Especially for high tech start-ups in industrial markets the first customer should be used as reference to reduce the perceived risk of potential buyers by communicating the product's performance benefits (Ruokolainen and Igel, 2004) as

well as the supplier's credibility, capabilities and commitment to the technology (Salminen and Möller, 2006).

## 1.2 Problem statement and research assignment

Several scholars identified the importance of using the first customer as reference to convince subsequent customers. There has been little academic research on references (Salminen and Möller, 2006) and especially the use of references by high tech start-ups needs further research (Ruokolainen and Igel, 2004). Salminen and Möller (2006) explored the different uses of references. Ruokolainen (2005) modeled the process of using the first customer to build a reference business for high-tech start-ups. Gomez-Aires and Montermoso (2007) explored the selection of a first customer for a new technology product to be used as reference among others. Additional work by Ruokolainen and Mäkelä (2007) based on start-ups in the software technology sector resulted in an extended market domain model for constructing a reference business. Explorative research by Bosman (2008) based on interviews with entrepreneurs and incubators found support for various positive effects on the start-up's product and organization. The first customer references helps to create awareness and proves the relative value of the product as well the capabilities and perceived credibility and chance of survival of the start-up (Bosman, 2008).
More research is necessary on the use of references by subsequent customers in their adoption decision process to establish the relevance of the reference customer to the buyer. Thus the problem statement for this research project has been formulated as follows:

Problem statement:
**The relevance of the first customer reference in the adoption decision making process of industrial customers needs further investigation.**

Organizational buying behavior research conceptualizes the decision making process of industrial buyers as a buying process consisting of several phases or stages. The use of references by subsequent customers is subject to the information needs of the buyer in this process. Therefore the research assignment of this study has been formulated as follows:

Research assignment:
**Investigate the relevance of customer references as information source in the buying process of industrial customers.**

Before describing the theoretical framework and research objectives for this study, the following chapter will address the importance of the study.

## 1.3 Importance of the study

From a scientific point of view, this study aims to contribute to the research on the use of references for the business-to-business marketing of high tech innovative products. As described in the problem statement few scholars have investigated the use of references as a marketing strategy for high tech start-ups. Unlike previous studies, this study investigates the use of references from the perspective of subsequent customers. The cost-benefit paradigm of information seeking behavior theory is used to quantify the role of references in satisfying the informational needs of subsequent customers in their adoption decision.

From a managerial point of view, the underlying question of this study is whether using the first customer as reference helps to overcome the legitimacy issues and is worthwhile to implement in light of resource constraints for marketing activities. This study aims to establish the relevance of providing prospective customers with information from references compared to other marketing information. The depth and extent to which the first customer is willing to cooperate in providing information about the implementation and the achieved benefits in his business is subject to not only the customer-supplier relationship but also the competitive volatility on the market.

By contributing to the research on the use of references and providing implications for managers of high-tech startups, this study helps to establish a method for high-tech startups to persuade subsequent customers of the early adopter profile, which will thereafter help the startup to survive, grow and cross the market chasm to enter the mainstream market. As the first paragraph of the introduction explained, if successful, high-tech startups positive effects on economic development (Aspelund et al, 2005) for example by providing high growth rates in employment, exports and other positive effects. Therefore the study also has a degree of social relevance, as governments promote innovation and entrepreneurship.

## 1.4 Research approach, structure and methodology

### *1.4.1 Research approach*

The approach used for this study consisted of a literature study to explore the subject and identify the problem by studying adoption theory and reference theory. Further review of organizational buying theory and information seeking theory resulted in a conceptual framework. The research objectives and design were formulated to answer the research question by collecting data from the field. For this a data collection instrument was developed. Finally, the results of the data collection lead to conclusions and recommendations. The approach used for this study is presented in Figure 1.1.

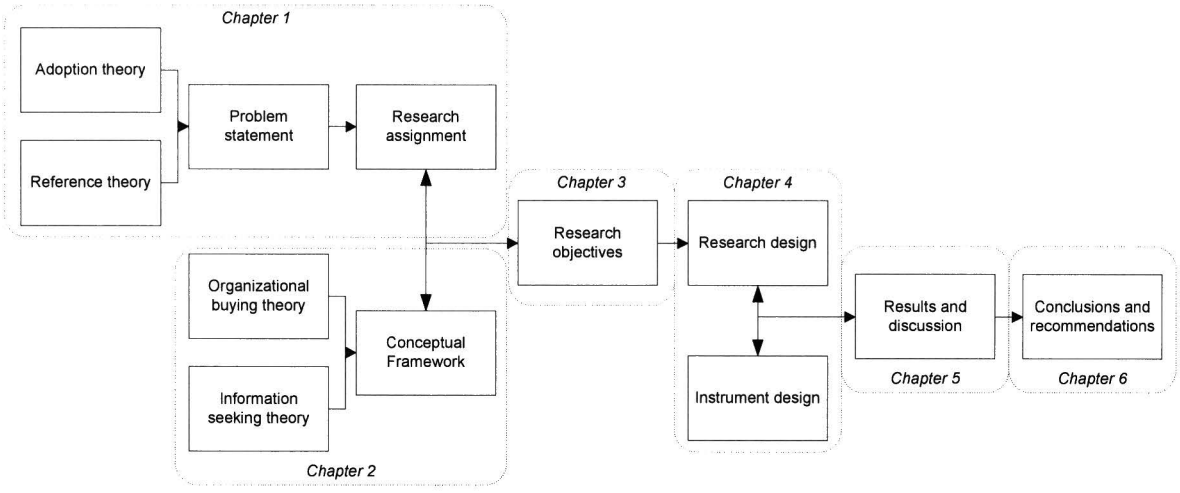


Figure 1.1: Research approach

### 1.4.2 Structure of report

Chapter one introduces the subject of this research (1.1) and based on previous research presents the problem statement and research assignment (1.2). Using the scientific and management perspective the importance of this study is explained (1.3). Finally, the research approach and used methodology is presented (1.4) and the structure of this report (1.5).
Chapter two provides the theoretical framework for this study by exploring organizational buying theory (2.1) and information seeking theory (2.2) using literature, resulting in a conceptual model (2.3).

Chapter three presents the research objectives. First, the research scope is explained (3.1), followed by the formulated research questions (3.2).

Chapter four describes the research design. First the choice of methodology is explained (4.1). Then the used information mix (4.2) and experimental treatments (4.3) are presented, followed by the used measures (4.4). The design and procedures are explained for both the sample (4.5) and the data collection (4.6). Subsequently, the developed instrument is described (4.7, 4.8). Finally some notes with regards to the validity, reliability (4.9) and data analysis (4.10) are made.

Chapter five presents the results of the experiment. First, the used sample is described (5.1). Then the collected data is analyzed (5.2, 5.3, 5.4). Using the findings from the data analysis the research questions are answered (5.5). Finally, the findings are discussed (5.6) using additional insights from the interviews.

Chapter six presents the conclusions of the research (6.1), followed by the practical implications (6.2), the limitations of the study (6.3) and recommendations for further research (6.4).

### 1.4.3 Methodology

The methodology used in this study consisted of a literature study and an experiment. The first phase of the literature study explored adoption theory and reference theory with regards to high-tech startups and reference customers resulting in the problem statement. The second

phase of the literature study review organizational buying theory and information seeking theory and resulted in the theoretical framework, research questions and measures for the research design. For the literature study relevant articles from various journals were found using ABI-Inform and ProQuest. Additionally several publications were borrowed from the TU/e library.
The methodology used in the research design consisted of a survey-based experiment coupled with interviews. The methodology for collecting the data necessary to answer the research questions is fully explained in chapter five.

# 2 Theoretical Framework

This chapter provides the theoretical framework for this study on the basis of organizational buying behavior and information seeking behavior theory.

## 2.1 Organizational buying

Organizational buying behavior theory provides a framework to study the use of the first customer reference by subsequent customers. The decision making process industrial customers engage in to adopt a new high-tech product is conceptualized in organizational buying behavior theory as a buying process consisting of several phases or stages. Several conceptual models of organizational buying behavior had been developed in the late 1960s to understand organizational buying and subsequent empirical research focused on the various constructs influencing the process (Sheth 1996; Johnston & Lewin, 1996). Johnston and Lewin (1996) extended the original models with additional factors. As the specific composition of the buying process depends on many factors, Mohr *et al* (2005) suggest that a basic five-stage purchase process is adequate to provide a framework for buying behavior in high-tech markets. The process by Mohr *et al* (2005) consists of the stages 1) problem definition, 2) information search, 3) evaluate alternatives, 4) purchase decision 5) post-purchase evaluation. This five-stage process is used as basis to create a conceptual buying process model focusing on the use of information. The resulting model is depicted in Figure 2.2.

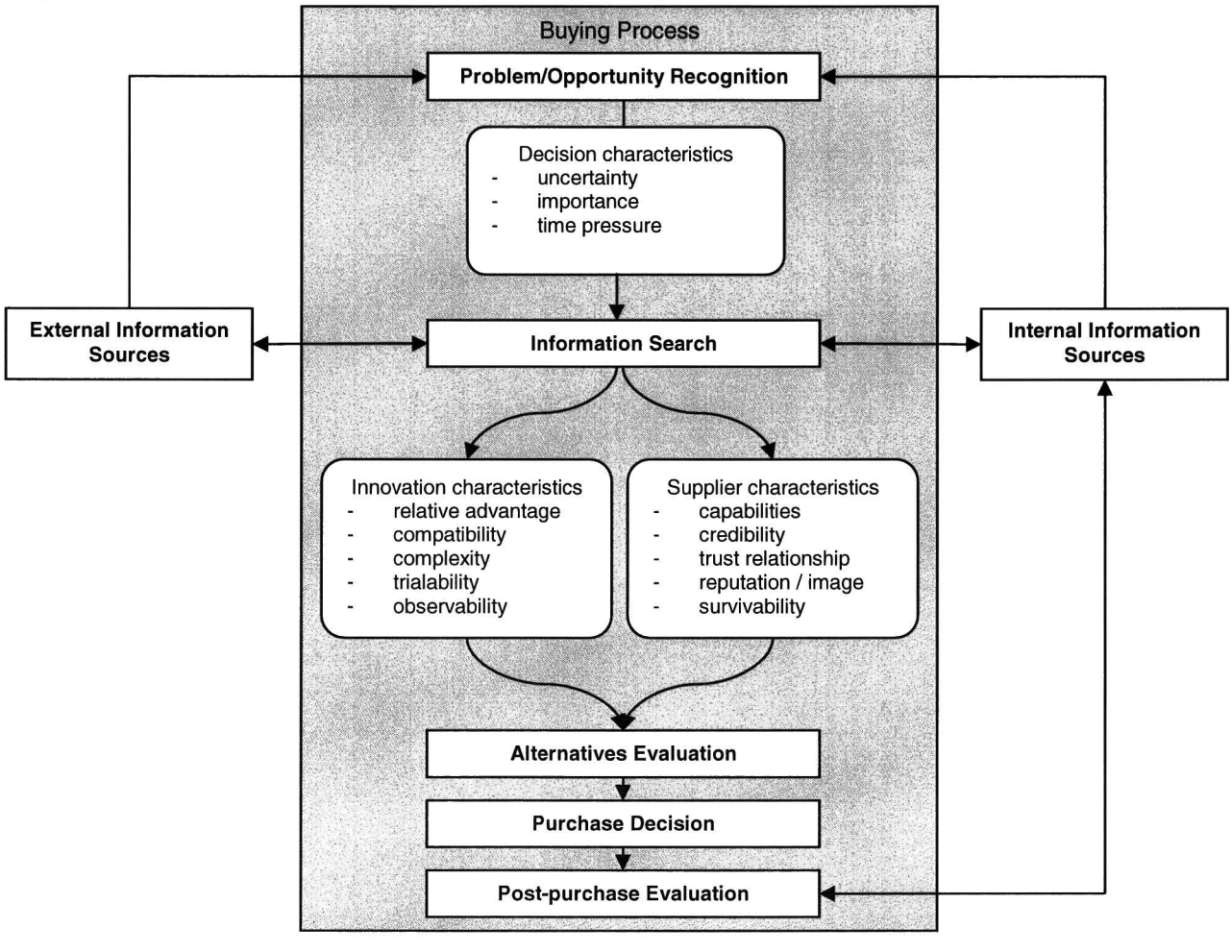


Figure 2.1: Conceptual model of the buying process.

The buying process is depicted vertically. Buyer uncertainty, importance of the problem/opportunity and available time are the parameters stemming from the purchase situation and decision characteristics that influence the information search process. The outcomes of the information search process are the perceived supplier and innovation characteristics, which will be the input for the alternatives evaluation. On the left and right side of the process tree, the external and internal information sources used during the process are depicted, initially for problem or opportunity recognition and then for the information search process. The double-headed arrow indicates information can either be push or pull; promoted by the source (for example through advertising) or be requested by the buyer (for example contacting a salesperson). Furthermore on the basis of the ERP acquisition process model by Verville and Halington (2003), this study recognizes that the buying process can be iterative without graphically displaying iterative connections.

The following paragraphs describe each of the stages of the buying process.

### *2.1.1 Problem recognition*

The purchase process starts when the buyer recognizes a need, be it a problem or an opportunity. Need arousal can be stimulated by internal or external stimuli (Mohr *et al*, 2005). The customer has to become aware of the new technology as a possible solution to his problem or as an opportunity in the context of his business. Awareness is the first step in the purchase decision process of a potential customer (Rogers, 2003). This is supported by socio-cognitive research; the new technology has to be recognized as a relevant option by assuming a place within the existing knowledge structures in the market (Rosa *et al*, 1999). Therefore the seller has to promote its innovation by providing information which can be called upon as part of the on-going search process of individuals within organizations. Buyers and non-buyers in organizations engage in information search activities that are independent of specific buying decisions (Borghini *et al*, 2000). Therefore the buyer may become aware by accessing information sources that are internal or external.

### *2.1.2 Information search*

The buyer actively searches for information about how to solve the problem or act upon the recognized opportunity. This often takes the form of identification of alternatives. (Mohr at al, 2005).

Research on consumer behavior has conceptualized the information search as a process of risk minimization (Ashford & Cummings, 1983), and also organizational buying behavior literature has shown that there is a relation between information search behavior and perceived risk. Gemünden (1985) found in a meta-study of 100 studies on information behavior by consumers and industrial buyers that risk perception proved to have similar effects on information search. Industrial buyers engage in increased information search when the buying situation is risky (Moriarty & Spekman, 1984; Bunn, 1994) impacting the information search effort and information source use. (Bunn & Clopton, 1993). Johnston and Lewis (1996) also proposed that as risk levels increase information search will be active and a wide variety of information sources will be used. Consequently Thompson *et al* (1998) found large support for this and also Juha and Pentti (2008) see information search as a means to reduce perceived risks. According to Bienstock and Royne (2007) many other researchers in both risk theory and service marketing indicated also that the degree of information search as well as different types of information source usage is based on the perceived risk. The risk and uncertainty for services has shown to be higher than for goods and the same applies for

high-technology products, especially considering they may be or include a service component. Urbany *et al.* (1989) found that uncertainty about which alternative to choose positively influences search behavior, but that knowledge uncertainty materializes in higher perceived costs of searching for information. Johnston and Lewis (1996) also found support that time pressure influences the buying process. Glazer and Weiss (1993) pointed out that information in the high-tech market is time-sensitive due to the fast pace of technological change. So the buyer tends to search for shorter periods of time. Heide and Weiss (1995) have found that for the same reason the buyer increases its information collection effort. Thus it can be assumed that the buyer intensifies the information search process for high technology products.

The amount of search effort is most commonly measured by asking the buyers to rate the extent to which each information source was used (Park & Bunn, 2003). Information sources used by the buyer can be classified as personal-nonpersonal, commercial-noncommercial or internal-external (Moriarty & Spekman, 1984). The used information source mix differs between buying situations. Bunn and Clopton (1993) found that for high uncertainty purchases such as a high-tech product but with low importance to the client organization, buyers seek mostly promotional materials from suppliers/vendors to identify an acceptable solution. However in case of high importance all available sources will be used (Bunn & Clopton, 1993), including both internal and external.

Thus uncertainty, importance of the buying decision, and time pressure are important factors that determine the extent to which the buyer engages in information search.

### *2.1.3 Evaluate alternatives*

With regards to evaluating alternatives, organizational buying behavior research states that product quality and after sales service will be of the utmost importance as purchase risks increase, with price having a secondary role (Johnston & Lewin, 1996; Thompson *et al*, 1998). However for high tech products the evaluation of alternatives is more complicated than a fit to predefined specifications and comparison of price, quality and service. Evaluation of high-tech products is subject to the perceived characteristics that influence the potential adoption of a new innovation, as described by Rogers (2003) framework.

- relative advantage; benefits of adopting the new technology compared to the switching costs.
- compatibility; extent to which the innovation is consistent with the existing values, norms, processes and needs.
- simplicity; extent to which the innovation is easy to understand and use.
- trailability; extent to which the innovation can be tried on a limited, low commitment basis.
- observability; extent to which the benefits are visible.

Johnston and Lewin (1996) concluded that buyer-seller relationships become increasingly important in higher risk purchase situations as dealing with a seller with a proven 'intra-organizational' track record reduces risks. Thompson *et al* (1998) confirmed that a potential new supplier without a relationship with the buyer still faces considerable difficulty. Thompson *et al* (1998) also noted that supplier's reputation was used as an important early filter. As described in Chapter 1, high-tech startups face legitimacy issues. The perceived credibility of the supplier and the trust relationship are thus important characteristics due to the absence of a track record and lack of information about its reputation on the market. Gao *et al* (2005) found that the buyer's trust in the supplier has a significant role in reducing decision making uncertainty in a purchase decision. The authors suggest that suppliers

interested in reducing buyer uncertainty and building a long-term relationship with a buyer should first show a spirit of trust to the latter by devoting relationship-specific resources to the exchanges with the buyer and be flexible in accommodating the buyer's needs. They also suggest that a dependent supplier may want to promote its dependence to the buyer as supplier trust of the buyer (Gao *et al*, 2005).
Resource-based and institutional theory indicated that the customer evaluate not only the new high-tech product but also the capabilities of the new supplier with regards to delivery and support services, organizational buying behavior theory also supports this (Johnston & Lewin, 1996; Thompson *et al*, 1998).
As pointed out in the introduction of this paper, industrial customers also judge the chance of survival of the newly established supplier. (Henderson, 1999).
Combining these views on important perceived characteristics of the supplier, the buyer will evaluate the supplier based on his of the following characteristics:

- capability; extent to which the supplier can deliver the product and support as promised.
- credibility; extent to which the information provided by the supplier is credible and reliable.
- trust relationship; extent to which the supplier can be trusted and is committed to the customer.
- reputation / image; reputation or image of the supplier in the market.
- survivability; chance that the supplier will survive.

Based on the product's innovation characteristics and the supplier characteristics, the buyer evaluates the alternatives and the process enters the decision stage when the best or at least one suitable supplier has been found.

#### *2.1.4 Purchase decision*

The buyer reaches agreement with the selected seller on the terms of purchase (Mohr *et al*, 2005). Johnston and Lewis (1996) assumed that for purchase situation with higher risks the most likely negotiation strategy to be used would be a collaborative or problem-solving approach.

#### *2.1.5 Post-purchase evaluation*

The buyer assesses how well the product has lived up to its potential (Mohr *et al*, 2005). Depending on the supplier relationship and product successfulness, the supplier can utilize this new customer as reference and/or build a new reference case based using the customer's evaluation (Ruokolainen & Mäkelä, 2007).

### 2.2 Information seeking

Information seeking can be defined as a conscious effort to acquire information in response to an information need, which arrives from the recognition that your knowledge is inadequate to satisfy a goal that you have (Case, 2007). Information seeking as part of the buying process, or more specially the information search stage in the process, represents task-oriented information seeking, namely acquiring information to reduce uncertainty in the industrial buyer's decision making process when buying a high-tech product. Uncertainty reduction is widely acknowledged as the goal or motivation to seek external information (Case, 2007). Uncertainty is one of the factors affecting the buyer's information search stage, which explains why the information search by buyers is often conceptualized as a risk minimization process.

### 2.2.1 Cost-benefit paradigm

Research on information seeking behavior of consumers (e.g. Ratchford, 1982) and feedback seeking of users in an organizational context (e.g. Morrison and Vancouver, 2000) used cost-benefit analysis to study the information search. Also studies on information seeking behavior of engineers have used cost-benefit analysis (King *et al*, 1994; Hertzum *et al*, 2002). The cost-benefit paradigm reflects the information search process as the evaluation of benefits that can be gained from acquiring the information against the costs associated with conducting the information search (Ashford and Cummings, 1983).

Empirical studies that have built upon the cost-benefit paradigm have presented benefits and costs in a variety of ways (Morrison & Vancouver, 2000). Perceived benefits have been represented as the value of feedback, goal orientation, uncertainty reduction, technical quality, source credibility and desire for control. Perceived costs have been represented as anticipated amount of effort or time, social or financial costs, negative performance expectations, presence of an audience and low self-confidence. Morrison and Vancouver (2000) argued that the cost-benefit rationale does not only affect the decision of whether or not to seek information, but also affects decisions on what information to seek and from whom.

Although the study by Morrison and Vancouver (2000) concentrated on users seeking feedback in an organizational context, the cost-benefit rationale can also be applied to the information search process of customers. For industrial buyers the benefits from the search process translates into risk and uncertainty reduction in the purchase decision making and the cost is represented by the search effort, in which time is an important factor for high-technology environments. Parallel to feedback seekers and consumers, industrial buyers of high-tech products are assumed to search for information in the most efficient way. The buyer tries to achieve its risk minimization goal by gathering relevant information with the least amount of effort.

However to decide on what type of information to seek and from which source, the costs/benefits associated with each of the information types and sources have to be determined. In order to apply the cost-benefit paradigm to the information seeking of industrial buyers, the benefit parameter of expertise for information sources as used by Morrison and Vancouver (2000) has been expanded to credibility, a closely related construct.

### 2.2.2 Cost-benefit parameters

Vancouver and Morrison (2000) showed that individuals seek varying amounts of different information types depending on the perceived value or importance of the information and difficulty of obtaining that particular type of information. The more important a certain type of information is to the individual the more beneficial it becomes. The more difficult it is to obtain certain information, the higher the perceived costs are for that particular information type.

Vancouver and Morrison (2000) also showed that the amount of information obtained from a particular information source depends on the perceived expertise and accessibility of that source. Other studies also identified reliability of information sources as important factor, as expertise and reliability are important factors of the information source's credibility (Ohanian, 1990). Therefore the higher the perceptions with regards to the source's credibility, the individual will see obtaining information from that particular source as being more beneficial. Accessibility encompasses cost factors of time, money and perceived effort spent on getting

information from a particular source. The higher the source's accessibility, the lower the perceived costs for an individual to obtain information from that source. Research by Fidel and Green (2004) on information seeking behavior of engineers showed that the concept of accessibility can be construed in different ways. They found that saving time was the most important criterion for selecting among documents, while familiarity was the main factor in selecting human sources.

## 2.3 Conceptual model

Having reviewed information seeking behavior theory, the conceptual buying process model is expanded by the detailed information search process. The information seeking of the buyer is based on the perceived cost of effort versus the anticipated benefit in the form of risk reduction.

To answer the question of how the reference information is used, a closer look at the information seeking behavior of engineers provided the cost-benefit perspective of information sources. Following the study by Morrison and Vancouver (2000), a distinction was made between information types and sources. Information sources are evaluated on their credibility and accessibility while the information types are evaluated on their relative importance and difficulty to obtain. The information of various types can be provided by the various information sources, which are the buyer's external information sources.

Because this study focuses on the use of external information as part of the active search for information, the link between the external sources and the Problem/Opportunity stage has been removed and the internal information sources have been omitted. The resulting model can be found in Figure 2.3.

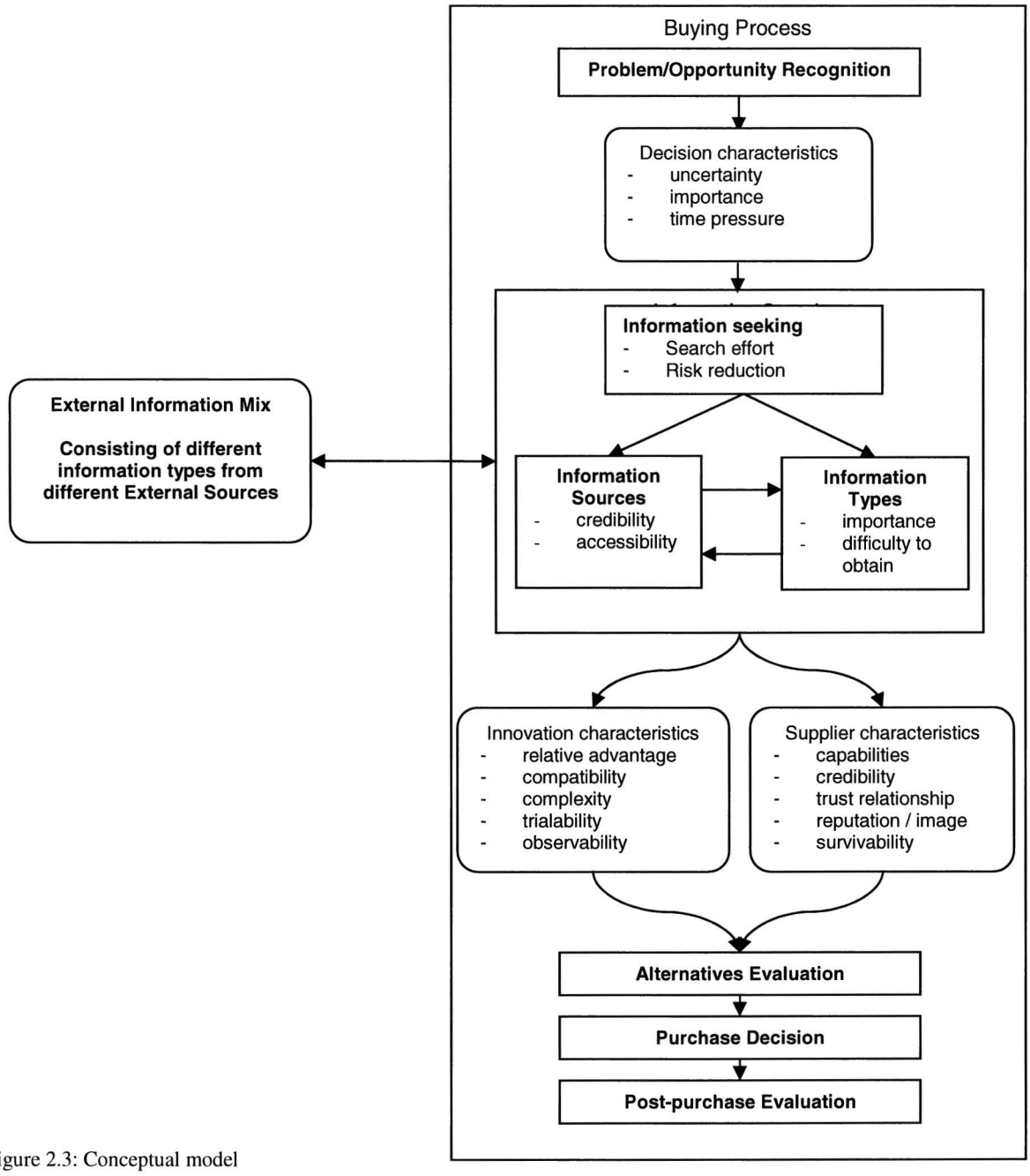


Figure 2.3: Conceptual model

# 3 Research Objectives

## 3.1 Research scope

Based on the findings of the literature review, research has established the relationship between characteristics of the purchase decision and the overall search effort. The buyer spends more effort on seeking information when he is faced with greater uncertainty, importance and time pressure to reach a point where he can make a well informed decision. However these relationships reveal little regarding the type and source of information. This research aims to explore the use of information provided by the reference customer in particular. The next step would be to examine the effectiveness of certain information to change the perceived innovation and supplier characteristics, as these affect the product's chances in the next stages of the buying process: the evaluation of alternatives and the subsequent purchase decision. However in addition to specific product related and many situational factors this would also heavily depend on the actual informational content presented by a certain information source and type.
For these reasons the scope of this research is limited to obtaining information from external sources as part of the information search stage of the buying process. More specifically this research focuses on the constructs determining the selection and use of the reference customer as source of information and the type of reference information.

## 3.2 Research questions

In the buyer's search process, the customer can rely on the various types of information which can be obtained from various information sources. Vancouver and Morrison (2000) pointed out that a within-person approach is best fitted to study information seeking behavior, as prior studies on other types of behavioral choice resulted in stronger relationships when using a within-person approach. Within-person analysis concentrates on variances in the use of different information sources and types by the person asked, rather than variances between persons. The type-specific and source-specific costs and benefits determine to which extent information is obtained across types and sources (Vancouver & Morrison, 2000). Thereby the use of reference information relative to other information can be examined.

For selecting among information sources, the cost parameter is frequently conceptualized in terms of accessibility (Case, 2007; Vancouver & Morrison, 2000). The buyer will seek more information from a given source to the extent that he evaluates that source as accessible. The benefit parameter is frequently conceptualized in terms of the quality of information it provides (Case, 2007). Because a distinction between sources and information types is being made here, quality of the source will be viewed on the basis of its credibility.

**Does the buyer will prefer and allocate more time seeking information from a particular source because he evaluates the credibility/accessibility ratio of that source as more favorable than for the other sources?**

For each information source, different types of information can be considered. The relevant parameters for the selection among information types are the perceived importance and difficulty to obtain (Morrison & Vancouver, 2000). When information of a certain type is considered to be difficult to obtain while the importance of that type of information is perceived as low, the customer may not try to obtain that information.

**Does the buyer will prefer and allocate more time seeking information of a particular type to the extent that he evaluates the ratio importance/difficulty to obtain of that type as more favorable than for the other types?**

Because the high-tech start-up itself lacks credibility (Ruokolainen & Igel, 2004), the credibility of other information sources presents the main benefit of using those sources, including the reference customer. However the cost-benefit paradigm suggests that the buyer also considers the accessibility of the source. Thus the research question with regards to the reference customer can be formulated as follows:

**Does the buyer prefer and allocate more time seeking information from the reference customer than from the high-tech startup because he evaluates the benefits/costs ratio (credibility : lack of accessibility) more favorable?**

Finally, this research aims to explore how the use of the different types of information differs when the supplier is a high-tech startup rather than an established company. Thus the final research questions can be formulated as follows:

**In case the supplier is a high-tech startup, how does this affect the buyer's preference and time allocated towards different types of information in light of the trade-off between the importance and difficulty to obtain?**

The next chapter will present the research design which is used to answer these questions.

# 4 Research Design

This chapter presents the research design used to conduct the field work necessary to answer the research questions. Before the research design is explained, the choice of methodology to collect the data is explained.

## 4.1 Methodology choice considerations

As the information seeking perspective on this study is based on the study by Morrison & Vancouver (2000), the first option considered is to conduct a survey by questionnaire. The assessment of information seeking via self-reports is consistent with other studies on information seeking (e.g. Ashford & Cumming, 1985, Fedor et al, 1992, Morrison, 1993). However, the mentioned studies investigated information seeking behavior for more general tasks using typologies of information sources and types. As this study focuses on the more specific case of purchasing an industrial innovative product from a high-tech startup, purchase specific and situational factors cannot be ignored. Additionally, this study is particularly interested in the reference customer. Respondents would be asked to think about a particular product acquisition where he/she has been involved with seeking information. Not only the factors influencing the process, but also the information mix would vary for each respondent. Therefore a very large sample would be needed. Also the required sample size increases as the preconditions of a) the product being innovative and b) having obtained the product from a high-tech startup would need to be checked. Thus, finding a sufficient number of suitable respondents may present a threat.
The second option is to conduct a case study for one particular product and high-tech supplier or a series of small case studies. By interviewing multiple existing customers of one supplier, post facto qualitative answers can be obtained regarding the costs and benefits of the available information during the process. Alternatively, prospective customers can be asked about their information seeking. This option is not further explored as the researcher conducts the study internally at the university and is not affiliated with any high-tech startup.
The third option is an experimental design involving a purchase scenario. Scenarios are used to manipulate variables and contexts that cannot be easily replicated in a real-life setting. As it is difficult to observe how people both think about information sources and use them, a laboratory simulation makes a great deal of sense according to Case (2007, p.200) because the experiment design affords a way to restrict the information sources in such a way as to make them comparable and measurable across the experimental subjects who use them. Although relatively few laboratory experiments exist on information seeking behavior (Case, 2007), there are some consumer behavior studies that investigated the use of information sources using experiment designs. Hauser, Urban and Weinberg (1993) conducted their experiment in a highly controlled setting to identify and predict the order in which consumers would choose types of information sources and how much time they were likely to spend with each source. Using the cost-benefit rationale, the authors assigned a certain time budget as treatment. Murray (1991) investigated the information sources used by consumers of services in a pre-purchase context using an experimental approach by using different services as treatments.

The approach involving a scenario is viewed to be the most suitable method for the research, as it allows experimental control of key factors, namely the situational and purchase context. By using a scenario involving a fictional product, high-tech startup supplier and reference customer, it was not required that the respondents had prior experience with buying innovative products from startup companies and using the reference customer. Furthermore the information mix available is identical for all respondents and they will be presented with similar information. The next paragraph defines the information mix used in the experiment.

## 4.2 Information sources & types

The information mix used in this study considers a combination of various sources (4.2.1) and types of information (4.2.2).

### *4.2.1 Information sources*

The information source is defined in the current context as the party that provides the information to the buyer, or the party from which the buyer obtains the information. This research only considers external sources for two reasons. The first reasons is that for new technology and new supplier, the company itself does not possess information that is directly related to the product and supplier. The second reason is that for innovative or high value capital equipment the search for information is often performed by a buying team consisting of different individuals. Thus it would be difficult to distinguish between coworkers and team members.

The most prominent external source for information is the supplier itself, in the context of this research this is the high-tech startup. For example, the supplier provides product information via its sales and marketing efforts. The information could also be provided by or sourced from a third party. The supplying party is not necessarily the original manufacturer or developer, but a partner of the original supplier. The third party of interest in this study is the reference customer. Other third parties may include peers at other firms, consultancy firms, universities, trade organizations, library, research institutes.

As this study focuses on the use of reference customers by high-tech startups, the supplier and the reference customer will be part of the information mix explored here. As both are directly related to the product and supplier, a third source in the form of publications has been added as a more independent source without further specifying its exact origin. The term publications was selected in favor of the term literature to avoid confusion between trade or scientific literature and the sales literature originating (directly) from the supplier.

Thus the information sources included in this study are defined as:
- High-tech startup: the supplier of the new technology.
- Reference customer: existing customer for the new technology.
- Publications: sources that publish information about the new technology.

### *4.2.2 Information types*

The personal/non-personal typology is often used to distinguish the different forms of information a particular source can contain. Information obtained from interactions between two persons is usually regarded as personal, while non-personal information is usually considered to be obtained from written documents. This typology is used in this study to distinguish two types for the high-tech startup and reference customer. For publications the typology is not well suited, thus for publications the types were distinguished by objectivity. Finding a good example for each of the types produces the following selection:

- **Supplier meeting**
  Personal interactions with the supplier include all kinds of meetings with a representative of the supplier or in case of the high-tech startup the entrepreneur. Notwithstanding the importance of networking and trade show appearances, only the meeting by appointment between the supplier and prospective buyer is considered as

type of personal information obtained from the supplier. This information entails the sales pitch or presentation as well as interactive talks.

- **Product brochure**
  Various non-personal marketing and sales tools can be regarded as non-personal types of information originating from the supplier. Examples include advertisements, press releases, sales brochures, catalogs, and the supplier's website. The latter often includes all previous examples, but does not always contain the same amount of information regarding specific products. Therefore the product brochure is considered to be the most relevant with regards to the buyer's search for information and thus included as non-personal type of information from the supplier.

- **Reference visit**
  The buyer can also visit the reference customer's site to gain more information directly or with a supplier's representative (Salminen, 2001). This can be for a tour of the installation on site or to consult with the previous buyer in person (Salminen & Möller, 2006). Reference visits play an important role in business market and are especially important in deals involving capital equipment augmented by support and services (Salminen, 2001). Beard and Easingwood (1996) also indicated that using reference sites is a regular tactic to market revolutionary innovations. The reference customer's site can also be utilized to offer a demo of the product in a real business environment. Foremost the supplier can demonstrate the product technology to the buyer (Salminen & Möller, 2006). Additionally the on-site demo will offer the buyer the opportunity to see and possibly use the innovation after having been implemented in a real production process, integrated in a full commercial product, or functioning in real-time on a working platform, depending on the nature of the product (Ruokolainen, 2005). For these reasons, the reference visit is included as the personal type of information

- **Reference letter**
  Most basic instances of reference information would be when the reference customer provides a letter of recommendation or other forms of customer testimonials (Salminen & Möller, 2006). The letter of recommendation was considered more applicable to the business-to-business context of this research, thus included as non-personal type of information originating from the reference customer.

- **Articles in journals**
  The product and its supplier may be featured in articles of trade or scientific journals (Smilor, 1989), these often take the form of success stories. When industrial buyers read about a product application in a trade journal, they accept the information as credible and worth to consider (Brierty, *et al.* 1998). Or an article can offer information on the new technology in more general form. Thus journal articles are included as a subjective type of information from publications.

- **Research report**
  As objective type of information the research report is included in the information mix was included. The research report is defined as a published report by a research institute as scientific articles are often less product or application specific.

### *4.2.3 Information mix*

Combining the selected information sources and specific types of information selected for this study produces the information mix. The information mix is presented in the matrix below.

| | | Information Sources | | |
|---|---|---|---|---|
| | | High-tech startup | Reference customer | Publications |
| Information Types | Supplier meeting | X | | |
| | Product brochure | X | | |
| | Reference visit | | X | |
| | Reference letter | | X | |
| | Articles | | | X |
| | Research report | | | X |

Table 4.1: Information mix

Various other types or forms of information were considered, but not introduced in the information mix for this study. Two of them deserve some attention; the reference business case and the demo application. Ruokolainen (2005; 2007) advocates to build a business case for the product based on the reference customer. The business case will present the economical and performance improvements in the value chain of the reference that resulted from adopting the product, as well as user experiences and implementation time (Ruokolainen, 2005). Because the business case can be part of the supplier's sales presentation or brochure, part of the information provided by the reference customer during a visit, as well as part of an article or research report, it is not included as a specific type. The demo application can be used during a meeting with the supplier, by the buyer himself, or as part of the reference visit. Therefore it is not included as a specific type.

## 4.3 Experimental treatment

The experiment counts two purchase scenarios. Each scenario describes the same technological product, but one scenario represents the supplier as a high-tech startup, while the other scenario represents the supplier as a well-established company. Subjects are randomly assigned a single purchase scenario. As purchase decisions reflecting emergency circumstances may lead to atypical information seeking behavior (Wright, 1974), the decision context of the purchase scenario is presented as a nonemergency one. Furthermore in light of the complexity of the buying process and the evaluation and negotiation stages which fall outside the scope of this study, the scenario presents the respondent with the question if he wants the supplier to conduct an audit for a reasonable fee, providing the buyer the business case for adopting the product.

The information mix is identical in both scenarios. The information itself is comparable, only the provided information about the supplier is slightly different. The information search process of the experiment is depicted in Figure 4.1.

The respondent starts his information search after being provided with the purchase scenario. In the laboratory experiment the respondent is provided with a list of information sources to choose from. Based on the information contained in the scenario and a brief description, as well as previous experience with obtaining information, the respondent will have certain expectations regarding the costs and benefits of each source and type of information on which he will base his selection. Having selected one of the option, the information is displayed and the respondent can use the information. Subsequently, the respondent can obtain more information from the other options, until he has obtained enough information or exhausted the available options in the experiment.

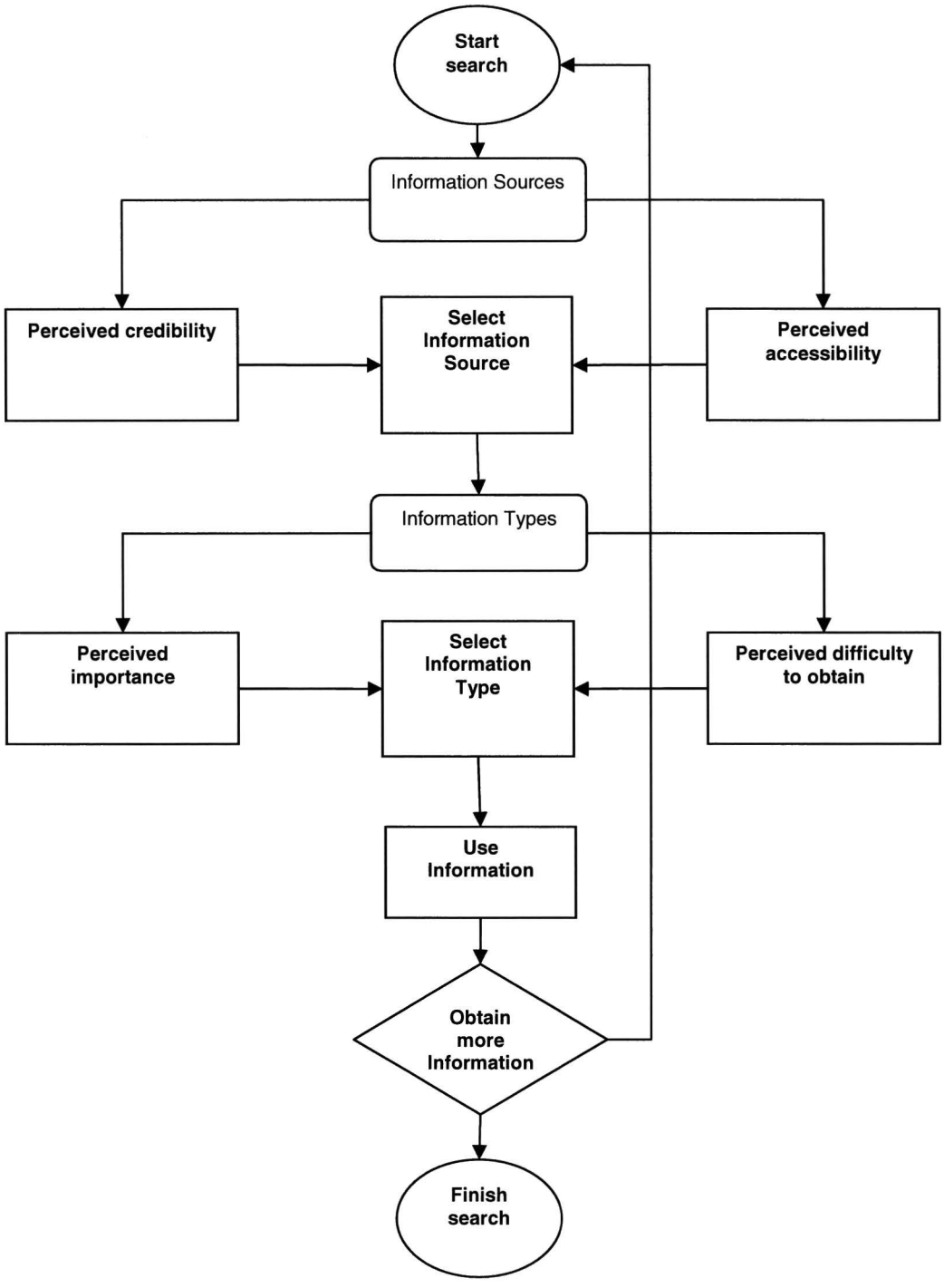


Figure 4.1: Conceptual information search process in the experiment

## 4.4 Measures

### *4.4.1 Dependent variables of seeking information*

Rather than asking respondents to indicate how much information they obtained from each source and for each type of information, the amount of obtained information is measured by recording the time the respondent allocates to the source/type. Additionally, the source order is recorded as a measure of the customer's preference for a particular source/type. By design customers can search for information faster in the laboratory experiment than they would otherwise (Hauser et al 1993, p. 459). Furthermore, this acceleration varies by source. For example a visit to the supplier might normally take a few hours, but only a few minutes in the laboratory. In contrast, the acceleration of the time it takes the customer to read a letter of recommendation might be less dramatic. The laboratory also does not simulate fixed costs such as driving to visit the supplier before information can be obtained. Therefore it would be dangerous to project from the laboratory the relative amount of time consumers spend on each source. (Hauser et al 1993, p. 459)
However the various information sources made available in the experiment are still information sources. The customers faces both a time-allocation and source-order problem. If the customers in the sample are interested in the product and desire real information, then it is likely that they will react to the laboratory with the same allocation process they use in real life. As long as the analyses is limited to the allocation of time within the laboratory and make no attempt to compare accelerated to actual time, it should be able to represent the amount of information the customer would obtain from that source.
Finally the total number of information sources and types obtained by the respondent will be recorded.

### *4.4.2 Independent variable: Source credibility*

Expertise and reliability are important factors of the information source's credibility (Ohanian, 1990). The set of perceptions that determine credibility may contain impressions concerning the source's prestige, power, attractiveness, expertise or trustworthiness (Shimp, 1980). Morrison and Vancouver (2000) only assessed expertise by measuring responses on a five-point agree/disagree scale to the items "This source is a good repository of knowledge about..." with each item pertaining to a different subject. For this study credibility of information sources is assessed using the following items:

1. This source is a good repository of knowledge about the product and technology.
2. This source is a good repository of knowledge about the capabilities and competences of the supplier.
3. This source is a reliable source of information about the product and technology.
4. This source is a reliable source of information about the capabilities and competences of the supplier.

### *4.4.3 Independent variable: Source accessibility*

Morrison and Vancouver (2000) used three items to assess the perceived accessibility of information sources. The provided sample item was "You could contact this source very easily if you needed to obtain information.", rated on a five-point agree/disagree scale with a not applicable option. Fidel and Green (2004) pointed out there are multiple interpretations for the concept of accessibility, often it is seen as physical proximity or saving time, but the authors also noted familiarity and availability to be important factors. In this study source accessibility is assessed using the following items:

1. This source is always available if we want to obtain information.

2. Because we often obtain information from sources like this, it is easy to obtain relevant information from this source.
3. Assuming we want to request information from this source, it would not require much time.

### *4.4.4 Independent variable: Importance of the type of information*

Morrison and Vancouver (2000) used three items to assess the perceived importance of each information type, asking the respondents the degree to which they agreed to statements such as "It is extremely important that someone in your position has information of this type" (Morrison and Vancouver, 2000). Responses were on a five-point agree/disagree scale. However the authors investigated within-person differences for seeking feedback, therefore the question used here will be formulated for the purchase situation. Additionally a measure of appropriateness and usefulness will be introduced. Both are criteria of situational relevance, which concerns the relation between information and a situation, task or problem. (Saracevic, 1996, as cited in Hertzum *et al.*, 2002). In this study importance of a certain type of information will be assessed using the following items:

1. This type of information is very important to be able to evaluate the product and supplier.
2. This type of information is very relevant to explore the possibilities and benefits of this product for our situation.

### *4.4.5 Independent variable: Difficulty of obtaining the type of information*

Morrison and Vancouver (2000) used two items to access the perceived difficulty of obtaining each information type, reformulating the two items for the context of this research produces the following items:

1. This type of information normally requires much effort to find.
2. This type of information is normally difficult to get.

### *4.4.6 Additional measures*

Additional measures have been introduced to assess several factors that lie outside the range of controlled factors in the experiment. These factors can possibly influence the information seeking behavior and thus modify the studied constructs. The following items assess the respondent's company sector, company size, function and role in the buying process:

1. Business sector
2. Annual revenue
3. Number of employees
4. Function
5. Role in buying tasks

Another factor that affects the information seeking behavior is the motivation to buy a certain product. Innovators and early adopters possess a higher level of motivation to learn more about new technology products. Related concepts are customer involvement and technology readiness. The Technology Readiness Index (Parasuraman, 2000) measure people's readiness to adopt new technologies. The index consists of four dimensions: Optimism, Innovativeness, Discomfort, and Insecurity. For each of the dimensions five of the original measures by Parasuraman (2000) were selected and adjusted for the organizational context. From these two items for each of the dimensions was selected to limit the number of items on the questionnaire:

1. Optimism: The use of new technology makes our company more efficient.
2. Optimism: New technological developments are interesting.

3. Innovativeness: Other companies come to us for advice on the new technology which we use.
4. Innovativeness: Our company is mostly the first to implement a new technology in comparison with our competitors.
5. Discomfort: If our company wishes to use new technology then it is necessary to hire experts from external parties.
6. Discomfort: We should be careful with replacing important human tasks by technology, because new technology can fail.
7. Insecurity: When a process has been automated, our employees should carefully monitor it to make sure the system does not make mistakes.
8. Insecurity: When a company invests too soon on a new technology, it may end up without support or replacement parts.

Another factor affecting the information seeking behavior of the customer may be prior experience with the product or knowledge on the technology that is describes in the purchase scenario. Therefore the following items have been added:

1. How would you rate your knowledge about this technology and the adoption of it in your branch?
2. Does your company use this technology?
3. If yes, were you involved in the decision making regarding the procurement, development or implementation?

## 4.5 Sampling design and procedure

The relevant population for this study consists of Dutch industrial buyers of high tech products. Organizational buying behavior theory revealed that the type of persons involved in the buying process is not restricted to people from the purchasing department, when high tech products are concerned. Abratt (1986) pointed out the personnel involved in the purchase decision process of high-tech products are predominantly technical, due to the nature and complexity of the product; the purchasing department often has only an administrative function in the buying process. Thompson *et al* (1998) pointed out that a shift towards empowered buying teams consisting of both engineers and buyers has been made for purchases with higher value and higher importance to the organization. Therefore especially for radical innovations that will be acquired to gain a strategic advantage, the relevant population cannot be limited to purchasing managers. Considering purchasing department will predominantly deal with modified and straight re-buys, other managers are more important. Therefore the relevant population consists of senior and executive managers that are responsible for the buying decision of innovative technology

Because of the focus of this research on high-tech products, the use of a specific product in the scenario, and the nature of the population, a non-probability sample is used. Candidate companies are potential buyers of the product described in the scenario.

The researcher found approximately 80 production companies within geographical reach using various internet directories. Upon reviewing the information provided on the companies' websites, 39 companies were contacted by telephone. The researcher asked for the manager responsible for the acquisition of new technology or information system in support of the production process. This lead to 13 respondents willing to participate; 12 were visited by the researcher, 1 completed the survey on the internet, 1 did not complete the survey. Additionally two respondents were found using the researcher's personal network.

## 4.6 Data collection procedure

For data collection the experiment is presented in the form of a questionnaire on the computer, the instrument is described in paragraph (4.7). The experiment was conducted as part of a face-to-face interview (described in paragraph 4.8) to ensure good cooperation from participants, allowing for questions about the survey as well as additional follow-up questions. Because of time constraints the survey was also available on the internet for respondents who were not available for an interview.
The respondents were introduced to the research without revealing that the reference customer as information source represents the main focus of the study. As Case (2007) states experiments cannot be carried out without some degree of omission or deception regarding the purpose of the experiment, as merely being aware of the purpose may alter the responses of the experimental subjects. If the researcher would have informed the subject prior to the experiment that the purpose of the study is to establish the relevance of the reference customer, the respondent might consciously or unconsciously have prioritized the reference information when selecting information sources. Furthermore, it might have influenced the responses to the benefit and cost measurement questions.
However the respondents were informed that the described product, supplier as well as the information sources were fictional and that the aim of the study was not to evaluate the respondent's interesting in such a product. The researcher found this necessary for ethical reasons and to convince respondents that the researcher was not acting on behalf of a company trying to sell the product.

## 4.7 Instrument design

The data collection instrument consists of a computer-based questionnaire using a purchase scenario for the information seeking experiment as described in the previous paragraphs. The product selected for the scenario is a Manufacturing Execution System (MES), an application to control and monitor the production process, and automate the information flows. The selection of an information system for the scenario was based on Ruokolainen's (2005) notion that references are especially important in the software business. Although MES has been in existence for many years, only more recent developments are aimed specifically at smaller to medium-sized discrete manufacturing firms.
The instrument has been written in PHP programming language. Because the instrument involves iterative steps it has been described as a process. The process is depicted in the form of a flow chart of Figure 4.2. The process consists of three parts, the second part involves the scenario and information seeking experiment.

### *4.7.1 Part 1: Demographics*

The first part measures several situational factors, outside the controlled scope of the scenario. It starts with some questions about the respondent and the company (step 1). Industry sector, annual revenue, number of employees, job functions and role in purchase tasks are the items to explore the context of the respondent's answers. Subsequently the respondent is asked to agree/disagree with several items to explore the involvement or motivation for seeking information on technology (step 2). For this two items for each of the factors from the Technology Readiness Index have been selected and adapted for the organizational context.

### 4.7.2 Part 2: Experiment

Each respondent is randomly assigned one of the two purchase scenarios, i.e. treatment. Both scenarios describe the same product, but one describes the supplier as a high-tech startup, while the other describes an established company. The respondent is asked to imagine this product has come up in a meeting (step3a). Before the respondent commences the information seeking experiment, he has to answer two items to establish his knowledge of similar products and experience with MES (step 3b). The respondent is then asked to imagine this is the first time a MES product is offered and the supplier is still the only provider on the market (step 3c). The respondent is told he has been offered the option for the supplier to conduct an audit of his production facility to establish the benefits and configuration of the product. To decide whether or not to invest the time and pay the consultancy fee, the respondent is triggered to find more information. Additionally a sense of time pressure is added in the description.
Next, the respondent is given a list of options for his information search (step 4). Each source and the two options for each are briefly described. The respondent can now select one the three sources. In the next screen the respondent is asked to rate the source on the credibility and accessibility items (step 5a). He is then asked to select one of the two types available for that source. Next, the respondent will be asked to rate that type of information on the importance and difficulty to obtain (step 5b).
Having answered the questions, the information is displayed on the screen (step 6). The starting time will be recorded. When the respondent has finished viewing the information, he continues to step 7. At this point the end time is recorded and the total time spent on viewing the information is known. At step 7 the respondent returns to step 4 to select his next source or continues to step 8, depending on the stopping rule, which is explained next.
In order to avoid a lengthy survey a stopping rule has been introduced at this point. Rather than looking at the number of options viewed, it looks at the viewed sources. For this research it is important that at least for the supplier and the reference customer the questions are answered. So when not at least one option from the supplier and one options from the reference customer have been viewed, the respondent is sent to step 4. If each has been viewed, then the respondent is given the choice to continue and view another option or stop the experiment. When the respondent continues the viewed options will no longer be available. Thus when all six are viewed the experiment is also stopped.
Step 8 involves two items to end the experiment from the respondent's viewpoint. The respondent is asked on his decision on whether or not the product is suitable for his company and thus interesting to further explore. The other item establishes the purchase likelihood.

### 4.7.3 Part 3: Open Questions

The third part reveals the aim of the research. Some additional questions explore the use of references as information source, from the respondent's past experience within his context. This final part of the survey has been added exclusively for respondents who were not available for an appointment but willing to complete the survey online.

### 4.7.4 Testing

The instrument was tested by a small number of Master students on two occasions. The first time the test focused on the overall length of the questionnaire and general impression of the setup and layout. The second test measured the time required for each step to further decrease the overall length and focused on the wording of items. Additionally the instrument was reviewed by the first supervisor.

Screenshots of the instrument are included in Appendix 8.1.

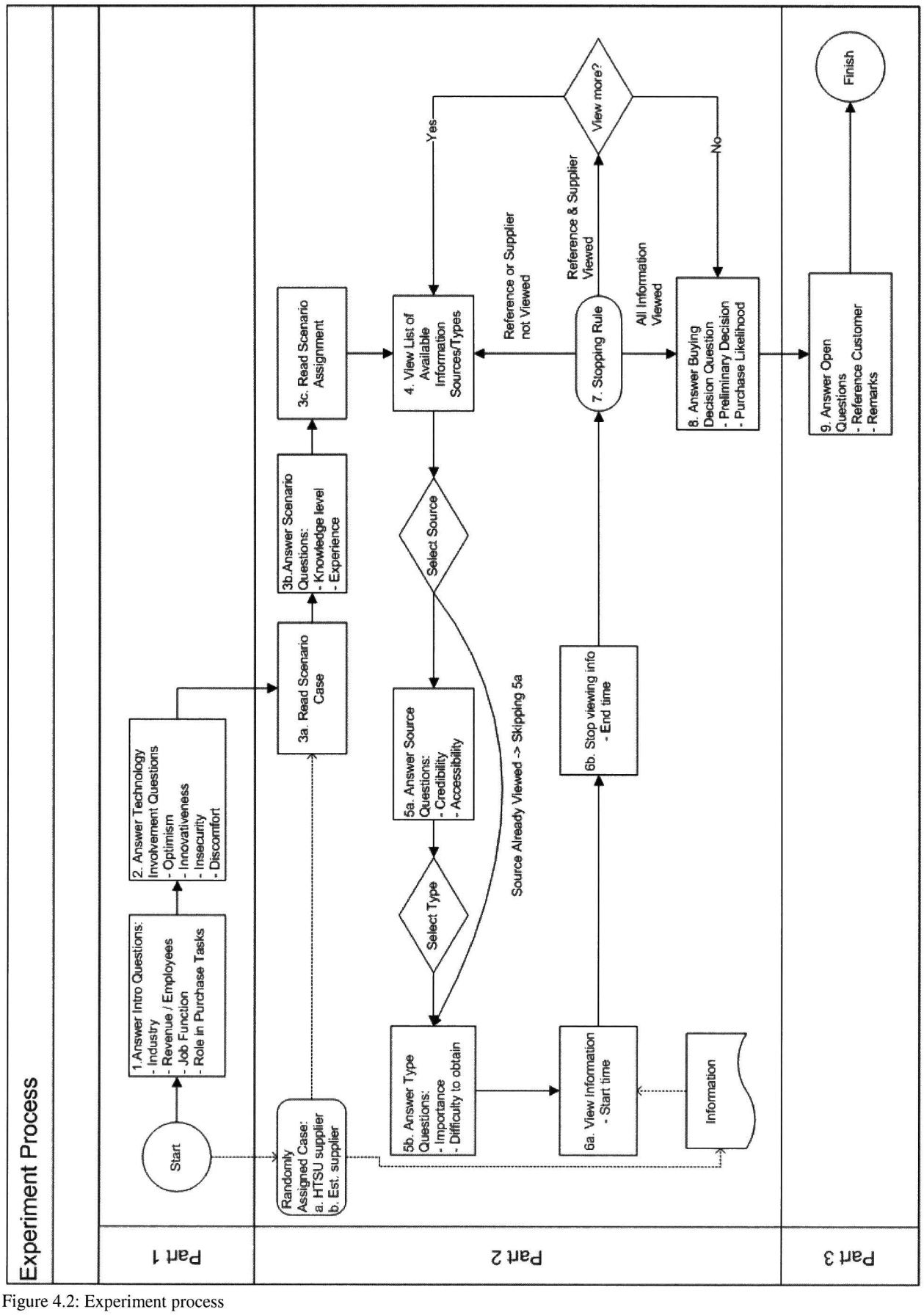


Figure 4.2: Experiment process

## 4.8 Interviews

The interviews consist of two parts and are semi-structured. The first part is an introduction and consists of questions regarding the respondent's company. These questions are aimed to give the researcher a better idea of the business and applicability of the product described in the scenario and introduce the respondent to the experiment. The topics include:

- Structure and size of the company
- Products and markets
- Function of the respondent
- Manufacturing process
- Familiarity with ERP and/or MES

After concluding the first part, the respondent is asked to complete the questionnaire on the computer in the presence of the researcher. Upon completion of the survey, the respondent is asked for feedback after which the aim of the study can be revealed. Part two of the interview thus consists of questions regarding the use of reference customers.

1. If you want to acquire a technological product for use, how important are reference customers for the buying decision?
2. Do you often use reference customers as a source of information about the product or supplier?
3. If yes, how do you obtain the reference information?
4. Can you provide an example of a buying decision for which the information from a reference customer was used?
5. Does your company use reference customers to convince prospective customers?
6. Would you/your company be willing to serve as a reference customer for your supplier? What are the preconditions?

## 4.9 Validity & reliability

Validity is the extent to which a test measures what the researcher wished to measure (Cooper & Schindler, 2006). Cooper and Shindler (2006) distinguish between external and internal validity. External validity, the data's ability to be generalized across persons, settings and times, will be assessed after the data analysis. Internal validity concerns the measurement instrument, and can be classified as consisting of three forms: content validity, criterion-related validity, and construct validity (Cooper & Shindler, 2006). Prior to data collection and analysis the content has been validated by doing a literature study about the relevant factors and measures, additionally the content of the survey has been assessed on a judgmental basis by the researcher. The supervisor has been asked for feedback on the content of the survey. Criterion-related validity concerns prediction or estimation, which is not applicable in this case. Construct validity is assured by using constructs based on theory, furthermore validity is judged by the researcher and supervisor. Due to the limitations of this study, this cannot be done using a test sample that is sufficiently representative of the population.
Reliability is the degree to which the measure supplies consistent results (Cooper & Schindler, 2006). The technology readiness measures and the cost/benefit measures have been based on reliable measures from previous research, as much as possible.

## 4.10 Data analysis

The data gathered by the researcher consist of a combination of quantitative and qualitative data. The quantitative data was recorded by the instrument, subsequently the data was first explored using descriptive statistics on the individual measures and variables in SPSS, a widely used statistical software package. However because of the limited sample size and the requirement to use the within-subject perspective, the quantitative data was further explored using Excel to cross-tabulate the data and calculate the cost/benefit ratios.

The next chapter describes the results of the data analysis.

# 5 Results

This chapter presents the results of the data analysis. First, the sample is described (5.1). Paragraph 5.2 presents describes the information seeking behavior that occurred in the experiment. Subsequently paragraph 5.3 explores the witnessed behavior using the ratio of the benefits and costs on a per case basis. Next the two experimental treatment groups are compared in paragraph 5.4. Paragraph 5.5 provides the conclusions of the analysis by answering the research questions. Finally the results are discussed using additional insights from the interviews.

## 5.1 Sample

The sample consists of 14 companies in the Eindhoven region of the Netherlands, all except one operate in the industry sector. Because the Manufacturing Execution System aimed at discrete manufacturing was used as product for the purchase scenario, the selection of potential respondents focused on companies which manufactured parts, assemblies or final products. 13 of the 14 companies thus delivered industrial goods. For each company one individual was invited to fill in the survey. All respondents are responsible or had been previously involved in the buying process for technology or capital equipment for use. The sample consisted of 7 senior managers, 4 middle managers and 3 project managers. The size of the companies is indicated by categorical data regarding annual revenue and number of employees displayed below.

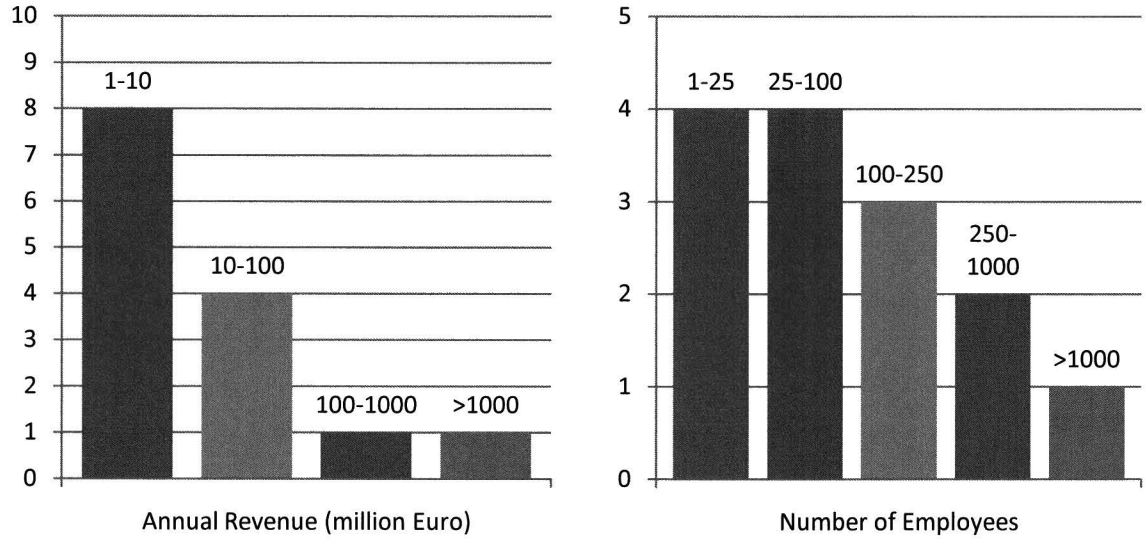


Figure 5.1: Categorical sample demographics

The respondents each had two or more roles within the decision making process for the acquisition of technological products or services, mostly including the technical decision making and determining the needs and wishes. Most respondents would also be responsible for the implementation. The table below displays the results.

| Role | n | % Cases |
|---|---|---|
| Technical decision making | 13 | 93% |
| Financial decision making | 8 | 57% |
| Determine needs/wishes | 13 | 93% |
| Specify alternatives | 7 | 50% |
| Evaluate and rate alternatives | 10 | 71% |
| Implement | 11 | 79% |

Table 5.1: Respondents' roles in the buying process

Using the taxonomy by Colby (2002) the sample consists predominantly of explorer and pioneer companies. This can be explained by the technical nature of the manufacturing industry selected for this study and the high-tech region from which the sample is drawn.

| Technology Readiness Taxonomy | n | % sample | Optimism | Innovativeness | Discomfort | Insecurity |
|---|---|---|---|---|---|---|
| Explorer | 5 | 36% | high | high | Low | Low |
| Pioneer | 6 | 43% | high | high | high | High |
| Skeptical | 2 | 14% | low | low | Low | Low |
| Paranoid | 1 | 7% | high | low | high | High |
| Laggard | 0 | 0% | low | low | high | High |
| | 14 | 100% | | | | |

Table 5.2: TR Taxonomy, based on Colby's (2002) taxonomy for the technology readiness index (Parasuraman, 2000)

Five of the 14 respondents rated their knowledge of the described system as good. Of these five, three companies already operated similar systems. The three individuals representing these companies had also been involved in the decision making or implementation of the system.

## 5.2 Information seeking behavior

On average the respondents spent 397 seconds (std. dev. of 214s) in total on viewing the presented information types in the laboratory, with a minimum of 129 seconds and a maximum of 776 seconds. The supplier was selected as first choice in 50% of the cases, this represents that within the experiment the supplier was the preferred starting point. When having selected the supplier as initial source, 86% then choose the meeting with the supplier's representative. When the reference customer was selected, either as first or second choice, the reference visit was preferred over viewing the letter of recommendation. From these descriptive totals it can be concluded that the supplier meeting and the reference visit were the most important types of information available to the respondent in the experiment.

| | Usage | First use | Second use | Avg. Time (s) |
|---|---|---|---|---|
| Supplier: | 100% * | 50% | 14% | 174 |
| Meeting | 100% | 43% | 14% | 198 |
| Brochure | 21% | 7% | 0% | 60 |
| Reference customer: | 100% * | 29% | 64% | 105 |
| Visit | 86% | 29% | 50% | 141 |
| Letter | 29% | 0% | 14% | 23 |
| Publications: | 29% | 21% | 14% | 88 |
| Article | 29% | 14% | 7% | 183 |
| Research report | 21% | 7% | 7% | 22 |

Table 5.3: average results of information seeking behavior within the experiment.

* usage of at least one information type from both the supplier and the reference was a requirement by design.

Table 5.4 presents the order in which sources were prioritized in each case. The experimental design consisted of two treatments randomly assigned to each respondent. Treatment one presented the scenario with high-tech startup as supplier, while treatment two described an established company.

| Source Order | Freq. | Case | |
|---|---|---|---|
| | | Treatment 1 | Treatment 2 |
| Supplier – Reference Customer | 6 | 1,5,8 | 10,11,12 |
| Reference Customer – Supplier | 4 | 7,13 | 4,9 |
| Publications – Reference Customer – Supplier | 2 | 14 | 2 |
| Supplier – Publications – Reference Customer | 1 | 3 | |
| Publications – Supplier – Reference Customer | 1 | 6 | |

Table 5.4: order of selecting source.

Although no conclusions can be drawn from the exact order of sources, when also looking at the selected information type it can be concluded that all respondents stopped the information search when given the choice to do so. Under the assumption that this is always the case, 36 different orders were possible. 8 different ways to order them were witnessed.

| Type Order | Freq. | Case | |
|---|---|---|---|
| | | Treatment 1 | Treatment 2 |
| Supplier Meeting - Reference Visit | 5 | 1,5,8 | 10,11 |
| Reference Visit - Supplier Meeting | 2 | 7 | 9 |
| Reference Visit - Reference Letter - Supplier Meeting | 2 | 13 | 4 |
| Supplier Meeting - Reference Letter | 1 | 12 | |
| Brochure - Supplier Meeting - Article - Research report – Reference Letter | 1 | 3 | |
| Article - Research Report - Reference visit - Supplier Meeting | 1 | | 2 |
| Research Report - Reference visit - Supplier meeting | 1 | 14 | |
| Research Report - Article - Brochure - Supplier Meeting - Reference | 1 | 6 | |

Table 5.5: order of selecting types.

## 5.3 Cost-Benefit rationale

Because the respondents were only asked to rate the cost/benefit items for a particular source and type when they selected to view that information it is assumed that the sources/types not viewed would have been rated lower than the sources/types which had been viewed.

By averaging the items measuring credibility and accessibility the benefits/costs ratios of the three sources were calculated for each respondent. In 8 of 14 cases the sources were selected in the order of their benefit/cost ratio and time was allocated accordingly. In five cases the source selected first did not have the highest ratio. In the other case, the two viewed sources were rated the same.

By averaging the items measuring importance and difficulty to option information the benefits/costs ratios of the six types of information were calculated for each respondent. Within a source, the respondent had two options. However not all respondents viewed and thus rated both types. Only six respondents viewed more than one type for one or more sources, producing 9 instances where the two types within a source were both rated. Three times the type selected first also reflected the type with the highest benefits/costs ratio, in three instances the two types were rated equally, in the other three instances the respondent did not select the type with the highest ratio.

As all information types were described on the same page on which the source selection occurred, it is possible that the respondents did not only consider the benefits/costs of the source, but also the importance and difficulty to obtain of the information types available from the source. In eight cases the type selected first also had the highest ratio between all available types.

Therefore composite scores were calculated for each respondent, with the benefits consisting of the credibility of the source and highest importance of one of the two types and the costs consisting of the inverted accessibility of the source and lowest difficulty to obtain one of the two types. In 9 of the 14 cases, the source with the highest ratio also was the respondent's first choice. In 5 of the 14 cases, the first choice was not the source with the highest ratio. Combining these three views results in the following table:

| Case | First information viewed | First source selection based on credibility/accessibility of the source | First source selection based on importance/difficulty to obtain information type | First source selection based on benefits/costs of both the source and the types available from that source |
|---|---|---|---|---|
| 1 | Supplier | Yes | Yes | Yes |
| 2 | Publications | Yes | Yes | Yes |
| 3 | Supplier | Yes | Yes | Yes |
| 4 | Reference | No | Yes | Yes |
| 5 | Supplier | Yes | Yes | Yes |
| 6 | Publications | Yes | No | No |
| 7 | Reference | Yes | - | Yes |
| 8 | Supplier | Yes | Yes | Yes |
| 9 | Reference | No | - | No |
| 10 | Supplier | No | No | No |
| 11 | Supplier | No | Yes | No |
| 12 | Supplier | Yes | Yes | Yes |
| 13 | Reference | - | No | Yes |
| 14 | Publications | No | No | No |

Table 5.6: First selection based on the cost-benefit paradigm of information seeking.

From this analysis four patterns emerged:

1. The respondent first selected the source with the highest benefits/costs ratio, which also contained the information type with the highest ratio (case 1,2,3,5,7,8,12).
2. The respondent first selected the source with the highest benefits/costs ratio regardless of the costs/benefits of the types within that source (case 6).
3. The respondent first selected the source which did not have the highest benefits/costs ratio between sources, but offered the highest ratio between types or highest combined benefits/costs (case 4,11,13).
4. The respondent first selected a source without using the cost-benefit paradigm (case 9,10,14).

## 5.4 High-tech startup vs established company

Table 5.7 presents the order in which the supplier and reference customer were prioritized in each case. The publications have not been considered in this comparison. The experimental design consisted of two treatments randomly assigned to each respondent. Treatment one presented the scenario with high-tech startup as supplier, while treatment two described an established company. No significant preference for the reference customer was witnessed when the supplier was a high-tech startup.

| Preferred Source order | Frequency | Case | |
|---|---|---|---|
| | | Treatment 1 | Treatment 2 |
| Supplier – Reference Customer | 8 | 1,3,5,6,8 | 10,11,12 |
| Reference Customer – Supplier | 6 | 7,13,14 | 4,9,2 |

Table 5.7: Preferred order of using the supplier and reference customer

For each case the percentage of the total time spent viewing information was calculated for each of the information sources. In order to be able to compare the treatment groups, a distinction has to be made between first and subsequent sources. This is because in all cases most time was spent viewing the first selection. As can be seen in table 5.8, in case the described supplier was the high-tech startup the respondents did not allocate much more time on viewing the information presented by the reference customer. The 10% difference cannot be regarded as a significant change in behavior because of the small sample size.

| | Average Time Allocation | | |
|---|---|---|---|
| Source | Treatment 1 | Treatment 2 | Difference |
| Supplier as first source | 80% | 75% | -5% |
| Reference customer as first source | 65% | 55% | +10% |
| | | | |
| Supplier as subsequent source | 25% | 25% | 0% |
| Reference customer as subsequent source | 20% | 25% | -5% |

Table 5.8: Average time allocated to the supplier and reference customer

## 5.5 Conclusions

Having analyzed how the benefit/cost ratio determined the preference and time allocation per case and the use of the reference customer between treatment group, the research questions can now be answered.

**Does the buyer will prefer and allocate more time seeking information from a particular source to the extent that he evaluates the credibility/accessibility ratio of that source as more favorable than for the other sources?**

Yes, in most cases the source with most favorable cost-benefit ratio was selected first and thus most time was allocated towards seeking information from that source. When the source with the most favorable cost-benefit ratio was not selected first, the respondent allocated more time (mean 35%, std. dev. 11%) on viewing information from that source than the time allocated to subsequent sources by those who did already viewed the source with the most favorable cost-benefit ratio (mean 16%, std. dev. 10%), p=0,015.

**Does the buyer will prefer and allocate more time seeking information of a particular type to the extent that he evaluates the benefits/costs ratio of that type as more favorable than for the other types?**

Concerning the selection between two types within a source, no conclusion can be drawn on the basis of the benefits/costs ratios. Most respondents only viewed one information type per source. However between all available types, in 8 cases the type with the highest benefits/costs ratio was selected first and thus the most time was allocated towards viewing it.

**Does the buyer prefer and allocate more time seeking information from the reference customer than from the high-tech startup because he evaluates the benefits/costs ratio (credibility : lack of accessibility) more favorable?**

No, only in case 7 can the preference for the reference customer be explained by the difference of the cost-benefit ratios between sources. In cases 13 and 14 the buyer did prefer and allocate more time towards the reference customer than the supplier, but with the cost-benefit ratio being equal to that of the supplier. However in the other five cases with the high-tech startup as supplier, this was not the case. And overall there was no significant difference in behavior compared to the group with the scenario describing an established supplier.

**In case the supplier is a high-tech startup, how does this affect the buyer's preference and time allocated towards different types of information in light of the trade-off between the importance and difficulty to obtain?**

Whether the supplier was presented as a high-tech startup or as an established company, the buyer preferred the personal types of information. In most cases the meeting with the supplier was preferred over the product brochure and the reference visit was preferred over the letter of recommendation. Comparing the supplier meeting with the reference visit, the reference visit did generally not have a more favorable benefit/cost ratio. Only in two of the 12 cases that obtained information from the reference visit and the supplier meeting was the ratio more favorable for the reference visit. Just one of these two cases belonged to the group with the high-tech startup as supplier. Furthermore this respondent did only allocate 1% more time using the reference visit compared to the supplier visit.

## 5.6 Discussion

In this paragraph a discussion is presented based on the conclusions from the data analysis as well as the data from the interviews. An overview of the interview results are available in Appendix 8.2. First information seeking behavior is discussed, subsequently the reference customer, high-tech startup and publications will be discussed.

### *5.6.1 Information seeking behavior*

The cost-benefit paradigm of information seeking explains information seeking behavior across better when also the benefits/costs ratio of the information types available from that source are considered. However the combined ratio explored in this study did still not explain the source order in all cases. This might be explained by within-buyer differences in weighing the different parameters.
Another possible reason for this is that the credibility of the source and the importance of the information type did not present the main benefit of using that source or type in light of the buying decision. In case 14 for example, the respondent explained he first opted to view some articles as they can provide more general information and provide a framework for the product specific information provided by the supplier and reference customer, which were viewed as more credible sources providing more important information than the articles. In case 10, the reference customer had the highest ratio but the supplier was the first choice. The respondent explained that although the reference customer offers credible and important information, the possible lack of a good match with the reference company would limit its overall value and usefulness. Because this is difficult to assess prior to visiting the reference company, the supplier was thus preferred as first source.

### 5.6.2 Reference customer

The reference customer is often regarded as a credible source of information, as they provide their professional opinion and have no incentive to hide their more negative feelings towards the supplier or product. However this view is not shared by everyone, some buyers are concerned that the supplier only provides a reference customer that will only state the positive about the supplier and product. They can even be influenced by the supplier to suppress the negative aspects and provide no information that differs from the sales pitch. Other buyers take this into account when processing the information or ask for another reference.
Reference customers lack accessibility as source of information because they are not readily available. Although the supplier often offers to visit a reference customer, it is difficult to judge in advance if it will be worthwhile. Buyers find information from a reference visit difficult to obtain. It takes more time and effort than meeting with a supplier's representative. Therefore the buyer also relies on other references from his own network. This includes similar companies as well as partner companies and industrial customers of the buying company.

### 5.6.3 High-Tech Startup

If the supplier is a high-tech startup the supplier is still considered a credible source of information and obtaining information from a meeting with the supplier is still considered important.
Insufficient evidence was found to suggest that the reference customer and the reference visit are more relevant in case the supplier is a high-tech startup. The buyer already faces a high level of risk and uncertainty regarding the product as well as facing high financial risks, thus the reference information is just as important in case the supplier is an established company. Also some respondents indicated that having a startup company as supplier can offer many benefits compared to a larger well-established company. Benefits included the possibility further co-development of the product, shorter communication lines, lower support and service fees, and especially for the smaller companies a better match between the two companies. This enables a closer and stronger relationship. When a company buys from a high-tech startup it is often a local company or there was already a relation with the entrepreneur. Furthermore, in case the supplier is a small startup company the buyer can easier judge the capabilities of the company and expertise of the people, reducing the need to visit a reference company to obtain such information.

### 5.6.4 Publications

Publications serve as a starting point for some buyers, as articles are not difficult to obtain and still provide relevant information for the buying decision because they can enhance the buyer's knowledge before meeting the supplier or visiting a reference customer. In most cases they are not actively sought as part of the buying process, but are more likely to be part of the buyer's ongoing search for information irrespective of a certain buying task.

# 6 Conclusion

This chapter concludes the study. First the research conclusions are presented, followed by the practical implications. Subsequently, the limitations of this study are explained. Finally, some recommendations for future research are offered.

## 6.1 Research conclusions

The relevance of the reference customer as a source of information for subsequent buyers is subject to how the buyer perceives not only the credibility and accessibility of the reference customer, but also the importance and difficulty to obtain the type of information it offers. The reference customer as a source of information is more relevant if the information is provided in the form of a reference visit, just like a meeting with the supplier is more relevant than a sales brochure. However this means that even though the buyer perceives the ratio of credibility and accessibility favorable, the use of the reference customer is still subject to the perceived importance and difficulty to obtain a reference visit. Buyers often find information from a reference visit important but also difficult to obtain. It takes more time and effort than meeting with a supplier's representative and is usually only carried out once. Having obtained information from a reference customer using a visit, the value of that information for evaluating the product still depends on the quality. The quality of a reference visit depends on the match between the two companies, the people involved, the extent to which the application of the product will be similar, and whether or not the supplier was present during the visit.
Although the high-tech startup presents higher risk to the buyer, buyers also consider the benefits of having a small startup company as supplier. Even if the supplier is an established company, the supplier is often a new supplier to the company and the buyer still faces the same level of uncertainty and risk with regards to the product. Therefore, provided that the buyer perceives the reference customer as credible and the information from a reference visit important, the reference customer is just as relevant to the buyer as a source of information. Furthermore, buyers who find references unimportant and lacking credibility and accessibility will not be more likely to use the reference customer as a source of information when the supplier is a high-tech startup.

## 6.2 Practical implications

Reference customers can provide a great deal of information to the prospective buyer. Reference lists and letters of recommendations are of little relevance to the buyer and little information is obtained from them. However visits to the reference customer are considered important means of getting more information. Most buyers view this information as credible and important for his decision making. The reference customer can share knowledge that is more relevant to the buyer's application of the product in his business than the information a supplier can offer.
Prospective customers have to be made aware of the possibility to visit a reference customer, as they often perceive the accessibility low. Some prospective customers also will have to be convinced of the benefits as it requires more effort.
Buyers expect the reference customer's case to be a success story and the information provided to be positively biased, they may need to be convinced that the reference visit also offers practical information and great insight into the functional properties of the product.
Buyers also want to hear about problems and reference customers want to provide prospects with their honest and professional opinion. Thus the supplier should not try to influence the

reference customer. Rather the supplier should be prepared to address any queries from the customers arising from what the reference customer has told them.
Similarity between the prospective customer and the reference customer is important and can be conceived as a test of the supplier's understanding of the buyer's business and vision for the product.

If high-tech startups have a first customer it is recommended to use it as reference customer, more specifically they should invite prospective customers to visit the reference's site. The reference customer is generally regarded as a credible source of information with regards to the product and can demonstrate the product in a real business setting. The reference customer can validate the high-tech startups claims with regards to the product and its own capabilities and improve its credibility.
As the high-tech startup is restricted to using the first and only customer as reference, the match between subsequent buyers and the first reference customer is not always there. The high-tech startup needs to understand the business and application of the product of both parties, but also the position in the organization and level of knowledge of the persons involved. If there is a mismatch, the high-tech startup should clearly address this prior to the visit so the prospective customer will not be disappointed.
Although most companies do not object to the idea of being visited, they are cautious when the visitor is a competitor. This can potentially limit the use of the first customer for reference visits if the product is geared towards companies operating within the same sector.

## 6.3 Limitations

This study's conclusions and implications are subject to a number of limitations.

**Purchase scenario**
The experiment was done using a scenario. The product described in the scenario was not a truly radical innovation. Some of the respondents were already familiar with the product. The described product was an information system to monitor and control the production process. Despite a careful pre-selection, the product was not applicable to the production process of all companies. During the interviews the purchase of capital manufacturing equipment was also frequently used as example. Information seeking behavior might be different for buying decisions for technology that will form an actual part of the manufactured physical product.

**Sample**
The sample was limited in size, thus restricted the use of statistical tests. Additionally this meant that the statistical validation and reliability tests were not deployed and factor analysis did not yield satisfactory results.
The respondents employed different positions in companies ranging from small to large. Not all respondents operated in the same industry sector.

**Experiment**
The experiment did not include all possible information sources, internal sources and external peers were not considered. The respondents were not required to complete the questions for each information source and type to limit the time required to complete the survey. The consequence of this limitation in combination with the limited sample size was that insufficient data was collected to conduct statistical analysis to compare the variables for each of the different sources and kinds of information. Furthermore insufficient data was collected to compare the experimental treatment groups using a non-parametric test. Also it was

required to assume that the source and types not viewed were perceived to have lower benefits/costs ratios.

**Controls**
Every experiment presents a controlled environment. By using the scenario, the researcher tried to control the purchase situation, risk level and time pressure. However the effectiveness of the controls were only tested on judgmental basis by asking the respondent for feedback after having completed the experiment.

**Interviews**
The interviews were conducted as follow-up to completion of the questionnaire and were conducted using a semi-structured approach. Thus the depth and quality of the answers provided by the respondent heavily depended on each respondent as well as the researcher's ability to ask relevant follow-up questions, this ability increased with each interview.

## 6.4 Recommendations for future research

This paragraphs offers a number of recommendations for future research. The first part presents of a number of recommendations for further research. The second part presents propositions to investigate the effect of reference information on the product and supplier evaluation during the next stage of the buying process. The third part consists of practical advice.

### *6.4.1 Further Research*

For further research on information seeking within the buying process using specific sources and types of information available to the buyer a two-stages approach may improve the findings. First of all it is recommended to use a significantly larger sample in order to use statistical tests. During the first stage the survey data is collected about the respondents and cost/benefit parameter. The survey should contain more items to measure the different factors of each of the cost/benefit parameters for each of the information sources and types. The sample can then be divided in groups on the basis of the findings. During the second stage the respondents will be asked to do the experiment. Each group can be assigned a relevant purchase scenario on the basis of the data previously obtained. As the second stage only consists of the experiment, the respondent can be asked to do the experiment online as it requires less time and the respondent will be more likely to complete the experiment if the product is relevant and the respondent is already familiar with the research and researcher. Rather than using time as dependent measure, the respondent can be asked to select the most relevant sources and then order them accordingly. One of the major benefits of this approach is that the researcher does not have to create the actual information. Having completed the two-stages of data collection, the data can be combined to test the within-subject and between-group hypotheses.

### *6.4.2 Propositions*

Future research should establish how the information from the reference customer affects the evaluation of the product in the next stage of the buying process. As explained in paragraph 2.1 the evaluation of high-tech products is subject to the perceived characteristics that influence the potential adoption of a new innovation, as described by Rogers (2003) framework: the relative advantage, compatibility, simplicity, trailability and observability.

The interview results (see Appendix 8.2) reference customers are important to the buyer because they provide user perspectives, better insight into the functioning of the product, practical information on implementing and using the product, weighing the benefits when there is a good match between the buying company and the reference company. Thus, the following propositions can be formulated:

- The reference customer impacts the perceived relative advantage as the information provided changes the relative weight given to the various benefits of adopting the new technology.
- The reference customer increases the perceived compatibility of the product, if there is a good match between the reference customer and the prospective buyer, by providing information from the user prospective.
- The reference customer increases the perceived simplicity of the product, as he can provide the prospective buyer with practical information for implementing and using the product.
- The reference customer increases the perceived observability of the product, as a reference customer can provide the buyer with better insight into the functioning of the product.

As explained in paragraph (2.1) the buyer will evaluate the supplier based on his perceptions regarding capability, credibility, trust relationship, reputation/image and survivability. The interview results included the topics of experience with the supplier, validating sales info and continuity. Combining the perceived characteristics with the practical reasons for using a reference customer, the following propositions can be formulated:

- The reference customer influences the perceived capability of the supplier, as the reference customer provides the buyer with information about his experiences with the supplier.
- The reference customer influences the buyer's trust relationship with the supplier, as the reference customer provides the buyer with information about his experiences with the supplier.
- The reference customer affects the perceived credibility of the supplier, as the buyer uses the reference information to validate the sales information provided by the supplier.
- The reference customer positively affects the perceived survivability of the supplier, because the availability of a reference customer increases continuity of the product and the supplier's support.

Some interviewees also indicated they used other references from their own network to gather information on the supplier's reputation in the market. Thus another direction for future research would be to compare the use of references offered by the supplier and the use of the buyer's own references.

### *6.4.3 Practical advice*

**Reference Customer**

More qualitative research is necessary on the use of reference customers as information source to provide a better foundation for quantitative research. By conducting case studies at companies in the process of buying or selling an innovative product or service. If the study is conducted at a company selling an innovative product, the researcher can explore to what

extent the prospective customers of that company use or have used the offered reference information. By focusing on the reference visit in particular, the researcher can establish its relevance to the prospective customer in greater detail. If the study is conducted at the buying company, the researcher can ascertain when in the buying process the different types of reference information are consulted and how the information from the reference customer influenced the adoption decision.

**Industrial Buyers of Innovative Technology**

Industrial buyers of new technology for use are predominantly senior managers at smaller companies or dedicated project managers at bigger companies. They are difficult to reach by "cold calling" the company. From experience calling the medium to large companies, the researcher recommends to ask for the human resources department first. The researcher found that the HR department is better able to refer you to the right person than the secretary answering the phone.

A better way to get a larger group of respondents would be to administer the survey at a trade show for similar products or a trade show for a particular industry branch. Industrial buyers of technology for use often visit one or more annual industry specific tradeshows.

**Purchase Scenario**

Using a purchase scenario enables the researcher to control the purchase context. However it is important that the product is also relevant to the respondent when studying behavior. Also when using internet or e-mail based approach for data collection product relevance is important, otherwise the respondent might lose interest or not complete the survey because he/she thinks the aim of the research is to evaluate the product. One of the major drawbacks of using a purchase scenario in the industrial context as opposed to consumer research is that the product selection largely determines the possible sample size. For example in this research the relevant population consisted of industrial buyers of new technology, however because of the used product in the scenario the population became industrial buyers at discrete manufacturing companies. Thus the scenario can make pre-selection more difficult and limit the sample size. The researcher's advice to anyone who wants to study industrial marketing of innovations using a purchase scenario is to carefully consider how the product selection determines the sample; many industrial innovations are often very sector and application specific. Also it is often difficult to establish whether the product is relevant to the respondent prior to an interview. A possible way to expand the sample would be to have several products, so the respondent can pick one that he finds most applicable for his business context. Furthermore, innovations are often complex by nature, thus it is advised to select a product with an application or market that the researcher is familiar with.

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# 8 Appendices

## 8.1 Instrument screenshots

Screenshots of the developed instrument. The image below depicts the login screen.


After having logged in, the respondent is presented with the introduction.

Step 1: Questions about the respondent and the company.

TU/e Technische Universiteit Eindhoven University of Technology

Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 1: Vragenlijst

Hieronder staan een aantal vragen met betrekking tot uw bedrijf en uw functie. Beantwoordt a.u.b. alle vragen en klik vervolgens op 'Doorgaan'.

| | | |
|---|---|---|
| 1 | In welke sector opereert uw organisatie? | -- (SBI2008 indeling) -- |
| 2 | Hoeveel bedraagt de jaarlijkse omzet? | miljoen Euro |
| 3 | Hoeveel medewerkers telt uw bedrijf? | -- selecteer aantal medewerkers -- |
| 4 | Wat is uw functie? | -- selecteer uw functie -- |
| 5 | Wat is uw rol in het besluitvormingsproces voor de aanschaf van nieuwe technologische producten/services? | Technische besluitvorming<br>Financiële besluitvorming<br>Vaststellen eisen/wensen<br>Adviseren en specificeren van producten/services<br>Evalueren en beoordelen van producten/services<br>Implementeren van het product of service<br>Andere rol<br>Geen rol / Niet betrokken<br>* meerdere antwoorden mogelijk |

Doorgaan

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Step 2: Technology Involvement items.

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Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 1: Stellingen

Hieronder staan een aantal stellingen met betrekking tot het gebruik van technologie in uw organisatie. Geef a.u.b. voor elke stelling aan in hoeverre u het met de stelling eens bent.

| Stelling: | In hoeverre bent u het met de stelling eens... | | | | |
|---|---|---|---|---|---|
| 1 Indien ons bedrijf van een nieuwe technologie gebruik wil maken is het noodzakelijk om de expertise in te schakelen van een externe partij. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 2 Wanneer een bedrijf te snel investeert in een nieuwe technologie, kan het zonder ondersteuning of vervangende onderdelen komen te zitten. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 3 Het gebruik van nieuwe technologie maakt ons bedrijf efficiënter. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 4 We moeten voorzichting zijn met het vervangen van belangrijk mensenwerk door technologie omdat nieuwe technologie kan falen. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 5 In vergelijking met onze concurrenten is ons bedrijf meestal de eerste om een nieuwe technologie in gebruik te nemen. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 6 Andere bedrijven komen naar ons voor advies over nieuwe technologie waarvan wij gebruik maken. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 7 Wanneer een proces geautomatiseerd is, moeten onze medewerkers dit nauwkeurig nalopen om zeker te zijn dat het systeem geen fouten maakt. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 8 Nieuwe technologische ontwikkelingen zijn interessant. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |

Versturen en doorgaan naar het volgende onderdeel

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Step 3a: Purchase Scenario, the case with the established company and in the next image the high-tech startup as supplier. The respondent is shown one of the two.

TU/e Technische Universiteit Eindhoven University of Technology

Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 2: Scenario

Het tweede gedeelte van het onderzoek betreft een experiment: U gaat op zoek naar informatie over een product. U krijgt hiervoor de keuze uit een aantal informatiebronnen. Vervolgens worden een aantal vragen gesteld over uw verwachtingen met betrekking tot de informatie. Daarna wordt de informatie getoond en kunt u deze doornemen.

**Lees a.u.b. het volgende fictieve scenario zorgvuldig door, na dit scherm kunt u niet meer terug naar deze beschrijving.**

Een collega heeft tijdens een vergadering verteld over een bedrijf dat een interessante technologie heeft ontwikkeld voor uw bedrijf:

Manufacturing Execution System (MES)

Een Manufacturing Execution System (MES) is een systeem voor de automatische verwerking van alle elektronische data van de werkvloer. Het systeem bestaat uit functies en tools (anders dan die van een ERP systeem) voor elk aspect van een data-driven productie proces door middel van een gebruikersvriendelijke interface en automatische koppeling met machines.

Doordat het MES document- en spreadsheetprocessen vervangt kan het de productie snelheid verhogen. Het zorgt voor een snellere communicatie van procestaken, vermindert onnodig papierwerk, en vormt één bron voor alle data voor rapportages, analyses en auditing. Het MES wordt gekoppeld aan het ERP systeem, zodat automatisch data wordt uitgewisseld tussen de back-office en de werkvloer. Het systeem kan automatisch order informatie uit het ERP omzetten in een productie planning, routing, materiaal planning. Het systeem weet altijd precies welk product uit welke order wordt geproduceerd, dus de operators krijgen alleen de informatie te zien die relevant is voor die combinatie van productorder en processtap. Dit zorgt voor een snellere, beter gestroomlijnde en flexibiler producie proces zonder papierwerk.

Het bedrijf NHIS biedt een MES suite aan dat bestaat uit een database, werkvloer-data management systeem en een ERP integratie module. Een gedeelte van de data kan direct naar het ERP worden overgezet, andere data wordt opgeslagen in het data management systeem voor verwerkingen en gedetailleerde proces analyses.

NH Innovative Systems (NHIS)

NH Innovative Systems (NHIS) is marktleider op het gebied van IT systemen voor productie bedrijven. Het bedrijf bestaat al 30 jaar en is continu bezig met nieuwe ontwikkelingen op IT gebied. NHIS levert toepassingen voor verschillende markten, de Nederlandse branch is vooral gericht op toepassingen voor logistiek en productiebeheersing. De belangrijkste producten vormen ERP en MRP systemen. Naast vele multinationals behoren ook overheidsinstanties tot het klantenbestand. NHIS heeft dus ook veel ervaring met het implementeren van nieuwe systemen om productie en logistieke processen te automatiseren. Enkele jaren geleden heeft het bedrijf een Manufacturing Execution System ontwikkeld. Na introductie op de Amerikaanse markt zijn de producten sinds een paar jaar ook in Nederland geïntroduceerd. Een grote Nederlandse producent van onderdelen voor defensie heeft in 2007 het MES systeem van NHIS als eerste geïmplementeerd.

Doorgaan naar het volgende onderdeel



TU/e Technische Universiteit Eindhoven University of Technology

Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 2: Scenario

Het tweede gedeelte van het onderzoek betreft een experiment: U gaat op zoek naar informatie over een product. U krijgt hiervoor de keuze uit een aantal informatiebronnen. Vervolgens worden een aantal vragen gesteld over uw verwachtingen met betrekking tot de informatie. Daarna wordt de informatie getoond en kunt u deze doornemen.

**Lees a.u.b. het volgende fictieve scenario zorgvuldig door, na dit scherm kunt u niet meer terug naar deze beschrijving.**

Een collega heeft tijdens een vergadering verteld over een bedrijf dat een interessante technologie heeft ontwikkeld voor uw bedrijf:

Manufacturing Execution System (MES)

Een Manufacturing Execution System (MES) is een systeem voor de automatische verwerking van alle elektronische data van de werkvloer. Het systeem bestaat uit functies en tools (anders dan die van een ERP systeem) voor elk aspect van een data-driven productie proces door middel van een gebruikersvriendelijke interface en automatische koppeling met machines.

Doordat het MES document- en spreadsheetprocessen vervangt kan het de productie snelheid verhogen. Het zorgt voor een snellere communicatie van procestaken, vermindert onnodig papierwerk, en vormt één bron voor alle data voor rapportages, analyses en auditing. Het MES wordt gekoppeld aan het ERP systeem, zodat automatisch data wordt uitgewisseld tussen de back-office en de werkvloer. Het systeem kan automatisch order informatie uit het ERP omzetten in een productie planning, routing, materiaal planning. Het systeem weet altijd precies welk product uit welke order wordt geproduceerd, dus de operators krijgen alleen de informatie te zien die relevant is voor die combinatie van productorder en processtap. Dit zorgt voor een snellere, beter gestroomlijnde en flexibiler producie proces zonder papierwerk.

Het bedrijf NHIS biedt een MES suite aan dat bestaat uit een database, werkvloer-data management systeem en een ERP integratie module. Een gedeelte van de data kan direct naar het ERP worden overgezet, andere data wordt opgeslagen in het data management systeem voor verwerkingen en gedetailleerde proces analyses.

NH Innovative Systems (NHIS)

NH Innovative Systems (NHIS) is een jong, dynamisch bedrijf dat in 2007 is opgericht. Het bedrijf is ontwikkelaar en leverancier van software systemen voor productie bedrijven. Het belangrijkste product van NHIS is een Manufacturing Execution System. In samenwerking met een grote Nederlandse producent van onderdelen voor defensie is het systeem verder ontwikkeld. Dit bedrijf heeft het systeem in 2007 geïmplementeerd.

Doorgaan naar het volgende onderdeel

Step 3b: Previous experience and knowledge items with regards to the technology.

TU/e Technische Universiteit Eindhoven University of Technology

Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 2: Situatie

**Beantwoordt a.u.b. de volgende vragen:**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Hoe zou u uw kennis over Manufacturing Execution Systems en de toepassing daarvan in uw sector beoordelen? | Zeer slecht | Slecht | Gemiddeld | Goed | Zeer goed |
| 2 | Maakt uw bedrijf gebruik van een Manufacturing Execution System? | Nee, nog niet overwogen | Nee, maar wel een vergelijkbare oplossing | Nee, maar wel in overweging | Ja, maar nog op proef / beperkt | Ja, volledig geïmplementeerd |
| 3 | Zo ja, was u betrokken bij de besluitvorming met betrekking tot de aanschaf, ontwikkeling en/of implementatie van het systeem? | N.v.t. | Nee | Soms | Ja, gedeeltelijk | Ja, volledig |

Klik op onderstaande knop om door te gaan.

Doorgaan naar het volgende onderdeel

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Step 3c: Information seeking task given to the respondent.

TU/e Technische Universiteit Eindhoven University of Technology

Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Deel 2: Uitgangspunt

**Stelt u zich de volgende situatie voor, ongeacht uw antwoorden op voorgaande vragen.**

- Uw bedrijf maakt nog geen gebruik van een Manufacturing Execution System.
- NHIS is de eerste op de Nederlandse markt met een MES product, geschikt voor uw bedrijf.
- Dit is de eerste keer dat u in aanraking komt met een Manufacturing Execution System oplossing.
- U bent geïnteresseerd in dit product voor toepassing in uw bedrijf.

**Het bedrijf NHIS biedt u voor een reële prijs een MES audit aan. Consultants voeren een scan uit van uw productie omgeving en komen met een adviesrapport met betrekking tot de invoering en configuratie van het Manufacturing Execution System.**

**Voordat u hierover kunt beslissen en dus tijd en geld investeert, wilt u eerst over meer informatie beschikken. In het volgende gedeelte krijgt u hiervoor de keuze uit een aantal verschillende informatiebronnen. U wilt zo snel mogelijk een beslissing kunnen maken, u heeft het immers al druk genoeg met uw dagelijkse werkzaamheden.**

Klik op onderstaande knop om door te gaan.

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## Step 4: Available information mix and selection.

TU/e Technische Universiteit Eindhoven University of Technology — Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

### Deel 2: Informatie zoeken

Via de website van de producent heeft u de volgende opties gevonden om meer informatie te krijgen:

- **Referentie klant**
  U kunt terecht bij de huidige klant voor meer informatie. De volgende opties zijn beschikbaar:
  - Bezoek: U maakt een afspraak met het bedrijf dat als eerste klant ook heeft geholpen met de ontwikkeling. Tijdens uw bezoek krijgt u uitleg over de werking en implementatie van het systeem bij het bedrijf.
  - Aanbevelingsbrief: U vraagt het bedrijf om informatie over hun ervaringen met NHIS en het MES en zij sturen u een "Letter of Recommendation".
- **Producent**
  U kunt contact opnemen met de producent voor meer informatie. De volgende opties zijn beschikbaar:
  - Afspraak: U maakt een afspraak met NHIS. Een medewerker van het bedrijf komt bij u op bezoek en houdt een presentatie over het product en het bedrijf. Na de presentatie kunt u vragen stellen.
  - Brochure: U vraagt om informatie toegezonden te krijgen. U ontvangt een product brochure.
- **Publicaties**
  U wordt verwezen naar een aantal publicaties, de volgende opties zijn beschikbaar:
  - Vakblad artikel: U vindt een interview met de directeur van NHIS in een vakblad en een algemeen artikel over Manufacturing Execution Systems.
  - TNO Onderzoek: U vindt een publicatie van TNO van een onafhankelijk onderzoek naar de voordelen van een Manufacturing Execution System.

| **Welke bron zou u nu als eerste raadplegen?** | |
|---|---|
| ○ | Referentie klant |
| ○ | Producent |
| ○ | Publicaties |

Per informatiebron krijgt u een aantal vragen over de bron en de optie waarvoor u vervolgens kiest. De tweede keer dat u dezelfde bron gebruikt krijgt u alleen enkele vragen over de overgebleven optie. U hoeft geen vragen te beantwoorden met betrekking tot de inhoud.

Doorgaan

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## Step 5a: Benefit and Cost items regarding the information source.

TU/e Technische Universiteit Eindhoven University of Technology — Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

### Producent als informatiebron

De volgende stellingen gaan over uw verwachtingen met betrekking tot de Producent als bron van informatie.

| **Stelling:** | **In hoeverre bent u het met de stelling eens...** | | | | |
|---|---|---|---|---|---|
| 1 De producent is een goede bron van kennis met betrekking tot het product en de technologie. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 2 De producent is een goede bron van kennis met betrekking tot capaciteiten en competenties als producent en leverancier. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 3 De producent is een betrouwbare bron voor informatie over het product en de technologie. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 4 De producent is een betrouwbare bron voor informatie over de capaciteiten en competenties van het bedrijf. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 5 De producent is altijd wel beschikbaar indien we informatie willen. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 6 Omdat we vaker informatie van IT bedrijven gebruiken, is het makkelijk om zo relevante informatie te verwerven. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |
| 7 Stel dat we via deze weg informatie zouden willen opvragen, dan zou dit niet veel tijd kosten. | ○ Totaal mee oneens | ○ Mee oneens | ○ Neutraal | ○ Mee eens | ○ Totaal mee eens |

| **Voor welke optie kiest u?** | | |
|---|---|---|
| ○ | Afspraak | U maakt een afspraak met NHIS. Een medewerker van het bedrijf komt bij u op bezoek en houdt een presentatie over het product en het bedrijf. Na de presentatie kunt u vragen stellen. |
| ○ | Brochure | U vraagt om informatie toegezonden te krijgen. U ontvangt een product brochure. |

Volgende

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## Step 5b: Benefit and Cost items regarding the type of information

TU/e Technische Universiteit Eindhoven University of Technology Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Afspraak met de Producent

De volgende stellingen gaan over uw verwachtingen met betrekking tot de informatie van een Afspraak met de Producent

| Stelling: Ik denk dat een Afspraak met de Producent informatie biedt die ... | In hoeverre bent u het met de stelling eens... | | | | |
|---|---|---|---|---|---|
| 1 ... zeer belangrijk is om het product en leverancier te kunnen beoordelen. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 2 ... zeer relevant is om de mogelijkheden of voordelen van het product voor onze productie omgeving te bekijken. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 3 ... normaal gesproken veel inspanning vergt om te vinden. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |
| 4 ... normaal lastig is om te krijgen. | Totaal mee oneens | Mee oneens | Neutraal | Mee eens | Totaal mee eens |

Volgende

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## Step 6: Information is displayed, in this case the meeting with the supplier.

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Afspraak met de Producent

De informatie wordt hieronder weergegeven. Wanneer u de informatie heeft bekeken, klik dan op de knop **Doorgaan** onderaan de pagina.

### Presentatie

**Klik hier om de presentatie te bekijken**

### Vraag en Antwoord

Hieronder zijn een aantal mogelijke vragen gedefinieerd, klik op een vraag om het antwoord te zien te krijgen.

1. **Hoe kan het Manufacturing Execution System onze productie kosten verminderen?**
2. **Hoe kan een Manufacturing System onze voorraad en Work In Progress (WIP) verminderen?**
3. **We willen wel betere productie rapporten nodig maar we hebben slechts beschikking over een beperkte hoeveelheid fabricage informatie.**
4. **Hoe wordt de data van de werkvloer verzameld en waarom is dit beter dan nu?**
5. **We streven naar "operational excellence" om te kunnen concurreren op de markt van tegenwoordig. Hoe past het MES daarin?**
6. **Waarom zouden we weer een ander IT systeem implementeren?**
7. **Hoe weten we hoeveel het systeem voor ons bedrijf kunnen besparen?**

   **Hoe weten we hoeveel het systeem voor ons bedrijf kunnen besparen?** Sluiten

   NHIS biedt een 'value/savings opportunity audit' aan in samenwerking met een branche-specifieke consultancy partner tegen een laag tarief.

   Op een vertrouwelijke basis wordt in samenwerking met uw team een diagnostische scan uitgevoerd om te verkennen, vast te stellen en te kwantificeren hoe en waar precies het MES zou kunnen worden ingevoerd en wat de opbrengsten zouden kunnen zijn. Op basis hiervan wordt een ROI rapport gemaakt.

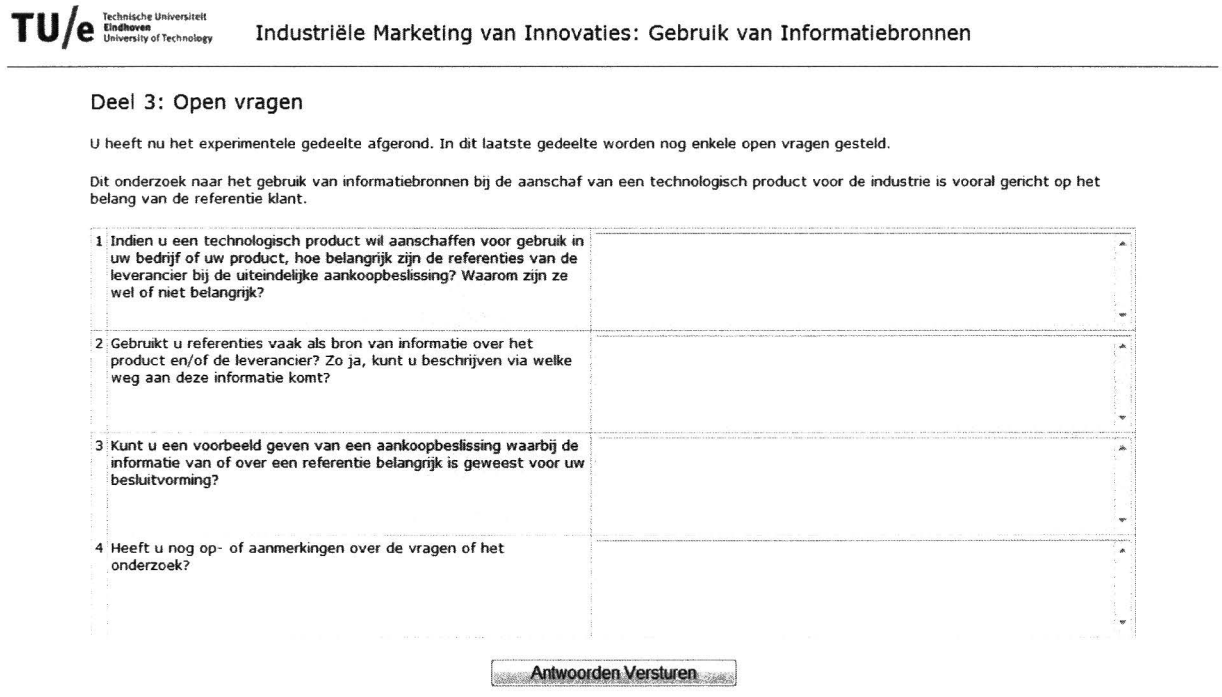
8. **Hoe zit het met de duur van de implementatie?**

Doorgaan

Step 7: Respondent is asked to continue or stop seeking information.


Step 8: Respondent is asked to make a decision.

Step 9: Open, interview question regarding the use of reference customers.



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Deel 3: Open vragen

U heeft nu het experimentele gedeelte afgerond. In dit laatste gedeelte worden nog enkele open vragen gesteld.

Dit onderzoek naar het gebruik van informatiebronnen bij de aanschaf van een technologisch product voor de industrie is vooral gericht op het belang van de referentie klant.

| | |
|---|---|
| 1 Indien u een technologisch product wil aanschaffen voor gebruik in uw bedrijf of uw product, hoe belangrijk zijn de referenties van de leverancier bij de uiteindelijke aankoopbeslissing? Waarom zijn ze wel of niet belangrijk? | |
| 2 Gebruikt u referenties vaak als bron van informatie over het product en/of de leverancier? Zo ja, kunt u beschrijven via welke weg aan deze informatie komt? | |
| 3 Kunt u een voorbeeld geven van een aankoopbeslissing waarbij de informatie van of over een referentie belangrijk is geweest voor uw besluitvorming? | |
| 4 Heeft u nog op- of aanmerkingen over de vragen of het onderzoek? | |

Antwoorden Versturen

Industrial Marketing of Innovations: Information Seeking Experiment
Research Project by Niels Hillebrand (c.hillebrand@student.tue.nl) under supervision of dr. ing. J.P.M. Wouters and prof. dr. E.J. Nijssen.
Innovation, Technology Entrepreneurship & Marketing, Department of Industrial Engineering & Innovation Sciences, Eindhoven University of Technology

Step 10: Final thanks for participation.

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Industriële Marketing van Innovaties: Gebruik van Informatiebronnen

Hartelijk dank voor uw medewerking aan het onderzoek.

Afsluiten

Industrial Marketing of Innovations: Information Seeking Experiment
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## 8.2 Interview results

In addition to the survey, data was collected using semi-structured interview. 12 respondents were asked several general questions with regards to references during the face-to-face meeting upon completion of the survey. Two respondents who completed the survey on the internet also responded by e-mail to some of the open questions, the responses were added to the set of interview data.

### *8.2.1 Importance of references*

The interviewees were asked whether or not the information from a reference customer was important for the buying decision. 12 out of 14 respondents answered that they are important with answers ranging from "Yes, sometimes" to "Yes, of the upmost importance". 2 respondents did not find them important at all. Subsequently, each respondent was asked to explain. The matrix in table 8.1 displays the different topics addressed and their frequency, the topics are explained below.

| | Topics: Importance of reference customer | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | overall importance | Positivity bias | user perspective | Functional | Match | practical info | Supplier experience | Investment | Weight Benefits | Validate sales info | continuity | Organizational support |
| n | 14 | 6 | 6 | 6 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 1 |
| R1 | + | | | | | | | | | yes | | |
| R2 | + | | | | | | yes | | | | | |
| R3 | - | yes | | | yes | | yes | | | | | |
| R4 | + | | yes | yes | | | | | | | | |
| R5 | + | | yes | yes | | | | | | | yes | |
| R6 | -/+ | | | | | | | yes | | | | |
| R7 | + | yes | yes | yes | | yes | | yes | | | | |
| R8 | ++ | yes | yes | yes | yes | yes | | | | yes | | yes |
| R9 | + | | | | | | | yes | | | | |
| R10 | + | yes | yes | yes | yes | | yes | | | | yes | |
| R11 | ++ | | | | | yes | yes | yes | yes | | | |
| R12 | - | yes | | | yes | | | | | | | |
| R13 | + | yes | | yes | | yes | | | | | | |
| R14 | ++ | | yes | | yes | yes | | | yes | | | |

Table 8.1: Matrix of topics regarding the importance of information from reference customers

**Positivity/Bias**

Six respondents mentioned the topic of positivity or bias toward the product or supplier. R3: "The supplier will only provide happy customers as reference, so they will not give you a proper indication of the supplier's support and customer service." Also respondents who did find reference information important recognized this. R8: "Of course the views expressed by the reference customer are likely to be positive, but afterwards you can filter the information. If we think the reference customer was too positive or used to communicate the supplier's sales pitch, then we ask the supplier for another reference.". But they can still be useful as Respondent R11 explained: "Even model customers where there are no problems still provide a nice look of how the product functions, only the value of such references is less." A reference customer who co-developed a product might even be more positive and biased, but as R7 pointed out: "Even if they are biased because they helped developing the product, the reference customer is perhaps even more important because they have good inside knowledge of the product."

**User Perspective**
The reference customer is important as it enables the buyer to also get the opinions of an actual user. Not just management, but also the production workers. However respondent R10 looked at the supplier for this: "It is important that the supplier has people who have worked in a production environment. Then they will know who the users are and will have developed the system and implementation process accordingly."

**Functional**
The reference customer enables you to see how the product works. R7: "Reference customers are important to see how the product functions in a real world setting. Software demos always work, they can keep adjusting it until it functions well and looks nice. In practice it's often a more complex task, especially once you start adapting the product's functionality to suit your situation." Other respondents responded they would much rather use a trial or demo. R12 "I never visit reference customers, the supplier visits me and shows how the product works using a presentation, pictures, simulations, and if it is software a demo. If it concerns capital equipment, I can visit the supplier to see the product, or he can install one at our location and we will trail it first."

**Practical Information**
The reference customer provides information on how the product functions in practice. R13: "The reference customer can provide me the practical perspective on the problem. Using that information, I can easier interpret the more technical story of the supplier into how it would work in our situation."

**Match**
The match or mismatch between companies is mentioned in 5 cases. R11: "Reference customers are important, but often the reference customer provided by the supplier does not match your company. Then the connection between you and the person is not there and the insight into each other's application of the product is missing." Respondent R3 simply put it like "The reference company is never the same as your company." Respondent R8 told the researcher that "Finding a good match between your situation and a reference is already a good test to see if the supplier understands you." but admitted that they are not always available "Then you have to mirror the reference and see how the differences affected the product's use."

**Supplier experiences**
Support, customer service, feeling, response times, communication/organization. R11: "You need a reference customer to hear about his experience with the supplier's support and how he feels about the relationship." R10: "If it concerns a new supplier, whether it is a startup or established company, you still need to familiarize yourself with the organization of the supplier. References are less important if you already know the supplier well and have an existing relationship." R8: "A reference visit is good way to find out whether the supplier has enough qualified people and capacity to deliver the necessary support."

**Level of investment**
R6 responded that the importance of reference information "depends on the acquisition price" and R9 said "references are always considered if it concerns big investments." This can be explained by the higher financial risk, one of the risk factors affecting information seeking behavior, and most likely applied to all respondents as R11 also said: "When the risks are low

and it is a small investment, then you don't need a reference customer. In that case you just rely on your own judgment and the supplier's information."

**Benefits**
The reference customer can tell you the real benefits and enables you to weigh the relative importance of the product's benefits you expect. R11: "The supplier tells you about all the benefits that are possible with the product, the reference customer can tell you which benefits that were really achieved." R14: "Using the practical story from the reference customer, you can adjust the weight you give to the different benefits you envisage to achieve with the product."

**Validate Sales Info**
The information provided by a reference customer can be used to validate the information used for the decision, as R1 explained "References are important with regards to the reliability and accuracy of the product information.". R8 "References are often vital to discover discrepancies between the information provided by sales and what happens in real life, so you can subsequently confront the supplier with them."

**Continuity**
References are important to judge the chance of survival. R10: "In case the supplier is a startup company, references are important because they indicate continuity."

**Organizational Support**
R8 also revealed that reference visits in particular are also a way to create and measure organizational support within the buyer's organization.

### *8.2.2 Frequency of use*

Of the 12 interviewed respondents, 2 respondents replied they always used references and visited one or more reference customer when available, 5 respondents replied they regularly used references to obtain more information but not always through a visit to a reference customer. 4 respondents sometimes used reference customers to obtain information, and 1 respondent indicated he never used reference customers. 9 interviewees indicated or confirmed that a supplier had offered to visit a reference customer in the past, but two respondents turned down such invitations. 6 respondents indicated they used reference companies from their own network, but they were not always existing users of the product.

| | Overall importance | Regular use | via supplier | via network |
|---|---|---|---|---|
| R1 | + | + | yes | |
| R2 | + | | | |
| R3 | - | - | yes | |
| R4 | + | - | | |
| R5 | + | - | | yes |
| R6 | -/+ | | | |
| R7 | + | + | yes | yes |
| R8 | ++ | ++ | yes | |
| R9 | + | + | yes | |
| R10 | + | + | | yes |
| R11 | ++ | + | yes | yes |
| R12 | - | -- | not used | |
| R13 | + | - | not used | yes |
| R14 | ++ | ++ | yes | yes |

Table 8.2: Results matrix of frequency of use

### 8.2.3 Using references for own marketing

Although none of the respondents were (pure) marketing professionals, the 12 interviewed respondents were asked if they used references to convince their own customers. 7 companies used references, 4 did not use references, 1 did not know. None of the companies that were confirmed to use references utilized a reference visit. The reason reported for this was mostly product and/or market related. A reference visit would not be worthwhile or valuable to the prospective because of the type or application of the companies' product. Market related reasons included market-pull (the customer knows exactly what he wants and selects the supplier based on the product's quality, price or an existing relationship) and high competitiveness between customers.

### 8.2.4 Serving as reference

The 12 respondents interviewed face-to-face were asked if they would be willing to serve as reference customer for a supplier. 10 respondents answered yes, 9 of which already were or had served as reference customer, and of the 3 respondents who had not served as reference customer in the past, 2 answered no. All of the 10 respondents who answered yes explained or confirmed that the primary motivation was to reinforce the relationship with the supplier, but in half of these cases a healthy relationship was also a precondition. Depending the product and on the nature of existing relationships with competing companies, 4 respondents would also be willing to welcome competitors, while 4 respondents did not want competitors to visit. One of the two respondents who answered no explained: "If I would be visited it would occupy too much of my time, so there has to be some incentive for me such as a discount or commission." 8 respondents were asked in follow-up question if the supplier needed to offer an incentive and all replied no. R10 even commented "If my supplier would offer me any kind of return, I would start to doubt the supplier as it is bad business ethics". R8 responded that he found such deals unacceptable as it would jeopardize their ability to give their honest, professional opinion.

| | Serving as reference customer | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Experience | Willingness | Supplier relationship | Incentive | Exclude competitor | Costs time | Exchange views | Free Exposure | Ethics | | |
| Case | 12 | 12 | 10 | 9 | 8 | 3 | 3 | 3 | 2 | | |
| 1 | yes | yes | yes | no | no | | | yes | | | |
| 2 | | | | | | | | | | | |
| 3 | no | no | | yes | yes | yes | | | | | |
| 4 | no | yes | yes | no | | | | | | | |
| 5 | yes | yes | yes | no | no | | | yes | | | |
| 6 | | | | | | | | | | | |
| 7 | yes | yes | yes | | | no | yes | yes | | | |
| 8 | yes | yes | yes | no | yes | | yes | | yes | | |
| 9 | yes | yes | yes | no | | no | | | | | |
| 10 | yes | yes | yes | no | yes | | | | yes | | |
| 11 | yes | yes | yes | no | no | | | | | | |
| 12 | no | no | | | no | | no | | | | |
| 13 | yes | yes | yes | | yes | | | | | | |
| 14 | yes | yes | yes | no | | | | | - | | |
| Yes | 9 | 10 | 10 | 1 | 4 | 1 | 2 | 3 | 2 | | |
| No | 3 | 2 | 0 | 8 | 4 | 2 | 1 | 0 | 0 | | |

Table 8.3: Results matrix regarding serving as reference customer.