Department of Industrial Engineering and Management

Management of Commercialization

Case Studies of Industrial, Business-to-Business Product Innovations

Henri Simula

Aalto University

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Management of Commercialization

Case Studies of Industrial, Business-to-Business Product Innovations

Henri Simula

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Abstract

Product innovations are the cornerstones of growth and profit in business. One of the main arguments put forward in this dissertation postulates that commercial success is required for a new product to become a product innovation. Commercial success does not happen automatically; it requires the proper management of commercialization. Commercialization within the context of new products is defined as a set of business activities, tasks, and actions that run in parallel with ideation and product development processes and complete them so that a new product can become commercially viable, tradable, and eventually successful on the market.

The purpose of this dissertation is to study and understand commercialization within the context of industrial, business-to-business (B2B) product innovations and to develop a new theory for it. A conceptual framework for product innovation is developed and used to support the operationalization of commercialization construct. The empirical part of the dissertation provides practical value derived from empirical case data, which practitioners may use to improve the management of commercialization among industrial B2B firms.

The body of knowledge for this study consists of literature on innovation management, product innovation, marketing, R&D management, organizational theory, and business strategy. The literature review revealed that the concepts of innovation, product innovation, and commercialization are all ambiguous and that there are no commonly accepted definitions for them. The concept of commercialization in particular is an undeveloped construct within the context of new products.

As a research method, the study makes use of case-study research. The empirical material consists of six within-case studies and a cross-case analysis of them. The B2B case firms under study included Beneq, Exact Tools, KONE, Marioff, Martela, and Vaisala. New theoretical constructs and propositions for the successful management of commercialization are presented based on combining the case studies and the literature.

The research revealed that the commercialization of new, industrial B2B products was an unexplored research area. This dissertation aims to fill this research gap. The main findings are presented in nine propositions. In addition, linear thinking during the innovation process should be abandoned and replaced with a new concurrent commercialization framework, which is presented as the concluding result of this dissertation.

Keywords Commercialization; Innovation Management; Product Innovation; Management of New Products; Industrial Business-to-Business Products; Product Launch; Concurrent Commercialization; Case Studies

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Tekijä
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Väitöskirjan nimi
Kaupallistamisen hallinta – tapaustutkimuksia tuoteinnovaatioista teollisten yritysten välisessä liiketoiminnassa

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Tiivistelmä

Tuoteinnovaatioilla on merkittävä vaikutus yritysten liiketoiminnan kasvuun ja kannattavuuteen. Väitöskirjan yksi keskeinen argumentti on se, että tuoteinnovaatio edellyttää kaupallista menestystä. Kaupallinen menestys ei tapahdu automaattisesti, vaan edellyttää kaupallistamisen hallintaa. Kaupallistaminen uusien tuotteiden yhteydessä on määritelty seuraavasti: Kaupallistaminen käsittää ideoinnin ja tuotekehityksen rinnalla kulkevat aktiviteetit, tehtävät ja toimenpiteet, jotka täydentävät toisiaan, jotta uusi tuote tulee toteuttamiskelpoiseksi, mahdolliseksi kaupallisen vaihdannan kohteena olemiselle sekä lopulta menestykseksi markkinoilla.

Väitöskirjan tavoitteena on tutkia ja ymmärtää kaupallistamista yritysten välistä liiketoimintaa harjoittavien teollisten yritysten osalta. Työssä luodaan konseptuaalinen viitekehys tuoteinnovaation osalta. Tämä viitekehys myös tukee kaupallistamiskäsitteen operationalisointia. Työn käytännön tavoitteena on tuottaa uutta liikkeenjohdollista tietoa tapaustutkimusten pohjalta. Tätä uutta tietämystä voidaan soveltaa kaupallistamisen kehittämisessä teollisissa yrityksissä.

Väitöskirjan kirjallisuuskatsaus perustuu innovaatiojohtamisen, tuoteinnovaatiotutkimuksen, markkinoinnin, tuotekehityksen, organisaatioteorioiden sekä yritysstrategian keskeiseen kirjallisuuteen. Katsauksen perusteella voidaan todeta, että käsitteet innovaatio, tuoteinnovaatio ja kaupallistaminen eivät ole yksiselitteisiä, eikä niille ole olemassa yleisesti hyväksyttyä määritelmää. Erityisesti voidaan todeta, että kaupallistaminen käsitteenä ei ole muotoutunut vakiintuneeksi käytänteeksi uusien tuotteiden yhteydessä.

Työn empiirisessä osassa käytetään tapaustutkimusmetodia. Empiirinen materiaali käsittää kuusi erillistä tapaustutkimuskohdetta, sekä niiden välisen ristiinanalysoinnin. Tutkitut teolliset yritykset ovat Beneq, Exact Tools, KONE, Marioff, Martela ja Vaisala. Yhdistämällä tapauksien löydöksiä aiempaan teoriaan esitetään väittämiä siitä, miten menestyksekästä kaupallistamista tulisi toteuttaa.

Erityisenä havaintona voidaan todeta, että aiempaa tutkimusta ja teoriaa uuden teollisen tuotteen kaupallistamisen osalta on erittäin vähän. Tämä työ pyrkiikin osaltaan täydentämään tätä tutkimusvajetta. Löydöksinä esitetään yhdeksän propositiota. Lisäksi todetaan, että lineaarinen ajattelu innovaatioprosessissa tulisi hylätä ja korvata rinnakkaiskaupallistamisen käsitteellä, jonka osalta esitetään työn yhtenä lopputulemana uusi konseptuaalinen viitekehys.

Avainsanat Kaupallistaminen; innovaatiojohtaminen; tuoteinnovaatio; uusien tuotteiden hallinta; teollinen tuote yritysten välisessä kaupankäynnissä; tuotelanseeraus; rinnakkaiskaupallistaminen; tapaustutkimuksia

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Acknowledgement

Education is the best provision for the journey to old age. – Aristotle

The process of completing this dissertation took a surprisingly long time and there were also several smaller and longer breaks when the work was put on hold. I must say that many times I was pretty much ready to give up with the whole thing. The main reason that I accomplished this project probably had to do with the rationale that it would be stupid not to finalize it. So here we are, finally.

Professor Paul Lillrank, who acted as my supervisor, provided excellent sparring discussions and valuable comments. I want to express my deepest gratitude to Paul for this. The distinguished reviewers of the dissertation, Professor Mats Magnusson and Professor Marko Torkkeli, provided insightful remarks and suggestions for improving the dissertation and I have tried my best to take these comments into account during the final stages of the process.

The interviewees at the case firms also deserve special thanks, because they took the time to complete the interviews and were willing to share their insights during and after the interviews.

I also want to thank the whole Value Networks research group where I have worked as a project manager in various research projects. There have been several people working for that group during the past years and they all deserve thanks for their help and advice or for otherwise just having been good friends and colleagues. (I would rather not try to come up with a list of names, because this dissertation project took so long time and I might just forget someone.) In addition, I also want to thank all of the personnel and the colleagues at the BIT Research Center and in the Department of Industrial Engineering and Management in general. I have had many wonderful research and non-research-related discussions with them during the last years. I would also like to thank Erik Hieta for his excellent editorial assistance and for checking the document's grammar, punctuation, and spelling.

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Finally, I want to express my deepest gratitude to all my family members. My parents, Helena and Pekka, my brothers, Tapio and Jouko, and also my mother-in-law, Raija, and father-in-law, Reino, have provided generous support and encouragement in many different ways. My beloved wife Irina has supported me during this long process and she deserves all the gratitude one can imagine. My children, Anton and Melissa, have kept their dad busy (and sometimes awake at nights), but they are the most adorable kids in the world and deserve hugs and kisses. Thank you for being there for me!

Vantaa, September 2012

Henri Simula

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1 Introduction

This chapter provides background to the dissertation. The objectives, scope, and limitations are introduced together with the research questions. There is also a brief discussion of the overall structure of the dissertation.

1.1 Setting the scene

Not all invention progress into innovation. – Grant, 2002

The purpose of this dissertation is to study commercialization and the management of commercialization within the context of industrial, business-to-business (B2B) product innovation. The central concepts of this dissertation are innovation, product innovation, and commercialization. Commercialization is said to be the least developed area of innovation management and that without commercialization the innovation cycle is not complete (Adams, Bessant & Phelps, 2006; Crossan and Apaydin, 2010). Adams et al (2006) actually states that this area of innovation is an urgent need of further development.

According to a recent report by the Finnish Funding Agency for Technology and Innovation, "the interest in assessing the impact of research and innovation has been continuously increasing due to the need to understand the role of innovation in the competitiveness and renewal of economies" (Luoma et al., 2011, p. 6).

While there is a consensus about the importance of innovation among scholars (cf. Twiss, 1986; Souder, 1987; Chaney, Devinney & Winer Russell, 1991; Cooper, 1993; Patterson, 1998; Dodgson, 2000; Narayanan, 2001; Miller, 2001; Debruyne et al., 2002; Pauwels, Silva-Risso, Srinivasan & Hanssens, 2004; Hsu, 2009), there does not seem to exist any commonly accepted way of defining innovation.

The main research subject of this work is product innovation. Product innovation as such can be seen as part of a broader, general innovation discourse. While it is not feasible to present a general definition of innovation within the scope of the dissertation, I do offer a definition for product innovation. I also develop a new conceptual framework for product innovation. This framework is then used to support the concept of commercialization in the context of new products.

According to Holt (1983), firms fase two simple but fundamental questions related to new products – i.e. can we make it and is there a need for it? However, I feel that there is a need to extend this set-up and, thus, I want to add a third question: *Can we commercialize it*? This question is very much related to Grant's (2002) above-mentioned argument that inventions and innovation are not one and the same. The reason is simple: many new products never progress to the point of becoming innovations. There are numerous *product innovation attempts,*[1] but, despite their novelty, only few of these will eventually become successful products. Successful products are those that add value or benefit to a customer so that a customer will purchase that particular product.[2] The "quest" towards innovation is nothing but easy as firms have to be able to balance long-term goals of renewal, change, and flexibility with short-term objectives for efficiency and profitability (Magnusson, Boccardelli, & Börjesson, 2009).

While it has been stated that an organization's proficiency in up-front activities such as initial screening, preliminary market assessment, and business and financial analysis have an impact on the success of a product (Dwyer & Mellor, 1991), commercialization actually determines the destiny of a product (Beard & Easingwood, 1996; Guiltinan, 1999).[3] In addition, the commercialization phase is especially important due to financial commitments, which are often the most costly part of the new product program (Di Benedetto, 1999; Kotler & Keller, 2009). According to Crossan and Apaydin (2000, p. 1165) "commercialization is an inherent part of innovation".

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[1] An excellent case study example is provided by Rehn & Lindahl, (2011), from whom this term is borrowed.
[2] The theoretical framework for B2B product innovation is presented in section 4.3.1.
[3] It is worth mentioning that the term *launch* is often used synonymously with commercialization. This dissertation understands launch differently and treats it as part of commercialization. Please see section 4.2.

Kotler and Keller (2009) provide simple calculation that illustrates the cost of introducing new and successful products onto the market. In their rough analysis, a hypothetical firm with 64 new ideas spends almost 14,000,000 EUR in total to create one commercially successful new product. In other words, monetary investments for bringing new products to the market are often significant. Thus, the importance of firm's having a better understanding of and, especially, a better management of commercialization is a relevant topic for practitioners and academics alike. Considering its importance, it is surprising to find that commercialization is often the most poorly managed phase of product innovation (Montoya-Weiss & Calantone, 1994).

Rogers (2003) states that, "commercialization is the conversion of an idea from research into a product or service for sale in the marketplace" (p. 152). In this dissertation I study empirically how this *conversion* is actually performed and managed in industrial B2B firms.

One fundamental question is, "how is commercialization related to other, more established topics such as marketing and new product development (NPD)?"

Marketing has been defined as

> *The activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large.* (AMA, 2012)

NPD, on the other hand, is defined as

> *The overall process of strategy, organization, concept generation, product and marketing plan creation and evaluation, and commercialization of a new product. Also frequently referred to just as 'product development'.* (PDMA, 2012)

Thus, according to the latter definition, commercialization belongs under the category of NPD. On the other hand, many of the activities that are performed during commercialization are typically those that many marketing scholars would argue represent the core of marketing. [4]

I personally believe that commercialization actually is something that belongs in between these two larger and more established managerial

[4] According to PDMA, the development of marketing material is a part of commercialization, and, thus, the development of marketing material is a part of NPD as well.

concepts. In other words, the unit of analysis in this dissertation is the interlinked area connecting NPD with marketing, as illustrated in Figure 1.

It also worth noting that, typically, many firms have both NPD and marketing departments. But, at least to my knowledge, there are no commercialization departments. This is actually an important point because, in my opinion, *both* NPD and marketing departments are then put in charge of commercialization! According to Chaston (2000) entrepreneurial marketing differs from traditional marketing by challeging the existing conventions. Similarly commercialization 'thinking' recuires a new mind set toward this traditional convention of marketing vs. product development. This topic is discussed further in the chapter 5.2.1.

Commercialization as a term is bound up with the word "commerce." This simply means that commercialization activities and the products resulting from them are part of the objectives of commerce. Commercialization requires the basic assumption that an entity (i.e. a product) exists and that it is possible to design and manufacture that particular entity. This entity then needs to be made tradable, i.e. subject to buying and selling. The activities that make it happen are called commercialization.[5] In other words, as illustrated in the Figure 1, commercialization can be seen as a separate managerial topic that overlaps with NPD and marketing.

In any event, based on the extensive literature review, I feel that there is still a limited amount of research on and academic understanding of how companies actually commercialize their new products. In particular, how products are commercialized within an industrial B2B context and what kinds of attributes contribute to the successful commercialization of particular products is a topic that warrants additional research.

[5] The exact definion is available in section 4.1

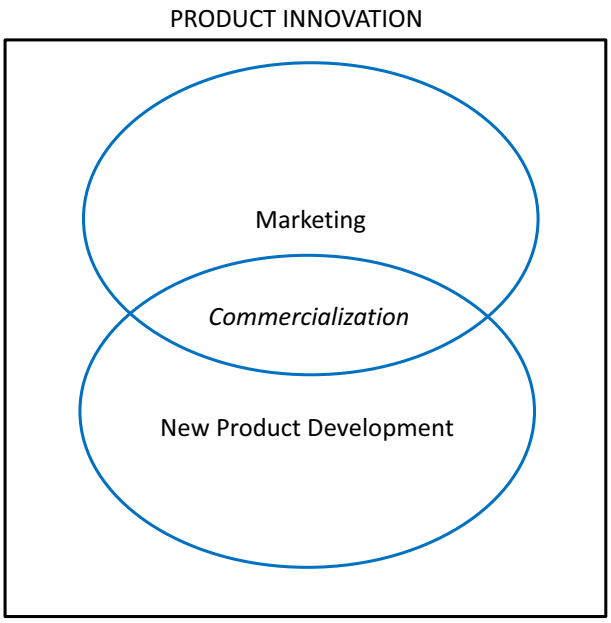

Figure 1. Commercialization within the context of product innovation

1.2 Objectives, scope, and limitations

> *Ideas are like rabbits. You get a couple and learn how to handle them, and pretty soon you have a dozen.* - John Steinbeck

The dissertation focuses on those activities that management is required to perform for a new B2B product to become successful in the market place. The main objective of this dissertation is to gain insight on how new B2B products are commercialized. Naturally, there are certain scope-related limitations to the study. The basic scope of the study is illustrated in Figure 2.

It is quite evident that almost all of the firms selling products on B2B markets have some kind of service elements included in their offerings. However, service businesses and the role of services in innovation are not within the scope of this study.

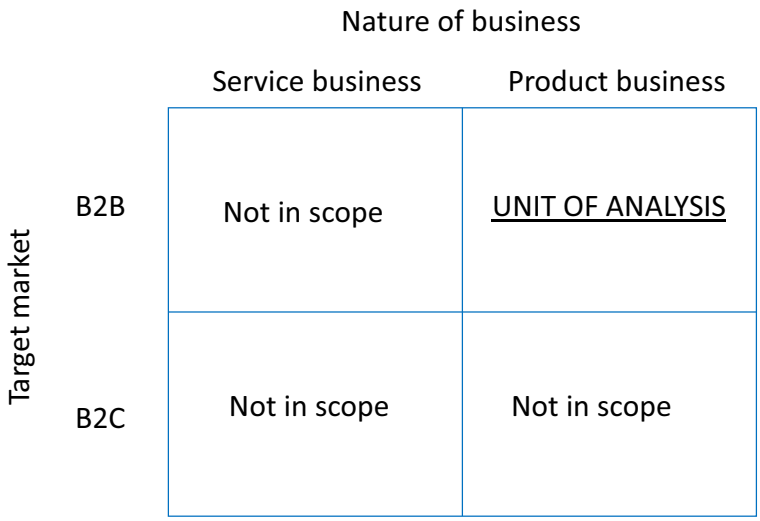

Figure 2. Scope of the dissertation

Some studies have found that there are certain similarities between consumer and industrial products, for instance in launch-related topics (e.g. Hultink, Hart, Robben, and Griffin, 2000), and, thus, some of the articles referred to in the literature review are taken from the business-to-consumer (B2C) domain. In any event, the main scope of the dissertation concentrates on industrial B2B product innovations.

In general, B2C products differ from B2B products in many ways. B2B products are often capital-intensive investments, whereas consumer goods are often commodities with no payback requirements (Kotler & Keller, 2009). The purchase process is also different. Consumer buying is often more intuitive and variety seeking. As Schneider (2004) points out, "according to IRI's[6] estimates, in general, two-thirds of people who try a new product typically won't repurchase it" (p. 17). In B2B trading, firms are mainly seeking longer relationships. Even though there are various short term- and long-term issues involved (see Ahola, Laitinen, Kujala, & Wikström, 2008), business partners do not typically switch products just for the sake of changing their mind. Decisions about changing suppliers typically boil down to such issues as quality, terms of delivery, service, and cost (Christopher, 1998). There are two reasons for this: First, the member

[6] Information Resources, Inc. (IRI) is one of the largest marketing research firms in the U.S.

of the integrated partnership between the suppliers and customers will enjoy a greater profit and, second, it is more likely that innovative products meeting the needs of customers will be developed in collaboration (Bowersox & Closs, 1996; Christopher, 1998).

According to Boer and During (2001), there are three categories of innovation: namely, product, process, and organizational innovation. Each of these categories shares certain similarities and differences. As mentioned above, the dissertation focuses on product innovation, whereas process and organizational innovation topics are beyond the scope of this study.

There are actually several other types of innovation and the literature review reveals that the basic concept of innovation as such is quite ambiguous, as illustrated in section 3.1. It also seems that the more "prefixes" we add to innovation, the more conceptually disordered it becomes. In any event, I feel that it is essential to unambiguously clarify the concept of product innovation before we can discuss its antecedents and the commercialization of it.

The product-centric view of this dissertation was chosen for a reason. According to Cooper (1979a), "the product is the core or central strategy in most industrial new product ventures; and it is through the product that the firm must seek its differential advantage"[7] (p. 100). It has been stated that if companies want to stay competitive and be able to grow their business, they are required to produce more innovative products (Cooper, 1993; Patterson, 1998; Miller, 2000). Despite the importance of a product's superiority (Cooper, 1990), a successful business requires that products are converted from the idea stage into products for sale in the market place (Rogers, 2003), i.e. commercialized.

Garcia and Calantone (2001) cite various scholars and state that an invention becomes an innovation only after successful commercial exploitation.[8] I want to follow that logic and stress that commercial success is required for something to be called a product innovation. To legitimize

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[7] Of course, one can challenge this statement and come up with several other ways to differentiate a firm, for instance through innovative business models, value added services, novel marketing ideas, etc. However, the point is to emphasize the value of *a new product* as a central element in the overall business constellation.
[8] This is one of the guiding principles in this disseration, too. However, instead of commercial explotation, I decided to use a shorter term, e.g. commercialization, which in my opinion also covers *exploitation*.

this claim, I also analyze the success versus failure literature in detail as a part of the general literature review.

A product should be manufactured according to certain quality criteria and a product typically needs to pass type approvals and quality controls (Lillrank & Kano, 1989; Juran & De Feo, 2010). The topics of quality and manufacturability play key roles in the development of new products and one could even claim that these topics should be included in any investigation of commercialization, but they are not analyzed here to keep the work to a manageable length.

It is also quite evident that the commercial success of new products does not happen without sales activities. Management of sales is a separate and broad topic and, thus, beyond the scope of this study. Similarly, for reasons of space, the ideation/front-end phase and the actual product development phase are only touched on briefly.

One of the objectives of the theory part of the study is to provide a novel, firm-centric view of the product-innovation discourse as well as present a more comprehensive outlook for describing how success and failure are related to the concept of innovation. The extant literature is applied to create a new conceptual framework for product innovation.

The purpose of empirical part of the study is to provide a new theory by combining empirical findings with the existing literature. This is done via analyzing a number of case studies and developing a series of propositions. If the propositions hold true after further investigation, they should eventually help practitioners to better manage commercialization activities in B2B firms and improve the success rate of new products.

In summary, there seems to be a lack of commercialization-related studies within the context of new, industrial B2B products and this dissertation aims to fill this gap. The research objective of the dissertation can be summarized in the following sentence: **The purpose of this dissertation is to increase new knowledge concerning the successful management of commercialization within the context of industrial B2B product innovations.**

1.3 Research questions

If you can dream it, you can do it. - Walt Disney

What kinds of activities and tasks do industrial B2B firms perform during commercialization? How is commercialization related to product development? How should commercialization be organized and managed? These were the initial questions at the start of this study. Several other questions came to mind as well: What are the key activities that characterize a successful commercialization? And, what topics should management concentrate on when they are about to commercialize new products? Accordingly, the main research question of this dissertation emerged from these initial questions:

How do industrial, B2B firms manage the successful commercialization of new products?

The additional supportive research questions are as follows:

- How are commercialization and innovation treated in the existing academic management literature?
- What is product innovation?
- What is the role of success and failure in innovation and how are they measured?
- What is commercialization and how can it be operationalized?
- How did the case study firms commercialize their products and what kinds of activities did they perform during the commercialization process?

1.4 Structure of the dissertation

No pressure, no diamonds. - Thomas Carlyle

Chapter one provides the background and motivation, objective scope, research questions, and structure of the dissertation.

Chapter two illustrates the research methodology and the essence of the case studies, with descriptions of the data collection and how it was analyzed.

Chapter three is divided into three main sections. Section 3.1 concentrates on particular themes, such as the definitions of and terminology used for an innovation, the concept of newness, innovation process modes, and different types of innovation. Diffusion and the adoption of innovation are also studied briefly. Section 3.2 studies the role of products and the management of new products, as well as product strategy. The market versus technology orientation is also illustrated here. Section 3.3 focused on commercialization. It begins with a discussion of the distinction between

the commercialization of products and technology. Product launch and the topics of success and failure are discussed in detail.

Chapter four clarifies the distinction between commercialization and launch for the purposes of this dissertation and also further elaborates the success-failure dilemma. The chapter also takes a critical look at innovation terminology . By doing this, the dissertation attempts to provide coherence in the face of the confusion of concepts and to position the concept of product innovation within a meaningful framework. It also offers a new framework for defining product innovation from a single firm's point of view.

Chapter five focuses on the operationalization of commercialization. The subchapters provide insight into how commercialization is organized, product strategy and market entry strategy, timing, naming, and advertising-related topics, as well as cannibalization and the use of customer references.

Chapter six describes six industrial case studies. The case studies focus on the following firms: Kone, Vaisala, Marioff, Beneq, Exact Tools, and Martela. Each of the case studies includes a case description and within-case analysis.

Chapter seven provides the cross-case data and illustrates the differences and similarities between the firms and the products being developed.

Chapter eight develops a theory for commercialization more fully, continues with the cross-case analysis, and uses it to further investigate the commercialization concept. This chapter includes propositions that aim to answer the research questions. The propositions are derived from the analysis of the case studies, but they are also combined with insights derived from the literature.

Chapter nine is the overall conclusion to this study. It describes how the dissertation contributes to commercialization theory and also outlines the managerial implications for practitioners. The validity, reliability, and limitations of the study are also discussed here. Finally, suggestions for future research are made.

2 Research Method

This chapter introduces the research approach and applied philosophy of science. It describes the case research method and data collection, and discusses the way in which the data is analyzed in the dissertation.

2.1 Theoretical perspectives of the research

The beginning is the most important part of the work. - Plato

According to Peter and Olson (1983), there is semantic confusion[9] regarding the variety of philosophical perspectives in science. In order to overcome this issue, they divided science into a positivistic/empiricist approach and a relativistic/constructionist approach (ibid). Guba and Lincoln (1994) provide additional *paradigms* (i.e. a set of basic beliefs), such as postpositivism, critical theory, and constructivism.

The positivist approach can be called *nomothetical*; the idea behind it is that research procedures are formal, structured, and standardized to create empirically observable and experimentally verifiable proofs (Pihlajisto, 1994). On the other hand, the relativistic, or "*idiographic,*" approach, which is the one applied in this dissertation, seeks to understand the particular phenomenon rather than generate law-like explanations for it (Welch, Piekkari, Piakoyiannaki, & Paavilainen-Mantymäki, 2011).

Figure 3 illustrates the framework of the research. The philosophical background is explained below. The body of knowledge is derived from marketing, innovation management, new product management, and strategy-related literature.

[9] They provide examples such as logical positivism, logical empiricism, instrumentalism, realism, falsificationism, relativism, etc.

The prevailing understanding is that commercialization is the last phase of a linear innovation process (e.g., Booz, Allen, & Hamilton, 1982; Crawford, 1987; Koen et al., 2001). This dissertation, however, takes a much broader view point and aims to create a more holistic picture for defining commercialization within the context of industrial B2B product innovation.

In the other words, the main entities forming the system boundaries of the research are product innovations and industrial B2B firms. Naturally, there are different types of B2B products on the market, each with its own special characteristics. In any event, the general product category forming the *playing field* of this dissertation is capital items.[10]

The empirical data has been collected from six different case firms and their new products. The perceived problems and applied managerial practices are analyzed as a means of answering the underlying research questions. This research aims to analyze the relations and interactions between a body of knowledge and empirical data and to build a new theory by providing a multi-dimensional picture of the situation (Remenyi, Williams, Money, & Swarts, 1998). Thus, the outcome is an empirically grounded conceptual framework, which is presented in the form of several propositions.

[10] Different B2B product categories are presented in Figure 7 later on.

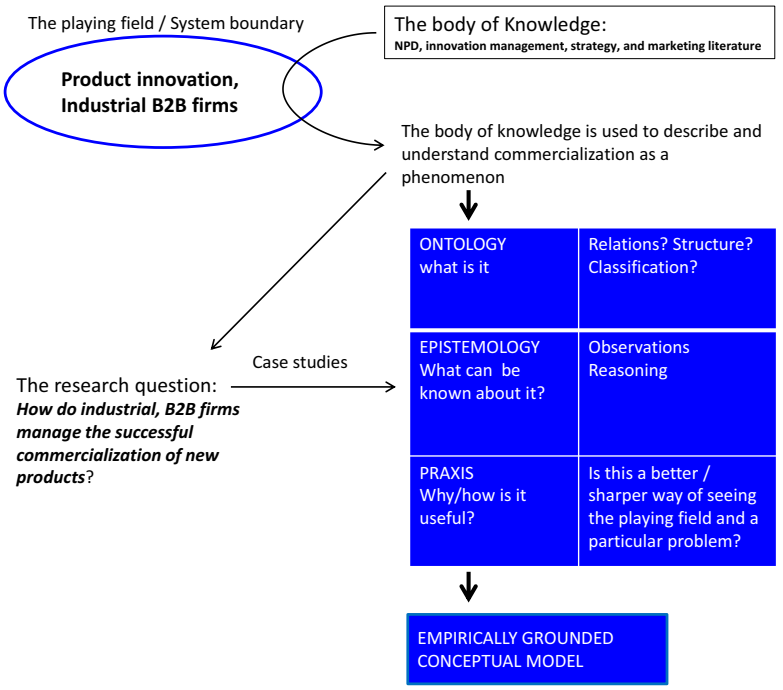

Figure 3. Framework of the Research (Applied from the framework by Professor Paul Lillrank / Research methods course, 2009)

The ontological, epistemological, and practical issues listed in Figure 3 can be illustrated by hierarchical layers, as shown in Figure 4. The idea here is to provide structured answers to the basic assumptions concerning the nature of social science. The explanation for the relationship between the entities in Figure 4 is provided by Pihlanto (1994):

> *The autonomous human actors create their world (ontology) and possess information about this world relevant to the researcher (epistemology); the researcher's role, then, is to choose an appropriate actor-centred method (methodology) for acquiring this information. (p.381)*

The following subchapters further discuss how the concepts of ontology, epistemology, and praxis are applied in this dissertation, explain the methodology in more detail, and provide supporting details.

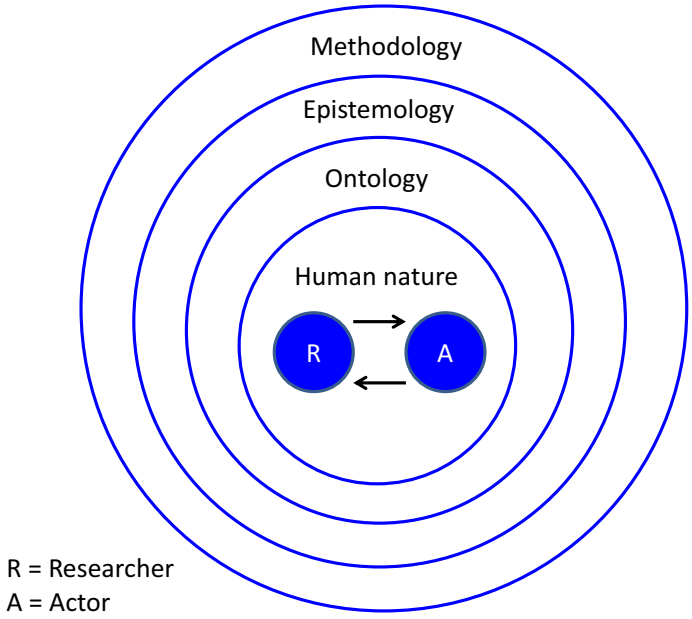

Figure 4. The hierarchy of philosophical assumptions (Pihlanto, 1994)

2.1.1 Ontology

According to Guba and Lincoln (1994, p 108), the central ontological question is, "what is the form and nature of reality and, therefore, what is there that can be known about it?" While the dissertation focuses on the underlying phenomenon of commercialization, it also briefly discusses its ontological elements. In doing this, it borrows from Rehn and Vachhani (2006), who have postulated:

> *Although many researchers in innovation management have shown that there are epistemological problems with essentializing innovation, thus on the surface arguing for a critique of novelty in innovation management, the ontological element of innovation has received almost no consideration. (p. 310)*

I believe that it is feasible to say that commercialization has received little attention as well. In addition, the available literature does not provide an ontological analysis of commercialization. However, before continuing with the discussion of commercialization and its ontology, we need to address an ontological question pertaining to a product and product innovation.

A product is an artifact, i.e. something that can be produced within a production system. A product also has an independent existence. A product can be delivered from one person to another person. A product has an

existence that can be objectified in a concrete format. In this sense, products and services are different.[11] For instance, a service is typically seen as an interaction or as a process, and, thus, a service per se is different from *preproduced bundles of physical resources and features that are provided by manufacturing companies* (Gröönroos, 1998). On the other hand, the physical equipment that is used to accomplish or support the creation of a particular service can be objectified, i.e. such equipment can be viewed as products.

A product is also an artifact that is purposefully created, i.e. it does not come into being as a result of random chance, evolution, or other means; rather, it is clearly the result of human action. Within an industrial B2B context, products are typically duplicated and manufactured in scale.[12] Also, from an ontological perspective, one important pre-condition for the successful commercialization of a product is that the product is tradable and sellable.

Product innovations are accomplished through a process of development, formation, and commercialization combined with a process of diffusion. It is only at this point that users see the benefits of the products, which is what ultimately determines whether or not a product becomes successful. Typical attributes associated with product innovation are discussed in section 3.1.4.

In any event, product innovations are not defined through their attributes, but they can be described and classified according to their attributes. In addition, the associated attributes are (in principle) measurable variables. Such variables can include the degree of newness, the level of disruptiveness, its magnitude/size, etc. The gestation process can be relatively fast or slow and the process can include various numbers of individuals, groups, and networks. Also, the diffusion process can vary in terms of speed and broadness.

This leads to the following question: What can we know about commercialization within the context of new products. First of all, commercialization refers[13] to those activities that management needs to perform to make an idea or prototype into a tradable and commercially

[11] For example, a personal favor is not a product.
[12] There can be unique on-off products, but their commecailization path is different. (Quite often, these kinds of tailor-made products are commisioned works.)
[13] The exact definition is available in section 4.1.3.

viable product. But how can we say that such activities exist, after all? One way to address the issue is by observing the "reality" of the commerce. In addition, based on observations, it can be argued that a tradable product has to have some features not included in a nascent / initial product prototype. The underlying logic here is that commercialization does not happen automatically, but via concrete actions taken by the underlying firm and its management. It is also worth mentioning that practitioners and policy makers have been arguing that commercialization know-how is missing in Finland; thus, is seems feasible to suggest that commercialization can also be managed better. All in all, is seems plausible to argue that the prevailing reasoning tells us that the phenomenon exists and that it is *true*.

There are, however, several other philosophical questions that can be raised around commercialization: For example, is commercialization the type of phenomenon that can be identified, described, and measured? This dissertation aims to provide answer to that question within the above-mentioned boundaries by combining the existing literature with the empirical data and by creating variables that characterize the phenomenon. It focuses on the notion of operationalization of commercialization, including all relevant variables, in chapter 5.

It is difficult to achieve an exact measurement of commercialization using any meaningful scale. For that reason, the analysis of commercialization is only performed using a high-level taxonomy. For instance, while *success* and *failure* are basic attributes that can be integrated with commercialization as a phenomenon, they are not without their issues. [14]

Due to scope of this dissertation and the researcher's access to data, the analysis only consists of successful product cases. However, it is worth mentioning that commercialization can also happen when the outcome is unsuccessful.

One could also legitimately ask if there exist a situation "where there is no commercialization?" For example, a government can launch various initiatives and seek acceptance for them. Technically, such activities would look like commercialization (there can be target groups, the creation of

[14] Success and failure will be discussed in detail in section 3.3.4. It is worth mentioning that I personally feel that this kind of *binary* categorization is a bit problematic. I will discuss this topic more in section 4.2.

marketing material, setting up a launch date, etc.). However they would lack the essential element of product commercialization, i.e. turning a prototype into a tradable and sellable product. Similarly, a “not-for-profit” organization can introduce new products, but that does not exactly fit the idea of commercialization as it is discussed here. (The reason is that this study considers the phenomenon of commercialization from the perspective of a profit-seeking firm.)

While it seems obvious that commercialization as a phenomenon is multi-dimensional and very much context and case specific, the objective of this dissertation is to understand the phenomenon, provide observations about how it works in practice, and create a new theory on how new products are commercialized.

2.1.2 Epistemology

According to Guba and Lincoln (1994, p.108), the main epistemological question is, "what is the nature of the relationship between the knower or would-be knower and what can be known?" The epistemological assumption concerning the nature of knowledge and truth in this dissertation follows the subjectivist approach, i.e. the social world of the actors is not separated from their subjective experience, which means that the world can be understood from the perspective of the actors involved in the events studied (Pihlajisto, 1994). As Warren (2002) points out, the epistemology of qualitative and interview-based studies is often constructionist. This is also the case in this dissertation, though it also includes elements of interpretive sense-making (Welch et al., 2011).

Based on the above ontological discussion, it seems justified to argue that commercialization exists in the real world. However, based on a review of the extant literature, it seems that there is a lack of a common understanding in the general body of knowledge about commercialization within the context of product innovation. Therefore, it is quite difficult to explicitly address the “what can be known about it” question, too.

In any event, one way to approach the phenomenon is to ask if it achieves singularity in form. (In other words, is there only one type of commercialization and are all possible commercialization “cases” similar?) The cross-case analysis of this dissertation reveals that commercialization can hardly be seen as a singular event. However, various different commercialization cases seemingly share certain related characteristics that can be meaningfully analyzed. In that sense, we can also assume that commercialization has particular attributes.

Even if it is not possible to adequately quantify how commercialization is managed, it is possible to assign certain attributes to it. For example, one attribute could be the amount of employees harnessed for commercialization activities. A certain value can be assigned to this attribute, such as whether an activity involved a few, several, or many employees. This could lead to the next step of forming several types of commercialization activities and trying to create a classification / typology for them. One additional solution would be to create classes such as *fat* or *narrow* to describe the magnitude of commercialization.[15]

The objective of this dissertation is to create an overall understanding of the commercialization, and, therefore, a detailed level classification is beyond the scope of the study.

An additional epistemological question involves whether or not the attached attributes can be defined as categories or variables. Basic categories in terms of the "outputs" of commercialization could be, for instance, successful, mediocre, and failure.[16] These categories could be used to distinguish between different commercialization efforts. It is, however, practically impossible to give them a continuous, quantifiable measure. If, for instance, we assume there would be quantifiable variables, then their relations could be examined as well and some type of causality could be drawn. (As an example, we could create the following rule: if a company invests X amount of euros in commercialization, then it will always result in Y amount of euros in profit.) In any event, the problem with such a nomothetical approach in social sciences is that it is impossible to make these types of general laws. The reason derives from the obvious fact that, in reality, it is not possible to know all the variables that affect the outcome, nor can a researcher be aware of all the possible hypotheses that could be used to explain a phenomenon (e.g. Peter and Olson, 1983).

One of the epistemological assumptions behind this dissertation is that we can gather data concerning the phenomenon and, by abductive reasoning, make sense of it. With this increased amount of information, we can create a better understanding of how the variables are related and further analyze how the phenomenon could logically be improved. The idea is to find *a posteriori* knowledge that can be used as *a priori* knowledge in the future.

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[15] For instance, Cui et al. (2011) used these terms when they categorised different launch strategies.
[16] See figure 18.

Analytically developed propositions will then be presented at the conclusion of the dissertation.

2.1.3 Praxis

Praxis, shown in Figure 3, is also a key element in the conceptual framework of the study. As mentioned earlier, this dissertation compares different industrial B2B cases. The qualitative descriptions of cases and within-case analysis are used to develop a theory and provide answers to the research questions. From a conceptual point of view, the work combines the existing literature and empirical data with the aim of creating a new theory for commercialization. Increased understanding and reasoning about the phenomena could then be used as a basis for further studies. In addition, the research provides a novel way to approach commercialization in a product innovation process.

As mentioned above, commercialization does not happen on its own; rather, it requires certain managerial actions. Thus, there is also a question pertaining to how the topic is or should be managed. The dissertation also presents a conceptual framework for product innovation that shows the relations between the market acceptance, novelty, value, and success or failure of new products. This product innovation framework is then used as a basis for developing a new theory for commercialization and the operationalization of commercialization. The presented framework /construct can be considered to act as "a set of lenses" through which we can investigate the "reality" objectively. These "lenses," however, only focus on commercialization, leaving the other parts fuzzy. In other words, a sharper view for seeing the underlying playing field is now available. Naturally, other "lenses" are still needed to investigate the other fields. The lenses were created through an action-oriented approach. According to Pihlajisto (1994),

> *It is therefore probable that an action-oriented researcher will understand the managers and their actions much better than a nomothetical researcher, and will be able to produce research results that are both more comprehensible and relevant to practitioners. Thus, it is suggested here that there is a strong case for using the action-oriented approach in management studies of a practical orientation.* (p. 374)

The research provides ideas on how the actions taken by management and decisions related to commercialization affect the commercial success of a product. The presented conceptual framework for product innovation suggests a new taxonomy for assigning products to meaningful categories. If applied within an organization, it could help that organization to measure

and to divide products into meaningful categories. While the research does not provide normative guidelines, the findings and propositions could help practitioners better understand the phenomenon and, thus, make the right decisions regarding priorities and the magnitude of commercialization-related managerial decisions. In other words, if the presented propositions hold true, then they could help practitioners better understand and eventually manage the new product business.

It is worth mentioning that while commercialization as a phenomenon has been around as long as firms have introduced new products to the market, an academic understanding of the phenomenon, within the context of industrial B2B products, still seems inadequate. I therefore suggest that a new perspective is worth identifying. A case-study approach was selected to provide an in-depth understanding of and insight into the management of commercialization. The next chapter will discuss the topic in more detail.

2.2 Research approach and reasoning for the case study as a research method

> *Qualitative methods are resources that researchers use in observing and making sense of aspects of social life*. - Miller, G. (1997, p.3)

According to Guba and Lincoln (1994), the answer to the methodological question, "how can the inquirer (would-be knower) go about finding of whatever he or she believes can be known?" (p. 108) is constrained within the answers to previous ontological and epistemological questions. This chapter aims to demonstrate why a case study is suitable for answering the above-mentioned questions in relation to the applied ontological and epistemological approaches.

This dissertation belongs under management studies and, thus, under the broader category of social sciences. The research tradition in these fields has often emphasized the role of drawing conclusions based on deductive reasoning; this approach, however, sacrifices contextual richness (Bonoma, 1985). For this reason, the inductive approach has been found a useful path for scientific learning (ibid). The traditional deductive approaches are concerned with developing propositions from current theories and making them testable in the real world, whereas inductive approaches rely more upon a grounded-theory type of an approach where theory is systematically generated from the data (Dubois & Gadde, 2002).

To my knowledge, there are no applicable theories for studying commercialization deductively. There are several solid management theories, such as *transaction cost economics* (Williamson, 1979) or the *resource-based view of a firm* (Wernerfelt, 1984), but they do not seem applicable within this particular context.

One possible approach would be to use the *theory of reasoned action* (Fishbein & Ajzen, 1975), which provides a means for understanding customers' choices. The theory, however, deals with consumer behavior and focuses on the determinants and performance of a single behavior of an individual and honing in on to the particular forms of behavior that are under a person's volitional control (Sheppard et al., 1988). Thus, it is not perhaps applicable within a B2B context. The other related theory is *diffusion of innovation* (Rogers, 2003), which actually proved to be quite suitable for this dissertation. Perez Perez, Martinez Sanchez, de Luis, & Vela Jimenez (2004) compare the two theories in the following way:

> *An important conceptual difference between innovation diffusion theory and theory of reasoned action is that the former concentrates on the characteristics intrinsic to a technology (or innovation) while the latter anchors its analysis at how important characteristics of a technology are communicated and perceived by target users.* (p. 282)

Thus, diffusion of innovation seemed to be applicable and is discussed in section 3.1.6 and also used with case studies.

As mentioned, an alternative to deductive reasoning is to use an inductive research approach, which means that the included cases provide data for conceptualization and theory generation rather than testing or confronting existing theory (Gummesson, 2003). Orton (1997), however, calls attention to a gap that exists between inductive research and deductive research, for which he suggests an iterative grounded theory.[17] A similar research approach has also been introduced under the label abductive reasoning (Dubois & Gadde, 2002; Miles & Huberman, 1984). Abductivity and iterativity refer to the type of reasoning that occurs when the theoretical framework, empirical fieldwork, and case analysis evolve simultaneously, and this makes it is particularly useful for developing a new theory (Dubois & Gadde, 2002).

[17] Traditional grounded theory was first introduced by Glaser and Strauss (1967).

Dubois and Gadde (2002) also describe a method called systematic combining. It refers to "a nonlinear, path-dependent process of combining efforts with the ultimate objective of matching theory and reality" (ibid, p. 556). They also argue that systematic combining is particularly useful for developing new theories because it highlights a process in which the theoretical framework, empirical fieldwork, and case analysis evolve simultaneously (Dubois & Gadde, 2002).

This kind of abductive reasoning with systematic combining elements seemed to be the most suitable way to study commercialization for the purposes of this dissertation. This means that the dissertation does not aim to develop law-like generalizations independent of time or context, which would be the case with a positivistic research orientation (Orlikowski & Baroudi, 1991).

The creation process for this dissertation has also followed the principle of *cycling between theory and data*, which is the guiding principle of abductive reasoning (Orton 1997). As Orton (1997) states, "in a study where neither the theory nor the data is fixed, research improvisation works better than research design" (p. 432). This kind of approach seems to be appropriate since the objective of this dissertation is to craft an emergent theory (Glaser & Strauss, 1967; Eisenhardt, 1989) about commercialization within the context of new products. The actual conceptualization and classification, i.e. construct creation, is presented in more detail in chapter 5.

In any event, in light of the previous discussion on ontology and epistemology, the case-study method seems to be an appropriate research method. The essence of the case-study method is a research strategy focusing on understanding the dynamics (Eisenhardt, 1989) and investigating contemporary phenomena in real-life contexts (Yin, 1994). The definition suggested by George and Bennett (2004) claims that a case study is "the detailed examination of an aspect of a historical episode to develop or test historical explanations that may be generalized to other events" (p.5).

Eisenhart (1989) points out that the "development of theory is a central activity in organizational research" (p. 523) and that the case-study method is suitable for topics in which existing theories seem inadequate or in which a fresh perspective is needed. Yin (1994) states that the case-study method focuses not so much on statistical generalization as it does on analytical generalization. In other words, the results allude to generalizations about a

broader theory rather than to predictions that can be made about a population in general (Yin, 2003).

Building theory from case studies is a research strategy that uses one or more cases to create theoretical constructs, propositions, and a theory from empirical, case-based evidence; i.e. the central idea is to use cases as the basis from which a theory is developed (Eisenhardt, 1989; Eisenhart & Graebner, 2007).

As Yin (1994) points out, case studies are rich, empirical descriptions of particular instances that are especially suited to answering "how" and "why" type questions about a contemporary set of events. The debate between comparable, case-oriented (i.e. qualitative) research and large-N, variable-oriented (i.e. quantitative) research streams has been ongoing and rather extensive (Ragin, 1997). They both, according to Ragin (1997), aim to "construct representations of social phenomena from evidence" (p. 40). However, the goal of case research is to increase the depth of existing knowledge and the contextual richness of the findings rather than focus on the representativeness of large-N research (Bonoma, 1985).

The case studies in management science often refer to Eisenhardt (1989) and Yin (1994) for basic guidance and to justify the chosen methodology. Their case-research approach has been oriented towards positivism, but there are also different schools of thought in case study research. For instance, Stake (1994) advocates a more constructive approach, Burawoy (1998) a more reflexive approach, and Dyer and Wilkins (1991) a more interpretative approach.

However, scholars, including, for example, Numagami (1998), strongly defend using case studies in management science. More detailed methodological discussions are available, for instance, in Piekkari, Welch, and Paavilainen (2009), Platt (1992), and Foster, Gomm, and Hammerley (2000).

Bonoma (1985) states that the phenomenon under study also dictates what type of research method should be used. If the phenomenon is not amenable to quantification,[18] then the case-study method is the most valid method. In that sense, I feel that the "management of commercialization" is also a topic that is not amenable to quantification and that it should,

[18] As an example, Bonoma discusses the issue of "good practice in marketing management."

therefore, be studied using the case-study method. Based on the literature review conducted in this dissertation, I also feel comfortable in postulating that, as of today, commercialization within the context of a new product is an ambiguous and undeveloped construct.[19]

2.3 Usage of multiple cases and selection of cases

It's kind of fun to do the impossible. - Walt Disney

Case studies can include multiple cases or just a single case with different levels of analysis (Yin, 2003). There are scholars who strongly favor single case studies. For instance, Kennedy (1979) discusses the importance of using single case studies and generalizing from single case studies. She describes the extension dilemma when knowledge from a general case is used to predict a situation in a specific case, and vice versa. According to Kennedy (1979), the researcher who studies multiple cases should investigate the cases separately and individually, but try not to average or pool the data across cases. Similarly, Dyer and Wilkins (1991) provide critique the approach outlined by Eisenhardt (1989) and claim that multiple case studies lack the richness of classic, single case studies. The basic claim of Dyer and Wilkins (1991) is that researchers using Eisenhardt's method will only scratch the surface of social phenomena. "Although it is difficult to determine how deep a researcher must go to generate good theory," they claim, "the classic case study researchers went deeper in the dynamics of a single case than Eisenhardt advocates" (Dyer & Wilkins, 1991, p.616).

Eisenhart and Graebner's response (2007) is that,

> *Multiple cases enable comparisons that clarify whether an emergent finding is simply idiosyncratic to a single case or consistently replicated by several cases. Multiple cases also create more robust theory because the propositions are more deeply grounded in varied empirical evidence. Constructs and relationships are more precisely delineated because it is easier to determine accurate definitions and appropriate levels of construct abstraction from multiple cases. (p.27)*

In addition, Miles and Huberman (1984) also stress that having multiple cases increases the scope and freedom of the study. Multiple cases also enable the researcher(s) to compare different cases and increase the

[19] See section 4.1.

amount of generalizations they can make regarding the findings; thus, they provide the researcher(s) with more explanatory power (ibid).

According to Eisenhardt (1989), the within-case study involves a detailed analysis of cases in which the main purpose is to become familiar with each case as a stand-alone entity, whereas cross-case analysis is required to compare several categories as a means of discovering differences and commonalities. Yin (1994) recommends using multiple cases instead of a single case and, similarly, Eisenhardt (1989) suggests that the number of cases should be between 4 and 10 because a researcher(s) cannot generate a theory based on less than four cases, whereas it becomes difficult to cope with the complexity and volume of data with more than ten cases. Thus, the six product-innovation cases selected for this dissertation seem an ideal amount. Naturally, the work included investigating each case separately, too.

This kind of multi-case approach has been criticized by those in favor of a single, or deep-case, study. For instance, Dyer and Wilkins (1991) argue that by adding more context with additional cases, the researcher(s) will be making a trade-off by sacrificing a deeper understanding of the phenomenon. However, according to Eisenhardt and Graebner (2007), adding additional cases significantly affects the quality of the emergent theory because additional cases add more analytic power. They also postulate that theory building from multiple cases provides a more robust, generalizable, and testable theory than single-case research (ibid).

There has also been some debate about the true essence of a case (e.g. Ragin, 1997) and whether an empirical unit or research subject corresponds with the theoretical unit (the case). The empirical units in this dissertation consist of the new products that are being commercialized by the industrial B2B firms. In other words, there is a case product and a case firm that together make up the case in question. The overall focus of these *cases* is mainly on the managerial activities related to the commercialization of a particular product. The focal firm creates a framework and a context where these activities occur; it is then, of course, important to understand this context.

The underlying product innovations were not selected for statistical purposes, but, rather, by using the logic of theoretical sampling (Eisenhard, 1989; Eisenhardt & Graebner, 2007). This means that the hypothesis and the theory itself do not specify population and the cases are not intended to be representative of some population, as is the situation in large-N

hypothesis testing research (ibid). According to Eisenhardt and Graebner (2007),

> *Theoretical sampling simply means that cases are selected because they are particularly suitable for illuminating and extending relationships and logic among constructs. Again, just as laboratory experiments are not randomly sampled from a population of experiments, but rather, chosen for the likelihood that they will offer theoretical insight, so too are cases sampled for theoretical reasons, such as revelation of an unusual phenomenon, replication of findings from other cases, contrary replication, elimination of alternative explanations, and elaboration of the emergent theory. (p. 27)*

In practice, the underlying product innovation cases were selected because they represent successful Finnish industrial B2B products. The idea was to select products and firms that would provide a basis for forming new insights on building a theory for the commercialization process. The firms were selected based on certain criteria, i.e. all of the case firms have several things in common:

- They operated in industrial markets within a B2B environment;
- Their offerings included a tangible product (i.e. pure service companies were excluded);
- The underlying product was successfully introduced onto the market (this was confirmed during the initial discussions with the contact person);
- The researcher was able to get permission to study the product cases.

Traditional selection criteria such as convenience, access, and geographical proximity were also used as additional criteria for selecting the cases (Yin, 1994; Remenyi et al., 1998).

Typically, there are many difficulties associated with detailed studies on the innovation process, including problems in negotiating access to the information, not having the time and resources to carry out the study, and difficulties with external researchers being accepted into the decision-making procedures (Gill & Johnson, 1997). These issues did not create obstacles for this study. I contacted the case firms directly and booked the interviews once I had found the right contact person. Thus, I did not encounter any problems in gaining access to the firms and they were perfectly willing to provide data. In addition, no firm refused to participate in the study.

As Ragin (1997) points out, cases usually are not predetermined or somehow known from the outset. This was also the situation during this dissertation process. I had had previous contact with some of the firms based on the on-going or completed research projects (Vacon, Beneq) or negotiations during the project planning phase (Vaisala, Martela), whereas I approached some of them based on articles about their new product in

trade magazines (Marioff, KONE). Even serendipity played a role. The CEO and founder of Exact Tools sat next to me on a flight and our conversation made me interested in studying their new product.

In any event, the cases are not sampling units; rather, they are more like multiple experiments, with the aim being to make analytic generalizations. In that sense, the different industrial product innovations chosen for the investigation serve as multiple experiments in which the aim is to predict similar types of results, i.e. literal replication (Yin, 1994). The other approach would have been theoretical replication, which aims at predicting contrasting results (ibid). In other words, the underlying cases represent successful products based on a retrospective analysis. If I would have chosen a theoretical replication approach, I would have included cases with product failures too.[20]

2.4 Data collection

Innovation distinguishes between a leader and a follower. - Steve Jobs

The subject groups of the study are the founders of the case firms or the senior executives and managers that were closely involved with commercialization. The data was collected mainly in semi-structured interviews, but also additional material such as internal reports, presentations, brochures, news, industry reports, annual reports, and company web pages were used as data sources, as suggested by Eisenhardt (1989). The interviews were made in Finnish and carried out in 2007.

It is often suggested that a research strategy should involve multiple investigators and visiting the company in teams to increase the confidence of the findings (Pettigrew, 1990; Eisenhardt, 1989). However, due to the nature of the PhD dissertation as an individual assignment, the author conducted the interviews for this research project on his own.

When I contacted the case firms, I wanted the possibility to interview those persons who had been working with the commercialization on a

20 That was actually one of my initial ideas during the research plan creation. Based on my master's thesis (Simula, 2000), I realized that people are not too eager to discuss their failures (even if I had actually worked for the same organization at the time). Thus, I feel it would have been extremely difficult to conduct several failure studies and this idea was therefore abandoned.

hands-on basis and thus would have personal experience regarding the events. The reason for this is explained by Kumar, Stern, and Anderson (1993), who note that the responses of those whose roles have not been closely associated with the phenomena under study contain more errors.

The interview questions were mainly open-ended, as is suggested by the epistemologically constructionist approach (Warren, 2002). The respondents were asked to fill in a form at the beginning of the interview and the categorization sheet for a case product was based on their self-analysis. Each case firm only filled in one sheet.[21]

The list of interviewees was not fixed in advance. During the informal discussion before or after the interview, some of the interviewees pointed out that I should also interview an additional person who would be an important key informant. Thus, I updated the list of interviewees based on those suggestions. The list of interviewees and their functional roles and the length of the interviews are listed in Appendix A1. The number of interviews that concerned the actual cases was 15. The interviews were transcribed and I also wrote field notes and comments during the data collection phase. Due to the limited number of informants per case firm, I promised the interviewees that the direct quotes included in the case descriptions would be anonymous. The generic interview template is available in Appendix A2.

There was also a preliminary case study that is not a part of this dissertation. The underlying firm was an industrial drive manufacturer firm called Vacon; I conducted 11 interviews with employees from this firm. The pilot study was conducted as a part of a research project focusing on the Commercial Exploitation of Innovative Technology (CEIT), but it was not included in the case section because fit focused mainly on product launch. However, that study worked towards creating an understanding of the theme in a manner discussed by Remenyi et al. (1998).

In addition, the upper management of Vacon was separately interviewed later on. These top management interviews were conducted in order to

[21] That can be seen as a potential bias as these were filled by one person only. On the other hand, it would have been diffucult for the author to adequately assess the differences reflected in the sheets without lengthy discussion. For example, if an informant A consider a product radical, whereas B considers it incremental, there would have been a conflict. Thus, it was assumed that the first person interviewed was knowledgeable enough to make such an assessment. In any event, these sheet were not meant to represent a survey items but just to collect some facts and figures as a backround material.

gather empirical material about commercialization for a managerial book (i.e. Simula, Lehtimäki, Salo, and Malinen, 2010). In any event, the ideas derived from these interviews were used as an extra support material during cross-case analysis.

I used multiple informants as a data source for each case firm because this is the recommended procedure to avoid single-informant bias (Ernst, 2002). As Kumar et al. (1993) state, the theoretical and methodological benefits of multiple-informant studies are well documented in the literature. The reason for multiple informants was to get multiple stories, voices, data sources, and perspectives to best create a holistic view of the case and reduce the bias (Kumar et al., 1993; Ernst, 2002). The choice of informants was premised on the principle that information is best elicited from people who have been involved with the phenomenon and have knowledge about it (Arksey & Knight, 1999). In other words, the persons interviewed were so-called key or elite informants. Key informants are persons in organizations who are supposedly knowledgeable about the issues being researched and able and willing to discuss them (Kumar et al., 1993; Welch, Marshan-Piekkari, Penttinen, & Tahvanainen, 2002).

Thus, by conducting interviewees with key informants I was able to reach the point of saturation (Yin, 2003). Guest, Bunce and Laura Johnson (2006) refer to Morse (1995, 147) who has stated that "there are no published guidelines or tests of adequency for estimating the sample size required to reach saturation…and saturation can be "elastic" concept. Guest et al. (2006) however, estimated that for non-probabilistic samples, saturation can occur within the first 12 interviews, although basic elements for major themes are present as early as six interviews. This amount of interviewes is reached in total in my work but it would have been impossible to find that amount of relevant informants per case.[22]

In discussing the extended case method, Burawoy (1989) advises that the empirical investigation should extend beyond just collecting data from informants by interviewing them to actually taking part in the events as a participant observer. Due to the retrospective nature of my cases, such an

[22] The teams working for commercialization were quite small and these people interviewed were seemingly the most knowledgeable ones to provide information. I must admit that it was also to my surprise that there were not more people involved with the product commercialization cases. These interviewed informants were also explicitely mentioned as key informants when I asked the compony contact persons if there are additional persons that should be interviewed.

approach was not an option; the only way for me to adequately conduct the study was to rely on key informant interviews.

2.5 Data analysis and theory development

> *Innovation is not the product of logical thought - although the result is tied to logical structure.* - Albert Einstein

The phenomenon of commercialization was approached with no pre-hypothesis to test, and there were no preordained theoretical perspectives in place either. This is the ideal situation, as suggested by Eisenhardt (1989), because there are no pre-set limitations to the findings or bias involved. Each of the cases was studied during within-case analysis with the idea that it should be understood as a stand-alone entity. The result is a case description that illustrates unique evidence and patterns; the evidence and patterns are then used as a basis for cross-case analysis (Eisenhardt, 1989).

These case descriptions were then submitted to the interviewees for final review and the interviewees were able to provide additions and correct some of the mistakes. The permission to use real company and product names was also confirmed.[23]

The data collection and analysis phases overlapped to a certain extent, as suggested (Eisenhardt, 1989), but mainly the analysis occurred after all of the interviews had been recorded and transcribed. The cross-case analysis and theory building parts of the study were naturally conducted after all the case descriptions and within-case analysis had been done. The cross-case analysis occurred after some time had passed since the actual interviews and, thus, an initial-impression bias was avoided and all the cases were on the same level.

Dubois and Gadde (2002) have argued that theory cannot be understood without empirical observation, and vice versa. Thus, the analysis for this study also involved continuous cycling between theory and data. This allowed me to focus on relevant literature and then compare gaps in

[23] My concern was that it would cause some level of censorship, but this was an unnecessary concern because none of the firms insisted on removing some content from the case descriptions.

literature and also circulate between the data and literature. This type of recursive iterating or coupling between theory and data during the analysis is recommended, for instance, by Langley (1999).

In addition, modest[24] triangulation was used. Yin (1994) and Denzin (1978) have emphasized using triangulation, by which they mean combining different sources of evidence and shifting between analysis and interpretation. This was done by using other data sources (such as internal reports, presentations, brochures, news, industry reports, annual reports, and company web pages) and studying the interview descriptions and field notes, but the main data source was still the interviews.

The cross-case analysis compared firm data in a table format and also provided a deeper analysis of the case content. The cross-case analysis used the comparison tables and a separate meta-matrix. Meta-matrixes are charts that assemble data from each case in a standard format and help the researcher(s) to compare the cases, as suggested by Miles and Huberman (1984).

While this study is not a classical diffusion research project, it borrows some ideas from it. The customary method in diffusion studies is to approach adopters of an innovation and retrospectively ask them why they adopted that particular innovation. According to Rogers (2003), this tradition was established by Ryan and Gross (1943), even though they did not use the concept of innovation. The five classical diffusion criteria[25] - relative advantage, compatibility, complexity, trialability, and observability - are applied to case products and the commercialization process.

The opinions presented in the study are from the manufacturer's side only.[26] Of course, it would have been interesting to interview the customers, too. Unfortunately, that would have been too exhaustive of a process to perform with every case firm. In addition, it would have directed the research beyond the scope of the original objective, which is to understand the management activities inside an organization rather than the diffusion process as such.

The emerging constructs and data was pooled and constantly compared, as suggested by Eisenhardt (1989), during the theory-building phase.

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[24] See a critique of triangulation in section 9.4.
[25] See more discussion of these criteria in section 3.1.6.
[26] This is potentially a major source of bias.

During the proposition-shaping phase, each of the propositions was tested against each case and not for aggregated cases (Yin, 1984; Eisenhardt, 1989). Gummesson (2003) also emphasizes that a researcher should offer alternative interpretations of and meanings for data and this was attempted during the cross-case analysis.

According Dubois and Gadde (2002), "In systematic combining, the researcher would not be able even to identify 'all the literature' since the empirical fieldwork parallels the theoretical conceptualization. Hence, the 'need' for theory is created in the process" (p. 559). That was also the situation encountered during this dissertation process. I returned to the literature and circulated back and forth between data and previous theories, only to find out that there were no extant theories on the management of commercialization within the context of new products.

3 Literature Review

This chapter is based on an extant literature review and concentrates on topics such as general innovation theory, product innovation, management of new products, and commercialization.

The literature has been selected to represent a wide range of innovation management and product innovation literature. The selection of marketing and marketing research literature, organizational management, product launch, product development, and technology management literature are also used as references to provide broader coverage of the underlying research subject. Also, relevant managerial textbooks and managerial journals are used to cover the above-mentioned topics from different perspectives.

3.1 Innovation theory

> *One requirement for innovation is faith that there will be a future.* – Deming, 1988, p. 25

It is commonly agreed that innovations are important for technological progress and overall economic and business growth; innovations extend our technological capabilities and improve productivity, and they also contribute to the wealth of society and high standards of living. Innovations increase market share and contribute to the comparative and absolute advantages of a firm (Twiss, 1986; Souder, 1987; Patterson, 1998; Dodgson, 2000; Narayanan, 2001). In addition, firms can attain greater competitiveness and growth by developing innovative products and services (Cooper, 1993; Miller, 2001; Debruyne et al., 2002). Innovative products also have a positive impact on the market value of the firm introducing them (Chaney et al., 1991; Pauwels et al., 2004; Hsu, 2009). It has even been stated that innovations make essential contributions to the survival rate of a firm (Cefis & Marsili, 2005).

One of the main issues to consider is that the term "innovation" has been used quite liberally by practitioners. Unfortunately, there is also clear ambiguity in the way that it has been used in the academic literature. To make things more complicated, there are often various, different extensions attributed to innovation.[27] This has led into a situation where the innovation typology is inconsistent and, despite some attempts to clarify the situation, the underlying concept of innovation (Garcia & Calantone, 2002) it still remains vague precisely because the word innovation has been used so liberally by academics,[28] too. According to Crossan and Apaydin (2010) "innovation research is fragmented, poorly grounded theoretically, and not fully tested in all areas" (p. 1174).

3.1.1 Definition of innovation

The concept of innovation has existed for quite a long time and scholars have been writing about innovation since the days of the Roman Empire; actually, the word *innovation* has its origins in the Latin word "innovare," which can be translated as "to re-new, to make, or to alter" (Souder, 1987; Narayanan, 2001).

According to Zaltman, Duncan, and Holbek (1973), innovations can be discussed in three different contexts: (1) Innovations can refer to an invention and the creative process itself; (2) innovations can refer to the adoption process; and (3) innovations can refer to "that idea, practice, or material artifact that has been invented or that is regarded as novel independent of its adoption or non-adoption" (ibid., p. 8).

Based on extensive literature review Crossan and Apaydin (2000) state that innovation literature considers innovations either as a process or as an outcome. Determinant of innovation can be consolidated into three constructs; innovation leadership, managerial levers and business processes (ibid.)

According to Rogers and Shoemaker (1971), innovations can be categorized based on an idea and an object component, whereas Schumpeter (1939) conceives of innovations as being related to

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[27] See section 3.1.4.
[28] As an example, in the beginning of his book *Open Innovation* Henry Chesbrough (2003) states: "Most innovations fail. And companies that don't innovate die" (p. xvii). My question is: Why do we call those failures innovations in the first place? More discussion on this topic is provided in section 4.2.

entrepreneurship and productivity. According to Schumpeter (1939), innovation in general is defined "as the setting up of a new production function" (p. 87). Schumpeter (1934) was also the first to distinguish between product innovation and process innovation.

Inventions and innovations are often confused. Schumpeter (1939) stresses that innovations are those inventions commercialized on the market by entrepreneurs. According to Smith (2006), commercialization is required before an invention can become an innovation,[29] as illustrated in Figure 5. He also notes that in reality, many inventions will never turn out to be innovations.

Similarly, Trott (2002) also states that an idea in and of itself is nothing more than a concept or thought - only after it has been converted into a more formal shape (product or process) does it turn out to be an innovation.

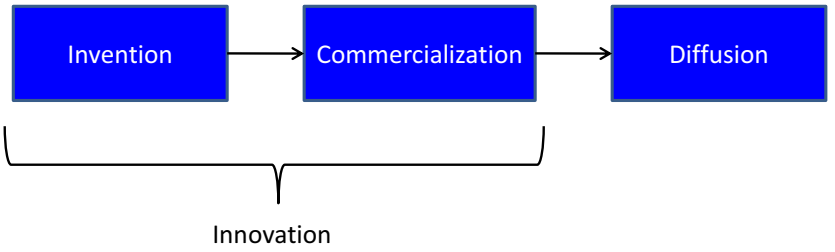

Figure 5. From invention to innovation (Smith 2006, p.6)

The OECD's Oslo manual declares that innovation is a complex, diversified activity with many interacting components. This manual also draws a "Schumpeterian" distinction between product and process innovation. According to the OECD, product innovation is implemented if the product has been introduced on the market, whereas process innovation is used within a production process (OECD, 1996).

Many authors have tried to define innovation. According to Souder (1987, p. 2), they commonly define innovation in the following ways:

- A creative process in which two or more existing things are combined in some novel way to produce a unique new thing;

[29] The requirement that the commercialization of a product be successful is the guiding principle behind product innovation in this dissertation.

- A complex set of activities from the conceptualization of a new idea to its reduction to practice;
- The invention and implementation of a new device;
- A process of social change in response to a new technology;
- The sequence of events from the generation of an idea to its adoption;
- A novel new device, concept, or idea;
- The adoption of a change that is new to the organization, group, or society;
- A new modification or new combination of existing entries;
- Anything that is new because it is different from the existing forms;
- Any idea, practice, or thing perceived to be new by the adopting entry;
- Anything perceived by the individual or user as new.

It is worth mentioning that this is just one set of definitions. There are actually a considerable number of definitions in the academic and management literature. Please see Appendix B for the collection that I created during the literature review. While the purpose of Appendix B is not to provide any collectively exhaustive collection of definitions, it hopefully highlights the vagueness of innovation terminology in literature. A systematic literature review by Crossan and Apaydin (2010) also reveals the several perspectives to study innovation. Smith (2006) captured this very well by stating that "it is actually quite hard to be precise about innovation" (p. 6).

3.1.2 Innovation process models

There are various models of the underlying mechanisms that help firms to create innovations. These models have also evolved over the course of time. Until the 1980s, an innovation was considered to be the result of a linear process. The basic variations were technology-push and market-pull models. According to the technology-push model, science and R&D serve as the source of new discoveries and engineers apply these discoveries to products that are left for marketers to promote to potential customers. The market-pull model turned the "pipe" the other way round. According to this model, the customer and market needs are the starting points and initiators for new ideas and requirements. In this model R&D has more of a reactive role in finding solutions to emerging needs. These first- and second-generation models were quite simplistic and, as a result, a more advanced model of simultaneous coupling emerged. The third-generation model emphasizes the coupling of functional entities and suggests that innovations are the result of knowledge between research and development, marketing and manufacturing being shared. The interactive, or integrated, model represents the fourth level of innovation and it considers a firm's activities to occur parallel to one another. This model acknowledges that innovation occurs or originates from different points as a result of

concurrent tasks. Finally, the fifth-generation, innovation-process model is a complex set of communication paths and systems integration with strong external networking (Dodgson & Rothwell, 1994; Trott, 2002).

The product-innovation process is often presented in a linear format. For instance, Brandbury (1989) suggests an innovation-project model that consist of four phases: (1) Feasibility, i.e. base product innovation and evaluation; (2) applications, i.e. base product consolidation, application product innovation and evaluation; (3) development, i.e. product/process development and evaluation, data summary and exploitation proposal; and (4) exploitation, i.e. strategy and data selection, patenting and consultancy, proposal, presentation, negotiation for project adoption. Koen et al. (2001) present a similar linear model, in which they divide the innovation process into three phases, i.e. a front-end phase, an NPD phase, and a commercialization phase.

Whereas Padmore, Schuetze, and Gibson (1998) also refer to linear and chain-link models, they ultimately introduce a more cyclical model. Schoen, Mason, Kline, and Bunch (2005) have criticized linear models and propose a cyclical model for innovation development. While Rogers (2003) describes an innovation process involving a series of stages, he admits that the order of stages may change and that some of the stages can be omitted in certain cases; he also admits that many innovations deviate from this general process flow.

3.1.3 Sources of innovations and innovativeness

It is difficult to find sources that clearly define the nature of innovations. Once again, there is significant amount of literature on this subject but no widely recognized theory exists that would give us an exact answer regarding the origins of innovations.

Wolfe (1994) provides a literature review of innovative behavior in organizations. He maintains that there are three main research approaches, i.e. the diffusion of innovation, organizational innovativeness, and process theory research streams, which have studied the topic of the origin of ideas and innovation.

Goldenberg, Lehmann, and Mazursky (2001) list five main sources for ideas: Need spotting, solution spotting, mental invention, market research for new products, and trend following. Chaston (2000) illustrates entrepreneurial approach to innovations where the key question to start with is simply “why not?”.

Afuah (1998) categorizes innovations based on functional and circumstantial sources. Functional sources include the firms' internal activities together with the external players. Examples of functional sources include suppliers, customers, and competitors as well as related industries, universities, government, and other nations. Circumstantial sources of innovation can be divided into planned activities, unexpected occurrences, and creative destruction (Afuah, 1998).

Deterministic and individualistic approaches can also be used to categorize innovations. The deterministic approach emphasizes external social factors and influence, whereas the individualistic "school" thinks that innovations are based on extraordinary individuals and even serendipity (Trott 2002).

Sheth and Ram (1987) list four forces that they think primarily drive the creation of new products and service innovations. This is illustrated in Figure 6.

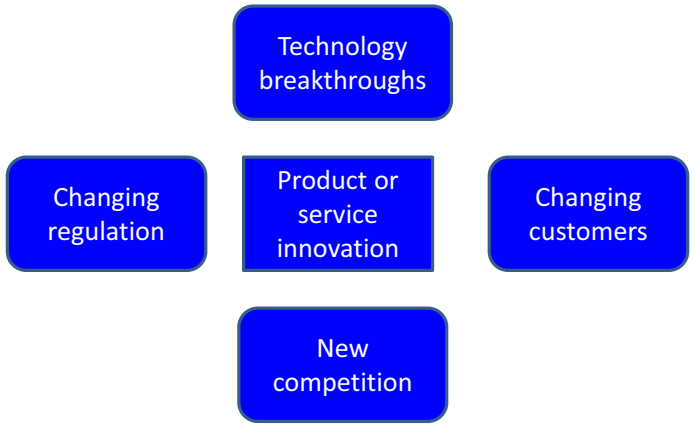

Figure 6. Forces driving innovation (Sheth & Ram, 1987)

Schumpeter (1939) has suggested that the size of a firm matters and, thus, that larger firms are more innovative. His argument is grounded in the idea that larger firms have more financial and organizational resources, risk tolerance, and economies of scale for R&D projects and, thus, more chances to provide for more innovation. However, this argument has not received unanimous support and there has been mixed empirical findings (Narayanan, 2001).

According to Cyert and March (1992), successful firms have extra resources and excess slack, which are essential funds for innovations. That would suggest a virtuous cycle in which previous success is the only antecedent for innovation. However, Cyert and March (1992) also state that unsuccessful firms can create innovations when they are forced to solve acute problems that they are facing.

Palmberg (2004) points out that innovations are not related to mere technological issues. He states that there are other variables that can be seen as sources of innovation, such as customer demand, market niches, and collaboration with customers. Similarly, new management ideas can lead to overcome the trade-offs between efficiency and profitability (Magnusson & Martini, 2008) and provide a basis for new innovations.

Technological changes may not provide instant value for established customers, but the new technology can later on invade the established market and thus be a source of innovation (Bower & Christensen, 1995). However, technology is not the only aspect to look at, because changes within industry structures are also potential sources of innovation (Drucker, 1985).

Hult, Hurley, and Knight (2004) have found that market orientation, entrepreneurial orientation, and learning orientation are the key antecedents to innovativeness and that innovativeness increases business performance. In other words, they have found that firms should investigate new ways to gather market data about customer needs to create innovations (ibid.) Managers should also foster an overall marketing orientation[30] if the firm's target is to create new product innovations (Wind & Mahajan, 1997).

However, innovations and innovativeness do not necessarily go hand in hand. According to Garcia and Calantone (2002), it is important to realize that product innovativeness does not guarantee that the company itself is innovative. In other words, there can be less innovative firms that have highly innovative products. Innovativeness is sometimes determined based on a product's newness to the firm. However, the meaning and impact of innovativeness to a customer is much different - something perceived as a superior feature by a manufacturer may be seen as quite the opposite by the buyer, who is less familiar with the underlying technology (Lee and

[30] Please see section 3.2.5 for a more detailed discussion of "orientation."

O'Connor, 2003). Morton (1971) summarized the origin of innovations by stating that,

> *innovation always occurs in an imperfect world: we never have all the physical understanding we need, not the time to develop and execute all the good ideas, nor indeed the assurance that unexpected things will not occur.* (p. 29)

3.1.4 Various innovation attributes

As mentioned in the introduction, the concept of innovation becomes more ambiguous when additional meanings are included with the word innovation. For example, additional attributes might pertain to a product being deemed radical, incremental, really new, architectural, initiative, and modular.[31] In their article "A critical look at technological innovation typology and innovativeness," Garcia and Calantone (2002) provide a thorough analysis of how terminology is used to identify different types of innovations. They note that the same innovation can actually be placed on either end of the measurement scale of innovativeness depending on the researcher. Similarly, Lee and O'Connor (2003) argue that product innovativeness as a construct is not clear, but, rather, quite ambiguous.

Despite efforts to classify an innovation typology, it seems that researchers are unwilling to follow any "standardized" approach. For instance, Iyer, LaPlaca, and Sharma (2006) used the terms incremental and continuous synonymously. In addition, they combined the terms radical and disruptive.

As one other example, Ettlie, Bridges, and O'Keefe (1984) studied radical and incremental innovations and derived their empirical data on flexible packaging technology and used a modified, retortable pouch and a tray as a source for empirical data on radical innovation. [32]

However, according to the terminology of Garcia and Calantone (2002), only revolutionary and rare objects, such as a steam engine or the World Wide Web, are legitimate examples of radical innovations. According to Tushman and Nadler (1986), the majority of product innovations are actually incremental in nature, which means that they only provide some added features or extensions to more or less standard products.

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[31] If it seems confusing at this point just how one goes about perceiving of the concept of innovation as such, I suppose these extra attributes blur the issue even more.

[32] I personally do not feel that this represent a radical product innovation very well.

Continuous and discontinuous are also terms that are commonly used to distinguish between innovations (Robertson, 1967; Rice, O'Connor, Peters, & Morone, 1998). According to Rice et al. (1998), discontinuous innovations refer to "game changers;" these are innovations that have the potential to enhance the performance by a factor of 5 to 10 times or reduce costs by 30–50% or that have new-to-the-world performance features compared to existing products.

Henderson and Clark (1990) have classified innovations based on the degree of the innovations' impact on existing concepts and components, and the links between them. Their model consists of four types of innovations, i.e. incremental, architectural, modular, and radical innovations.

Christensen (2003) mentions what he calls disruptive innovations. By "disruptive innovation," he means a slow process of adoption that forces incumbent firms to abandon their existing business and slowly enter into a position that is difficult to maintain.

Open innovation is a concept disseminated by Henry Chesbrough (2003), and it basically has to do with leveraging external ideas together with internal ones and lowering company borders when acquiring and sharing ideas. In other words, valuable ideas can come from inside or outside the company and go to market from inside or outside the company (Chesbrough, 2003). Torkkeli, Kock, and Salmi (2009) provide a recent review of literature on open innovation and combine it with empirical examples.

Holt (1983) admits that it is not easy to come up with a clear distinction between different innovation classifications and that the difference between the degree and the novelty of an innovation should be interpreted from the view point of the firm in question. Table 1 illustrates different innovations within the context of product innovation.

Original product innovations: • Basic (technical breakthroughs) • Incremental (improvement innovations)
Adopted product innovations: • Adapted adoptions (improvements) • Pure adoptions (copying)
Product improvements: • Major improvements • Minor improvements

Table 1. Product innovation classifications (Holt, 1983)

While often associated with economic literature, one additional type of taxonomy distinguishes between revolutionary and evolutionary innovations (cf. Abernathy & Clark, 1985; Fagerberg, 2003; Gershon & Pattakos, 2004).

Marquis (1988) distinguishes between innovations based on their size and the related technological change. He differentiates between innovations for (1) complex systems such as communication networks and weapon systems, (2) medium-sized innovations like the jet engine and xerography, and (3) small "nut-and-bolts" innovations.

Moore (2004) used terms such as application innovation, experimental innovation, marketing innovation, and business-model innovation. In addition to that, there are a wide array of other types of innovations, such as administrative, organizational, financial (Holt, 1983), managerial innovation (Kimberly, 1981), and synthetic innovation (Tushman & Nadler, 1986). To illustrate the disarray, even the term *invisible innovation* (Cooper, 2002) has been introduced in academic literature.

3.1.5 Newness and goodness as attributes of innovation

Many of the innovation definitions include the word "new." This leads us to the following question: How is newness related to the concept of innovation?

The extant literature provides various typologies for categorizing products based on their newness. For instance, Schumpeter (1939) divides innovations into five different categories according to their novelty: (1)

Introducing a new good – that is one with which consumers are not yet familiar – or of a new quality of good; (2) introducing a new method of production that has not yet been tested via experience within the branch of manufacturing concerned, that by no means needs to be based upon a new scientific discovery, and that can also exist as part of a new way of handling a commodity commercially; (3) opening a new market in a particular branch of manufacturing that the country in question has not previously entered, whether or not this market has existed before; (4) successfully exploiting a new source of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it first has to be created; (5) re-organizing a particular industry, such as creating a monopoly position or breaking up a monopoly position (Schumpeter, 1939).

According to Griffin and Page (1996) the categorization introduced by Booz, Allen and Hamilton in the 1980s is commonly repeated in product development research. The categorization, which is actually based on Ansoff's product-market matrix[33], arranges products into the following six groups (Griffin and Page, 1996, p. 481):

- **New to the World**: New products that create an entirely new market;
- **New to the Company**: New products that, for the first time, allow a company to enter an established market;
- **Additions to Existing Product Lines**: New products that supplement a company's established product lines;
- **Improvements in/Revisions to Existing Products**: New products that provide improved performance or greater perceived value and replace existing products;
- **Repositionings**: Existing products targeted to new markets or market segments;
- **Cost Reductions**: New products that provide similar performance at a lower cost.

Kleinschmidt and Cooper (1991) used the degree of innovativeness as a basis for their taxonomy of new products and state that (1) highly innovative products consist of new-to-the-world products and innovative new product lines for the company, (2) that moderately innovative products are new lines for the firm, but products that are not new to the market, and (3) that less innovative products are, for instance, product modifications to existing lines, but products that are not new to the market or to the company.

Schneider (2004, p. 12) provides the following list of topics that are related to new products:

[33] Please see section 5.1.

- Breakthrough technologies;
- Line extensions that stretch or renew the appeal of existing products;
- Brand extensions that take a franchise into a new product category;
- Seasonal or holiday products that need to be relaunched each year;
- The relaunch of icon products;
- The relaunch of a company that is significantly shifting its focus;
- The introduction of new packaging or a new feature that makes age-old products easier to use;
- A new application for an existing product that will attract a totally new market segment or prompt existing customers to use the product more frequently;
- Products that are new to your company but not new to the world;
- An exciting cause-related program that brings new attention (and market share) to your product.

However, according to Trott (2002), "very often the distinction between one category and another is one of degree and attempting to classify products is subject to judgement" (p. 210). Similarly, Souder (1987) and Rogers (2003) consider novelty to be in the "eye of beholder." They state that it is not possible to define something as objectively new, but that any new idea is an innovation if it seems new to the individual. Van de Ven (1986) shares the same viewpoint and concludes that "as long as the idea is perceived as new to the people involved, it is an 'innovation' even though it may appear to others to be an 'imitation' of something that exists elsewhere" (p. 592). Levitt (1986) seemingly disagrees with this perspective.

> *We often mistake innovation for what is really imitation, the large and highly visible outpouring of an imitative product that was genuinely new several years previously when a single innovator first launched it. (Levitt, 1986, p. 213).*

It is not uncommon that a firm decides to follow an adaptation strategy with "second-but-best" or "me-too[34]" products (Crawford & Di Benedetto, 2003). Competing firms can even make a clear copy[35] of the new product and make an imitation of it (Narayanan, 2001). On the other hand, there are some arguments that counterfeit and imitative products, despite there being many serious issues associated with them, play a role in the product-innovation process because they actually facilitate the development of new products (Rehn & Vachhani, 2006; Trott & Hoecht, 2007). Similarly, it is worth mentioning that, a disruptive innovation, for example, is an innovation category that does not include elements of supremacy.

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[34] In other words, kindred or similiar product(s) by a competitor already exist(s) within a particular market

[35] Intellectual property rights and other legal issues are beyond the scope of the study, but a related discussion is provided in section 3.4.1.

According to Christensen (2003), disruptive innovations are "…products and services that are not as good as currently available products" (p. 34).

There is also an assumption that innovations are constructive and good in nature, that they solve problems and are useful. The goodness and positiveness of an innovation is a topic that has not been studied very much. The studies by Knight (1967), Kimberly (1981), and Steele (1988) are rare examples that highlight the positive bias towards an innovation.

Some innovations can actually be like double-edged swords. They can provide benefits to a particular individual, but, at the same time, misery to others. For instance, new production equipment may leave some workers without a job or force less competitive firms out of business (Rogers, 2003). Rogers and Shoemaker (1971) point out that there can be innovations that are harmful or un-economical from the point of view of an individual or a social system.[36] In any event, there are only few authors who argue that innovation can be undesirable (Steele, 1988) and that innovations are not always desirable and can yield a negative outcome (Knight, 1967).

Naturally, it may take some time to realize all the positive and negative effects and outcomes of an invention. Thus, time dependency supports the retrospective assessment of innovations. Van de Ven (1986) is one of the scholars who admit that "it is not possible to determine at the outset which new ideas are innovations or mistakes" (p. 592). According to this statement, we can only assess the mistake/failure or success of an innovation after it has been implemented. In other words, it is impossible to foretell which ideas will turn out to be successful. This sense of time dependency leads us to the concepts of adoption and diffusion and is one of the key elements in the product innovation framework presented later on.

3.1.6 Diffusion and adoption of innovation

The concepts of diffusion and adoption of innovation are essential topics to understand when we contemplate the route to product innovation. From a firm's point of view, adoption refers to the process where a customer makes decisions to buy products or services, whereas diffusion then arises from the customer's adoption decisions (Narayanan, 2001). More precisely, diffusion has to do with the process "by which an innovation is

[36] Consider, for instance, the atomic bomb.

communicated through certain channels over time among the members of social system" (Rogers, 2003, p. 5).

Adoption represents the positive outcome of a decision process that ranges between rejecting and accepting a proposed new solution - an adopter decides to make full use of an innovation as the best course of action available and the rate of adoption is then the relative speed with which an innovation is adopted by members of a social system (Rogers 2003). Kimberly (1981) also emphasize that it is an individual, not an organization, who is the adopter.

Diffusion of innovation has been a separate research discipline since the 1940s and 1950s (Rogers, 2003). Diffusion has been defined as a process "in which an innovation is communicated through certain channels over time among the members of social system" (Rogers, 2003, p.3). However, some of the new ideas do not get accepted immediately, but they may gain favor as time passes (Fox, 1982). According to Rogers (2003), the adoption process is affected by the perceived characteristics of the innovation and the adoption of an innovation tends to follow an S-shaped curve as it approaches normality. As an example, cellular phones and VCRs became popular within a few years, whereas it took decades before large numbers of people began to adopt the practice wearing seat belts in cars in the United States (ibid).

3.1.6.1 Adopter categories

Rogers (1976) mentions that Ryan and Gross (1943) were the first authors to champion the diffusion paradigm when they published their study on the diffusion of hybrid seed corn in 1943 and identified five major stages in the adoption process among Iowa farmers. These stages pertained to the farmers being aware of, having an interest in, evaluating, trying out, and finally adopting the innovation. The exact typology Ryan and Gross (1943) used to distinguish adopters is not known,[37] but Beal and Bohlen (1957), who compelled other researchers to focus on the diffusion process among farmers, used the following terms: Innovators, early adopters, early majority, majority, and non-adopters. The other paper that Beal and Bohlen

[37] Rogers (2003, p 31-35) provides a compelling story of their work, but does not exactly describe this process. I was not able to track down the original paper.

(1955) co-authored[38] used only four categories: innovators, community adopters, local adoption leaders, and late adopters. Everett Rogers (2003) noted this confusing disarray of terminology and his work has made it possible to "standardize" the adopter categories in diffusion studies so that they consist of innovators, early adopters, early majority, late majority, and laggards.[39]

It is worth noting that Rogers himself states that these categories only represent "ideal types" and that they have been created to make comparisons possible. However, Moore (1998) in his book *Crossing the Chasm* has suggested that significant gaps exist between these groups. Moore states that an enormous chasm exists between the categories of early adopter (visionaries in Moore's terminology) and early majority (pragmatists in Moore's terminology). The chasm is mainly due to a different value base and different risk attitudes among these two groups. Pragmatists do not trust visionaries in their buying decisions, but would rather wait for the technology to mature. Goldenberg et al. (2002) have also found that this kind of "saddle"[40] exists in the consumer electronics industry. Rogers, however, remains skeptical of this kind of gap-thinking. He states that

> *past research show no support for this claim of "chasm" between certain adopter categories. On the contrary, innovativeness, if measured properly, is a continuous variable and there are no sharp breaks or discontinuities between adjacent categories. (Rogers 2003, p. 282)*

The adoption discussion is related to a pragmatic question: What approach should a firm take in their commercialization activities to best meet the needs of different adopters?

3.1.6.2 Perceived characteristics of innovation

The adoption process is affected by the perceived characteristics of the innovation. Rogers (2003) lists five qualities that are the most important means of differentiating between different rates of adoption: relative advantage, compatibility, complexity, trialability, and observability. These are defined as follow (Rogers, 2003, p. 285-266):

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[38] Actually, there are no authors mentioned in this paper, but, based on the preface (which provides the names of the committee members), it is justified to assume that Beal and Bohlen have been the authors behind it.
[39] As a side note, the first edition of this book dates back to 1962.
[40] That is the term they use to refer to the slump of sales between the early and main market.

- Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes;
- Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters;
- Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use;
- Trialability is the degree to which an innovation may be experimented with on a limited basis;
- Observability is the degree to which the results of an innovation are visible to others.

The relative advantage, compatibility, trialability, and observability of an innovation, as perceived by members of a social system, are positively related to the rate that the innovation is adopted, and thus the complexity of an innovation is the only one of these attributes that is negatively associated with the rate of adoption of an innovation Rogers (2003).

These five attribute are the main factors that explain the rate of adoption. The following additional variables can also determine the rate of adoption: The type of innovation-decision (optional, collective, authority), the nature of the communication channels (mass-media, interpersonal) diffusing the innovation at various states in the innovation-decision process, the nature of the social system in which the innovation is diffused (the norms and network connections), and the extent of the change agents' promotional efforts in diffusing the innovation Rogers (2003).

3.1.6.3 Resistance to new products

Even if a proposed new product provides benefits, it still may not be easy to get customers to accept it. Sheth and Ram (1987) and Ram and Sheth (1989) borrow ideas from diffusion research to postulate reasons for a customer's resistance to new products. They argue that the causes for such a resistance can be divided into structural and functional barriers.[41] Structural barriers are bound to such issues as the amount of resources and expertise a firms has at its disposal, market regulations and restrictions by the government, market access and the changes required in internal operations. Functional barriers consist of subcategories such as usage, value, risk, tradition, and image barriers. The following chapter provides examples of these barriers and suggests ways that firms can circumvent them.

[41] There are not many studies on this subject in a B2B context, but it is assumable that the same reasons are applicable at some level.

There are certain industry sectors that by default are more traditional and where firms do not want to be the first ones to try new ideas. This creates a major challenge for a firm that aims to commercialize new products that are different from the existing products. One of the main issues is that new products may not be compatible with existing workflows, practices, or habits.

Firms that want to overcome usage barriers can either integrate their innovation with existing activities (selling it to someone who sells it further as part of a package) or try other ways to fit their product into existing systems. In addition, firms may want to affect existing legislation so that their products become mandatory. Examples of this include lead-free gasoline, seat belts, and smoke detectors. Unless an innovation offers a strong performance-to-price value compared with product substitutes, there is no incentive for a customer to change his or her purchasing patterns. A firm that wants to remove value barriers can reduce its costs and pass the savings on to the customer, position the innovation so that it creates a better value (such as new health food products), or simply provide superior performance over competitive products. Risk barriers in general can be categorized according to physical, economic, functional, and social risk factors. A firm can respond to the risk barriers by giving customers the chance to test and evaluate a product in advance. Other methods to circumvent these barriers include using expert opinions and testimonials to convince customers or selling the innovation to a brand owner that already enjoys a good reputation. Tradition barriers are very much related to cultural issues. Understanding and respecting cultural differences are reactive ways of responding to tradition barriers. However, more proactive ways are also possible, even though such processes may be time-consuming and labor-intensive. In some cases studies, market education and change agents have been successfully used. Image barriers are very much related to brand reputation. The country of origin or name of a manufacturer can create stereotypes and prejudices among buyers. A firm that wants to erase a poor image can create advertising campaigns for that purpose (Sheth and Ram, 1987; Ram and Sheth, 1989).

3.2 Management of product innovations

> *New product development is one of the riskiest, yet most important, endeavours of the modern corporation. – (*Cooper, 1993, p. 4)

According to Utterback (1994), managing innovation activities includes significant uncertainty, creativity, and the exploitation of opportunities within any industry. The new opportunities can be sought with new products. However, the reasons for why firms choose to start new product development projects vary. The objective can be to retain existing customers in a competitive market; also, a new product can increase the profit margin via a better cost structure or a firm can seek growth and use new products to reach new markets (Griffin & Page, 1996).

In other words, firms seek new product opportunities, which Cagan and Vogel (2002) define in the following way:

> *"A product opportunity exists when there is a gap between what is currently on market and the possibility for new or significantly improved product that result from emerging trend" (p. 9).*

This chapter discusses the essence of products, managing new products and resisting new products. The concepts of market, customer, and technology orientation are also highlighted.

3.2.1 What is a product?

Innovation in general was discussed in section 3.1. Before analyzing product innovations in more depth, it is well worth asking, what actually is a product?

According to Corey (1975), "The 'product' is what the product does; it is the total package of benefits the customer receives when he buys" (p. 122). Levitt (1986) states that products are problem-solving tools, which may be tangible, intangible, or a combination of both. In his words, "A product is, to the potential buyer, a complex cluster of value satisfactions. The generic thing or essence is not itself the product" (ibid, p. 77). Corey (1975) and Levitt (1980) both emphasize that a firm should place efforts on finding new ways to differentiate their products from competitive offerings.

According to Kotler and Kellet (2009), products can be categorized based on their durability and tangibility - there are non-durable (soap, beer) and durable (machine tools and refrigerators) products. Services on the other hand can be seen as intangible and perishable products. Another way to categorize products is to divide them between B2B products[42] and

[42] Kotler and Keller use the term "industrial product," but it seems appropriate to use B2B as a synonym for that idea here.

consumer goods based on how they are used. They classify goods as consumer goods based on people's shopping habits. The four basis ranks here are convenience, shopping, specialty goods, and unsought goods. They divide B2B goods into three primary categories - material and parts, capital items, and supplies and business services, which they then further divide into various subclasses, as illustrated in Figure 7 (Kotler & Kellet, 2009).

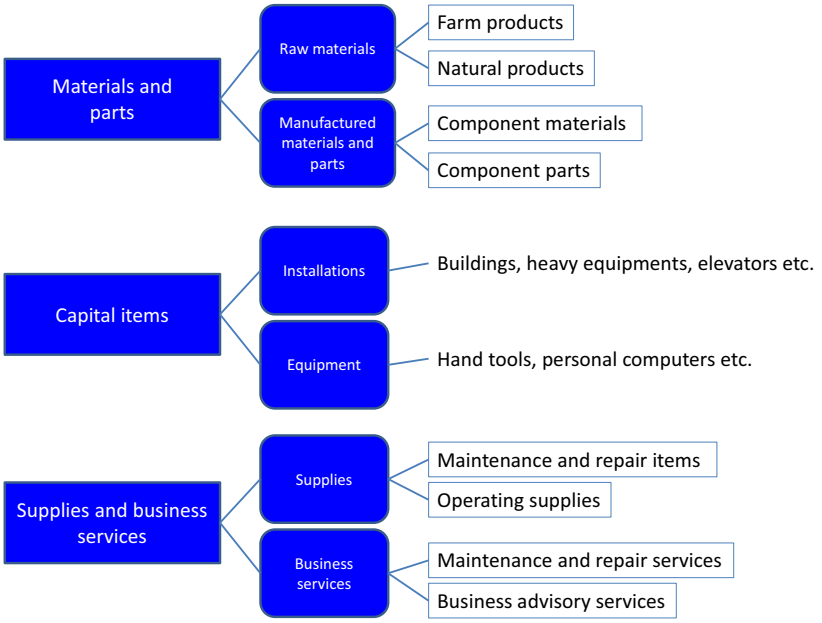

Figure 7. Classification of a B2B product (illustration based on Kotler and Keller, 2009)

Levitt (1986) first introduced the concept of total product and it can be used to illustrate the product differentiation steps. The basic idea behind it is that a product has a range of possibilities, as illustrated in Figure 8.

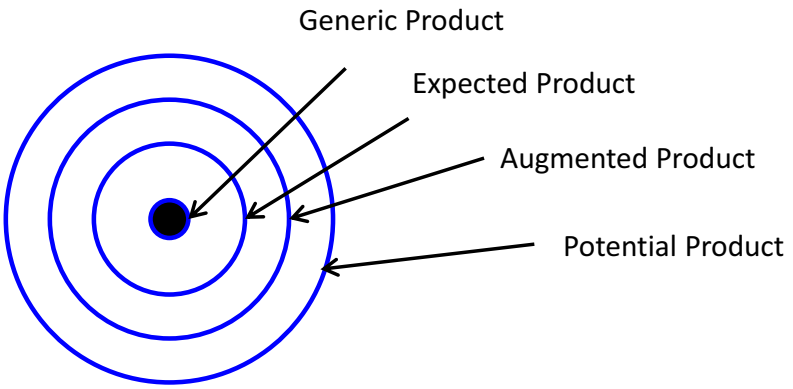

Figure 8. The Total Product Concept (Levitt, 1986)

According to Levitt (1986, p. 78), "The generic product is the rudimentary substantive 'thing' without which there is no chance to play the game of market participation. It is the 'table stake' of the game." But this generic product can only be sold if a customer's expectations are met. Thus, the expected product represents the customer's minimal purchase conditions and expectations. These vary by customer, the conditions, and the various industries involved and every customer also has minimal purchase conditions that exceed the generic product itself (Levitt, 1980; 1986). A seller is not able to gain differentiation benefits if he or she is not able to deliver to the customer what is expected. An augmented product does this by offering something a customer had never previously thought about or something that she or he was not expecting. It can be more than what the customer thinks she or he needs and provide great benefit to customers. (Management advice or training programs are good examples of "augmentations"). The usage of these extras is not troublesome because some customers prefer lower prices over more augmentations and some cannot use certain offered extra services at all. According to Levitt (1986), the potential product,

> *consists of everything potentially feasible to attract and hold customers. Whereas the augmented product means everything that has been or is being done, the potential product refers to what may remain to be done, that is, what is possible. (p. 84)*

An augmented product that addresses the customers' latent needs and provides them with superior benefits is the basis for a competitive advantage. (As a side note, a firm that is able to understand and satisfy both current and latent needs is said to be truly market oriented[43] (Slater & Narver, 1999).)

The whole product concept has been used, for instance, within the context of a product requirements definition. For instance, the Digital Equipment Corporation shifted from a technology-centric view to a customer-centric view and broadened its product scope to include a marketing message, pricing, packaging, and service scenarios (Hutchins & Knox, 1995).

Teece (1986) acknowledges the importance of different product-related entities that are needed in conjunction with core assets and capabilities. He states that complementary services such as marketing, competitive manufacturing, distribution, and after sales support are needed for the

[43] This concept will be discussed in more detail in section 3.2.4.

successful commercialization of a core product or for technological know-how. Kotler and Keller (2009) provide a somewhat different approach and present five products levels, which they call a customer-value hierarchy. This is based on Levitt's concept; however, they have modified it to include core benefit at the very center of the hierarchy. Instead of a generic product, Kotler and Keller use the term "basic product." Their message is that a firm has to turn a core benefit into a basic product. An example of a core benefit is "rest and sleep" in the case of a hotel room and the "purchase of holes" in the case of a drill. Thus, a firm should see itself as a benefit provider (Kotler and Keller, 2009).

According to Moore (1998), the simplified version of an entire product consists of two categories that firms need to think about - what they ship and whatever else the customer needs in order to have a compelling reason to buy a particular product. The latter is important because it forms a so-called marketing-promise, which helps the firm maintain good customer relationships (ibid). Achieving good customer references plays an important role, especially in the B2B industry, since negative word of mouth can have serious impacts on sales figures (ibid).

Davidow (1986) follows the same logic when he suggests a way to distinguish between products and devices. His argument is that engineering invents devices, but they only become products after they are given a marketing touch. In his formulation: "Great devices are invented in the laboratory. Great products are invented in the marketing department" (Davidow, 1986, p. 25).

Goldenberg, Lehmann, and Mazursky (2001) studied product introductions and, based on the literature, they provide the following classification for new products:

- Technology-stretching products (superior technology introduced into an existing product);
- Need-addressing products (a new and important need satisfied by the new product);
- Economical products (the purchaser saves money or other resources due to lower price or more economical usage);
- Trend-gimmick products (the product offers a gimmick without any other benefit or mimics a non-relevant trend in a remote product);
- Segment-focused products (a product adapted to better fit a market segment); and
- Formalization products (a product that incorporates existing improvisations or consumers' habits).

3.2.2 New product development

Numerous studies have focused on the product development phase and extensive literature reviews of NPD are provided, for example, by Brown and Eisenhardt (1995), Krishnan and Ulrich (2001), and Ernst (2002). There are also various new product models and methods available (e.g. Mahajan & Wind, 1992). In addition, new product development from entrepreneurial percpective is illustrated by Chaston (2001).

While every new product project includes special challenges that are unique to the underlying product itself, there are some generic variables that a new product project has to deal with and keep in balance. The most important inputs for every project include value, time, quality, and cost (Crawford & Di Benedetto, 2006).

First of all, a new product has to meet the customer's needs and provide value to the customer. The quality of the design and manufacturing has an essential role when it comes to achieving the maximum customer value. While scholars sometimes replace the quality requirement with performance (Wheelwright 1988; Ali, Krapfel, & LaBahn, 1995), a core dilemma arises when demands for a low-cost structure and fast time-to-market attributes are included. Management must be able to make compromises and optimal choices in the face of such divergent variables.

Several project management scholars emphasize 'the trinity' to accomplish projects on time, within budget and scope.[44] (Archibald, 1992; Morris, Patel, & Wearne 2000; Morris, Ashley, & Shepherd, 2006).

Scholars have reported that faster cycle times and increased speed-to-market attributes are critical for a product's success (Smith & Reinertsen, 1998). Product cycle times refer to the elapsed time from ideation to the phase when a product is commercially available (Wheelwright, 1988; Ali et al., 1995) There are, however, hidden costs involved in accelerating the process (Crawford, 1992). Similarly, Ali et al. (1995) conclude that "the premise that shorter cycle time is desirable, however, should be cautiously accepted" (p. 67). The start-up firms studied by Ali et al. (1995) were able to reach shorter cycle times without sacrificing quality, but to accomplish that they had to keep their products simple enough.

[44] There is an old saying: "fast, good and cheap – pick any two"...

Lambert and Slater (1999) raise the question, what is fast enough? There are claims that introducing new products too quickly will only confuse customers and erode profit margins (Ali et al., 1995; Lambert & Slater, 1999). There are other issues that arise as well when there is pressure to speed up the process. For instance, Cohen, Eliasberg, and Ho (2000) argue that when the time-to-market targets are too ambitious, it can create an upward bias of resource intensity usage and eventually lead to product entry delays. In addition, firms can simply skip potential radical innovation projects and pursue "low-hanging fruit" because they perceive incremental innovations as being less risky (ibid). Other handicaps of time-focused approaches include the implementation of processes that are too rigid and organizational frustration when there is a requirement to maintain a product range that is excessive (ibid). Ultimately, this may lead firms to terminate viable products because there is a flow of new products waiting to be launched (Lambert & Slater, 1999).

Lambert and Slater (1999) also point out that "time-based competition may cause managers to focus too much on internal measures of schedule performance and forget why they are trying to improve those measures" (p. 430). Instead of seeking to speed up the development, firms should aim for effective market introduction timing and increased managerial responsiveness to changing conditions (ibid).

Faster product development is related to the market entry strategy and, ultimately, the timing of a product launch, which I will discuss in more detail later on.

3.2.3 Product-development process

Scholars such as Cooper (1993), Ulrich and Eppinger (2000), and Crawford and Di Benedetto (2003) provide ideas, models, and management advice for product development. Krishnan and Ulrich (2001) define product development as, "The transformation of a market opportunity and set of assumptions about product technology into a product available for sale" (p. 1).

Cooper (1993, p. 107) points out that there are various other names to describe what he calls the "from idea to launch stage gate." The other names are PDP (Product Delivery Process), NPP (New Product Process), Gating System, and Product Launch System.

Fox, Gann, Shur, Von Glahn, & Brian (1988) question whether or not the disciplinary "process step" approach of Cooper and Kleinschmidt (1986) is

always the prerequisite for a new product's success. After all, success depends not only on a state-of-the-art process, but also on how motivated and willing people are to act according to that process (Fox et al., 1988). On the other hand, Cooper and Kleinschmidt (1986, p.84) state that "the outcomes of the new product project are also very much in the hands of the men and women who move the project from idea to launch." Cooper and Kleinschmidt (1986) also call special attention to activities such as market studies, initial screening, and preliminary market assessment.

While the front-end activities were beyond the scope of this study, it may be worth mentioning here that Cooper (1993) actually left idea generation out of his original stage-gate model, too. According to him, "Idea generation is a critical activity, but one that occurs prior to beginning the new product process: ideas are the inputs or triggers of the new product process" (Cooper, 1993, p. 109). It seems that Cooper changed his mind later on because the stage-gate model today does include a separate discovery stage (stage 0), which is defined as "activities designed to discover opportunities and to generate new product ideas." (Product Development Institute, 2012).

3.2.4 Market orientation and product innovations

According to several studies, market orientation has a strong and positive impact on a firm's long-term success and business performance (Desphpandé & Farley, 1998; Kohli & Jaworski, 1990; Narver & Slater, 1990; Rodriquez Cano, Carrilat, & Jaramillo, 2004) because these firms have the ability to understand what their customers are after and to act accordingly so that they can attract and keep those customers.[45] Market-oriented firms seem also to be able to anticipate a competitor's actions and make fact-based decisions (Day 1999, cited in Rodriquez Cano et al., 2004, p. 192).

3.2.4.1 Essence of market orientation

There is no consensus regarding an unambiguous definition of market orientation, even though numerous attempts to define it exist (Lafferty & Hult, 2001). According to Gray, Sheelagh, Boshoff, and Matheson (1998), there are two main "schools of thought" to market-orientation research and

[45] In that sense, it seems appropriate to postulate that market orientation is closely connected to the product innovation and commercialization activities of a firm.

literature; both schools of thought have focused on the link between market orientation and business performance. One school of thought is represented by Kohli and Jaworski's (1990) viewpoint, which approaches market orientation from an organization perspective and defines market orientation as follows:

> *Market orientation is the organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it. (Kohli & Jaworski, 1990, p. 6)*

The other approach originates with Narver and Slater (1990), who emphasize the more cultural aspects of firms:

> *Market orientation is the organization culture… that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuous superior performance for the business. (Narver & Slater, 1990, p. 21)*

Despite clear differences, both approaches overlap to a certain degree as well. Both approaches share the idea that customers' needs and expectations form the key points in market orientation and that processes and activities should be in place to overcome organizational barriers and facilitate the creation of value for customers via ongoing needs assessments (Rodrigues Cano et al., 2004).

Leskiewicz, Sandvik, and Sandvik (2003) try to combine both approaches by stating that market orientation includes the creation and refinement of market knowledge, which serves as basis for the organization-wide generation of product ideas and the decisions to use those ideas to develop strong market positions with customers and to take advantage of market development possibilities. Similarly, Lukas and Farrell (2000) also aim to find a consensus between these paths. They provide the concise summary of market orientation by stating that it is "the process of generating and disseminating market intelligence for the purpose of creating superior buyer value" (p. 240).

Deshpandé and Farley (1998) see market orientation as a set of activities rather than a culture. Thus, they define market orientation as "the set of cross functional processes and activities directed at creating and satisfying customers through continuous needs-assessment" (p. 226). Narver and Slater (1998b) disagree with Deshpandé and Farley; in direct response to the definition suggested by Deshpandé and Farley. Narver and Slater strongly emphasize that cultural aspects really are the essential part of market orientation.

3.2.4.2 Market orientation conceptualized

Scholars conceive of market orientation as including components such as: (1) customer orientation, (2) competitor orientation, and (3) interfunctional coordination (Narver & Slater, 1990; Slater & Narver, 1994).

Kohli and Jaworski (1990) provide additional key components: (1) intelligence generation, (2) Intelligence dissemination, and (3) responsiveness. Figure 9 illustrates all of these components.

Kohli, Jaworski, and Kumar (1993) have suggested that a causal ordering of the market-orientation components could help create a better construct for it. Deshpandé and Farley (1998) recommend that firms should be more focused on customers instead of on monitoring their competitors. Slater and Narver (1994) have a different opinion; they state that firms should be flexible and able to shift their area of focus regarding market-orientation components depending on changes in market conditions. Leskiewicz et al. (2003) point out that all the components should be in balance. They feel that if a firm overemphasizes some component at the expense of others, that particular firm can hardly be seen as having a truly market-oriented approach.

In any event, Slater and Narver (1994) encourage firms to increase their market orientation in general. According to a study conducted by Lukas and Farrell (2000), firms that are seeking to create line extensions should emphasize interfunctional coordination, whereas concentrating on competitors can help firms match their products with others on the market. Lukas and Farrell (2000) also state that "our findings suggest that businesses seeking to commercialize more breakthrough innovations should focus on a strong customer orientation" (p. 245).

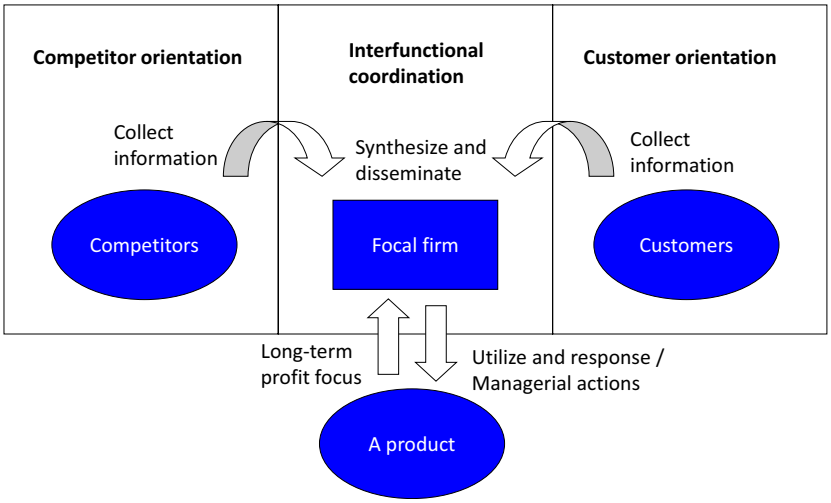

Figure 9. Illustration of the key components of market orientation (combining the ideas of Kohli and Jaworski, 1990, Narver and Slater, 1990, and Slater and Narver, 1994)

A more in-depth analysis of market orientation is provided by Lafferty and Hult (2001). According to them, the existing literature reveals the following five distinct perspectives on the concept of market orientation:

- the decision-making perspective;
- the market-intelligence perspective;
- the culturally based behavioral perspective;
- the strategic perspective; and
- the customer-orientation perspective

3.2.4.3 Limitations of market orientation

One of the main questions in the discourse on market orientation has to do with whether or not market-oriented firms are able to be innovative. The reason behind this question is the concern that market orientation could actually hinder a firm's capability to create product innovations because the market-orientation approach can easily lead firms to come up with me-too products and line extensions (Lukas & Ferrell, 2000). For instance, Bennett and Cooper (1979) are of the opinion that a strong market orientation yields imitations and only marginally innovative products. In other words, if firms listen too much to what their customers want (or are supposed to want), this eventually will lead these firms to avoid radical projects and new, try-out products.

Lukas and Ferrell (2000) refer to several scholars who have pointed out that a strong market orientation can be a barrier to commercialization and, thus, it will ultimately reduce competitiveness. Slater and Narver (1998)

strenuously object to this critique. The next chapter focuses on this debate in more detail.

Slater and Narver (1998) also strongly state that market orientation must not be confused with marketing orientation. They emphasize that market orientation is a concept that affects the whole organization and every business process, not only marketing, which performs just one function within a particular firm. A different opinion is expressed by Langerak, Hultink, and Robben (2004), who state that,

> *a market-oriented culture's influence on new product performance is restricted to the launch phase of the NPD process rather than also being pervasive to other phases (i.e., predevelopment and development) of the NPD process. (p. 90)*

It seems that market orientation is not a "silver bullet" for all situations. Kohli and Jaworski (1990) point out that the underlying business environment has a strong influence on the strength of the relationship between market orientation and business performance. For instance, high technology turbulence or very stabile markets are situations where market orientation is less important. If, for example, a firm enjoys limited competition, then being market oriented is not that crucial to business performance. Also, a strong overall economic situation typically help firms to run their business better and firms with less market orientation can also flourish in such situations (Kohli and Jaworski, 1990). Narver and Slater (1990) and Slater and Narver (1994) share a different opinion and argue that market-oriented behavior is relevant for every business in every situation and especially within the context of new product development. However, firms should consider the optimal degree of market orientation that would fit with their current and future business environment (Narver and Slater, 1990). In any event, the meta-analysis, which included studies that covered a total of 23 countries, found strong evidence that a clear, positive relationship exists between market orientation and business performance moderated by product innovation (Rodrigues Cano et al., 2004).

3.2.4.4 Market orientation versus customer orientation

Parallel to market orientation, the concept of customer orientation has raised interest among scholars, but also created a certain amount of confusion. It has been noted that customer orientation covers those up-front activities that ensure a smooth flow of ideas and have real market need (Parkinson, 1985), but it can also consist of activities during the

implementation phase that are essential in order for a customer to be able to fully exploit the new invention or technology (Ettlie et al., 1984).

Slater and Narver (1998) argue that the critique of market orientation is due to a conceptual misunderstanding in which scholars confuse customer-oriented business with market orientation[46]. In addition, they feel that a customer-led business is reactive by nature and focuses on the current needs of customers in the markets that it already serves. Slater and Narver also point out that this kind of customer-oriented philosophy favors a more short-term approach, whereas market orientation is a longer-term concept that seeks to understand both the expressed and latent needs of customers. Furthermore, a customer-led business utilizes tools such as market and customer-satisfaction surveys, concept testing, and focus groups to understand customers' wishes and perceptions of current products (ibid.). The dilemma is that this type of practices often leads management to pursue incremental improvements with minor risk, whereas a more holistic, market-orientation approach is the basis for creating new products for untapped markets (Slater & Narver, 1998).

Connor (1999) argues that the above-mentioned dyadic approach presented by Narver and Slater is an "unrealistically narrow interpretation" and also "too reductionist as a proposition" (Connor, 1999) argues that there should be more balance between customer-led and market-led approaches. According to Connor (1999),

> *All products must serve current customers and current needs. Future products must serve future current customers and their future current needs. We face a choice, do we try to make a future with our current customers or do we anticipate replacing our current customers with a new set of yet to be identified customers who will become our future current customers? It would appear, at face value, that the latter course would be a much higher risk route*. (p. 1160-1161)

Connor (1999) also points out that there are only a few, mainly large and resourceful, firms that are able to pursue current and future markets simultaneously. The dilemma of matching the products to the market is presented in Figure 10. Different planning horizons (Connor 1999).

[46] In this paper Slater and Narver actually use the term "customer-led," but I feel they are using the term as a synonym for customer oriented. In addition, please see the last paragraph of this chapter for more clarification.

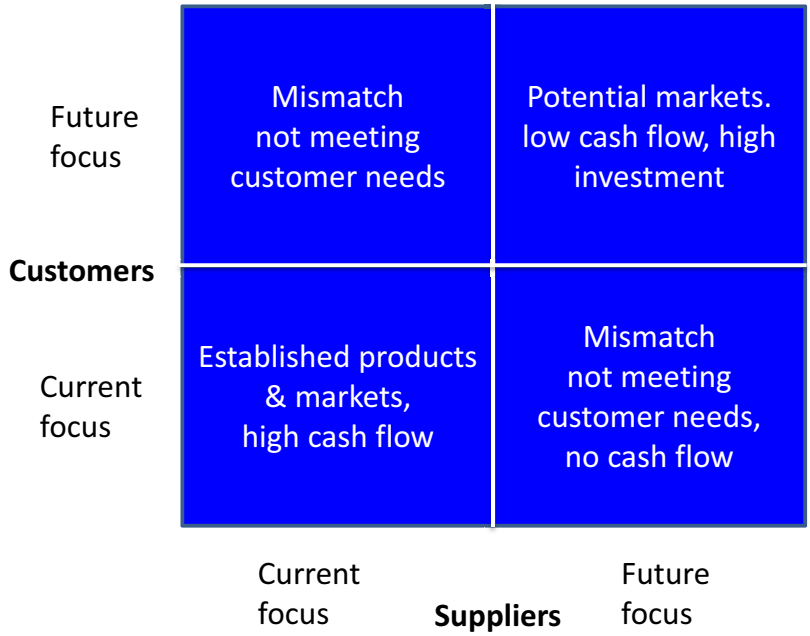

Figure 10. Different planning horizons (Connor 1999)

Slater and Narver (1999) continue the debate and, in their response to Connor's (1999) critique, they postulate that market orientation need not be expensive and also that small firms can be as much, or even more, market oriented than large firms. Slater and Narver (1999) also stress that market-orientation is "one end on a continuum and market learning and market response behaviours" and that "market-oriented business need not sacrifice short-term performance for long term prosperity or vice versa" (p. 1167).

Later on, Narver, Slater, and MacLachlan (2004) re-label the market orientation concepts again. They replace "customer-led" with the term "responsive market orientation," a term that focuses on customers' current needs. Similarly, the term "proactive market orientation" is used to describe a business that will lead customers to discover and satisfy their latent needs.

3.2.4.5 Market orientation versus technology/product orientation

Slater and Narver (2004) also approach new product success by using the terms "market orientation" and "innovation orientation." They do not operationalize or clarify what is behind *innovation orientation*, but it seems

likely that, according to them, firms that are innovation oriented are mainly focused on technological innovations.

The debate over product versus customer centricity has been the focus of various studies and discussions, too. Wallenstein (1968) illustrates these two different approaches. The customer, or market-oriented, approach views the customer as the main objective. The product-centric approach, on the other hand, takes customers for granted and focuses on products as the main objective, even if the existence of the customer is embedded in all the work done by the firm. Wallenstein (1968) admits that there are serious flaws in both of the approaches.

Another way to label these two approaches is to distinguish between market-driven innovation and technology-driven innovation. The basic differences between these types of innovation are presented in Table 2 below (Levy 1998).

Table 2. Technology-driven innovation versus market-driven innovation (Levy 1998, p. 15-16)

Technology-driven innovation	Market-driven innovation
"The basic stimulus for its implementation comes from the availability of a new technology or a combination of new technologies. The very fact that a new technology may allow the development of products that were difficult or even impossible to create in the past is by itself a strong motivation to develop such a product."	*"The basic stimulus for its implementation comes from well-perceived market needs or, better, from an established market demand. Innovation in this case usually consists of creating a new product to replace an existing one, or a new generation of products, with better, more attractive price-performance ration. In other cases, well-defined customer demand stimulates the development of original products that fulfill specific requirements in a totally new and innovative way."*

Cooper (1979b) argues that,

> *of particular interest is the fact that these two orientations are not mutually exclusive; the dimensions are independent of each other. A project simultaneously can have both a strong market orientation and a strong technical/production orientation. (p. 97-98).*

The above-mentioned approaches can also be reduced to the interplay between two "forces," i.e. technology push and market pull. For more discussion of push and pull, see, for instance, Dosi (1982), Dodgson and Rothwell (1994), Schwery and Raurich (2004) and Trott (2002). According

to Brockhoff and Chakrabarti (1988), this typology was originally developed by Myers and Marquis[47] (1969).

There are scholars who claim that the products that originate from market pull have better chances for success (Utterback, 1971), whereas others seem to reject the market pull completely (Cooper, 1979a; Brockhoff and Chakrabarti, 1988)

Goldenberg and Mazursky (2002) argue that the source of a really new product comes from the mind of an inventor and not from the market.

> *New and surprising products were evolved by a great variety of people, some of whom had no knowledge at all about the market for the product they had developed, and some never even imagined that the market would be interested in their inventions. (Goldenberg and Mazursky, 2002, p. 14)*

Scholars use post-it notes by 3M and the Sony Walkman as examples of products that fit the above-mentioned statement. Both of these products were not supposed to become successful at the time of introduction, but turned out to be a real hit with consumers (Goldenberg & Mazursky, 2002).

On the other hand, some scholars argue that a firm that becomes more aware of a customer's real wants is likely to achieve better results. This topic has been discussed by Urban and Von Hippel (1988) and Veryzer and de Mozota (2005).

There are even specific groups of customer called lead-users who already have needs, which will prevail in the market place in general in the future (Von Hippel, 1986;, 1989). Staying in touch with the customer can also cause a new application to be re-invented based on the underlying technology (Meyers & Athaide, 1991). A constant interaction between the buyer and the seller has been seen as beneficial for the seller, at least within the context of process innovation (Athaide, Meyers, & Wilemon, 1996). Berggren and Nacher (2001) argue that firms fail to make products with the right benefits because they lack an understanding of what the customer is trying to achieve and, in particular, how she or he is trying to achieve it.

Wind (2005) claims that technology-driven firms usually build a market around products, whereas market-driven firms begin with the customers

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[47] This item was not available as a primary source. / Myers S. & Marquis D.G. (1969). Successfull industrial innovation. *Nat. Sci. Foundation*. Washington. DC Pub. 17-69.

and then develop a product. Wind (2003, p. 867) emphasizes that the following questions form the core of the marketing perspective:

- Who are the customers and what do they do?
- What product/service offerings will meet the target segments' need and offer us a sustainable competitive advantage?
- What strategies and programs, resources, capabilities, and processes are required to develop and implement effectively the product/service solutions?

This leads to a questioning about the role of market research. That is to say, are customers capable of expressing their real needs? For instance Deming (1994) points out that "no customer asked for electric lights. … No customer asked for photography. No customer asked for pneumatic tires. … No customer asked for an integrated circuit. No customer asked for facsimile" (p. 7).

In any event, the question of how useful market research is has been much debated and the ability of customers to predict or foresee ideas for a new product has been questioned (Goldenberg & Mazursky, 2002; Griffin & Hauser, 1996; Griffin, 1996).[48]

3.3 Commercialization

> *The idea that a new product suddenly emerges from R&D - like a chicken from an egg - is simply incorrect.* - Crawford and Di Benedetto (2006, p. 34)

Commercialization is a term that is not clearly defined in the academic literature.[49] Rogers (2003) defines commercialization as "the production, manufacturing, packaging, marketing, and distribution of a product that embodies an innovation" (p. 473). Gans and Stern (2003) discuss commercialization within the context of start-up firms and see commercialization as consisting of the process in which firms translate promising technologies into a stream of economic returns for their founders, investors, and employees. Mitchell and Singh (1996) states that, "by commercialization, we mean the process of acquiring ideas, augmenting

[48] The market research literature is vast and further discussion of the topic is beyond the scope of this dissertation.
[49] As the reader may have noticed, there seems be certain issues with business management terminology in general.

them with complementary knowledge, developing and manufacturing saleable goods, and selling the goods in a market" (p. 170).

In addition, the term commercialization has been used to mean "converting or moving technology into a profit making position" (Siegel, Hansen, & Pellas, 1995, p. 18). This process, however, can be relatively slow and requires a long-term perspective (Fox, 1982).

Cooper (1993) defined commercialization as "'the 'back end' of the process, including market launch, production start-up, trial sell, and production" (p. 41). On the other hand, Cooper discusses marketing planning, which, he stresses, should start early in the new product process. According to Cooper (1993), many aspects of a marketing plan must actually be in place before product design and the development task commence.[50] According to Rogers (2003), commercialization can be seen also as "The conversion of an idea from research into a product or service for sale in the market place" (p. 152).

Previous statements cover quite a broad range of topics and, thus, leave a reader much freedom to interpret the concept in whatever way she or he desires. The chapter 5 defines commercialization for the purposes of this dissertation, but it is acknowledged that the term can have a different meaning within a different context. For instance, there is a fundamental difference between the commercialization of technology versus the commercialization of products, which will be discussed in the next two subsections. Jolly (1997) provides a good distiction between these two by stating that,

> *a technology is essentially a "capability", often a versatile one, that can be used in more than one product. Products are occasional embodiments of this capability and mediate the process of bringing it to market and realizing from it. The technology and these products, however, often live separate existences, following their own competitive logic, converging sporadically"*(p. xv).

Table 3 provides a detailed contrast between product and technology commerzialization.

[50] Most of these marketing planning activities are incorporated under commercialization in this dissertation. Also, the notion that commercialization is the "last phase of the NPD process" is very much challenged.

Table 3. The main differences between product and technology commercialization (Jolly 1997, p. xvi)

Characteristic	Product	Technology
Object to be commercialized	Single product	Multifaceted capability
Start of commercialization (and time scale)	Product conception (1 - 5 years)	As soon as a potentially valuable technological concept is proposed (10 - 20 years)
Stakeholders to whom to demonstrate value	Customers and end-users	Several, whole mix and interests evolve with the technology
Nature of demand	Final for the segment targeted	Derived from the product(s) made possible
Competition	Other products for same function	At different levels against other technologies for same product or function
Marketing challenge	Exploiting unique selling proposition (USP) of finished product	Exploiting whatever the technology can achieve at the point in time
Timing	End-user market opportunity	The time line of competing inventors, adopters, and resource providers
Opportunity for value creation and appropriation	Revenue from making and selling products competitively	Product sales and/or collateral benefits over life of technology

3.3.1 Commercialization of technology

According to Zahra and Nielsen (2002), the commercialization of technology is an important way for firms to create new business and profit. Technology can be seen as intellectual property, or it can be something that is embodied in physical artifacts, i.e. products,[51] or it can be present in the form of a technical service - technology represents knowledge rooted in engineering or scientific disciplines, and firms can treat it as an intangible asset (Arora, Fosfuri, & Gambardella, 2001). One definition states that technology is "knowledge of how to do things" (Steele, 1988, p. 8). Another, even broader, definition states that technology is "the system by which a society satisfies its needs and desires" (Steele, 1988, p. 8).

Commercialization within the context of technology has been seen to cover aspects ranging from basic and applied research to product development, production, and marketing (Jolly, 1997). According to Teece (2003),

[51] The distinction between *technology* and products is sometimes difficult to draw in practice - for instance, in software or biotechnology.

> *the strategic management of technology is fundamentally about the commercialization of new knowledge. … Commercialization is primarily about the entrepreneurial role of bringing technology to the user and winning in the marketplace". (p. 138)*

Rogers (2003), on the other hand, sees commercialization as a way to package research results in a form that can be adopted by users. According to Eldred and McGrath (1997),

> *For most companies, the primary focus has been on product development because it is the anchor of the development process. However, this is not sufficient to provide long-term competitive advantage, especially if commercializing new core technologies is an important driver of a product strategy. (p. 33)*

Unfortunately, the path from the early stage of technology to a commercial product can take a long time and requires organization to overcome numerous challenges. For example, concrete examples of the difficulties include the case of laser diodes at Sony (Wood & Brown, 1998) and fiber optics at Corning (Cattani, 2005).

According to Rogers (2003), the commercialization of technology is often done by private firms. However, the technology embodied in new products has no value for the firm unless it provides significant new or improved customer benefits, or reduces product costs (Abetti & Stuart, 1988). The commercialization of technology can happen in various ways and its form it takes depends on the competencies of an underlying organization.

One option for making new technology commercially beneficial is to sell the intellectual property rights (IPR) for it. This can happen by selling a licensing fee, for which there is the possibility to create various, different licensing models; alternatively, a firm can also market an underlying technology by selling complete patents to external parties (Katz & Shapiro, 1985; Dodgson, 2000[52]). According to Arora et al. (2001),

> *in general, when the rights to produce something or the knowledge of how to do so are separated from the thing itself, there is a clear line between the market for the thing itself and the market for the technology used to create it. (p. 3)*

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[52] In *The Management of Technological Innovation*, Dodgson (2000) acknowledges that commercialization can happen via the marketing of tangible products. Despite that, he devotes an entire chapter, with the title "The Commercialization Process," to only discussing the licensing and selling of intellectual property rights and know-how. He does not touch on the commercialization process for products at all in the book.

There are many motivations behind the sale or licensing of IPRs. First of all, there is the question of risk and reward. A firm that first introduces the actual new product will bear the market risk that the product might fail to achieve market success (Teese, 1986). Other reasons might involve the capacity restrictions of a patent holder (Katz & Shapiro, 1985). A firm might lack financial resources, access to certain complementary capabilities, or assets (Teese, 1986), or it might lack the necessary means for integration within the industry value chain (Kollmer & Dowling, 2004). In addition, a firm might have limited knowledge in some market areas and, therefore, it will be better off by making a licensing agreement with a partner that is able to compete in that market (Katz & Shapiro, 1985). In any event, firms should systematically assess their competences when considering new technologies (Torkkeli & Tuominen, 2002). If a firm decides not to sell IPRs, then it needs to consider whether to develop all of the required technological competence itself or acquire it from elsewhere (Holt, 1983). This topic is also related to the open innovation paradigm because the knowledge and technology can be exchanged between organizational boundaries (Kutvonen & Torkkeli, 2010).

There are many ways to transfer risk and reward between parties; they range from an one-off, fixed-fee licensing contract to royalty-based provisions and various combinations of them. The type of license model depends on, for example, the bargaining power between parties, the level of technological maturity, the radicalness of the technology, and the competitive position of firms. It is obvious that the licensor is often motivated to pursue a success-fee type of licensing agreement. If the final product turns out to be extremely successful, the licensor will still be able to reap the benefits in terms of royalties. However, monitoring per unit charges can be cumbersome. An additional issue is that once a licensee has access to the technology, he or she can try to imitate it and find ways to circumvent the patent by "inventing it around" in order to avoid paying royalties (Katz & Shapiro, 1985; Teese, 1986).

Additional ways to achieve technology commercialization include creating a joint venture (Zajak, 1991) or establishing a strategic partnership or alliances (Steele, 1989; Grant, 2002). Joint ventures help a firm share the business risk and combine complimentary assets and resources between two or more firms. However, joint ventures are sometimes hard to manage due to potential conflicts of interest. While strategic alliances usually limit risks only in the areas of co-operation, they help a firm commercialize

technology with additional skills and support from the alliance members (Megantz, 1996).

Gans and Stern (2002) present an alternative view of commercialization by considering the topic from an entrepreneur's perspective. Instead of entering the product market, a small firm may enter the market for ideas. This follows the same logic as commercialization of technology in terms of selling IPRs, only in this case the idea is non-technological in nature. The major issues within the context of only selling ideas have to do with the bargaining power between parties and also the disclosure problem related to ideas (Gans and Stern, 2002).

3.3.2 Commercialization of products[53]

Commercialization within the context of products is completely different than with technology. Cooper and Kleinschmidt (1990), for instance, use the term commercialization to describe trial production and sales, production start-up, and market launch. The two interpretations of the term commercialization are illustrated in Figure 11. In this dissertation the focus is on commercialization within the context of the product innovation process.

[53] This is based on the "traditional" approach. Chapter 5 presents a somewhat different view, where commercialization is operationalized for the purposes of this dissertation.

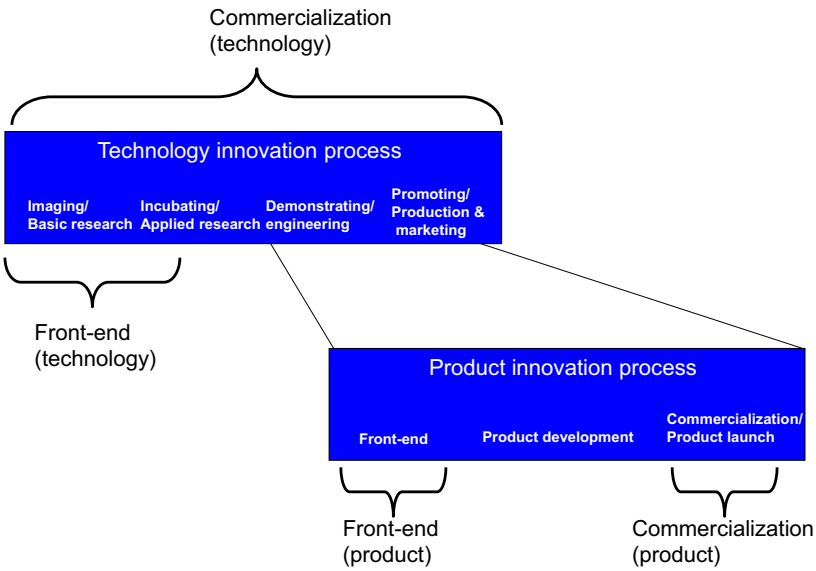

Figure 11. Commercialization within the context of technology and products (Adapted from Jolly, 1997 and Koen et al. 2001. Modified from Simula and Lindroos, 2006)

In other words, instead of concentrating on how technology is commercialized, another way to use the term commercialization is to apply it to describe the final step in a firm's new product creation process[54] (Cooper, 1996; Koen et al., 2001).

The commercialization of products, i.e. entering into the product markets, includes larger risk and investment requirements than the above-mentioned alternative commercialization strategies (Di Benedetto, 1999; Kotler & Keller, 2009). The basic reason is that the path to a commercially successful product is often complex and full of unforeseen surprises (Norling, 1998). The requirements for a new product are typically multidimensional. The Committee on Engineering Design Theory and Methodology of the National Research Council has created a list that covers various issues a firm should consider before launching a new product initiative. The list is available in Appendix D.

The focal firm, however, has full control over the development tasks and also possesses ownership over the intellectual property, which means that the rewards will also return to them alone (Grant, 2002). Naturally, a firm

[54] Grant (2002) actually labels this *internal commercialization*.

does not have to do everything alone. According to Mitchell and Singh (1996), a collaborative relationship is beneficial in the case of the commercialization of complex products.

As mentioned earlier, the literature on product innovation typically considers product innovation process to comprise three phases: a front-end phase, a development phase and a commercialization phase (e.g., Buckler, 1997; Koen et al., 2001). This type of linear approach with separate activities is embedded in various articles in the NPD literature, too (e.g., Cooper, 1996; Khurana & Rosenthal, 1997; Griffin, 1997; Schilling & Hill, 1998).

Figure 12 illustrates this kind if traditional, linear way of dividing the product innovation process into three separate phases. Cooper (1996) describes the commercialization phase in this form:

> *this stage sees the implementation of the marketing launch plan, the production plan, and the postlaunch activities, including monitoring and adjustment. (p. 479)*

While Cooper (1993) clearly emphasizes the importance of the superiority of a product as the key success factor, he also acknowledges the importance of commercialization.

Figure 12. Typical trisection of an innovation process (applied from Koen et al., 2001).

Within the context of the product innovation phases, the front-end phase is the phase that includes those activities that come before the more formal development phase (Koen et al., 2001). This is the phase during which there is a significant amount of uncertainty in terms of the market, competitors, and technology (Zhang & Doll, 2001; Reid & de Brentani, 2004).

Firms sometimes have difficulties in assessing the true value of technology. A single technology base can actually provide a base for various commercialization paths via different projects and several new products. Thus, a single project is not sufficient enough to capture the full value of a single technology base (Parker & Mainelli, 2001). Cook (1997) continues

this argumentation by stating that, “It may not be clear which new technology is the most appropriate to carry the product in future” (p. 23). Thus, a firm that chooses to commercialize new products has to keep a close eye on technology development because there can be radical changes that make existing products obsolete. The radical shift in underlying technology can dramatically change the rules of the game. There are many examples where new technology shifted the business to new paths. For instance, Cook (1997, p. 23, orig. Foster, 1986) lists the following examples of older products that were replaced by new ones:

- Nylon by polyester cord;
- Sailing ships by steam;
- Germanium by silicon;
- Mechanical watches by digital watches;
- Electro-mechanical cash registers by electronic cash registers;
- Propellers by jet power for aircraft.

It is worth mentioning that the time period between an original invention and a commercialized product can be very long. Agarwal and Bayus (2002) have studied 30 industrial and consumer innovations in the United State between the years 1849 and 1983. The average time between an invention and the actual commercialization of the product took 29 years. Yet, it was another ten years before sales really took off. The list of these examples is available in Appendix E.

The quote from Jolly (1997, pxv-xvi) summarize the distinction between products and technology also quite well:

> *For products, the desired outcome is value to customers, and it is the latter alone who decide. In contrast, the evolving capability a technology represents means that the stakeholders to be satisfied are of greater number, whose composition changes over time.*

Jolly (1997, p.13) also notifies that “the value of any new technology ultimately lies in the product incorporating it and their success in the marketplace”.

3.3.3 Product launch

The ultimate market test of any product is at the time of launch (Beard & Easingwood, 1996; Guiltinan, 1999). According to Di Benedetto (1999), an effective and efficient product launch plays an important role in company performance. In spite of its importance to business, there have been few empirical studies of what constitutes an effective new product launch and

academic interest in product launches has been relatively new (Hultink et al., 2000; Garrido-Rubi & Polo-Redondo, 2005; Calantone & Di Benedetto, 2007). According to Hart and Tzokas (2000),

> *until recently, there were relatively few studies, which operationalized the notion of 'launch' within the context of new product development, although a wider range of studies of "market entry" existed from which to draw possible parallels. (p. 350)*

Calantone and Di Benedetto (2007) provide a review of the literature pertaining to the product launch process. As discussed in the introductory chapter, the launch stage is often the costliest phase of NPD. According to Schneider (2004),

> *the single biggest obstacle to new product success is underfunding your launch. In today's competitive market place, it always takes longer and costs more to launch a new product than you expect. (p. 230)*

Cooper and Kleinschmidt (1986) state that among the 252 industrial projects they studied, "surprisingly, in over 30% of the projects, the launch stage was not formally recognized as a distinct and identifiable stage or activity" (p. 80). Kotler and Keller (2009) actually note that the product launch stage should be loaded with sufficient funding because implementing a launch typically takes more time and resources than originally anticipated. In addition, Oakley (1996) states that firms that immediately launch their products on overseas markets, in general, perform better than those firms that first introduce products on their home market and only slowly try to enter global markets.

The following subsections briefly discuss the launch process and management topics related to it.

3.3.3.1 Launch strategy and tactics

When a new product is launched, it is also visible to those already selling competing products on the market. Naturally, a firm may decide to release some information about its intentions to offer a new product in future. This is called a pre-announcement and it is discussed in more detail in section 3.3.3.4. The level of hostility as well as the strength and speed of the reactions of other firms in response to a product launch vary (Hultink & Langerak, 2002). According to Debruyne et al. (2002), the reactions of competitors also vary regarding the innovativeness of a new product. They claim that competitors fail to respond to radical innovations, but, rather, are eager to take action when the product is incremental in nature and represents a direct threat to the existing product category.

The launch strategy and tactics used by a particular firm has an impact on product performance and market demand (Guiltinan, 1996; Hultink & Robben, 1999). As mentioned in the introductory chapter, this dissertation focuses on B2B products. However, Hultink et al. (2000) have extended their research on product launches to provide an analysis of the differences and similarities between B2B and consumer product launches. Their study of UK firms revealed that there is actually a great deal of similarity between the product launch tactics of B2B and B2C firms.

Hultink, Griffin, Hart, and Robben (1997) have presented a model for how strategic (what, where, when, and why) and tactical (how to) launch decisions impact new product performance. This is illustrated in Figure 143. Hultink et al. (1997) emphasize that "the strategic launch decisions made early in the process impact the specific tactical decisions made later in the process" (p. 247). Similarly, Crawford and Di Benedetto (2006) have addressed a set of strategic and tactical decisions that firms need to take into consideration in their final launch plan.

It is, however, useful to notice the following comment made regarding strategic and tactical decisions and strategic givens. According to Crawford and Di Benedetto (2006), "be warned, of course, terms in the new products field are 'flexible,' and one person's tactic is another person's strategy and still another person's given" (p. 359).[55]

[55] This issue is further debated in the discussion section later on.

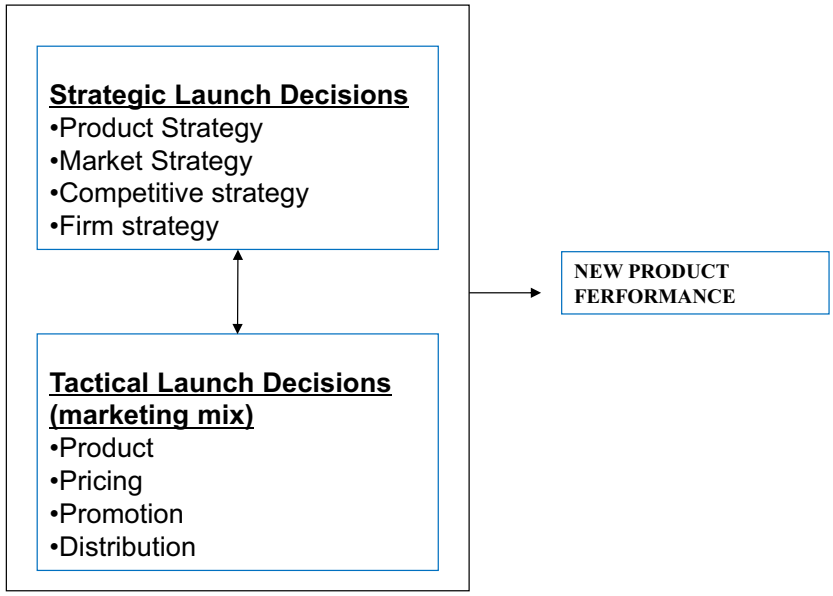

Figure 13. Strategic and tactical launch decisions (Hultink et al., 1997)

3.3.3.2 Launch process

Crawford and Di Benedetto (2006) use space systems as a metaphor when they compare the launch of a new product with the launch of a space shuttle. The shuttle is sent into orbit on the launch date. Similarly, a new product is launched onto the market when the product is officially revealed. The preparation for the shuttle launch takes time and, likewise, the activities related to the launch of a new product involve a longer time span. The period of time close to the day of the launch (before and after) is called the launch phase. However, the launch phase can last a week or months depending on the case (Crawford and Di Benedetto, 2006).

While a separate launch process might prove useful, it should be crafted as a collaborative effort between the different departments. Kitcho (1998) provides an example of a situation where the launch process was crafted by marketing department alone and, thus, those in the engineering and product development departments simply refused to pay attention to it. It is therefore important that the launch process should work for the whole business instead of being centered on the efforts of a single department (Kitcho, 1998).

Cooper (1993) has developed a conceptual and operational stage-gate model for the new product process. The model ranges from the " idea to launch" and breaks the project into separate stages, which are then divided

into formal decision points, i.e. gates. These gates are used to make go/kill judgments for the project. The number of stages varies depending on the project, but the generic key stages, according to Cooper (1993), are as follows:

- Preliminary investigation (scoping): A quick and inexpensive assessment of the technical merits of the project and its market prospects;
- Detailed investigation (build the business case): This is the critical homework stage - the one that makes or breaks the project. Technical, marketing, and business feasibility are accessed, resulting in a business case which consists of three main components: Product and project definition, project justification, and project plan;
- Development: (Plans are translated into concrete deliverables). The actual design and development of the new product occurs, the manufacturing or operations plan is mapped out, the marketing launch and operating plans are developed, and the test plans for the next stage are defined;
- Testing and validation: The purpose of this stage is to provide validation for the entire project: The product itself, the production/manufacturing process, customer acceptance, and the economics of the project;
- Full production and launch: Full commercialization of the product - the beginning of full production and the commercial launch of the product.

Schneider (2004) suggests that this model should incorporate a separate stage of market launch. She refers to this 6th stage as "market launch" and it includes all launch-related activities, as illustrated in Figure 144. The original idea behind the stage-gate approach was to ensure that there are formal go/no-go decisions after each stage. It seems that Schneider's model does not follow stage-gate thinking in its purest form, because she makes the following observation: "Just because the actual launch occurs at the end of the new product development process it doesn't mean that launch activities are on hold until the other stages are completed" (Schneider, 2004, p. 105). Guiltinan (1999) also stresses the similar parallel relationship between launch planning and launch-related activities.

While the stage-gate model presents the launch phase as the final phase in the development process, Cooper (1993) also refers to "corresponding marketing planning activities,"[56] which are aligned with the product development process.

[56] I would rather use the term commercialization here, because it can easily cover all of those aspects that Cooper refers to as "Marketing Planning Activities."

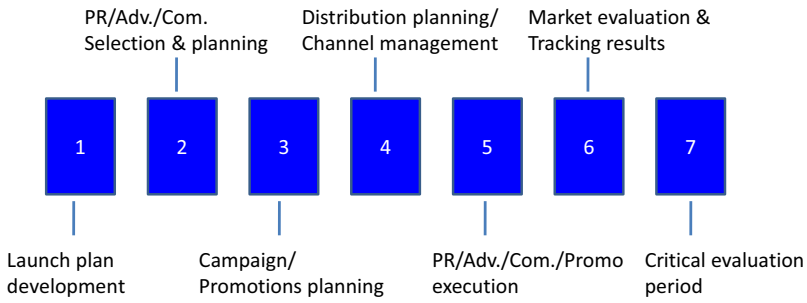

Figure 14. Market Launch Stage-Gate Model (Schneider, 2004)

In any event, planning clearly has an important role because it is visible in the first four phases of the market launch model. Thus, the planning aspects of a product launch are discussed in more detail in the next section. The other launch elements, including execution, evaluation, and monitoring, are also discussed in separate subsections later on.

3.3.3.3 Planning for a launch and having a launch plan

The firms competing in global competitive markets are often in a hurry to refine fresh ideas for new products and to bring these products to the market fast (Schmidt, 1995; Bayus, 1997). The timely introduction of a product, together with a reduced development cycle, has been considered the most important success factor[57] for new products (Di Benedetto, 1999; Wong, 2002). The timely introduction of a product, however, requires enough time for all participants involved to design and implement launch-related activities. In other words, a successful new product launch phase requires careful planning and a launch plan (Kono, 2005).

Brethauer (2002) points out that sometimes people have a tendency to optimize and fine-tune the product without paying attention to the fact that at some point in the development process, the work must be stopped for launch to take place. According to Schneider (2004), it is dangerous if the firm postpones launch-related tasks too close to an actual launch date. The launch planning phase aims to help to overcome these problems. The planning process for a product launch should be started well before the final product development is finished (ibid.). Schneider notes that,

[57] Please refer to section 3.3 for more success-related topics.

"Allowing adequate time for launch planning and execution is especially critical if you've got breakthrough product" (Schneider, 2004, p. 135).

The essential part of implementing the product launch phase is incorporated within an integrated launch plan, which is defined as "a coordinated set of strategies and tactics for introducing a product to a target market" (Guiltinan, 1999, p. 510). A somewhat more practical-oriented definition is provided by Kitcho (1998), who differentiates between marketing plan and launch plan and sees the marketing plan as the master plan; in his formulation, "the launch plan is the blue print that defines how and where the product launch will occur" (p. 171).

While categorizing the marketing plan and the launch plan separately is probably justified in some contexts, there is no consensus over these terms in the existing literature. As mentioned previously, Cooper (1993) uses the term "marketing plan," whereas Schneider (2004) uses the term "launch plan" to cover the same activities. According to Kotler and Keller (2009), the launch plan for a new product includes those activities necessary for presenting a new product to its target market so that a firm can generate income by selling the new product. According to Soni and Cohen (2004), the basic topics a launch plan needs to address are as follows:

- What are the launch goals and strategy?
- What are the requirements for launch success? (targets for sales to key customers and overall revenues in the first year);
- Who are the major players and stakeholders?
- Launch team and potential external partners as well as key milestones for internal components (readiness of documentation, pricing, demos, collateral, product training, sales tools, warranty, service, support); and
- External components (press and analyst meetings, trade show timing, advertising and marketing agency deliverables, etc.).

An example of an outline for a launch plan is available in Appendix F.

According to Kitcho, (1998) special resource allocation table, which list the names of the people involved with the dedicated tasks and expected deliverables is needed together with a separate launch schedule listing milestones and providing a backbone for measuring progress. There is also the need for *a launch brief*, which is a short summary of the essential ingredients underlying the product launch and which is communicated to all of the parties involved in the product launch (Schneider, 2004).

Flexibility of planning for unexpected delays is also of importance, because launches are always individual events and what might have gone well during the firm's previous launch might not be the case next time (Schneider, 2004).

3.3.3.4 Preannouncement before launch

A preannouncement has to do with a formal, deliberate communication or the move before a firm actually undertakes the action of introducing a new product, i.e. signaling the firm's intentions to enter the market with a new product in future (Eliashberg & Robertson, 1988; Robertson, Eliashberg, & Rymon, 1995; Lee & O'Connor, 2003b).

For instance, Pardue, Higgins, and Biggart (2000) define a new product announcement as "the announcement of intent to manufacture, excluding announcement regarding product availability, or volume production" (p. 147).

There are numerous motives and multiple targets for preannouncements. Preannouncements can be used to persuade and build interest among customers, to obtain feedback from the market, to encourage customers to delay their buying decisions, and to inform trade analysts or influence competitors. Preannouncements can also be intentional or unintentional and the timeframe in which they are sent out can vary from several weeks to many months before the product is ready to be shipped from the factory (Robertson et al., 1995; Lilly & Walters, 1997).

It is, however, a challenge to try to keep a new product a complete secret, i.e. firms can hide some details, but not the emergence of a new product (Crawford & Di Benedetto, 2006). Chaney et al. (1991) state: "much of the information is amorphous, making it impossible to determine exactly when the information is 'actually' released" (p. 578). The idea of a constant information flow from a firm to the market during the product creation process is illustrated in Figure 15.

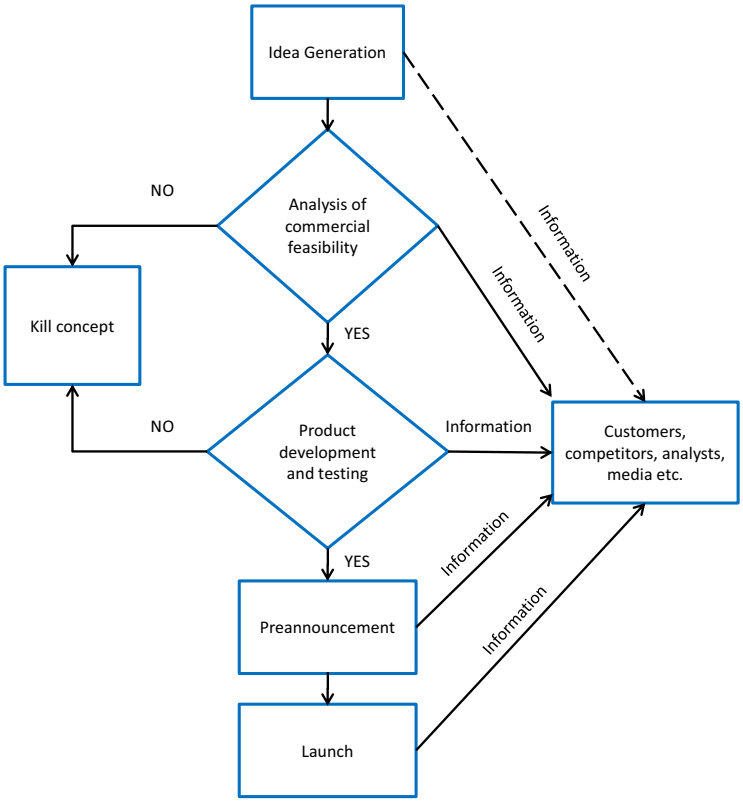

Figure 15. Information flows to market concerning a new product (Applied from Chaney et al. 1991)

It is agreed that the creation of "hype" during the new product introduction process can improve the chances of a successful launch (Wind & Mahajan, 1987). The idea is to boost positive feelings and enthusiasm and demand among the customers for the forthcoming product (Lee & O'Connor, 2003b).

According to Lee and O'Connor (2003b), a preannouncement gives incumbent firms time to reach and create severe counteractions. Thus, customer education and the creation of anticipation are much more effective strategies than fighting against competitors. Robertson, Eliashberg, and Rymon (1995) note that preannouncements targeted at competitors can also be cooperative in nature. The motivation can be to persuade competitors to follow a certain standard initiative or to form an industry alliance. Preannouncements seeking cooperation can be sent out to encourage other firms to design complimentary and compatible offerings. This is especially important with products that are subject to network externalities (Robertson et al., 1995).

One motivation for announcing a product in advance may simply be because a firm wants to be the pioneer in a particular market. The benefits of being a pioneer were already discussed in the section on market entry strategies. Lee and O'Connor (2003b) also point out that the market reacts differently depending on the nature of the preannouncement. In addition, if a new product is targeted at a competitive market, it is likely that competitors will react immediately (ibid.).

Investors' reactions to a new product are generally positive (Chaney et al., 1991; Pauwels et al., 2004), but reactions can also be negative because investors may find a new product attempt risky (Pardue et al., 2000). For instance, if a firm is planning to come up with a radically new product for a market in which a strong dominant design is already in place, it may be perceived as a potential failure by analysts, whereas if a new product represents only an incremental improvement, this may receive more favorable reactions from investors, especially during a longer-term investigation period (Pardue et al., 2000).

The Gillette Company has decided to use "two-peak" strategy as their announcement strategy. According to Schneider (2004, p. 186), "it [Gillette] does an event to announce a major product three to six months before the product goes on the shelf, and then it does another consumer media push when the product hits the store." Schneider (2004) also provides the following direct quotation from Gillette's vice president of corporate communications:

> *Immediately after telling the sales force, we a launch press event. This is a business environment; it is a business story. There is no consumer angle except to seed interest. I want to control the dialogue about the new product, and the only way to do that is to announce it to the world. Now there is no chance there will be a leak, because we announce the news ourselves. (p. 186)*

3.3.3.5 Delaying the launch

As discussed in section 5.4, there are benefits in being able to launch new products quickly. Reduced speed to the market enables pioneers to reap benefits in terms of peak sales as well as price premiums that lead to greater profit. In addition, customers may also get accustomed to the pioneers' products or bear a high switching cost for competitors' products later on. A firm that introduces products before its competitors will get direct market feedback and be able to use this information for further product modifications and quality improvements (Oakley, 1996; Smith & Reinertsen, 1998).

Despite the above-mentioned benefits, firms are often forced to delay the actual launch date. Wu, Balasubramanian, and Mahajan (2004) provide a framework to explain the reasons that firms delay introducing the actual product. The main components of that framework include the firm's motivations for delaying the introduction, the constraints that prevent delays, and the firm's ability to avoid delays. If a firm announces its product as counterreaction to a competitor's actions, then a product is likely to be delayed. A highly innovative product will have technological and market risks that also increase the chances for delays. However, if a firm has a dominant market position with a strong brand name, the firm is likely to try to avoid delays in every possible way. Also, strong partnership ties reduce the willingness to delay products. Similarly, inter-organizational aspects such as the top management being involved and interfuntional coordination are ways to avoid delays. (Wu, Balasubramanian, and Mahajan, 2004).

3.3.3.6 Internal launch and training

The new product also affects the sales strategy and sales force training. Cooper and Kleinschmidt (1986) studied 252 new product histories at 123 firms, and found that only 41.6% of the new products included training for the sales force in how to promote the new target product. Sales people have to adopt the product themselves and commit to selling it to their customers. The problem with a new product is that real user feedback that can be used in sales training material is limited. In addition, sales support lack the know-how about what types of material and training would be the most beneficial. While the type of newness of an introduced product may affect the sales management strategy of a firm in various ways, proper training and support and adjusting the incentives of the sales people are also of importance for ensuring a successful launch (Rackham, 1998; Kamel, Rochford, & Wotruba, 2003).

Davidow (1986) compares a sales force with the army – both require proper training, tools and equipment, and logistics support to be fully operational. Thus, firms should also put efforts into training their sales personnel about new products and, most importantly, this should happen well in advance of a product being launched onto the market (Rackham, 1998). In addition to the need for a sales force be competent in selling a new product, it is of importance to train and to educate the entire organization about the new product (Stryker, 1996; Pfeffer, 2007). This is called internal launch.

In addition, firm often use external resources, such as consultants and media agencies, to help with the launch project. If external partners are involved in the launch, then communication and collaboration between the various members of the team should be well planned during the launch phase (Schneider, 2004; Soni & Cohn, 2004).

3.3.3.7 Monitoring and evaluating the launch

Hill (1988) discusses the usage of market research data in evaluating the success of new product development projects. He concludes that even careful market research has its limitations. For instance, competitors' actions affect the success of a new product launch, but the actions are not known beforehand. What this means in practice is that the implementation of a launch may go much differently than what was actually planned. One issue is that firms are often in a hurry and neglect learning lessons from past endeavors (Schneider, 2004). According to Clark and Fujimoto (1991),

> *most companies rarely learn from their product development projects. In company after company, we have seen the same problems crop up over and over in project after project. At the end of every project, there is pressure to get on to the next. (p. 283)*

This approach has been predominant not only in product development, but also in product launches. Instead of rushing ahead, firms should build assessments and continuous improvements into their processes. One tool for this is derived from U.S. Army and is called an After Action Review (AAR). It not only occurs at the end of the project, as in typical postmortem practices, but throughout the project as well (Darling & Parry, 2001).

Hart, Hultink, Tzokas, and Commandeur (2003) also suggest that post-launch evaluations should be divided between short-term and long-term perspectives. The short-term evaluation reveals how the product will initially be accepted in the market place. The long-term perspective, in contrast, reveals whether the product has been able to establish a permanent role in the market and whether or not sales criteria and market share measures became more important over time (Hart et al., 2003).

3.3.3.8 Better management of the launch

Schneider (2004) mentions that more often than not managers make mistakes by not starting launch activities early enough and then they also cut launch activities off too soon after the product has been shipped. Cooper and Kleinschmidt (1986, p. 80) make some suggestions for how to improve B2B product launches:

- More resources and effort to be allocated to the advertising and promotion effort for the new product;
- A clearer definition of marketing objectives;
- Better in-house coordination among the sales, advertising, service, and production departments;
- Better training and preparation of the sales force.

Schneider (2004) provides the following ten topics, which she feels are the most important for a successful product launch:[58] (1) Treat the launch as a separate phase, (2) have a plan, (3) do not carve your plan in stone, (4) learn to live with the inevitable delays, (5) spend money on products that are new, (6) assemble an expert launch crew, (7) brand/product managers make the best team leaders, (8) bigger budgets fuel success, (9) consumer-focused spending prevents crash landings, and (10) do not overlook PR.

According to Lynn and Akgün (2003), teamwork and cross-team communication, clarity of vision and vision support from management, core team empowerment, tight deadlines, and a limited amount of formal communication procedures are critical factors that support a successful product launch. Soni and Cohen (2004) also point out four topics that a product launch should include: (1) A keen understanding of customers and the competition, (2) effective collaboration between internal resources and external customers, partners, and suppliers, (3) comprehensive product validation and testing, and (4) effective internal preparations for the external launch.

Kono (2004) lists four steps for a successful new product launch planning (NPLP) effort: (1) Give structure to the NPLP phase (define key activity steps and coordination checkpoints), (2) reconfigure cross-functional teams for the NPLP phase (maintain the integrity of the original cross-functional team while adding NPLP expertise), (3) keep the same steering committee throughout the NPLP phase (make sure the steering committee steps up its role during the NPLP phase), (4) manage NPLP knowledge consistently (analyze NPLP practice information for in-house best practice).

Kitcho (1998) stresses the importance of having a launch roadmap. This roadmap should be aligned with firms' strategic planning and have an outreach of at least two years. The launch roadmap should help to manage several launches and assign people to projects. In addition, according to Schneider (2004), many firms forget to create a separate crisis plan. A crisis

[58] These devices are derived from the consumer goods industry, but they include aspects that are seemingly relevant for B2B product launches as well.

plan is a document that prepares the firm in the event that something goes wrong with a new product. The idea of the crisis plan is to protect a firm's brand as much as possible. The chances that a firm's reputation will suffer are lowered if a firm has established clear procedures, messages, and communication responsibilities before any serious troubles materialize (Schneider, 2004).

3.3.4 Success and failure of new products

Failure is simply the opportunity to begin again, this time more intelligently.
-Henry Ford

Numerous management literature studies have focused on the success factors that come into play when a firm develops new products. For review articles, see, for example, Poolton and Barclay (1998) and Ernst (2002).

This section covers both the success and failure sides of a new product. It is worth mentioning that several studies put equal emphasis on NPD success and product success. The dilemma in differentiating between NPD success and the actual success of a product in the market place is discussed in more detail in the discussion chapter later on.

Innovation-seeking projects can provide a high payoff, but the risk of failure is high as well (Abetti, 2000; Leadbeater, 2006; Kotler & Keller, 2009). Failures can happen at the project-level or at the program-level, resulting in a product that fails on the market and thus yields significant losses for a firm (Rackham, 1998; Norling, 1998). Naturally, a new product that fails to meet market demand is a more critical issue to a young and small firm with limited resources (Thornhill & Amit, 2003). A large firm with a portfolio of products can tolerate occasional new product entry failures better than small firms, although there have been some cases where the failure of a new product has yielded difficulties on a scale that has threatened the existence of a large firm, too (Carroll & Mui, 2008).

Naturally, the new product-related problems are just one category of causes in a list of various reasons that explain why the products of various firms either succeed or fail to do well on the market (Carroll & Mui, 2008; Thornhill & Amit, 2003). According to Steele (1988), only a minority of companies survive in the long term:

> *Of the 500 firms that went public in 1961 to 1962, most of which presumably were attempting to offer something new, twenty years later, only 2 percent*

were still generating the level of profit that would make them attractive investment, 53 percent had gone bankrupt or completely disappeared. (p. 266)

In any event, new products are the cornerstones of business growth (Cooper, 1993; Miller, 2001; Debruyne et al., 2002), and hardly any firms can tolerate a constant stream of serious product failures. That is why it seems appropriate to study how the existing literature has treated the subject, even though the empirical data focus on successful products only.

3.3.4.1 Success and failure research

According to Griffin and Page (1993), the branch of research that focuses on the success or failure factors of new products dates back to 1964, when the National Industrial Conference Board published an article entitled "Why New Products Fail." Griffin and Page (1993) and Cooper (1979a) also mention that the studies by Booz, Allen, & Hamilton in 1968 and 1982 were among the first to concentrate on the subject of new product success. [59]

The following quotation by Griffin and Page (1993) illustrates the common urge to study and improve product development as such:

A large percentage of researchers is interested in bottomline investigations of what firms do to routinely propel a series of profitable projects through the product development process and out the corporate door. These researchers try to determine what techniques and tools keep the new product stream flowing with commercially advantaged products. The researchers are then able to recommend those means to firms interested in improving new product development. The end result of researcher S/F[60] investigations is both a discovery of general solutions applicable across firms and further dissemination of those solutions to other interested firms. (p.303)

Success and failure are two sides of the same coin and they are often researched in dyadic setup. According to Montoya-Weiss and Calantone (1994), this approach most likely dates back to the SAPPHO and NewProd studies. According to Cooper (1979a), Project SAPPHO was the first study to actually differentiate between the success and failure of new products.

In a review of 46 articles that studied new product performance, Montoya-Weiss and Calantone (1994) found that only two of the studies[61] concentrated on failure alone, whereas eight of them only concentrated on

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[59]. As a side note, even if these reports are widely cited, I was not able to get access to them. Neither the office of Booz, Allen, & Hamilton in Helsinki, nor their headquarters was not able to find copies when I kindly requested them.
[60] success / failure
[61] Those studies were the ones done by Cooper (1975) and Calantone & Cooper (1979).

success. In other words, the majority of studies have used a combined success vs. failure perspective (ibid).

Cooper (1979a, 1979b, 1980)[62] conducted the NewProd research project, which studied nearly 200 industrial product projects and categorized them as either successes or failures. This work was continued in the NewProd II and NewProd III projects. NewProd II and NewProd III examined 203 projects, of which 123 were successes and 80 were failures (Cooper & Kleinschmidt, 1987a; Cooper & Kleinschmidt, 1987b; Cooper, 1990). Another famous success/failure study is the Stanford Innovation Project conducted by Maidique and Zirger (1983).

3.3.4.2 Operationalization and measurement of success and failure

It is essential to point out that although in some contexts "product failure" means that a product has broken, malfunctioned or is otherwise flawed or not working as the buyer expected (i.e. Folkes & Kotsos, 1986), here the term "failure" is used differently. Failure is also seen from the manufacturers' perspective.[63]

The problem with success and failure studies is that the concept of "new product success" has been hard to operationalize (Cooper, 1979a). An additional major difficulty in distinguishing between success and failure is the fact that there are different layers to the analysis process. For instance, Brockhoff and Chakrabarti (1988) state that: "It appears that while technical success is more readily obtained, commercial success is far from being guaranteed" (p. 173). These two dimensions – i.e. the technical and the commercial – are often used to measure success, but Abetti (2000) adds financial success as another dimension that should be investigated. Similarly, Crawford (1977) pointed out that there is a dilemma in how to compare different failure studies, and she states that these studies are difficult to compare because their definitions of failure vary so widely. According to Dillon et al. (1979), the amount of different operational measures and variations in the sample design, as well as the inclusion of different types of products in these studies, hinders their comparison.

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[62] Robert Cooper has published dozens of articles related to the success/failure theme, and Ernst (2002) provides an extensive summary of his findings.
[63] Please refer to section 3.2

One of the issues is that success and failure can be measured on the level of a firm, on the level of a program, and on the level of an individual project/product. In addition to these levels, a product's performance can be assessed in terms of customer acceptance and financial performance (Griffin & Page, 1993, 1996). Table 4 summarizes a list of core success and failure measures that are used by academics and practitioners alike.

Table 4. Success and failure measures (Griffin & Page, 1993; 1996)

Customer Acceptance Measures	Financial Performance	Product-level measures	Firm-level Measures
Customer acceptance	Break-even time	Development cost	Development program ROI
Customer satisfaction	Margin goals	Launched on time	New products fit business strategy
Revenue goals	Profitability goals	Met performance specifications	Success/failure rate
Revenue growth goals	IRR/ROI	Met quality specifications	% Profits from new products
Market share goals		Speed to market	% Sales from new products
Unit volume goals		Innovativeness	Program hit 5-year objectives
Number of customers		Competitive advantage	Products lead to future opportunities
			Overall program's success
			% Sales under patent protection
			% Profits under patent protection

Hart et al. (2003) argue that the measures provided by Griffin and Page can be used only after a market introduction. To overcome that handicap, they added five additional measures that can be used during the product development process, but also after the launch. These measures are product uniqueness, market potential, marketing change, technical feasibility, and intuition (Hart et al., 2003).

Griffin and Page (1993) also point out that none of the actual program-level measures were among the core measures for the success and failure variables. They note that firms are often more interested in measuring and understanding the results of individual projects and products, whereas academic researchers are more interested in aggregated firm-level outcomes. Griffin and Page (1996) also point out that there might well be a difference of importance between different measurement levels in different firms. For instance, Hultink and Robben (1995) found that managers value different measures depending strongly on their time perspective.

> *For the short term, the respondents emphasize product-level measures such as speed-to-market and whether the product was launched on time. In the long term, the focus is on customer acceptance and financial performance, including attaining goals for profitability, margins, and ROI*. (Hultink & Robben, 1995, p. 392)

According to Stephens (1988), failures are easier to define, measure, and analyze in comparison to success. Goldenberg et al. (2001) define failure in terms of a (1) a product that was totally rejected by the market and ceased to exist, or (2) a product that failed in market tests, resulting in a decision to abort its introduction. Goldenberg et al. (2001) also classify the determinants of product success/failure into three main groups: (1) Early

determinants consisting of idea-based information, the idea itself and the circumstances of its emergence, (2) project-level determinants based on examining the compatibility of the project and the firm (including the execution process), and (3) market determinants consisting of market-based knowledge (requiring market research and tests).

According to Cooper (1975), the "failure label" is given to products whose initial sales fell below expectations. A "failure label" also belongs to those products whose profit margins fell below expectations or the development/investment costs exceeded expectations (Cooper, 1975). While Cooper (1975) simply equates financial failure with product failure, broader interpretations of product failure are probably justified. In other words, just as "financial success" is only one measure of product success (Griffin & Page, 1996), financial failure is just one dimension characterizing the failure of a product.[64]

Schneider (2004) refers to a study conducted in the consumer goods industry[65] that associated failure labels with those products that were unable to obtain enough distribution in the first year in which they were introduced. She measured the distribution threshold based on the amount of outlets selling that product. However, there was also a second, time-related chance for a product to fail. A successful product has to retain a certain level of distribution. "By this measure," Schneider says, "losing 30 percent or more of year-one distribution in year two put the product into the failing category" (Schneider, 2004, p. 14).

3.3.4.3 Failure rates

Product failure rates have been a subject of interest for decades. For instance, Crawford (1977) states that the overall rate of product failures has remained high during the last 25 years. Ottum and Moore (1997) acknowledge that while previous research has found the underlying reasons for product successes and failures, the success rate of new products still has not improved during the last 30 years.

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[64] I feel that product failures should be grouped under a similar taxonony as product successes.
[65] The original study was conducted by Information Resources Inc. (IRI) in 2000. According to Schneider (2004, p. 13), "IRI is a leading sales and marketing research firm serving the consumer goods industry."

The actual failure rate estimates for new products vary significantly. The most positive estimate is given by Boulding, Morgan, and Ruskin (1997), who claim that the new product failure rate is approximately 35-45 percent. Berggren and Nacher (2001) estimate that the new product failure rate is as high as 95% and has not improved over the years. While Semon (1996) states that the common assumption is that 80-90% of new products fail, Crawford and Di Benedetto (2003) argue that, in reality, the failure rate of new products is, at most, around 40%. Kotler and Keller (2009) refer to recent studies and argue that the rate of product failure is still around 50% and that even failure figures as high as 95% in the United States and 90% in Europe are sometimes the reality.[66]

Naturally, the underlying target market is one variable that plays a role. Cooper and Kleinschmidt (1990) found that a product designed for the international market performed better in terms of profit, whereas products that were targeted solely towards the domestic market had a much higher failure rate. In addition, the situation may differ significantly between different branches of industry and may depend on whether the product under investigation is an industrial or a consumer product (Hultink et al., 2000).

3.3.4.4 Reasons for failures

Just as there is no universal formula for product success, there is no ultimate cause for product failures. While some authors (e.g., Calantone & Cooper, 1979; Grayson, 1984) argue that we know the reasons for product failures, there is still a great deal of controversy. Dillon et al. (1979) and Griffin and Page (1996) state that despite the fact that a substantial amount of research has been devoted to the new product failure problem, the published results do not reveal consistent answers to the question of why new products fail. The key question is the one presented by Grayson (1984). He wonders that, if prior knowledge tells us why products failed, then why do firms keep on introducing products that fail?

According to Crawford and Di Benedetto (2003), there are two basic reasons for product failure: (a) There was no need for the product, or (b) there was a need for it but the new product did not meet that need.

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[66] The breadth of these estimations clearly illustrates the dilemma of how to define and judge failure.

It has been stated that the main reason why big firms fail is their inability to respond to technological changes and the evolving competition, i.e. the lack of strategic transformation and the inability to adapt to a new technical order makes their products obsolete (Anderson & Tushman, 1991; Bower & Christensen, 1996). Goodman et al. (2002) mention a few main reasons for why customer-based failure occurs: Either a customer is dissatisfied because he simply uses the product incorrectly or has unreasonable expectations about what the product will do or marketing makes inflated or misleading promises that a product cannot live up to (Goodman et al., 2002). According to Schneider (2004), another reason for failure is when the underlying technology is more complicated or expensive than necessary. Schneider also points out that sometimes first product versions can be rushed to market too early, and that sometimes a product can be ahead of its time.

The SAPPHO study included 43 pairs of success/failure cases. Based on the comparison of these pairs, the dominant factors that distinguished success from failure were (1) an understanding of user needs, (2) attention to marketing, (3) efficient development work, (4) use of outside advice and technology, and (5) seniority of innovators in their organization (Goldenberg, Lehmann, & Mazursky, 2001; Rothwell, 1972).

Cooper (1975) divides product failures into three main groups: general reasons, specific causes, and latent causes. The most common general reason is simply that the product did not sell. Specific reasons included particular decisions and events that can be traced to an unwanted outcome, such as competitors' actions or misdirected marketing. Latent reasons include, for instance, missing activities and the absence of needed resources. Cooper (1979b) lists the following three product-related barriers to success, which can be interpreted as explaining why a product fails:

- Having a high-priced product, relative to competition (with no economic advantage to the customer);
- Being in a dynamic market (with many new product introductions); and
- Being in a competitive market, where customers are already well satisfied.

There are also organizational reasons for product failures. According to Parker (1980), certain obstacles, such as organization will power, knowledge, capability, and market resistance, can be identified as antecedents to product failure, too. Grayson (1984) outlines the three main causes for new product failure: organizational weaknesses, a lack of objectivity, and the emotional moment when a new product reaches the

point of no return. The organization may not be properly organized to achieve the best or most innovative product breakthroughs. People making decisions concerning a new product may lose their objectivity due to time constraints, a lack of fortitude, or pressure from the upper management. The point of no return is an expression that refers to situations where, even though an objective analysis would indicate that a product should be cancelled, this does not happen (Grayson, 1984).

Grayson (1984) provides the following illustration:

> *Once management decrees that there will be six new products this year, you can be sure there will be. The reward system makes this inevitable; if you market six, you keep your job. Even though only four new products are worthwhile, there will still be six in the marketplace. Is it any wonder that at least two will fail? (p. 57)*

Similarly, Udell and Hignite (2007) state that many product failures can be seen as a result of the management's lack of objectivity during commercialization activities. They argue that management should have taken corrective actions or even terminated the project in time. They also argue that product failures are due to a faulty strategy being chosen by management or due to management being too inexperienced to foresee the organization's limited capacity to commercialize the product.

The effect of managers' resistance to cancelling a failing project is also illustrated by Boulding and Morgan (1997) and Biyalogorsky, Boulding, and Staelin (2006). Grayson (1984) argues that there is an emotional pressure to go forward and to justify earlier investments in the hopes that something unexpectedly good will happen. Failing to put someone in charge is another common organizational reason for project mistakes, and it often occurs with new products, as Parker and Mainelli (2001) explain. Moreover, internal company politics impact the innovation process. Jones and Stevens (1999) illustrate a case study of a company that missed a big market opportunity due to the disillusionment of one powerful manager. Jones and Stevens (1999) argue that micropolitics have a powerful influence on new product success, and they suggest that the pursuit of individual career objectives can explain why some projects fail and others succeed.

The inability to value the full business potential of an underlying technology with different applications can lead firms to miss great opportunities (Parker & Mainelli, 2001). In other words, there is often strong inter-organizational resistance that kills the products before their

birth. Berggren and Nacher (2001) state that companies lack the cross-functional and cross-divisional support and that, therefore, new ideas are not taken forward.[67]

Crawford and Di Benedetto (2003) have noticed this dilemma and they use Chrysler's successful children's car seat as an example. According to Crawford and Di Benedetto (2003), "new product manager Ron Zarowitz had spent two years getting management interested in that seat, and four more years overcoming internal resistance" (p. 16).

Market research and market studies can also be misleading and cause incorrect decisions and actions if their limitations are not understood (Hill, 1988; Ogawa & Piller, 2006). Top-down market research often leads to failures simply because managers anticipate a much larger demand than is reasonable (Parker & Mainelli, 2001). Firms do not always focus on the right customer segment, and this is another cause of product failures. In addition, some product failures are due to a simple lack of channel partner motivation and incentives (Berggren & Nacher, 2001).

The introduction of unique but superior products has been the key differentiator of success (Cooper, 1975, 1979a). Udell and Hignite (2007) warn that product superiority is not enough and can even act as a double-edged sword. Great enthusiasm for a new product can cause a firm to overestimate the advantages and overlook the shortcomings, which will eventually create potential pitfalls for a new product (Udell & Hignite, 2007).

According to Parker and Mainelli (2001), it is insufficient to develop technically advanced products with extra features if these features do not deliver new and significant user benefits and capabilities. For instance, Wankel's engine, despite its design novelty, did not deliver significant benefits over the existing motors and, therefore, it did not become a commercial success. A portable music player, on the other hand, made it possible to run and listen to music at the same time and can be used as a good example of a new capability being delivered by a new product. User benefits that help a customer to achieve something better or with less cost (i.e. saving time, resources, or money) are often found in successful products (Parker & Mainelli, 2001).

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[67] In colloquial language, this is typically called the N.I.H. (not invented here) syndrome.

One source of product failures on the global market can be traced to cultural disparity. Mishra et al. (1996) argue that "although there seems to be some global relationships between the NPD factors and new product success, we find no universal pattern in the intercountry correlations" (p. 547). While Farley and Lehmann (1994) admit that cultural differences exist and affect buying decisions, they also argue that industry-specific and market-specific factors are more important than cross-national discrepancies, because industry-specific knowledge can be generalized across industries.

Many of these studies are based on quantitative analysis. There is less research using a qualitative approach. One recent case study by Rehn and Lindahl (2011) provides an illustration of failure related to engine technology. Their case study reveals an additional insight about how external relationships between firms, unforeseeable events, individual decisions, and even serendipity can lead towards failure in the long run. Rehn and Lindahl (2011) illustrate the situation:

> *thus, the failure was not made up of anything in particular, but by odds and ends, small mistakes and uncertainties, tipping the scale this way and that until the situation careened out of control.* (p. 5)

In any event, the extant literature provided various reasons for new product failures. The non-inclusive list is available in Appendix C. The titles and categorization are combined based on the work by Calantone and Cooper (1981) and Jain (2001).

3.3.4.5 Improving success rates

Numerous books and articles deal with critical success factors for products. Review articles and comprehensive meta-analyses of product success have been done by Johne and Snelson (1988), Lilien and Yoon (1989), Griffin and Page (1993), Montoya-Weiss and Calantone (1994), Poolton and Barclay (1998), and Ernst (2002), among others. There are also comprehensive NPD-related reviews that touch on success factors while focusing mainly on much broader topics. For instance, Brown and Eisenhardt (1995) analyzed a large body of NPD-related articles from the organizational perspective, whereas Krishnan and Ulrich (2001) analyzed NPD literature from a decision-making perspective. Despite the vast amount of studies that have been conducted, scholars have not found any "silver bullet" that firms could use to guarantee success in their new product endeavors. Goldenberg et al. (2001) also point out that the success

of a given product is actually conditional and based on the underlying market that is supposed to adopt it.

New product performance and launch strategy literature are the two research streams that have examined the relationship between the innovativeness of a product and market performance, but they have found inconclusive results (Lee & O'Connor, 2003). For instance, Cooper and Brentani (1991) argue that there is U-shaped relationship between product innovativeness and commercial success. According to Lee and O'Connor (2003), this basically means that products with high or low levels of innovativeness are more successful than those in between. Quite the opposite opinion is shared by Goldenberg et al. (2001), who state that

> *radical changes are likely to be rejected and minor ones ignored. This leads to the notion of the optimal or "just right" level of innovation and explains why modest innovations tend to be more successful than trivial or radical ones. (p. 78)*

In other words, the viewpoint of Goldenberg et al. (2001) is that new products that include some familiar attributes are generally the most successful. Similarly, and perhaps a bit controversially in light of common beliefs, Abetti and Stuart (1988) postulate that it is actually less risky to commercialize a completely new product if compared to a situation where a firm tries to replicate a competitor's product.

According to Cooper (1993), a superior product is the most important factor in a firm's success and a superior product

> *has unique features for the customer, meets customer needs better than competitors' products, has a relatively high product quality, solves customers' problems with competitive products, reduces customers' costs and is innovative or novel. (p. 79)*

Cooper (1993) provides a list on the ten basic qualities of a successful product:

- Delivers unique benefits to the user;
- Is well defined prior to the development phase;
- Involves quality of execution of technological activities;
- Implements technological synergy;
- Involves quality of execution of development activities;
- Implements marketing synergy;
- Involves quality of execution of marketing activities;
- Possesses market attractiveness;
- Capitalizes on a competitive situation; and
- Has top-management support.

Ernst (2002) has provided comprehensive tables that summarize all of Cooper's studies. Ernst has also compared Cooper's findings with other key

author's reports[68] and states that they are well aligned. However, the underlying reason for this finding is simply that many authors have relied on the conceptual framework created by Cooper and Kleinschmidt (Ernst, 2002).

According to Levy (1998), there are five factors that are of importance for high-tech firms seeking success: (1) An innovation uncertainty factor, consisting of market, technology, and supply uncertainties for new products; (2) the human factor, i.e. the challenge of recruiting creative professionals capable of creating innovations; (3) an organization factor, i.e. the capability to create a culture and environment that nurtures innovations; (4) a management competence factor, i.e. the ability to bring in leadership and team spirit; and (5) know-how and know-why factors, which ensure that a firm is doing the right thing in the most efficient way (Levy, 1998).

Similarly, Lambert and Slater (1999) list topics such as managerial skills, superior product design, superior resources, customer understanding, competitive analysis, learning from competitors' mistakes, organizational competencies, process quality, distribution channels, image, and marketing skills and resources that play a crucial role in the success of new products.

The extant literature actually provides several "check-lists" outlining topics that are needed to create successful products. For instance, Connell et al. (2001) have proposed five critical factors for success:

- Executive direction;
- Project team's capability;
- Innovation strategy;
- Internal factors;
- External factors.

Berggren and Nacher (2001) present new rules for improving the success rate of new products: (1) Think solutions, not products; (2) think delivery, not introduction; (3) become schizophrenic, i.e. think like your customer, competitor, channel partner, and yourself.

Kulvik (1977) found no single factor that alone would have been sufficient for success; however, he also provides a list of variables that distinguish successful products in general:

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[68] It is beyond the scope of this paper to repeat those tables, but I highly recommend that a reader who is interested in this subject investigate them.

- Extensive development know-how in the new field;
- Thorough understanding of user needs;
- Extensive marketing know-how in the new field; and
- Compatibility between the company's marketing organization.

Kulvik (1977) also found that new products which resembled old products were less likely to fail. The similarity between products was determined in terms of the type of customer served, as well as the similarity between marketing and after-sales services.

Cagan and Vogel (2002) define three key factors that should be in place for a product to achieve success. They also add that the absence of any of these can actually jeopardize success, even if a firm is good in the other areas (Cagan & Vogel, 2002, p. 8):

- The ability to identify product opportunities. As cultures continue to change, opportunities emerge for new products. These products do not just solve existing problems - they also create possibilities for new entrants;
- A heightened understanding of customer needs translated into actionable insights that define attributes. These attributes serve as a guide in developing the product's form and features. In order for products to be successful, they must have features and forms that consumers quickly recognize as useful, usable, and desirable;
- True integration of engineering, industrial design, and marketing. Merely putting teams together in a multidisciplinary context is insufficient. They must be supported and managed effectively in an atmosphere where each discipline respects and appreciates the perspectives of the others.

Henard and Szymanski (2001) have conducted an extensive meta-analysis to discover why some new products are more successful than others. They provide four main predictor categories that characterize success: (a) The products (i.e. advantage, price, innovativeness); (b) the firm's strategy (i.e. order of entry, dedicated resources, marketing, and technology synergy); (c) the firm's processes (i.e. launch proficiency, customer input, and functional integration); (d) the marketplace (i.e. competitors' response, intensity of that response, and market potential). Altogether, Henard and Szymanski (2001) provide 24 key success predictors under these four main categories; however, the ones with the most significant impact on performance were product advantage, market potential, meeting customer needs, predevelopment task proficiencies, and dedicated resources.

In the view of Goldenberg et al. (2001), there are two main factors predicting success: (1) whether the product provides a solution to a customer's problem, and (2) whether the product fits certain "templates." These templates are attribute dependency, component control, replacement, displacement, and division, all of which describe changes in

regularities during the evolution of the product. A more detailed description and examples of these templates are provided by Goldenberg, Mazursky, and Solomon (1999a, 1999b).

Song and Parry (1987) studied a Japanese firm and concluded that cross-functional integration and the product's competitive advantage are the most important drivers behind the success of a new product. Cross-functional integration ensures that market and customer knowledge are diffused throughout the whole organization (Song & Parry, 1987).

Cooper and Kleinschmidt (2000) present a conceptual model for the factors that lead to success. Product advantage is the central element here. The three groups that drive success are (1) execution of the project development activities (i.e. homework activities, marketing activities, technical activities, and project organization), (2) company environmental activities (i.e. marketing synergies, technical synergies, top management support, perceived risk, influence on market R&D, influence on firm R&D) and (3) opportunity variables (i.e. market and technical conditions).

Poolton and Barclay (1998) list variables that can be seen as success factors. In their discussion of development success,[69] they distinguish between strategic and tactical factors. Their framework for various success factors is illustrated in Figure 16.

[69] The dilema between accounting for the successful development of a product and the actual product's success on the market is discussed in the next chapter.

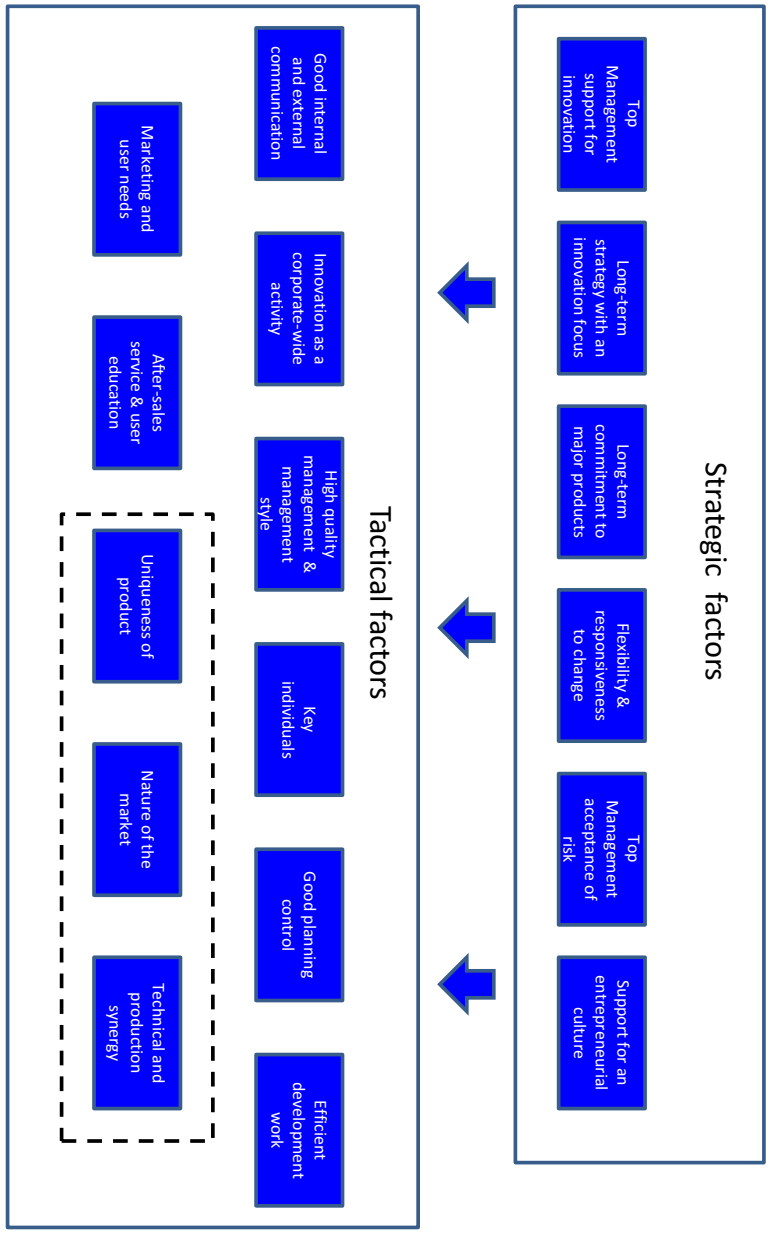

Figure 16. Variables associated with success (Poolton & Barclay, 1998)

4 Discussions Based on the Extant Literature

The literature review revealed that the concept of innovation is ambiguous and subjective. Many scholars have used broad interpretations and definitions for innovation. I favor those approaches that promote the importance of commercial success as a key antecedent for innovation. For instance, it does not matter how novel or technologically sophisticated a new product is if customers ultimately refuse to purchase it and use it. And, if there is no market for that particular product, I would rather not call it an innovation. This logic is the cornerstone behind the conceptual framework for product innovation presented in section 4.3.1.

Success and failure are discussed in detail in section 3.2.4. This chapter also provides more information about how launch and commercialization are perceived by the author. The reasoning presented in this chapter provides supportive background for the propositions presented in chapter 8.

4.1 The launch concept revisited and the position of commercialization and launch within this dissertation

There is no magic formula for launch. – Schneider, 2004

4.1.1 Discussion of the launch

In this dissertation the term "launch" is used to refer to a single event,[70] whereas commercialization is used as a larger concept covering a broader range of topics, including many of those that the extant literature on

[70] As illustrated in Figure 177.

launches consider under the term “strategic launch.” Thus, I feel that there is a need to discuss launch terminology in more detail and provide reasons for why I perceive of launch and commercialization as being different.

Calantone and Di Benedetto (2007) note that the majority of launch-related articles distinguish between tactical and strategic launch decisions. The basic difference between these two decisions types is available in the following quotation:

> *Strategic decisions are those that are concerned with product and market issues, and are often finalized early in the NPD process, perhaps in the Product Innovation Charter or at product protocol specification. Strategic decisions target market decisions (niche versus mass market), leader vs. follower decisions, and decisions on relative innovativeness … Tactical decisions include familiar marketing mix decisions such as product branding, sales and distribution support, promotion activities, timing decisions, and pricing decisions. These decisions are usually made after the launch strategy has been decided, and may be influenced by strategic decisions already taken. (Calantone & Di Benedetto, 2007, p .5)*

First of all, it is quite interesting that the launch-related articles have promoted the “decisions” approach. I feel that instead of discussing launch decisions, we should be interested in launch-related activities. This may seem like an exercise in semantics, but I would rather use term “launch activities” to cover a much broader field than is present if we just use the term “launch decisions.” In other words, I feel that it is also important to implement and monitor the results – not just the decision making. Crawford and Di Benedetto (2006) acknowledge that the “launch decision is more attitude than anything else” (p. 32). In addition, a decision to enter the market is also more subtle today. Firms can decide to cancel test marketing at any time, and, therefore, it is in reality difficult to justify if there is a real go/no go decision involved when launching a new product (Crawford & Di Benedetto, 2006).

Secondly, there is some level of unclarity between the idea of strategy and tactic. It seems that much of the launch literature treats certain decisions as tactics, whereas elsewhere researchers treat them as fundamental business strategy topics. For instance, if management faces the question, “what kinds of new products is our firm going to offer in the near future?” is this just a launch question or a topic that should discussed at the corporate strategy meetings? In addition, Easingwood and Beard (1989) consider co-operating with other producers to be a part of a firm’s launch strategy. I would instead suggest that it is a part of the top management’s business strategy! I have collected some definitions for strategy and tactics in business management to back up my viewpoint. Ansoff (1965) notes that the term “strategy” as it

is used in business literature is derived from the military. In a military context, strategy refers to a campaign to apply large-scale forces against an enemy. In Ansoff's formulation: "Strategy is contrasted to tactics, which is a specific scheme for employment of allocated resources" (Ansoff, 1965, p. 104-105). Trout provides (2004) the following analysis of the differences between strategy and tactics:

A tactic is a singular idea or angle. A strategy has many elements, all which are focused on the tactic. A tactic is an angle that is unique or different. A strategy may well be mundane. A tactic is independent of time and relatively constant. A strategy unfolds over period of time … A tactic is competitive advantage. A strategy is designed to maintain that competitive advantage. (p. 73-74)

Grant (2002) provides following distinction:

strategy is the overall plan for deploying resources to establish a favorable position; a tactic is a scheme for specific action. Whereas tactics are concerned with the maneuvers necessary to win battles, strategy is concerned with winning the war. (p. 17)

Finally, Lilien and Yoon (1990) provide the following suggestion for distinguishing between strategic and tactical topics:

> *the timing of market entry is a strategic, qualitative decision as well as a tactical, quantitative decision. The strategic choice between pioneering and following is a problem of balancing the advantages and disadvantages of the pioneer and the follower. The tactical decision of entry time is a problem of balancing the risks of premature entry and the missed opportunity of late entry. (p. 580)*

Launch literature (Hultink et al. 1997; Hultink et al. 2000) also describes pricing as a tactical decision. On the other hand, Cooper (1993) considers pricing to be a strategic issue that should be established with the corporate strategy in mind. Cooper illustrates an example from the 1980s where Daimler-Benz was about to enter the North American market and was willing to commit loses of up to $1 billion in a price war to gain market penetration. I assume a business decision of that magnitude should not be described as a "tactical decision;" rather, it should be described as a serious strategic commitment by the top management.

4.1.2 Disarray of terms

The main elements of commercialization were discussed in chapter 4. Based on literature review, it seems that scholars have used the terms launch and commercialization quite liberally and that there is a great deal of overlap between these terms. Various scholars have actually already called attention to this dilemma (e.g., Beard & Easingwood, 1996; Hultink &

Hart, 1998; Guiltinan, 1999; Di Benedetto, 1999; Crawford & Di Benedetto, 2003).

Hultink and Hart (1998) in particular acknowledge that the terms market entry, launch strategy, product launch, market launch, commercialization, and introduction are used interchangeably in the literature. The wide array of synonyms is also present in a study by Axarloglou and Tsapralis (2004), who collected data on 3,669 new products that appeared in The Wall Street Journal over the course of ten years by using the following key words: Announce, launch, release, introduce, unveil, update, facelift, and improve.

In that sense, the term launch can refer to various different situations. Product launch can mean an event when the plans for a forthcoming product are preannounced (Robertson et al., 1995; Schatzel & Calantone, 2006), when the actual features and outlook of a product are revealed (Thölke, Hultink, & Robben, 2001), or when a product is commercially available and first rolled out from the factory (Ali et al., 1995). In addition, a press release or other announcement that reveals the existence of (or plans for) a new product can be considered a launch (Schneider, 2004; Crawford & Di Benedetto, 2006). Likewise, terms such as new product introduction (Balachandra, 1997), market launch (Cooper, 1991, 1993), and market introduction (Oakley, 1995; Ernst, 2002) have been used interchangeably. Also, the term "innovation back-end"[71] has been used (e.g., Cooper, 1993; Di Benedetto, 1999; Crawford & Di Benedetto, 2003).

Kelm, Narayana, & Pinches (1995) even used the term product launch to make a distinction between the innovation and commercialization stages of an R&D project. In other words, the introduction of a new product marks the starting point of commercialization in their viewpoint.

Schneider (2004) provides the following definition for a new product launch: "Launch is powerful, multidisciplinary process that successfully propels a new product or service into the market place … and sustains it over time" (p. 12). Given the variety of terms used to describe the same phenomena, it is easy to conclude that a lack of consistency in terminology is an issue. It seems that the term launch is used more often than commercialization in the product innovation literature in general, and that commercialization is often associated with the financial exploitation of

[71] This obviously used contrast to front-end.

technology, whereas launch refers to the introduction of new products (Lehtimäki, Simula, & Salo, 2008).

Cooper (1993) sees a launch as a formal event, the point when a product is officially introduced into the marketplace. Similarly, Ali et al. (1995) see product launch as a single event. Cooper and Kleinschmidt (1990) consider commercialization within the context of product innovation in a much broader sense and they argue that launch is a sub-category of commercialization. This is also the way that launch is viewed in this dissertation - ***product launch is a single event***.

4.1.3 Commercialization defined

In my opinion, commercialization covers wider time span and is more strategic in nature than launch. The literature does not provide an unambiguous definition for commercialization in general, not to mention within the context of the B2B product innovation process.

As discussed in section 3.2.4, there are fundamental differences between the commercialization of technologies and the commercialization of products. The life cycle for a certain technology is often longer than for a particular product and several products (which can vary in their level of successes and failures) can be based on the same technology. Thus, for the purposes of this dissertation, commercialization within the context of industrial B2B product innovation is defined as follows:

Commercialization is a set of business activities, tasks, and actions that run in parallel with ideation and product development processes and complete them so that a new product can become commercially viable, tradable, and eventually successful on the market.

Some questions that need to be answered are as follows: Where does commercialization start and what does it need as input? And, where does commercialization end and what is the output?

To answer these questions, Figure 17 illustrates their position on a time line[72]. One of the key ideas of this dissertation (which is also reinforced with

[72] NOTE: This is an oversimplistic illustration and mainly aims to show how launch, commercialization, and marketing are treated in this dissertation. The exact location of these activities can vary significantly depending on the case. In other words, the purpose of this illustration is not to provide a crystal clear location
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empirical data later on) is that commercialization and NPD occur as parallel processes. In other words, the main point here is that commercialization, both mentally and pragmatically, begins at the same time that a firm starts the other NPD activities.

A (over-)simplistic distinction between marketing and commercialization within the context of new products could be that commercialization plays a role when a firm introduces a new product to the market for the first time. After successful commercialization, it is up to the marketing department to continue that work.

Many topics that the extant literature discusses under the product launch are intentionally applied under the commercialization theme in this paper. As mentioned, Hultink et al. (1997) for example consider pricing (and also branding) to be tactical launch topics. This dissertation treats those activities as a part of commercialization. Of course, these activities could also fall under the theme of marketing,[73] which is how Ansoff and Stewart (1967) and McDaniel and Kolari (1987) treat them.

Pricing is considered one of the four P's of traditional marketing (Kotler & Keller, 2009), but there is the need to start planning the potential market price already when a business case or a business plan is first drafted. Pricing also plays a role in various material, technology, and process-related trade-offs during NPD, so it is not only the marketing department that contributes to the ultimate product price.

The actual end point of commercialization is difficult to define. In other words, it is semantically difficult to exactly pinpoint when commercialization becomes marketing. As a matter of fact, it is perhaps impossible to do so in reality.

While certain activities are placed under commercialization in this dissertation, they could equally and legitimately fit under other phases of development, too. Thus, rather than trying to explicitly find clear end points and starting points, commercialization should be considered as a concept that co-exists in between marketing and product development, as illustrated in Figure 1 earlier.

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for these terms on a timeline, but to provide some way to discuss them at an ideal level.

[73] As a side note, a marketing department is an established organizational unit, whereas commercialization department is never used as a proper name.

There are still some elements in Figure 177 that need to be explained. Delivery (or shipping) refers to the actual date when a product becomes available on the market. The delivery can start at the same time as a launch event or it can start later on. Manufacturing can also start either before or after a launch event. Sales can start already before launch event, but it is then based on preliminary data about the forthcoming product.[74] In some cases,[75] sales can actually start already before any NPD activity has started. Preannouncement here refers to an initiative or teaser that does not disclose the essence of a new product yet. Preannouncement,[76] or signaling, can actually happen several times before the launch.

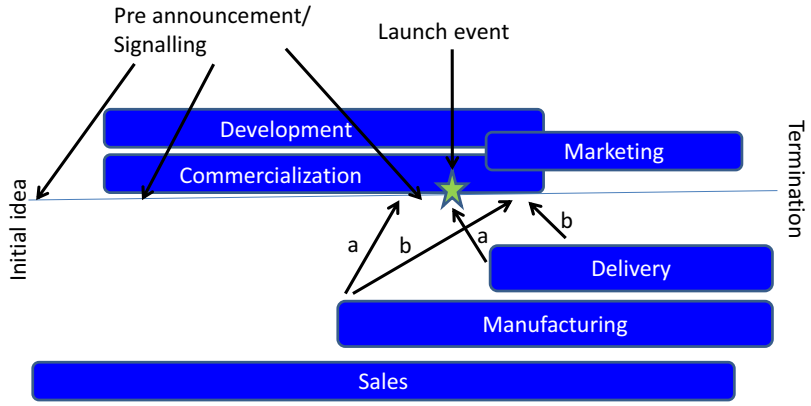

Figure 17. Rough positioning of commercialization on a timeline

To sum it up: Commercialization in this dissertation is considered as an umbrella term that covers all of the business activities, tasks, and efforts a

[74] In some cases, certain customers are in the position to receive "behind the desk" type information. In other words, the product is revealed secretly to them during pilot cases or some other initiative and sales orders are processed at that time.
[75] In the software industry this is called "vaporware" In other words, the idea is sold to a customer; the customer then pays the development costs.
[76] Schneider (2004) postulates that consumer-oriented product launch activities cannot begin before the product is available for purchase. I do not quite agree with this argument. If we think, for instance, of the movie industry, trailers promoting a new Hollywood blockbuster are typically released months before the night of the premier. In my opinion, these movie trailers are examples of preannouncements in the B2C industry. It is unlikely that people will decide not to go to see any other movies if they know that a certain new movie is about to enter local cinemas in a few months. The situation is much different in the B2B industry, where customers typically make long-term investment decisions and are more likely to post-pone their purchase decisions if they are informed that a significantly better product will be available in the next quarter. (Naturally, this willingness to wait varies between industries.) Thus, the preannouncement can perhaps, in certain situations, decrease the sales of a manufacturer's current products.

firm does alongside the traditional ideation, design, and development phases. In that sense, the launch is a "conditio sine qua non,"[77] but there are many other activities a firm has to take care of as well.

4.2 Success and failure revisited

> *If the secret to success is a complex muddling through, failure is no simple thing either.* – Rehn & Lindahl, 2011

According to Stevens and Burley (1997), only one out of 3,000 ideas will be a commercial success. But who is to say whether a product will ultimately be a success or a failure? Are there any universally accepted metrics and criteria to measure and declare some products a failure and others a success?

The discussion of success and failure can be considered from a praxeology, i.e. normative, perspective where success is good and failure is bad. The concern then has to do with what mechanisms can be associated with success and failure. Can there be some generic or situation-specific design rules for achieving success and avoiding failure? In general, the idea of failure has to do with not reaching or achieving an objective or goal. Thus, failure is the difference between the aim and what was achieved, given certain tolerances. While the aims and achievements always depend on particular situations, their relation is a universal. Success has to do with achieving an objective or goal. But the aims are always case specific and, therefore, I can only suggest that firms should define *success* and *failure* from their own particular perspectives, taking their unique situations and circumstances into an account.

There is still additional dilemma related to the success/failure assessment: Can a product that is considered a failure from the product development point of view still become a commercial or financial success later on? Or, asked differently, can poor commercialization cause the failure of a technically superior product? Furthermore, there is also the rarely asked question of how to differentiate between the success of a particular product and the success of NPD as a function. Few of the studies that I

[77] An indispensable and essential action, condition, or ingredient.

found have touched upon these types of questions. The aim of this chapter is to discuss these dilemmas.

4.2.1 Fundamental issues when assessing success and failure

The issues presented hereafter are very much related to how different authors see NPD. Literally speaking, NPD only covers the development phase of new products. Some authors, however, believe that NPD should cover the whole process from ideation to launch. The problem is embedded in the following statement:

> *"Cooper's research focuses on management's ability to commercialize a succession of successful new products. Cooper's measures capture only three independent dimensions of firm and program-level outcomes, and do not analyze S/F at the project level" (Griffin & Page, 1993, p. 296).*

Implicitly, this can be interpreted to mean that for Griffin and Page, some projects are successful, even if they never reach the market or if they never make any money for the firm. Similarly, Smith and Reinertsen (1992) argue that, in some cases, firms load their development funnel with too many projects, which in fact do not fail on technical grounds during the development phase. Their message is that development-funnel thinking is inappropriate in circumstances involving low failure rates because it causes projects to get stuck; likewise, the people in charge of development become demoralized when a feasible project is frozen due to resource constraints. While this may hold true, the point I want to make here is that only measuring the success of one particular function will lead to sub-optimization.

For instance, Goldenberg et al. (2001) state that market rejection transforms a successful design into a product failure. I feel that this kind of approach is a bit too cumbersome. Who is to say design is successful? Is not the sole purpose of design to create outcomes that the market likes? If designers and management like the design but market does not, is it feasible to say that the design was still successful?

One way to approach this is to say that "the outcome matters most." How much value is there if a product meets the design goals but an outcome is not sought after in the market?

I feel that the traditional way of considering design/ engineering and marketing separately actually creates this kind of debate and confrontation

between functions, which in essence are totally irrelevant. What matters is the need to have both great designs and successful commercialization.[78] This is one of the building blocks for "concurrent commercialization" thinking, which is presented later on.

The following statement by Griffin & Page (1993) hopefully supports my view point:

> *The majority of firms would use only customer acceptance measures rather than both customer and financial measures. We would expect that this narrower focus would give them a less complete picture of the overall performance of each new product commercialized, providing only an external view of how well the product meets customer needs. Companies moving to eliminate the financial analyses in conjunction with the customer acceptance analyses might find that they are commercializing highly satisfactory, yet unprofitable, products to the long-run detriment of their firm*. (p. 302)

Cooper (1993) argues that firms have spent more money on marketing activities for successful projects than for those that failed. So, which one is the cause and which one is the effect? Are firms investing significantly less on risky projects, and is that the reason that those particular products do not successfully break into the market? Or, is it that firms will decide to spend more money on marketing safe bets and, therefore, boosting the success for those particular products? Schneider (2004) calls attention to similar issues related to the degree of success and the resources devoted to achieving that success. She stresses that "with substantial human resources and higher budget allocations, it's not surprising that breakthrough products have a better chance of launch success than less exciting products that don't receive the same level of support" (p. 72).

One of the main problems with success studies is that they try to provide normative guidelines. Quite often, the formulas for success that they suggest are quite generic and even vague in nature. For instance, Connell et al. (2001) argue that leadership is the driving force behind success and that without leadership, failure will be almost inevitable. So what are "the good leadership" models that firms should adopt in real life?

According to Poolton and Barclay (1998), there are in fact various context-dependent success factors that vary in their relative intensity. They point out that success factors depend on the nature of the product and the

[78] The logic works both ways. It would be similarly pointless to claim that, despite a bad design, clever marketing and sales "saved" the product.

firm's position within the value chain. For instance, a firm that produces low-complexity components based directly on customer orders and specifications has different success factors than a firm manufacturing and selling highly complex products to end users (ibid).

4.2.2 Finding the culprits for the failure

Parker and Mainelli (2001) have stated that

> *as people who have worked in technology commercialization for some twenty years, we recently counted the failure factors on a hundred projects we have reviewed, assessed, or been otherwise involved with. Only three of 100 failures were related to science 'not working', the rest were essentially managerial failures. (p. 383)*

Parker and Mainelli do not elaborate upon the term "managerial failure," but I interpret it to refer to all management levels in general. In other words, if a firm fails to create a good business out of its underlying technology, it can very well be the fault of R&D, marketing, sales, and top management alike. According to Cooper (1975), the main reason for failure is because sales fall below expectations. On the other hand, this could also mean that sales expectations were unjustifiably high, causing the failures.

There are certain failures that can be traced to certain organizational functions. For instance, the infamous "chicken and gun" failure, which refers to a metaphor originally created by Tom Peters and illustrates the importance of proper testing during NPD. The story dates back to the 1970s, when Rolls-Royce expected its new aircraft engine blade design to be bird-strike proof. The truth was quite the opposite, as the proposed carbon fiber was insufficiently robust. However, the company foolishly ignored that critical test and only became aware of the problem very late in the project. Significant investments in the new product design turned out to be obsolete, and the company was forced to revert to a back-up design using titanium blades. The mistake was fatal and almost caused Rolls-Royce to go bankrupt (Parker & Mainelli, 2001; Smith, 2006).

There are also several cases where, from the NPD perspective, it seems that a firm has created a superior product but, nevertheless, it has not led to commercial success. This kind of misfit between technical superiority and commercial success is well illustrated by DuPont, which developed an artificial leather called Corfam. Corfam was not successful on the market despite having technically well-functioning features - Corfam was more robust and flexible than real leather. Unfortunately the artificial leather had negative associations among consumers and lacked the feel of real leather.

Corfam was also available only in one type of leather, while consumers were seeking various different types of material (Abetti, 2000; Smith, 2006).

An additional example is Philips, which failed with its digital compact cassettes. One of the key reasons for this failure was Phillips's poor commercialization strategy and, especially, the poor implementation of the product launch. Philips failed to convince consumers to overcome their resistance towards this new technology and failed to promote backward compatibility and the benefits over analogue-recording technology (Hill, 1997; Lee & O'Connor, 2003b).

There are also cases that are quite counterintuitive. In some cases a technically non-superior product has actually become a success. Griffin and Page (1996) call attention to the case of the Ford Taurus, which was Ford's first product to use the concurrent engineering method. The result was a car with the most defects in Ford's history. However, because of its nice design and other features, users liked it and sales exceeded expectations, leading the car to commercial success.[79] A similar case is presented by Rehn (2011) in the context of consumer electronics. Pure Digital Technologies decided to manufacture a simple, low-tech camera called Flip Video, which, despite a lack of features, became a huge success (ibid).

Added to these examples, the Xerox Mouse is a product that, despite technical and customer success, can be considered as a failure for Xerox. According to Griffin and Page (1996), "Xerox did not commercialize the mouse – for them, the product is a failure because it resulted in no financial return on the investment" (p. 480). A similarly interesting example is GE's pacemaker, which was both technically and commercially successful (doctors recommended it and customers obviously were eager to use it), but GE decided to withdraw the product in response to the risk that it might tarnish its brand image in the extreme case that some products could fail and cause patient death (Abetti, 2000).

These examples are listed here to illustrate the difficulty of drawing a line between products that were successful and those that failed. Again, the issue of timing plays a major role here. For instance, Gershman (1987)

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[79] In fact, the defects only became visible when the car was being driven. In that sense, it is not possible to determine if the vehicle would have been so successful if those first customers would have been aware of those problems. This again illustrates the role of timing when measuring success and failure

illutrates several consumer products that failed when first introduced to the market, but, after remarketing, became successful.

4.2.3 Failures are not always a bad thing

Failures can be seen from a more philosophical point of view, too. Failures make individuals stronger. Failures help people change the direction of their actions, and thus lead us to try new ideas. Ultimately, failures are also stepping stones to success. Connell et al. (2001) present examples that convey the idea that the line between success and failure is not straightforward or absolute. They use the terms "good failure" and "troubling success." As an example, the Apollo 13 mission did not fulfill its original goal of landing on the moon and it encountered serious obstacles during its flight; however, the failed mission revealed mechanical problems that could have had catastrophic consequences for future missions. In other words, a failure that provides the basis for learning and development can be seen as a good failure.

Similarly the well-known Post-it notes made by 3M were a result of a failed research and development project. The original goal of the project was to find a very strong adhesive, but the result was quite the opposite. It took years for 3M to figure out that they could make a profit with this adhesive, and ultimately the product became a great market success. This is an example of a troubling success, which confirms the idea that a product that seems like a failure (from a product development point of view) can still become a commercial and financial success (Connell et al., 2001).

4.2.4 Success or failure or something in between

In my opinion, to only distinguish between success and failure is an overly black-and-white approach. Cooper (1975, 1979a) has emphasized product superiority, and similarly Crawford (1977) concludes: "As is generally suspected (though perhaps equally disappointing) all studies[80] point to lack of meaningfully superior product uniqueness as the predominant reason for failure" (p. 52). Thus, one could easily come to the conclusion that a product without a unique superiority is automatically a failure, but this kind of judgment overlooks the fact that there are numerous "normal" products (i.e. mediocre products) that necessarily are not failures.

[80] Based on eight new product failures that she studied.

The following statement reveals this "binary approach" very well:

> *Table I indicates that 20-30 per cent of the projects ended in failure and 50 per cent showed no improvement. So this latter group also cannot be considered successful. In other words: 70-80 per cent of the projects failed, either completely or partly*. (Cozijnsen et al., 2000, p. 150)

Taking these types of shortcuts can naturally increase the estimates of failure rates.[81]

Large firms typically have many products in their product portfolio. Sometimes a firm can purposely introduce certain "teaser products" that are never intended to hit high sales figures, but, rather, to create the image of a technology leader. In other words, the whole idea behind a new product could be to get the media interested in it and, thus, interested in writing about the parent firm as well. This is typical in the automotive industry, with concept cars for example.

4.2.5 Final thoughts about failure

In my opinion, failure is a very subjective issue, and an unambiguous formula does not exist for determining whether a product should be considered a failure or a success or something between. For instance, although market analysts or certain customer groups may criticize a particular product, a firm may find that the unsuccessful product worked very well as a market probe (Trott, 2002). Even though these experimental probe products fail in the marketplace, they can serve as vehicles for firms to learn about and better understand technology and the market (Lynn, Marone, and Paulson, 1996). Consequently, failed probe products are an important part of the iterative process that leads towards innovation. There are also those products that are only marketed to fill out a particular line (Crawford, 1977); while they are doomed to be unsuccessful if measured individually, they are needed for a firm to have a complete product offering.

Many studies have primarily focused on the role of the seller. Yet, the ultimate success of a particular product is often related to adoption and diffusion topics. According to Klein and Speer (1996), the fundamental organizational challenge of innovation implementation is to change the behavior of users so that they will start using an innovation in their work.

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[81] The framework illustrated in section 3.2 should better reflect the reality by recognizing the existence of mediocre products too, i.e. those products that cannot easily and categorically be labelled as either successes or failures.

They also point out that many organizations fail to achieve the intended benefits from the innovation they have decided to adopt because the implementation strategy does not succeed. This is to say that, even if the NPD and commercialization efforts of a seller firm are as good as they can get, the product can still fail in the hands of an end user.

To sum up, the concept of failure is not as straightforward a topic as it may seem and there are plenty of chances for new products to fail. Boulding et al. (1997) pragmatically assume that new product failures are the by-products of doing business in an uncertain world. Similarly, Kotler and Keller (2009) argue that "failure comes with the territory, and truly innovative firms accept it as part of what's needed to be successful" (p. 611).

4.3 Product innovation revisited

> *Anything that won't sell I don't want to invent. Its sale is proof of utility, and utility is success.* - Thomas A. Edison

The literature review revealed that many authors perceive of innovation as a personal subject. Souder (1987) states pragmatically that:

> *If you perceive that something is so significant that you feel it is an innovation, who is to say that it is not an innovation in terms of your well-being? Perhaps it is not an innovation in terms of my experience. But does that make it any less an innovation for you?"* (p. 3)

Most of firms seem to follow this kind of thinking in their marketing material - it is not uncommon to find companies advertising almost any product as an innovation. However, this "*laisser-faire*" approach poses a significant threat to academic research. If there is no common agreement about what an innovation is, how can we search for the antecedents to particular innovations or create meaningful models for innovation? As Garcia and Calantone (2002) stress, "inconsistencies in labeling innovations have significantly contributed to a lack of academic advancements regarding NPD process of different types of innovations" (p. 111). Correspondingly, Christensen (2003) points out the human tendency to misuse terminology:

> *Many people have equated our use of the term sustaining innovation with their pre-existing frame of "incremental" innovation, and they have equated the term disruptive technology with words radical, breakthrough, out-of-box, or different. They then conclude that disruptive ideas are good and merit investment. (p. 66)*

I think there should be a clear distinction between inventions and real innovations within the context of new products. Chesbrough (2003, p. ix) states that innovation is different from invention and that "innovation means invention implemented and taken to market." However, an invention does not have to be new to the world. According to Grant (2002), "An invention is the creation of new products and processes through the development of new knowledge or from new combinations of existing knowledge" (p. 333). Thus, it seems that for Grant (2002), the initial commercialization of the invention makes it an innovation. Afuah (1998) and Crawford and Di Benedetto (2003) also share the same viewpoint.

Returning to the innovation taxonomy, the OECD provides the following definition:

> *The technological product and process innovating firm is one that has implemented technologically new or significantly technologically improved products or processes during the period under review. (OECD, 1996, p. 31).*

This definition emphasizes newness, implementation, and the need for a timeline. Similarly, Twiss (1986) emphasizes the commercial exploitation aspect of the innovation process. The idea of implementation includes the important distinction that an idea or an invention requires some concrete development before it can be called an innovation (Van de Ven, 1986). However, we are still unaware of the outcome if we choose to just focus on the implementation or commercial exploitation aspect of the innovation process. I feel that one essential component is missing from the above-mentioned definitions: the commercial success of the product. I personally think that ideas and inventions merely represent innovation try-outs or attempts, until proven otherwise.

Almost always the goal of a product innovation process is to introduce new products to the market and, by doing so, to generate a positive cash flow and profitable business for the firm. In other words, a firm that introduces a new product to the market is looking for demand in terms of customers who are willing to buy that product. For this to happen, there are two basic success-related factors that the product must meet: it must gain acceptance in the market place (commercial success) and it must meet certain specifications (technical success) (Abetti, 2000). According to Trott (2002), innovation includes theoretical conception, technical invention, and also commercial exploitation. However, Trott admits that a commercial failure can be called an innovation. In contrast, Twiss (1986) clearly states that "for an 'invention' to become an 'innovation' it must succeed in the market place" (p. 6). Similarly, Narayanan (2001) emphasizes that an

innovation requires acceptance among customers in the market. Also, Morton (1971) and Afuah (1998) have highlighted the need for commercial success. Goldenberg et al. (2001) studied 70 cases of successful and unsuccessful consumer products and, in their methods section, argue that the products were only successful if they generated substantial positive financial results.

4.3.1 Conceptual framework for B2B product innovation

The way I perceive of product innovation is illustrated in figure 18. The conceptual framework presented in the figure attempts to categorize new products from a firm and a product-centric perspective. By doing so, the framework aims to assign products to meaningful groups and also limit the number of products that are termed innovations.[82]

The proposed framework consists of three main components: **a firm, a product, and a market**. A firm sets the predetermined business goals for a product that it is about to commercialize. These goals can be, for instance, sales volume, profit margin, market share, or a combination of any of these goals. The overall purpose of these goals is to provide an adequate return on investment, i.e. to reach a certain level of financial success, as discussed by Abetti (2000). It is worth mentioning that these predetermined goals refer to effectiveness not to efficiency.[83]

Newness and value are the main variables related to product innovation. With this framework, these two variables are determined and perceived by an underlying market.[84]

The framework divides products into three principle categories based on market reception. This analysis is done after the predetermined probationary period has passed:

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[82] Truth be told, not every sportsman can be an Olympic medal winner and, by the same logic, not every product can turn out to be an innovation.
[83] "Otherwise a product whose launch was delayed one day should be regarded as a failure, even if it then reached or exceeded all other goals" as well notified by the reviewer.
[84] As a hypothetical example, scissors would be a completely new product when introduced to a rural tribe that has lived without many connections to other parts of the world. If those people would refuse to use the scissors and would still prefer to use their old cutting tools, it may not be legitimate to view scissors as an innovation in that context. I feel that, in such an instance, product would have failed the "market-test" and the focal firm or person who tried to introduce scissor to that market did not succeed. Even so, this is not to say that scissors could not be seen as an innovation in some other market.

- Failure - a product that was a clear underperformer;
- Mediocrity - a product that did not fail completely, but did not reach some of its goals;
- Innovation - a product that reached its goals in a predetermined amount of time.

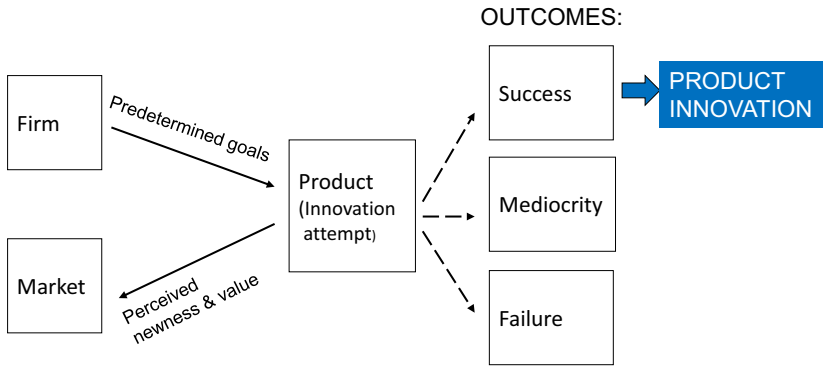

Figure 18. A conceptual framework for product innovation

4.3.2 Discussion of the product innovation framework

An idea that has traversed through a new product development process, i.e. from "mind-to-market," is still a mere innovation try-out or attempt before proven otherwise. The term *innovation attempt* is borrowed from Rehn and Lindahl (2011) to describe a status where the outcome is yet unknown. Eventually, and only after successful commercialization, the innovation attempt can become an innovation. Other possible outcomes are failure and mediocrity.

If we accept the logic that only a successful product is credited with being an innovation, then it is semantically incorrect to say that innovations fail.[85]

It is worth pointing out that I do not want to claim that innovation and commercial success are synonymous.[86] I feel that, while commercial success is necessary, it alone does not constitute product innovation. As Adams et a.l (2006) states "commercialization is concerned with making the innovative process or product a commercial success" (p. 37).

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[85] See the footnote in section 3.1 To say that an innovation fails is the same as saying that the winner lost a game.
[86] This kind of approach was suggested by an anonymous reviewer when I presented these ideas for the first time at the IAMOT conference (see Simula, 2007).

Similarly, I feel it is not sufficient to claim that a product is an innovation just because it has been taken to market or just because customers perceive of the underlying technology as being new.

As discussed in the introduction, B2B customers are seldom willing to buy a product just because it is new. They are looking for a solution that delivers value to them (Steele, 1988). The problem here is that "value" is also a very subjective topic. The same product that is perceived as completely useless by one customer may bring value to others. Consequently, value is a natural prerequisite for commercial success precisely because no firm is willing to purchase useless products. The newness and value of a product are left for the market to determine.

This is not to say that failures are only bad encounters. It is still worth stressing that innovation attempts are valuable in the learning sense because they generate various experiences and provide accumulated know-how that can be used to improve things in the next endeavor (Lynn et al., 1996; Narayanan, 2001; Trott, 2002).

As an example, Pfeffer (2007) states:

> *The idea of running small experiments, a managerial practise embraced as a management mantra at Harrah's Entertainment, Yahoo!, and IDEO, takes into account that some of the experiments and innovations[87] won't work, some of the Web site trials won't improve things, and not every idea is going to be equally successful. IDEO may make hundreds of prototypes for new toys, of which relatively few get tested in the marketplace and even fewer are ultimately successful. (p. 37)*

As a final comment, while Smith (2006) views innovations solely as a basis for the commercialization of inventions, I see the situation more broadly. There does not necessary need to be a new invention behind an innovation; combining existing "items" in a novel way can also yield innovations. In addition, inventions are often associated with something that is patentable. However, if one manages to combine existing ideas in a novel way, and successfully commercialize those ideas, then we are dealing with innovation.

However, if a firm feels that a new product did not fulfill the expectations placed upon it beforehand, it might not be justified to call that product an innovation. In other words, if diffusion and market success do not to

[87] This again is an example of the misuse and dillutation of the the innovation term. I would replace this with the words inventions or ideas.

happen in a predetermined period of time, then we are dealing with failure instead of innovation.

Based on the framework presented here and the discussion of it, I define product innovation for the purpose of this dissertation as follows: **A product innovation is a product, which is perceived as new and valuable by the market and which achieves technical, commercial, and financial success within a predetermined period of time.**

4.3.3 Limitations of the theoretical framework for product innovation

The proposed framework has certain weaknesses and limitations, which will be discussed next. First of all, the definition of success is troublesome, as discussed in section 3.2.4, and it is anything but easy to establish an objective measurement for success. Therefore, the framework is formulated from a firm-centric point of view. In that sense, I propose that the metrics for success be defined by a respective firm in advance (prior to the launch) based on that particular firm's internal business goals and objectives. For instance, customer satisfaction with or acceptance of a product can be the most desirable outcome of a product line extension, whereas gaining a greater share of the market is often the target for new-to-the-company products (Griffin & Page, 1996).

One obstacle is related to pricing. One could claim that a failure was due to incorrect decisions regarding price. Examples of that kind of an argument could be, for instance: "A product was not successful because the initial manufacturer price was set too high in an attempt to reach extraordinary margins, and thus customers rejected it." Or, alternatively, some might make the following type of argument: "A novel product became successful only because a seller wanted to gain market share by dumping the price below a normal profitability level." These are valid claims and those types of circumstances do happen in reality.[88]

However, the basic assumption behind the framework presented here assumes that there is a fair market price for new products. It is also

[88] This can be associated with an unexpectedly high cost structure due to changes in the labour force or raw materials … or simply due to greed. This creates a certain dilemma, which will be discussed in the next subsection.

reasonable to assume that management will try to adjust product pricing due to market reactions. This adjustment is discussed, for example, by Cui, Zhao, and Ravichandran (2011), who introduce systems dynamic modeling to the discussion of new product launches. According to Cui et al. (2011), the adjustments to the launch scale are made according to actual market conditions; and, not only pricing, but also advertising, channel development, manufacturing, and inventory management should be modified based on the market response.

Of course, a firm may not always follow "the adjustment approach." For example, management may decide to sell a new product at a low price in order to gain market share.[89] However, if the price cannot be re-adjusted or the cost structure changed so that the firm in question can make profit with that product, it may not be justified to claim that the innovation attempt was commercially successful.

If a firm is not successful in commercializing a particular product because of incorrect pricing (with or without additional price adjustments), then the product cannot to be called an innovation.[90] Naturally, this leads to the difficult question of cost allocation between different programs and products within a large firm. As a matter of course, there are endless ways to distribute R&D, marketing, and general expenses within a corporation.[91] In addition, it is worth remembering that profitability is only one factor among various business goals, as discussed in the section on the success and failure of a product. However, profitability is very sensitive to the actions of competitors and the strategies of other firms. Aggressive price competition and product imitation by competitors can dilute the price level rather quickly. This dilemma is especially crucial to start-ups competing against incumbent firms (Gans and Stern, 2002).

The shift in demand during the early phase in the life cycle of a product plays a major role as well. Agarwal and Bayus (2002) state that,

> *Sales in new markets are initially low because the first commercialized forms of new innovations are primitive. Then, as new firms enter, actual and*

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[89] A firm can even decide to distribute its products for free for promotional purposes. Naturally, the framework presented here is not applicable in that kind of a special situation.
[90] A bad business decision is a bad decision, just as any bad technical decision is a bad decision.
[91] Despite activity based costing methods, many firms may not know the exact profit figures for all of their individual products.

perceived product quality improves (and prices possibly drop), which leads to a takeoff in sales. (p. 1024)

There can be also new business models that are designed totally differently. For example, inkjet manufacturers typically provide the actual devices at a cheap price, with an attempt to make a profit by charging customers more to replenish the ink. This kind of innovative business model creates a totally different situation and renders the applicability of the proposed framework.[92]

One additional issue with the framework is related to products, which are subcomponents of larger implementations. Rogers (2003) uses the term "technology cluster" and he admits that "innovations often are not viewed singularly by individuals. ... The boundaries around any given innovation are often not clear cut or distinct" (p. 249). This dilemma is difficult to circumvent, but one solution is to limit the framework to only include those products that can be 'under commerce' as a separate entity.[93]

It is also worth noting that there can be external forces that may dilute the innovation try-out phase during a shorter period of time. A hypothetical example would be following: A firm introduces new-to-the-world production equipment that can be used to produce product Z. If the market price for product Z collapses rapidly due to macroeconomic reasons, this may make the production equipment obsolete, no matter how novel and innovative the equipment may be. Nevertheless, if the underlying product is not successful on the market – for one reason or another – the "callous" framework simply removes the label innovation. As a result, the market plays a significant role in prioritizing certain innovations over others. The common assumption is that the market operates effectively, thus the market also favors those inventions that deserve the title of innovation.

Time is perhaps the most challenging variable in the proposed framework. New ideas do not often become accepted immediately, but they may become favored as time passes. As Chandy, Hopstaken, Narasimhan, and Prabhu (2006) point out:

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[92] In reality, there is hardly any model or framework that would fit into every single managerial challenge and business situation.
[93] For instance an elevator can be seen as apart of larger installasion (a building) but KONE also sell them separately. Thus an elevator can be investigated under this framework.

> *The efficiency gains that can be derived during the conversion of ideas into launched products appear over a long period and cannot easily be tied to performance in a particular year. (p. 504-505).*

In other words, it may take a long time for an invention to be accepted by the majority of customers, as diffusion theory suggests. According to Rogers (2003), the adoption of a particular product tends to follow an S-shaped curve and approach normality. The rate of adoption is then a numerical indicator that can be measured, for instance, by the number of users or customers per year. However, the different rate of diffusion of different products makes it difficult to justify assigning an unambiguous time period during which a new product must meet the set business goals. The nature of an innovation attempt has a fundamental effect on the time it will take for that particular product to become accepted by the customer base. As mentioned earlier, according to Rogers (2003), cellular phones and VCRs became popular within a few years, whereas it took decades before the majority of people began wearing seat belts in cars in the United States.[94] Preventive innovations[95] such as seat belts tend to be adopted more slowly due the fact that the desired outcome is not immediately clear. As Rogers (2003) states: "The desired consequence is distant in time, and so the relative advantage of a preventive innovation is a delayed reward" (p. 234).

Moore (1998) also acknowledges that the issue of time is a fundamental problem when discussing the relative success of high-technology products. A vendor wants customers to buy a new product immediately, whereas more pragmatic customers want to wait and see if the new product will be accepted by their peers. In reality, the development and market acceptance of a new product can be a long journey. The case of fiber optics development by Corning is a good example of such a journey (Cattani, 2005; 2006).

The dilemma of how to measure a product's success over time when it comes to innovation projects is also affected by the consequences of management decisions, which only become evident after a long period of time (Patterson, 1998). If a firm is willing to wait, for instance 20 years for a product to become successful, they can of course do so.

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[94] It is easy to continue with the above-mentioned, hypotethical scissor case illustration and propose that scissors might have eventually been accepted by that particular tribe after a number of years.
[95] Something that helps to lower the probability of some unwanted future event.

I believe that more often than not, the amount of time during which a firm expects a product to become a business success is relatively short. In other words, most firms are not so patient and a product that does not become successful within a reasonable amount of time will be pulled from the market. As mentioned earlier, Schneider (2004) provided a threshold of just one year after a products were introduced. In any event, the actual timeframe may differ significantly depending on the particular industry and the patience level of top management. However, if management determines that a new product has to be profitable within one year of the initial launch, but the product fails to do so then, then, according to the proposed framework, we should not think of the product as an innovation.

As mentioned, some products are used as probes or teasers; they provide the basis for learning about the market or a platform for further development and, ultimately, act as stepping stones for future products (Lynn et al., 1996; Trott, 2002). This means that even if these particular products fail, the next generation of products can be treated as innovations. In that sense, a firm can make design alterations and re-enter the market with a modified product, but then we are dealing with a new introduction and a new "countdown" should be started.

Griffin and Page (1996) point out that "the time at which success is measured after introduction can effect whether a product is seen as successful or not" (p. 480). Griffin and Page also state that the timing for measuring the success of a particular product and project unambiguously across industries and different products is still unresolved. In any event, the time at which the product is terminated, at the end of its life cycle, is the moment when all the pros and cons can be aggregated and we can ultimately declare whether the product was a success or failure. Griffin and Page (1996) also argue that the importance of different measures can perhaps vary during the lifecycle of the product. Precisely the same dilemma of how to measure *business goals* is present within the proposed product innovation framework. The temporal-spatial[96] nature of the product innovation process makes it difficult to universally and unequivocally measure the relative success or failure of different products. Thus, the firm-centric approach presented here for defining product innovation simply leaves it to the firm in question to determine if its

[96] I want to thank professor Paul Lillrank for pointing that idea out during our discussions.

business goals are met or not. Also, the exact time during which to conduct such an assessment is left open.[97]

Newness is also a concept that is highly subjective. As discussed in the chapter 3.1.5 there are several levels to address newness. In this framework market is 'an aggregated instance'. In reality there can be several markets for a product and some market may see that particular product new, where as the same product may not me that new in another market.

4.3.4 Final comments

Aghion and Tirole (1994) discuss a situation where R&D activity is performed by outsiders on behalf of the customer: "We posit that the exact nature of the innovation is ill-defined ex ante and that the two parties cannot contract for delivery of a specific innovation" (p. 1186).

In addition, Rehn and Vachhani (2006) call attention to the fact that in innovation management, innovations are assumed *a priori* to be original. To build on this idea, I suggest that a firm should determine a certain period of time in advance (for instance, a year after the initial product launch) by which a particular product has to meet its goals. This approach implies that innovations can only be analyzed retrospectively. In other words, it implies that innovations should only be announced *ex post facto*.

Sometimes the passing of time can reveal problems that were not visible during the initial product launch. Griffin and Page (1996) use the example of Kodak, where Kodak's instant image product seemed very successful right after the launch. However, in the long run it turned out that Kodak was actually infringing on Polaroid's patent rights, which ultimately caused the product to be a financial failure.

It is also worth noting that products cannot stay new forever. The question of how long something should be considered "new" is again a difficult question. According to Griffin and Page (1996), 3M labels products as "new" during their first four years. When a product has been on the market for a number of years, it will lose its newness status. After this happens, a product falls into the category of ex-innovation.[98]

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[97]The varying "clock-speed" and special nature of different industries makes it impossible to set up any universal law for this.
[98] This happened to Sony Walkman and most likely it will eventually happen to Apple iPod as well.

The framework takes a firm-centric perspective on product innovation and focuses on a single product rather than the overall program level. The theoretical contribution of the framework is that it adds to our understanding of product innovation. As a result, this framework hopefully will give managers and academics alike a new mindset to better assign products to meaningful categories.

In addition, if applied correctly, the framework could help to limit the number of products that are declared innovations.[99] As stated previously, not every new product can evolve into a product innovation. It is also evident that the distinction between different outcomes – innovation, mediocrity, and failure – leaves room for interpretation. Where is the line between failure and mediocrity and when does mediocrity cross the border of the "innovation box" or become failure? There is no universal referee to judge such things. The ultimate interpretation is perhaps in the hands of the manager who sets the business goals in the first place.

Despite the potential flaws, the framework constitutes an essential cornerstone for this dissertation. It justifies the idea of commercial success as an antecedent of product innovation. And for commercial success to come, a firm is required to manage its commercialization of new products.

[99] This is an ideal and perhaps too naiive of a wish, but the idea is to prevent the term of *product innovation* from being too much diluted.

5 Operationalization of Commercialization within the Context of New, Industrial B2B Products

The following subsections include a discussion of the main commercialization activities a firm has to address before its products are ready to hit the market.

5.1 Gap in existing research and operationalization of commercialization in this dissertation

It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change. – Charles Darwin

Chiesa and Frattini (2011) claim that a research gap exists in terms of understanding how the commercialization of innovations in high-tech industries can determine commercial failure. They focused on the consumer market and stated that the industrial market needs to be studied more closely. Based on that comment and previous literature review, I feel comfortable in stating that the there is also a research gap in terms of understanding how commercialization activities can determine success in the industrial B2B market. Thus, this dissertation takes steps towards closing the existing research gap, as illustrated in figure 19.

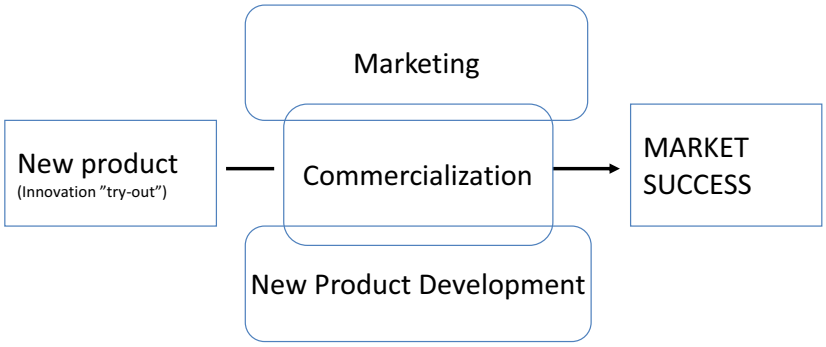

Figure 19. Gap in existing research on commercialization of new products in the industrial B2B market

Chiesa and Frattini (2011) built upon the extant literature on innovation, launch strategy, and high-tech marketing to provide a set of variables for the commercialization of innovation. The operationalization in this dissertation borrows from their taxonomy, but, again, it is modified somewhat to better suit the industrial B2B context. The resulting set of variables that are used as the basic dimensions for the commercialization of new products in this dissertation is shown in Table 5

In other words, the list of variables used to operationalize commercialization in this thesis represents a further modification of the set of variables[100] presented by Chiesa and Frattini (2011). Chiesa and Frattini (2011) defended their modification as part of a need "to isolate the influence of commercialization decision on new product performance" (p. 439). Their study is based on archival data and they are analyzing commercialization based on a historical analysis method and interested in the endogenous reasons that have led to the success or failure of new products, i.e. after commercialization. This dissertation, however, aims to understand the actual "work" performed by managers during the commercialization process and, therefore, some modifications were again needed.

[100] In addtition, the reasoning for avoiding a strict typology between strategic and tactical variables has been discussed earlier (See section 4.1).

Table 5. Dimensions of commercialization

Variable	Description	Attibutes
Organizing	How to organize commercialization-related tasks. Also interface issues between functions	Small team, large team; light weight PM, heavy weight PM
Positioning and product strategy	Target market for the new product, technological choices for the new product, market positioning of the new product	new market, new product, new technology
Market entry strategy	The set of strategic choices a firm approaches market	lead, follow
Timing	Timing of the products' introduction to market, timing of of the products preannouncement	Too early, on time, too late
Naming and branding	How to differentiate and name the product	New name, brand extension
pricing a product	What kind of pricing policy a firms decides to apply	high, low or modest
Advertising and promotioning and distribution	Types of advertising channels, type of message convoyed, monetary spending on advertizing, distribution channels	channels and media
cannibalization and termination	Conflict between existing product and the new product, termination of sales and production of the old product in a favour of the new product	ramp up , ramp down
Piloting	certain customers are willing to testdrive the new product	acceptance, benefits, learning
Launch	Official introduction of a new product to the market	Tactical , strategic, internal , external

Griffin and Hauser (1996) state that, "the desired outcome of in any NPD efforts is the timely commercialization of a profitable product" (p. 191). I think there is a need to refine this a bit. Commercialization should not be considered as an outcome of NPD. Instead, there is a need to run commercialization efforts alongside NPD efforts, which then together are capable of yielding a successful and profitable product.

The rest of this chapter is devoted to investigating these commercialization-related variables in detail.

5.2 Organizing for commercialization

Product innovation is not a one-department show! It is very much a multidisciplinary, multifunctional effort. – Cooper 1993, p. 83

Organizing for innovation (Tushman & Nadler, 1986), organizing for product development (Olson, Walker, & Ruekert, 1995), and organizing for better management of internal and external information flows in the innovation process (Tushman, 1977) have long been studied. This chapter briefly analyzes organizing for commercialization. Commercialization, as

seen in this dissertation, does not belong to any traditional organizational function alone - it belongs to all of them. The call for cross-organizational collaboration becomes obvious when we consider the key development objectives (Smith & Reinertsen, 1998) for a new product. In Figure 20 the circles illustrate the four main objectives for a product and the arrows indicate the trade-offs between these objectives.

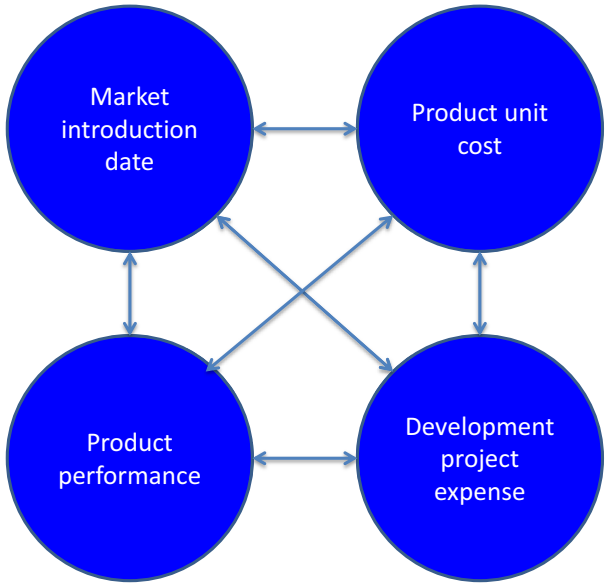

Figure 20. Objectives for a new product (Smith & Reinertsen, 1998)

Input from all organizational units, i.e. cross-functional collaboration, is required in order for a firm to be able to create a balance between the above-mentioned objectives. It is worth mentioning that increased competition has forced firms to challenge traditionally management theories, according to which efficiency and innovation are mutually exclusive issues and a firm can only be good in one of them at time (Magnusson & Martini, 2008).

In any event, the importance of cross-functional teams in the new product process has been documented and discussed widely (Nonaka, 1990; Aaby & Discenza, 1993; Hutchings & Knox, 1995; Song, Thieme, & Xie, 1998; Kono, 2005; Prebble, Gerrit, & de Groot, 2008). Researchers have found that when firms utilize a cross-functional team, they increase the quality of the product (Song et al., 1998), the success rate of the project (McDonough III, 2000), and the success rate of new products (Cooper, 1994; Valle & Avella, 2003), and they also improve the launch success of the new product (Kono,

2005). However, it takes time, resources, and leadership skills to build consensus between different units because managers need to navigate between diverse opinions and objectives (Song et al., 1998).

Most organizational and commercialization-related issues typically occur at the interface between marketing and engineering, and this will be discussed in the next chapter. Naturally, there are other functional interfaces, e.g. R&D vs. production (Martin, Ginn & Rubensten, 1986) and industrial design vs. marketing (Veryzer 2005; Beverland 2005), which have their own issues.

5.2.1 Marketing – R&D/engineering interface

Various studies have focused on the interface between marketing and R&D/engineering[101] (cf. Souder & Chakrabarti, 1978; Crawford, 1984; Ruekert & Walker, 1987; Griffin & Hauser, 1996; Fisher, Maltz, & Jarowski, 1997; Ottum & Moore, 1997; Song et al., 1998; Moenaert, De Meyer, Souder & Deschoolmeester, 2003; Rein, 2004; Michalek, Feinberg, and Papalambros, 2005; Massey & Kyriazis, 2007; Calantone & Rubera, 2012).

Managing that interface seems to play an important role in the success of new products (Song & Thieme, 2006). According to Grant (2002), there is a clear requirement for close co-operation between the different departments in an organization that are pursuing commercialization. Similarly, Michalek et al. (2005) points out that, "From the perspective of the producer, marketing and engineering design ideally work together to achieve a common goal: creating the product with greatest value for the firm" (p. 58-59).

However, Song et al. (1998) point out that trying to involve all of the different departments in a company in a product development project can be counter-productive. Instead, Song et al. (1998) suggest a function-specific integration based on stage requirements. According to Gupta et al. (1986), the R&D vs. marketing integration interface has a strong positive relationship with innovation success. Despite the importance of integration, adequately measuring the level of integration is still problematic. Gupta et al. (1986) suggest measuring it in terms of information sharing and R&D-

[101] It seems that the extant literature use the terms "R&D" and "engineering" quite interchangeably. For practitioners, however, these terms may mean completely different things. My interpretation is that many academics favour the term R&D because it "sounds" like it is more related to technology development than is engineering.

marketing involvement within the different stages of the innovation process.

The key issue, however, is not only physical proximity and working together. Somewhat counterintuitively, there are also problems related to having too close of a relationship. Souder (1987) investigated situations where individuals from R&D and marketing were good friends. That actually led to a situation where nobody wanted to hurt the feelings of others and both parties avoided conflicts and never challenged the other's ideas and always took the other's judgments for granted (ibid).

According to Souder (1987), over half of the 289 projects that he studied experienced some problems with the R&D – marketing interface. The failure rate was significant in those situations in which there was some disharmony: a failure rate of 23% when there was mild disharmony and a failure rate of 68% when there was severe disharmony (ibid). The major challenge, as Griffin and Hauser (1996) point out, is to get people coming from different disciplines to understand the goals of others and to appreciate the viewpoints of others.

While the cross-functional approach can yield positive outcomes, different ways of thinking and cultural differences can also create challenges for marketing and R&D (Dougherty, 1992; Griffin & Hauser, 1996). Differences in perspectives regarding new ideas, products, and development tasks and roles may cause problems in communication and lead to a lack of customer understanding (Dougherty, 1992).

Souder (1987) points out that deep-seated attitudes can lead to disruptive situations, which often have negative outcomes. He mentions that a lack of appreciation and distrust between parties cannot be easily overcome and disharmony creates real barriers between participants. According to Michalek et al. (2005), the measures of success and the objectives for products also vary according to the function. Whereas marketing values dimensions such as market fit, customer satisfaction, market share and profit, positioning, and the right price tier, engineering, on the other hand, is concerned with technical objectives such as performance, reliability, cost reduction, durability, energy use, manufacturability, and innovativeness (Mickhalek, Feinberg & Papalambros, 2005).

According to Littler (1994), the role of marketing in the product innovation process is to ensure that the customer's needs are taken into account throughout the process. On the other hand, Workman (1993) describes a case study of a high-tech firm where marketing's role was rather

limited. Marketing had no direct influence over new product decisions and the company culture was very much driven by the engineering department. Workman (1993) proposes that marketing has less power in situations where there is environmental uncertainty and also when products are highly modular or custom-built. According to Michalek et al. (2005), marketing may have the viewpoint that "design constraints generally can be overcome by allocating appropriate funds. In some cases they cannot" (p. 59). On the other, Michalek et al. (2005) note that "the engineering design community must accept that price and consumer preferences are aspects of design just as real as those determined by physics" (p. 59).

Souder (1987) lists antecedents that create problems and conflicts between R&D and Marketing. These are, for instance, technical specialization, a different sense of time, different motives and goals, dissimilar jargon, a bounded sense of responsibility, and a clique mentality (ibid). While Griffin and Hauser (1996) acknowledge that these stereotypic roles do not apply to every firm, they still point out that there is a certain amount of generic truth behind the roles and list differences in the various dimensions, which are illustrated in Table 6 below.

Table 6. Marketing and R&D differences (Griffin and Hauser, 1996, p. 196)

	Functional position	
Dimension	Marketing	R&D
Time orientation	Short	Long
Projects preferred	Incremental	Advanced
Ambiquity tolerance	High	Low
Departmental structure	Medium	Low
Bureucratic orientation	More	Less
Orientation to others	Permissive	Permissive
Professional orientation	Market	Science
Professional orientation	Less	More

The items listed in the table above are not issues that a firm can just ignore, because they may seriously impact a firm's level of performance. Crawford (1984, p. 85) lists a series of outcomes resulting from discrepancies between R&D and marketing:

- Products are late;
- The new items are more costly than predicted;
- The new products fail to sell, either because (1) they do not solve user problems well enough or because, (2) while they do so, they have other drawbacks that turn customers off;
- R&D and marketing blame each other for the misfires.

One important aspect to making the innovation process better is to overcome the language barriers between marketing and R&D via effective and ongoing communication (Michalek et al., 2005; Moenaert et al., 1995; Griffin & Hauser, 1996). Interpersonal trust and respect also influence the relationship between marketing and R&D (McDonough III, 2000; Massey & Kyriazis, 2007). Lovelace, Shapiro, and Weingart (2001) found that while disagreement is evidently bound to happen in functionally diverse teams, the key thing is to harness this disagreement as a source for innovations and that increased performance lies in communication management and in finding ways to resolve conflicts in a collaborative manner. Michalek et al. (2005) also emphasize the iterative nature of decision making, especially with products of a higher complexity.

There is also evidence that a high level of formalization in organizational structures can actually help the integration process. The reason being is that there are less conflicts and confusion of roles, resulting in efficient coordination between marketing and R&D (Song and Thieme, 2006). The problems are, after all, not specific to a single business unit. According to Wind (2005), "there are only business problems, the solutions of which are facilitated by insights and knowledge from marketing, operations, finance, human resources and other disciplines" (p. 871).

A separate but related topic is illustrated by Jones and Stevens (1999), who claim that NPD-related frameworks should take internal company politics into an account. They postulate that NPD is an intrinsically political process and label it under the term micropolitics. It means that individuals have their own agendas, i.e. personal career interests, and status ambitions. While this conflict between individuals and the group is present in any organization, its effects have been left out in studies that focus on new product creation as consisting of a series of logical steps. Jones and Stevens (1999) claim that:

> *The majority of organization scholars choose to ignore politics of management. This is particularly the case in the new product development literature which projects a vision of management which is unrealistically rational and objective. (p. 168)*

It is perhaps correct to posit that if individuals have the power to hinder the overall development, they also have opportunities to really influence the project's success. Constructive opportunities and the possibilities of an individual to influence the positive outcome of product initiatives will be discussed next.

A recent study by Calantone and Rubera (2012) states that, though companies often focus on the issue of environmental uncertainty, it is not the only issue of importance; the nature of a company's innovation should be analyzed when determining the optimal level of collaboration activities. They demonstrate that companies with aggressive innovation have also developed a deeper culture of collaboration between their RD&E and marketing units. It is also important for R&D to receive market feedback from marketing and also for marketing to create an understanding of the capabilities as well as limitations of R&D and how that know-how can be applied to new products (ibid).

5.2.2 The role of product champions and product managers

A product champion is an individual who has a personal role in developing and promoting a new idea within an organization (Markman, 2002; Rogers, 2003). The product champions' role is important because they are the ones who push ideas to develop projects and to market (Howell, 2005).

According to Rogers (2003), "the presence of an innovation champion contributes to the success of an innovation in an organization" (p. 414). The idea of a product champion originates from early 1960s and was first introduced by Schon in 1963 as cited in Smith (2006). A product champion is a person who is willing to act as an advocate and defend the idea with all his personal power and influence. Champions are more often needed in large organizations that have a built-in resistance to change (Smith, 2006). According to Howell (2005), these innovation champions convey confidence in and enthusiasm for the innovation, they are good at involving the key stakeholders and they often scout widely for new ideas to pursue.

The other important role in the commercialization of new products is assumed by the product manager. The role of product manager (PM) covers various planning, coordinating, concept creation, marketing and advertising, engineering orchestration and customer meeting-related tasks. A common problem has been that PMs usually do not possess any line authority over engineering, manufacturing, or sales. Still a PM should navigate between these functions and ensure that all parties are heading in the same direction in a synchronized mode. A PM is required to comprehend the underlying technical aspects, but also, at the same time, to understand product positioning, pricing, distribution, and sales-related topics (Ames, 1971; Gemmill & Wilemon, 1972; McDaniel & Gray, 1980; Cossé & Swan, 1983; Clark & Fujimoto, 1991). The evolution of the different

roles of PMs and the product management system in general is discussed by Katsanis and Pitta (1995).

Ames (1971) discusses the division of roles between a product manager and a market manager (MM). Product managers should be used when there are multiple products designed for single markets, whereas market managers should be used in cases when a firm produces just one product targeted at multiple markets. However, when multiple products are sold to many markets, i.e. products and markets "crisscross," there is a need for a dual mode – to use both product managers and market managers (ibid).

According to Ames (1971), the rationale behind using both types of managers is related to the complexity of the situation. PMs tend to focus too much on the existing products and cannot keep in touch with all of the different market requirements, whereas MMs concentrate on customer requirements (ibid). Naturally, this dual mode can create conflicts and real problematic situations because the above-mentioned roles overlap and certain decisions made by one manager may make life difficult for the other manager (ibid). However, Ames (1971) feels that this provides a firm with a new potential to find new markets and opportunities, if only it is managed properly.

Clark and Fujimoto (1991) list a few important tasks and activities for a PM. Maintaining close contacts with customers and the market is important because this direct, first-hand involvement can provide much better insights than abstract market data (ibid). Even though a PM usually does not possess formal authority over engineering or design tasks, PMs work as orchestrators and keep direct contact with engineers, and they can even intervene in cases when the overall integrity of a concept design is at stake (ibid). To achieve the close contact between internal departments and external parties, PMs are often in constant motion. The rationale behind this is that the value of many product-related topics just cannot be communicated via written material, but close, interpersonal help can make the product concept come alive in people's minds (ibid).

Similarly, it is not uncommon that there are conflicts of opinions between different organizational units or even within a unit and PMs are required to serve as a liaison officer to resolve such conflicts. However, Clark and Fujimoto (1991) state that this kind of referee role is typical for lightweight product managers who most often are facilitators and neutral problem solvers, whereas heavyweight PMs can even create a conflict if it proves necessary for protecting or promoting the product. Clark and Fujimoto

(1991) actually compare PMs to a "traveling preacher." In order to be successful in their position, PMs are required to be "multilingual" and able to translate customer requirements to the engineer, but also the other way round (ibid). According to Clark and Fujimoto, "During planning and prototype development, for example, they must be able to assess and communicate what engineering choices will mean for marketing and eventual customer experience" (1991, p. 259).

5.3 Product strategy and positioning

Your most unhappy customers are your greatest source of learning. - Bill Gates

While a thoroughly discussion of contemporary business strategies is beyond the scope of this dissertation, it is essential to present some product strategy and market entry strategy aspects from a commercialization point of view. For instance, Cooper (1993) emphasizes that product strategy and corporate strategy must be aligned. Product strategy, however, is more specific and defines the objectives and roles of new products (ibid). Product strategy also defines the arenas where a firm competes and the directions for new product focus in terms of technology and applications (Cooper, 1993). In other words, there are strategic decisions that managers need to make when a firm is planning to expand its offerings and commercialize new products. Lodish, Morgan and Kallianpur (2001) states that positioning and segmentation of products and services are the real core topics and help to define a key question a firm needs to adderess - "what am I selling to whom"[102] (p. 1).

According to Ansoff (1965), a firm must first decide between whether to diversify or not to diversify. Then, it must make a broad scope decisions concerning the actual industry a firm wants to operate in; eventually, the management needs to refine a specific product-market strategy (Ansoff, 1965).

A firm can aim to increase market penetration by selling existing products in an existing market or it can develop new products for a new market;

[102] Lodish et al (2001) provide a check list for segmentation audit in the appendix of their book.

alternatively, a firm can seek new markets for its existing products (Ansoff, 1965). Diversification happens when both the market dimensions and the product dimensions are new to a firm (ibid). This product-market matrix, which defines possible growth strategies for a firm, is illustrated in Figure 21.

Ansoff (1965) pointed out that many industries offer a broad range of products and technologies to customers if analyzed at a high level. Therefore, the growth analysis has to be done in terms of a particular sub-industry so that a common and meaningful thread can be found (ibid).

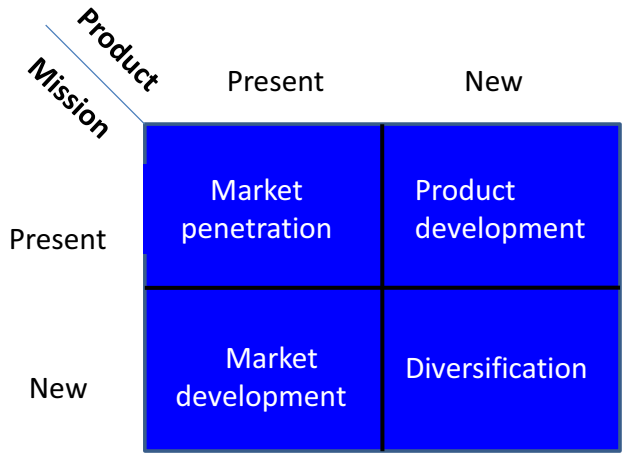

Figure 21. Product-market growth matrix (Ansoff, 1965)

Carroad and Carroad (1982), Steele (1988), Fox et al. (1988), and Cooper (1991) based their studies on this matrix and created three-dimensional versions of it. For example, Carroad and Carroad (1982) divided technology and product into different vectors, as illustrated in Figure 22. By doing this, they came up with seven possible scenarios (i.e. other corners) that a firm can pursue, which depart from its status quo.

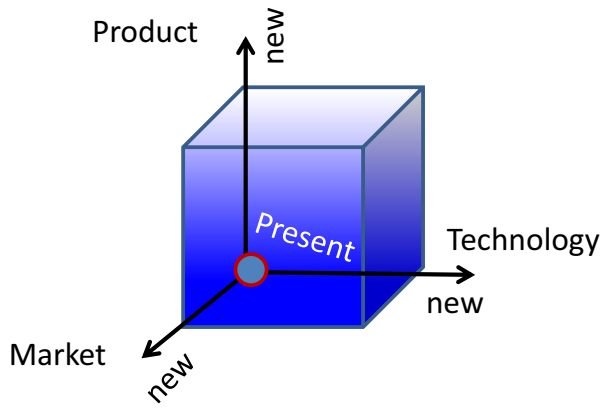

Figure 22. Technology-market-product matrix (Carroad & Carroad, 1982)

Cooper (1991) uses the "Who, How, What" questions to label these axis. "How" refers to the new technologies required to design, develop, and produce a new product, whereas "Who" addresses the new customer group to be served (that is, the market; shown in Figure 22). A firm can also move away from its "home base," as Cooper (1991) calls the present situation, and think about new applications (products) that answer the "What" question.

Steele (1988) used the same three-dimensional (product-market-technology) categorization as Carroad and Carroad (1982), but emphasized the risk aspects. According to Steele (1988), there can be a different combination of "risk spaces," but the greatest risk is present when a firm moves farther out along all of these dimensions at once. Steele (1988) actually uses the term "suicide square" to describe the direct movement to an area that is the greatest distance from the existing situation.

Fox et al. (1988) have used Carroad and Carroad's model as a starting point, but they replaced the product dimension with a process-related axis, as can been seen in Figure 23. Fox et al. (1988) argue that their model takes a broader view because it uses uncertainty across all dimensions. They also suggest that different NPD strategies (i.e. speed to market, learning driven, market driven, technology driven, etc.) be used in different uncertainty situations.

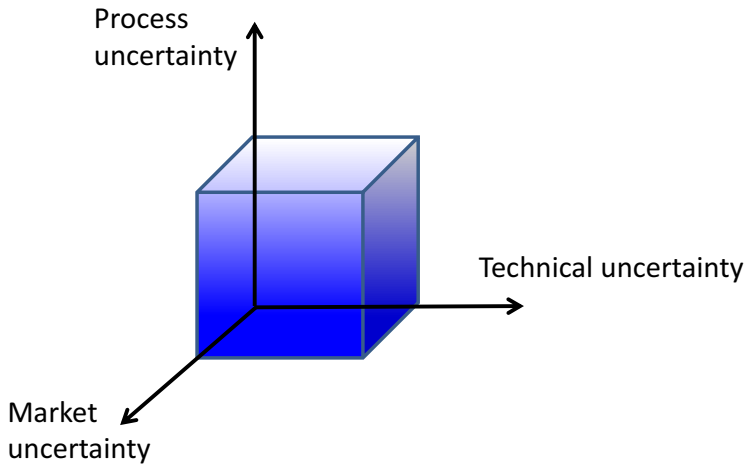

Figure 23. Technical-/process-/market-uncertainty matrix (Fox et al., 1988)

It is worth noting that even if Ansoff (1965) did not illustrate a three-dimensional model per se, he discussed new versus existing technology as a basis for new products that are targeted at a different customer base. This is illustrated in Figure 24. However, he left the issues of applying new technology to existing products or marketing old products in new markets, (whether based on current or emerging technology) out in this figure. A further discussion of different diversification strategies is beyond the scope of this dissertation. However, to provide just one example: what Steele describes as a "suicide square," Ansoff describes as "'gonglomerate diversification." A concrete example of such a product is, for instance, Teflon (Carroad & Carroad, 1982).

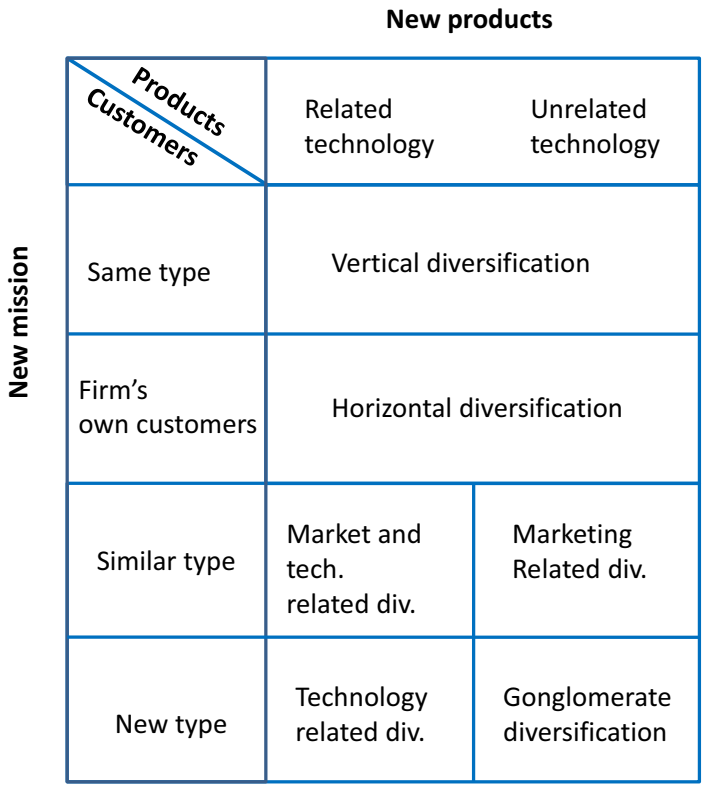

Figure 24. New products and a new mission (Ansoff, 1965)

5.4 Market entry strategy

Whenever you see a successful business, someone once made a courageous decision. - Peter Drucker

Firms that are contemplating entering into promising new markets must carefully consider the timing of their entry. Guiltinan (1999) points out that market size and growth rate, as well as the actual number of entrants, are not necessarily known at the time a firm is planning to commercialize its new product. According to Slater and Mohr (2006), some firms can only reach a niche market, while others successfully market their inventions to a mainstream market. Cooper (1993) states that the entry strategy of a firm constitutes an essential part of its product strategy. Ansoff and Stewart (1969) introduced four strategic alternatives for a firm entering an emerging market: first to market, follow the leader, application engineering, and "me-too." Similarly, Crawford and Di Benedetto (2006)

label firms as pioneers, quick seconds, slower ones, and late ones based on their market entry moves. Kotler and Keller (2009) added parallel entry as an additional option. The idea behind parallel entry is to get more market attention for new products when the introduction is timed to match a competitor's entry into the market.

Miles and Snow (1978) have presented the following business strategy typology based on the strategic choices made by organizations regarding new products and selecting a market in the face of changing conditions:

Prospectors are constantly seeking new market opportunities for new products. Prospectors are willing to take more risks and, therefore, they also encounter failures with their product experiments. Prospectors are the first in emerging markets and also put pressure on their competitors. According to Griffin and Page (1996), Honda and Chrysler are the best examples of prospectors in the automobile industry.

Analyzers use a two-fold strategy. They operate in a stabile market, but they are also present in a changing market. (This *ambidextrous* approach is also discussed by Tushman and O'Reilly (1996)). Fast product changes are made in a turbulent market, whereas stable market operations seek more efficiency via formal processes. Toyota and Ford are examples of analyzer companies.

Defenders focus on a narrow product-market area. They aim to maintain their niche position and avoid making major adjustments to technology and their methods of operation. These firms ignore industry changes and devote their primary attention to improving the efficiency of their current operations. General Motors, Nissan, and Mazda are examples of defender companies.

Reactors are eager to look for new opportunities and are not committed to established products and markets. Reactors primarily respond to strong environmental pressures. Griffin and Page (1996) describe Subaru as an example of a reactor firm.

In any event, being first to market with new products is perceived as risky; however, as compensation, it can yield a major competitive advantage, such as larger market share or increased sales (Mascarenhas, 1992; Kalyanaram, Robinson, & Urban, 1995; Crawford & Di Benedetto, 2006). While some authors have claimed that first entrants outperform late entrants (i.e. Urban, Carter, Gaskin, & Mucha, 1986; Lambkin, 1988; Ryans, 1988), others argue that being the first on the market is not always the optimal

strategy (e.g., Teece, 1986; Lambert & Slater, 1999). Kerin, Varadarajan, & Peterson (1992) postulate that the topic is complex, with various uncontrollable forces, and, therefore, the first mover advantage may or may not produce a sustainable advantage. In addition, the nature of an underlying product plays a role. According to Min, Kalwani, and Robinson (2006), the first firms to introduce really new products often face difficulties, whereas firms with incremental products are better off in terms of being pioneers. Lambert and Slater (1999) acknowledge that while general opinion claims that being first to market help firms achieve higher than average profits and market share, this does not automatically hold true. First movers may miss shifts in the technology or in customer needs, whereas late entrants can piggyback on pioneers' investments or in other ways benefit by learning from the actions taken by pioneers (ibid).

It is also possible that early entrants will make the wrong bets and acquire resources that prove to be of limited value as the market evolves (Lieberman & Montgomery, 1988; 1998). Urban et al. (1986) state that late entrants can dominate first movers if they are able to develop a superior product and back up it with aggressive low pricing and heavy expenditures on advertising. According to Shankar, Carpenter, and Krishnamurthi (1998), late entrants can purposely use a totally different strategy and business models than those used by pioneers and thus redefine the game to their advantage.

The classical case example is the battle between VHS and Betamax standards in the videocassette and recorder industry, as illustrated by Cusumano, Mylonadis, and Resenbloom (1992). Sony's Betamax was introduced to the Japanese market earlier and it enjoyed a clear leading position; however, VHS manufacturer Victor Co. allied itself with other manufacturers such as Matsushita, Sanyo, Toshiba, and Phillips and ultimately became the market leader, thereby forcing Sony to close down its Betamax operations (ibid).

Lilen and Yoon (1990) showed that with new B2B products, a firm is better off being among the first 3-5 companies to enter a particular market. Similarly, Golder and Tellis (1993) report findings that do not support any long-term rewards for pioneers. Golder and Tellis (1993) also pointed out methodological limitations in various market entry studies and introduced data according to which 47% of pioneers fail. Barczak (1995) found that the order of market entry is of no significance in the telecommunications industry. While more empirical evidence is needed, there are several studies

confirming that the order of market entry is not related to the long-term survival rates of firms (Kalyanaram, 1995; Lambert & Slater, 1999). [103]

This type of "follow-the-leader" strategy requires less market education and better suits those firms that have superior technical skills, strong brand equity, or large and efficient channel partnerships, which can be used to overcome pioneer advantages. In addition, a firm can prefer "application engineering" and avoid investing heavily in research and new technology. This approach is referred to as "playing it safe;" it focuses on cost control and efficiency in manufacturing. While some development is necessary, interest in the economy overrides innovativeness. Firms with a total "me-too" strategy simply avoid research and development entirely. For firms, the focus of this "copy and modify what others have done" approach is on manufacturing and administration excellence rather than on developing their own design. The market asset of these firms is their capability to compete at a low price and deliver strong performance, even if they are late on the market. An example of this kind of strategy is the Japanese firm Matsushita,[104] which has left it to Sony to be the innovator for a particular product (Ansoff & Stewart, 1969; Lieberman & Montgomery, 1988; Golder & Tellis, 1993).

The follower product bears the handicap that customers can perceive them as being "yet another mouse trap," i.e. a product that is different but not necessarily any better (Guiltinan, 1999). However, this strategy can prove to be useful because those that are first in the market need to commit resources to explore and pioneer such a market (ibid). At the same time, followers can take the time to learn about market dynamics and structures, build their strength and scan and evaluate opportunities with an increased amount of information and knowledge (Golder & Tellis, 1993).

5.5 Timing

New product launches are the lifeblood of most high technology companies. - Kitcho, 1998

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[103] The 'battle' between Internet search engines is also a good example off that.
[104] Matsushita's nickname in Japan is "maneshita denki," which means "electronics that have been copied."

Market entry strategy is very much related to product launch. However, the market entry strategy should not dictate the launch decision. A firm can, and is often even forced to, make certain adjustments to the actual launch date. According to Ansoff and Stewart (1969), "top management must be able to make important judgements of timing, balancing the improved product development stemming from a delayed introduction against the risk of being second to market" (p. 82).

Market entry and launch timing seems to be terms more often used in marketing and product innovation literature. Much strategy literature has used the term "first mover advantage" to describe the same phenomena (cf. Mascarenhas, 1992, Lieberman & Montgomery, 1988 and 1998 and Makadok, 1998).

For instance, Lieberman and Montgomery (1988) discussed first mover advantage in terms of the resource-base theory of a firm. They state that pioneering firms may be able to acquire superior positions in geographic space (e.g. prime physical locations), technology space (e.g. patents), or customer-perceptual space. The latter position has to do with customers being willing to perceive of the position of the pioneer as their preferable choice (ibid). This is also related to the switching costs that a customer encounters when changing a supplier (ibid). When firms are deciding upon their timing of entry, they are required to balance the risk of being too early with that of missed opportunities resulting from being too late on the market (Lilien & Yoon, 1990).

In addition, due to "network externalities" (Robertson et al., 1995 and Lee & O'Connor, 2003a) a pioneer's products can become, de facto, the industry standard because first movers can have a significant influence on standardization. It is beneficial for a firm to be the first to create the standard according to its own preferences, because it becomes difficult to displace an existing standard later on (ibid). In addition, according to Lieberman and Montgomery (1988) pioneers may be able to expand and defend their position in the market by blocking product space for new entrants with an extended product line. Kalyanaram et al. (1995) report that pioneering firms often have a broad product range, which leads to a large market share precisely because such firms have the opportunity to introduce numerous products to the largest and most lucrative market segments. The first mover also enjoys a reputation of being an innovative firm and is able to acquire the most skilled human resources (Lieberman & Montgomery, 1988; 1998).

The timing for market introduction depends on the market window the organization is operating within, characteristics of the technology and the industry, as well as the performance level of the underlying product and the overall competitive situation (Bayus, 1997; Lambert & Slater, 1999; Grant, 2002). For instance, according to Beard and Easingwood (1996) the window of opportunity for producers to reach the market is often small in the high-tech industry. Grant (2002) points out that different firms have different optimal strategic windows, i.e. time periods when the firms' "resources and capabilities are aligned with the opportunities available in the market" (p. 347). According to Tellis and Golder (1996), late entrants can actually outperform a pioneer with the right combination of vision, persistence, commitment, innovation, and asset leverage. Similarly, Urban and Hauser (1980) discuss the dilemma of fast launch and the pressure an organization may feel to speed up their commercialization process. This happens in a situation where a competitor begins a "crash project" in order to rush to the market with a similar product, which may put pressure on the firm in question to begin a crash program in response (ibid). Urban and Hauser note that "A crash program may be just the response the competitor wants if it forces you to make key mistakes that may compromise your position" (Urban & Hauser 1980, p. 466). They also discuss the increased cost level if a firm wants to be the first in the market. They state that there is a difficult trade-off between missing an opportunity by being too late in the market versus the increased cost of a crash program, which usually increases the risk of failure.

Despite the fact that time is critical, Smith and Reinertsen (1998) have argued that "many companies start to accelerate their process, when the real problem is that the current process is out of control" (p. 7). Moreover, Lee and Colarelli O'Connor (2003b) highlighted an important aspect of a new product launch having to do with network effect products. They point out that it is not just the product-specific features, but also the value derived from connections with other users and complementary products that plays a crucial role in certain cases.

According to Grant (2002), there are three main factors that determine whether it is better to be a pioneer or a follower. First, If a particular innovation can be protected by property rights or lead-time advantages, then the first mover is often better-off, for instance in the pharmaceutical industry. Second, if an innovation requires complementary resources, being first will increase the cost and the risk of failure. For instance, the first firms in the frozen food industry had to establish a distribution network by

themselves, whereas late entrants could enter with smaller investments. Similarly, the first electric automobile manufacturers struggled because they had to make huge investments in technology that was not mature enough. Finally, the third factor in this "to pioneer or to follow" debate has to do with the likelihood of being able to influence standardization. When the standard is already in place, it becomes difficult to displace it. For instance, IBM's PS2 was not able to shake Microsoft Windows's dominant position. There are, however, cases when late comers have been able to alter the game. Microsoft was able the overtake Netscape in the browser business. Similarly, IBM managed to create a de facto standard for personal computers in the early 1980s even though it was a comparatively late entrant behind Commodore and Apple (Grant, 2002).

Barnett and Freeman (2001) warn that introducing many innovative products simultaneously can be counterproductive for a firm because the work load can overwhelm the organization.

As Golder and Tellis (1993) points out, "the evolution of products repeatedly shows that each firm that was not able or willing to commit the resources necessary for market leadership was passed by another firm that was able and willing" (p. 169).

It seems that the timing of the market entry represents just one aspect of a complex phenomenon, a phenomenon that ultimately determines the success of a firm and its products in the long run. For instance, the magnitude of the investment committed at entry and the competitive emphasis at entry are additional topics that affect market entry strategy (Green, Barclay, & Ryans, 1995).

There are also additional dimensions related to market entry, such as the nature of the competitive environment, the strength of competitors' reactions and the time it takes for other firms to reach the market. All of these dimensions affect the decision making of the new market entrant and, most importantly, also the success level of a new product (Heil & Walter, 1993; Bowman & Gatignon, 1995; Gruca & Sudharshan, 1995).

Some firms favor the concept of first-to-mindshare instead of first to market (Lambert & Slater, 1999). Firms that aspire to the first-to-mindshare approach are not rushing their products to be shipped via fast product development; rather for them the goal is that their product will be associated being among the firsts in the market in the minds of customers (ibid). It is difficult for rivals to overcome that type of dominant position status; examples of such dominant position status include Intel

microprocessors, Xerox copiers, and Hewlett-Packard laser printers (Lambert & Slater, 1999; Trout, 2004; Crawford & Di Benedetto, 2006). Table 6 compares the first-to-mindshare strategy with more traditional first-to-market thinking.

Table 7. Comparison of first-to-market and first-to-mindshare strategies (Lambert & Slater, 1999)

First to market	First to mindshare
• Product focused	• Product line, portfolio, company focus
• First product wins the war	• First product wins a battle, best portfolio and series of products, services, and company actions wins the war
• Physical product	• Complete extended product
• Short-term product-customer relationship	• Long-term supplier-customer relationship
• Measure: when was the product introduced relative to the competition?	• Measures: How did the product contribute to a future mindshare strategy? What percentage of the market does the company have a mindshare with? Whose products are viewed as setting the standard for others to follow?

The nature of an underlying product also affects the market timing. According to Schoonhoven, Eisenhardt, and Lyman (1990), firms that had products with a lower level of technological innovation were able to enter the market faster that those with more technically ambitious projects. In addition, according to Mitchell (1991) the influences of the entry order on the market share and survival rate between incumbent and newcomer firms can vary. Incumbent firms have a stronger set of the assets required to run business and their performance is mainly affected in relation to other incumbents, whereas the role of newcomers is much weaker and the entry order is more critical for them (ibid). This distinction is missing from many studies and it creates a certain amount of bias when all firms are aggregated in the same analysis (Mitchell, 1991).

In conclusion, there does not seem to be any generally applicable managerial prescriptions concerning the absolute optimal timing for new products. In reality, it would be over-simplistic just to say that one approach works best. The reason is that the underlying strategies firms pursue differ, as do the managerial skills of firms for implementing those strategies (Schnaars, 1986; Moore, Boulding, & Goodstein, 1991, Green et al., 1995). Thus, when firms are faced with a decision about when to enter a new market, the optimal timing often depends upon the strengths and weaknesses of the firm's existing resource base (Lieberman & Montgomery, 1988; 1998).

5.6 Naming and branding a product

Your premium brand had better be delivering something special, or it's not going to get the business. - Warren Buffett

According to Rogers (2003), the naming choices for products are of extreme importance because the way that potential adopters perceive of a particular name and the associations they make based on the name also affect the adoption decision. A firm can extend its existing product line, use an existing brand for a completely different product range, or come up with a completely new brand (Paswar & Bapat, 2007). Building a strong brand is also important for new venture and entrepreneurs (Lodish et al., 2001) .Brand development and brand extension within the context of new product development is further discussed by Ambler and Styles (1997).

Kohli and LaBahn (1997) state that the brand name is a critical factor in the success of a new product and Trout (1996) even goes as far as declaring that “the single most important marketing decision you can make is what to name the product” (p. 111).[105] Rogers (2003) emphasizes that the technical and scientific working titles used during the development phase should be changed when a product is introduced to the market.

Even though the product name plays important role, firms often take shortcuts and forget to evaluate names due to time pressures (Kohli & LaBahn, 1997). The lack of careful product name evaluation and testing can lead to unwanted surprises, especially in international business (ibid).

[105] Where as launch literature just consider that as a tactic decision.

There are several examples of products that have been introduced to local markets by a foreign firm with a name that has hindered the purchasing intentions of buyers. For instance, a product called Tang (that means seaweed in German) initially failed in Germany, but it became success after the name was changed to Seefrisch. Coca-Cola encountered low sales in China when Coke was first marketed under a character set that meant "bite the wax tadpole" (Gershman, 1987).

Colgate toothpaste with the name "Cue" did not receive too much success in French-speaking countries (where an adult magazine with same name existed) and Chevrolet encountered similar rejections with a car model marketed as Nova (no go) in Spanish-speaking countries. Likewise, both Rolls Royce and Estee Lauder almost made huge mistakes in the German market. Neither Rolls Royce's Silver Mist car model nor Estee Lauder's Country Mist makeup would have been good names in the German market because mist means manure in German slang (Rogers, 2003; Crawford & Di Benedetto, 2003; Trout, 1996).

There are numerous other examples of bad name choices.[106] It is worth mentioning that, firms should not choose between a bad name and any name whatsoever. Names that have emerged as the result of a rigorous planning process have value in their own right. According to Kohli and LaBahn (1997), "while the image associated with a brand name can be built with advertising over time, brand managers realize that a carefully created and chosen name can bring inherent and immediate value to the brand" (p. 67). This implies that names and trademarks are of value to firms and that haphazardly naming a product can lead to serious problems. For instance, General Motors had to pay $500,000 to settle a lawsuit with an Italian arms manufacturer after GM had used the name Beretta for one Chevrolet's car models (Trout, 1996).

The above-mentioned examples of bad product names were consumer product brands, but it is likely the naming plays an important role for B2B products, too. Kohli and LaBahn (1997) have found out that consumer and B2B firms actually place similar emphasis on the brand names of their products. Studies by Shipley and Howard (1993) and Kohli and LaBahn (1997) state that brand names provide tangible benefits for B2B firms as

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[106] A longer list of bad examples is available on page 380 in the book *New Product Management* by Crawford and Di Benedetto (2006).

well and that good brand names can positively influence sales. According Kohli and LaBahn (1997), there are only a few differences in the way firms treat the naming process between B2B and consumer product manufacturers. Consumer goods firms are more often looking for product differentiation via a product name, whereas B2B firms place more emphasis on registration and trademark issues when selecting a name (ibid). However, B2B firms seem to omit the testing phase of a proposed name more often (ibid).

According to Kohli and LaBahn's (1997) study of 101 firms, the process of naming a product seems to comprise the following five steps: (1) setting branding objectives, (2) creating a list of candidate brand names, (3) evaluating prospective brand names, (4) choosing the best brand names, and (5) applying for registration.

Trout (1996) also provides a list of four basic steps that firms should make use of during the process of creating a name:

- Acceptability. A name should be evaluated by a native speaker fluent in the language of each foreign country where you expect to do business. Does he or she regard the name as being generally acceptable?
- Existing meaning. Does the name have any similar of different meanings than the one you intend for the product?
- Negative connotation. What could the name be confused with?
- Pronounceability. Is the name hard or easy to pronounce?

5.7 Pricing a product

We have met the enemy and he is us. - Walt Kelly

Pricing a new product plays a crucial role during the market-entry phase. The problem is that customers may undervalue the product and not understand how it could affect their business. This requires not only education and communication, but also careful pricing that justifies the benefits and economic impacts for customers (Cressman, 2004).

Calantone and Di Benedetto (2007) found that product launches for products with a high price but without an adequate amount of supporting market research and testing activities tended to be the least successful. Firms that used low-introductory-price policies were relatively successful because they backed their pricing decisions up with careful planning and their strategy was to penetrate the market fast. The most successful firms were able to skim the price. They backed up such high-introductory-price

launches with "excellent customer calibration" and correct timing. Also, the firms in question had excellent logistics and other service dimensions. Thus, the pricing decision needs to be carefully coordinated with the deliverables of the underlying product. Available support functions play a major role and, thus, the analysis should not be conducted using just a skim vs. penetration scale (Calantone & Di Benedetto, 2007).[107]

New product introductions prevent price mark-ups at the macro-economic level, especially in industries that are highly competitive, such as electronics, food, and transportation equipment industries (Axarloglou & Tsapralis, 2004). On the other hand, certain concentrated industries, such as medical instruments and controlling devices industries, rely more on technological leadership, which makes it difficult for firms trying to enter the market to attract customers with new products. This means that competition in these specific industries is not driven by pricing and, thus, new products do not automatically depress price mark-ups (ibid; Axarloglou & Tsapralis, 2004).

More discussion of pricing strategies in different market situations is provided, for instance, by Eliashberg and Jeuland (1986). Pricing decisions are alse essential entrepreneurs and discussed for example by Lodish et al. (2001).

5.8 Advertising, promotion, and logistics

Innovativeness itself does not guarantee success. - Lee and O'Connor, 2003b

In an article focusing on "The Impact of Communication Strategy on Launching New Products," Lee and O'Connor (2003b) discuss technology products and state that communication with customers is important for managing the perceptions of product innovativeness. They also emphasize that it is important for a firm to properly communicate the value of highly innovative products because customers may reject products due to a lack of knowledge.

According to Davidow (1986):

[107] It is difficult to achieve commercial success if a firm sets the product price too high. This creates a certain dilemma for the firm, which the discussions section earlier focuses on in more detail.

Technology products are almost never sold by advertising. At best, advertizing only raises customer awareness and creates a desire to learn more about the product. That's because the purchase of a high-tech product is often a high-risk decision. (p. 33)

Moore (1998) argues that firms should focus on creating marker-centric messages instead of promoting product-centric attributes. See Table 7 for a comparison of these approaches.

Table 8. Product- and market-centric value attributes (Moore, 1998, p. 133)

Product-Centric	Market-Centric
• Fastest product • Easiest of use • Elegant architecture • Product price • Unique functionality	• Largest installed base • Most third-party supporters • De facto standard • Cost of ownership • Quality of support

The market dynamic is often different in the consumer market. Schneider (2004) demonstrated that firms spent more on advertising for successful consumer products than for less successful products. Schneiner points out that strong advertising campaigns contributed positively to product sales. She also acknowledges the existence of a self-feeding circle when firms predict in advance that certain products will be potential blockbusters and thus also budget and invest more on advertising for such products.

Chen, Sehn, and Chiu (2007) have studied communication strategies and argue that informal and relational messages play an important role in supporting the launch of a product. They also emphasize that the quality and clarity of the marketing communication process is fundamental to the success of a new product.

Supply chain management[108] and logistics are an important part of business for any tangible product. Demand forecasting is a challenging task for existing products that are already selling, but the task of predicting sales for completely a new product is even more difficult (Simula 2000). According to Schneider (2004), "In our experience, if you don't have

[108] This includes forecasting, distribution, warehousing, channel management, etc. While this topic is of importance for every new product, it is not discussed in more detail here due to the focus of the dissertation.

distribution well organized before you launch, you don't have what it takes to win the new product wars" (p. 59). Davidow (1986) further argues that,

> *A new device or invention will never become a product without proper distribution. ... When the right product is properly marched to the customer base and a specialized sales force and distribution channels are added to it, the result can be a tremendous success. (p. 82)*

5.9 Cannibalization and termination of products

I haven't failed, I successfully discovered 1000 ways that don't work. - Thomas Alva Edison / Benjamin Franklin

Lieberman and Montgomery (1988) point to the extant literature to argue that incumbent firms are less likely to innovate than new entrants and that such firms are unwilling to cannibalize their existing products. According to Neff and Shanklin (1997), the cannibalization of one's own products is a dilemma that only the strongest firms can confront with impregnability. However, according to Greenley and Bayus (1994), few firms have a systematic elimination process. Chandy and Tellis (1998) point out that in the extant literature, cannibalization is quite often associated with something negative. For instance, many researchers highlight it as a reason for the loss of sales or as a result of unsuccessful management. Chandy and Tellis (1998) maintain that firms who are willing to sacrifice their current products are better-off in the long run because product innovations occur when a firm is willing to cannibalize its own products. However, it is also possible that a firm taking a new product to market with the sole aim of minimizing its time to market can operate sub-optimally due to the cannibalization effect (Cohen et al., 2000).

In some cases, a firm would be better-off canceling the new project or even withdrawing the product from the market if the product has already been launched. By doing so, a company can focus its resources on doing something else. Studies by Boulding and Morgan (1997) and Biyalogorsky, Boulding and Staelin (2006) focused on just such a situation and identified a phenomenon that they term "escalation bias," i.e. a commitment to a losing course of action. This means that managers tend to remain committed to a new product even though the launch has failed and it is time to "pull the plug." There are unfortunate examples where companies kept on losing money because they did not withdraw a product from the market, even though the failure had clearly been evident. In their study, Boulding

and Morgan (1997) found that the two most effective methods of improving the quality of a stop / no-stop decision involved using a predetermined decision rule and introducing a new decision maker at the time of the stop / no-stop decision. However, a study by Biyalogorsky, Boulding, and Staelin (2006) reveals that being involved in the initial start decision for a project is not a necessary precondition for inducing commitment to a losing course of action (i.e. escalation bias). Rather, a driving force is the improper use of initial positive beliefs about the project in the face of negative new information.

Neff and Shanklin (1997) refer to Schumpeter (1939), who come up with the concept of creative destruction as a business strategy. In brief, it means that to reach premium prices, firms are constantly forced to exploit new innovations. This also means that existing products, which once might have been innovative, will eventually turn into mere commodities (Neff & Shanklin, 1997).

In other word, cannibalization has to do with a firm deciding to launch new products that supersede its existing products before their competitors choose to do so. More details on cannibalization and its effect on the launching of new products is provided, for instance, by Moorthy (1992) and Mazumdar, Sivakumar, and Wilemon (1996).

Saunders and Jobber (1994) note that launching new products and deleting existing products are synchronized operations in practices, but academics tend to separate them. They found that firms that are fast at bringing new products to market will also be quick to pull or delete existing products.

5.10 Customer references and pilots

A product for everyone rarely reaches much of anyone. - Seth Godin

A recent study of industrial firms revealed that firms can use customer references to concretize their offering and demonstrate complex solutions and the technological functionality of a product, as well as to provide evidence of the supplier's experience and capability to deliver customer value (Jalkala, 2009). The demonstrations are important because they can increase new product acceptance (Heiman & Muller, 1996).

Ruokolainen (2008) studied a start-up firm in the software industry and noted that the first customer reference is especially important for

companies trying to enter a competitive business-to-business market for complex products, where it may be impossible to convince a potential customer of the product's value without proof that it functions well in the real world.

The customer reference creates trust, which is important (e.g. Doney & Cannon, 1997) in any buyer-seller relationship. Utilizing previous customer references also plays an important role, for instance, in the industrial bidding process (Salminen & Möller, 2004). In addition, if a firm is able to keep their customers satisfied for a long period of time, such customers may become *enthusiastic* about the company (Osarenkhoe & Bennani, 2007).

A recent case study of an industrial seller and a buyer provides a good illustration of a situation where the seller had to convince the customer of its technical knowledge and capability to solve the customer's problem and where a conclusive list of reference projects was a clear benefit for the seller (Lehtimäki, Simula, & Salo, 2009).

In any event, pilot projects are not only aimed at acquiring customers – Soni and Cohen (2004) note that good beta tests validate flaws in the function or performance of a product and in development process and represent, therefore, an opportunity to train and prepare customer support personnel, too.

6 Case Studies and Within-Case Analysis

This chapter illustrates six industrial case studies. The case studies describe how the underlying product was commercialized by the case firm in question. The structure and length of the descriptions vary a bit due to the individual nature of the cases. Each case study includes a brief within-case analysis. The cases are presented in alphabetical order. I opted to leave out the preliminary case for the variable speed AC drive developed by Vacon Plc, as explained in chapter 2. Pictures of each of the case products are available in Appendix H.

6.1 Case Study: Beneq's nHALO

6.1.1 Background

Beneq is a spin-out firm from the optical cable manufacturer Nextrom (formerly Nokia Maillefer). In 2004, Nextrom began new initiatives with the goal of finding new business sectors, and this effort led to the founding of Beneq, which established its operations based on a management buyout in May 2005. As a result, ten people moved from Nextrom to work for Beneq. Currently, the focus of Beneq is on designing, manufacturing and selling equipment and technology for functional coating systems. The company has its headquarters in Vantaa, Finland.

Beneq's main technology is nHALO, a flame spray technology used mainly for applying various functional coatings to glass, ceramic tiles, and some metals. nHALO can also be used for multi-component, nanoparticle synthesis. Other technologies currently offered by Beneq include nAERO (an aerosol coating technology) and ALD (Atomic Layer Deposition) technology. ALD can be used to produce accurate, pinhole-free and conforming thin-film coatings to various substrates. With the nAERO process, submicron droplets are directly deposited on hot glass, where they

form a uniform film coating. Beneq also acts as a business facilitator and offers its know-how as a service to other firms. Using this strategy, Beneq seeks new ideas outside the company and offers its expertise to help transform these ideas into workable industrial equipment. The company had a turnover of approximately 1 million euros in 2006. (In 2009, Beneq has 45 employees and a turnover of approximately 8 million euros.)

6.1.2 The case product

The case product is the nHALO burner, which is an industrial product mainly used for coating glass and tile surfaces. The coating is based on nanoparticles generated with the nHALO burner system. Several different raw materials, including metal nitrates, alkoxides and sulphates, can be used as active elements of the coatings, so the system can be used to coat materials other than glass and tile, and it is also possible to create pure metals and multicomposite materials consisting of nanoparticles. The nHALO process is based on flame oxidization, which takes place in a new vapor phase created by increased temperature. However, the extremely hot temperature of the flames that is required (500-1000 degrees Celsius) sets some boundaries for nHALO's applications.

It is difficult to calculate the exact R&D time because parts of the technology had already been developed well in the past. For instance, a company called ABR Innovation began developing the underlying coating technology in the 1980s. Its original intent was to enhance art glass and optical fibers and other slightly different application areas than those currently focused on by Beneq. However, the dedicated development decision for nHALO was made in October 2004, and the first customer delivery was in 2006.

The product can be used as a stand-alone system; however, in practice it is always hooked up to the customer's production line. In other words, nHALO does not do much if it is not integrated within, for example, a glass or tile production line. To offer a complete solution to customers, Beneq developed special coating systems for products, which are currently branded as FCS 500, FCS2000 and FCS4000F. The nHALO burner is still the key element of these systems, although the product itself needs to be tailored to the customer's production line, which entail different parameters, such as production speed. Therefore, nHALO is always tailored to meet customer specifications.

One of the main customer segments for nHALO is the glass industry. The basic problem in the traditional glass manufacturing process is that color changes take a long time when using the traditional methods, and it is not desirable for any manufacturer to keep the production line idle during those color changes. nHALO's new functional coating system radically reduces the changeover time and creates significant cost savings. The other customer segment is tile manufacturers, who use nHALO to create self-cleaning surfaces. nHALO provides better mechanical durability than products produced with alternative technologies. In short, nHALO offers cost savings for the glass industry and new features for the tile manufacturing process. The glass industry is clearly trending toward increasing its demand for functional surfaces and colorizing, so there is also demand for technologies and products that can help to satisfy this demand in a cost-effective manner. Low energy consumption is also one of the benefits of nHALO.

6.1.3 Commercialization activities

Developing a technology into a product, i.e. "industrialization," was an important part of selling nHALO. (Beneq uses this term to refer to the idea that the product is capable of working in real production environments.) However, while the basic set-up remains constant, there is always customer-specific tailoring to be done for specific proposals. Industrialization requires careful planning: Drawings and part lists represent just the starting point; usage and security documents are needed, contracts must be developed, and spare parts and documentation must be available for every delivery. The creation of marketing material is also a central part of this process; while there are many marketing-related tools that can be used with new products, firms must understand how to use them effectively, especially when the firm is new to the industry.

The nHALO technology could be applied to various purposes, so Beneq's upper management had to spend time finding the right focus for the business and deciding which customer segments to approach first.

> *"It is kind of natural and, in retrospect, quite easy, to say that we had to try to reach many places before we had an idea of what would be closest to commercialization and where there was demand and more market pull."*

The development phase proceeded without major problems and positive results were achieved quickly.

> *"Commercialization in Beneq means that there is an idea that is transferred to a machine or device, which delivers value to customers in such a way that the customer is able to solve some existing problem with that device or*

underlying technology—or let's say with a combination of that device and technology, in other words, to turn technology via device into a commercial product."

Beneq derived several process guidelines and process descriptions from its background with Nextrom. However, commercialization as a separate process was not mapped at the time of this case study; although there were procedures in place for how new product ideas should be handled and developed into products later on. For instance, Beneq established a special product management barometer to measure the readiness of products by defining those aspects of the product that need to be finished before it can be said to be complete. The barometer covered the product-creation process and was able to visualize the readiness of a product. At the time of this study, Beneq was also in the process of creating an application barometer to describe how different systems are used in different contexts to solve customer problems.

During product development, "FCS" (Functional Coating System) was used as a product name; the nHALO brand was created later on. There were no direct competitor products with which to compare nHALO, so the marketing message compared nHALO to the existing way of coating glass and tile surfaces.

The role of nHALO in Beneq's product portfolio is clearly that of a key product with increasing sales potential. The sales model for nHALO includes a technology license, so part of customer delivery is a technology fee, and Beneq is entitled to annual royalties. The main sales channel is personal meetings and a tradeshow presence; the potential customer base is limited and reachable through one-to-one contact. The firm uses some sales agents, but manages most of its sales on its own. Similarly, customer support and services are provided directly by Beneq.

6.1.4 Convincing customers

The main issue for Beneq was that the glass and tile industries are very traditional and capital-intensive, a business environment that is always difficult for small entrants. Thus, there are two important issues for Beneq to address: First, customers want to be sure that the new technology really works and, second, Beneq is a new and small firm with no reputation in the field and customers need to understand who they are. In practice, this means that during the first customer meetings, Beneq had to explain who they were. Only after that, and usually in a separate phase, were Beneq representatives able to tell more about the technology and the product.

Naturally, big customers often doubt whether they can trust a small firm to deliver what they need. The fact that Beneq has its roots in Nextrom, which has delivered hundreds of pieces of industrial equipment, was a useful asset in convincing customers that Beneq has the necessary competence to deliver what is promised and to make things happen.

It was important for Beneq to try to line up major customers early on; these major customers could then recommend nHALO to others. Therefore, Beneq decided to target the biggest and most important customers from the very beginning. The idea was that if one of the major firms in the glass industry was interested, then that particular firm would carry enough weight in the conservative industry in general and help to turn the heads of other big firms as well. An additional benefit of having a major industrial player as their first customer was the assurance for Beneq itself that it was doing the right things.

"Our target was to find such reference customers that have enough power to create market demand."

Naturally, there was some temptation for Beneq to pursue smaller firms that could have been easier to win over, but the results would have been less significant. In other words, smaller firms could have had their needs filled, but the main industry would have been left unconvinced. A big customer name that would really create interest among the industry globally was seen as a base target for Beneq.

It was also important that discussions about Beneq's underlying technology be conducted between the right Beneq representatives and customer representatives since this kind of peer-to-peer dialogue could prove to the customer that Beneq really possessed sufficient knowledge about the new technology. In such meetings, Beneq experts listened to the customer carefully and then did their homework to come up with the right proposal to solve the customer's problem. It required plenty of legwork to meet with customers, understand their problems, and then address those problems effectively.

"You have to listen to your customer and see if you can solve his problem. The so-called force-feeding just does not work at all."

Various test samples were used to show customers what nHALO could do. The product and technology development aspects of nHALO were primarily conducted within Beneq, although there was some knowledge-sharing with one customer, which helped Beneq to analyze test coatings and, thus, provided important insights during development.

Additional materials that were used to convince potential customers included publications and presentations in conferences. Patent filings were also used to prove that the new technology was based on more than just buzz words.

6.1.5 Organizational topics

The whole firm participated in bringing the new products to the market. Thus, commercialization in its broadest sense was seen as something that touches everyone in the firm. Naturally, this is often the case in many small technology firms, where organizations are flat and the people multi-task. However, most of the responsibility for commercialization-related tasks in Beneq still belongs to product managers and application managers. One of the main tasks of product managers is to prevent a situation where an unfinished product enters the market. Product managers are responsible for the technical development of products, but they also play an active role in customer interface. At the time of the interviews, there were 20 people working for Beneq and about half of them worked on technology development; however, those whose main duties were technology development were also actively involved with customer interface.

6.1.6 Product launch

Beneq presented nHALO to the public for the first time during the Glass Processing Days conference in Tampere in June 2005. At that time, Beneq only had technological know-how regarding the product, so the first meetings with potential customers mainly involved discussions about the new technology; this was useful for the potential customers because the underlying technology was completely new to them, and it gave Beneq important insights into real customer requirements, while also creating interest among potential customers. In other words, nHALO product development did not start until there was some level of green light from the customer side of things. So essentially, there really was no product launch for nHALO; the product more or less drifted onto the market.

6.1.7 Diffusion factors

The question of relative advantage was not an issue. Whereas before it had taken days or weeks to set up a new color in a production line, nHALO makes it possible to do so within a matter of minutes. Thus, the price versus performance ratio is easy to justify.

Complexity of use or compatibility was not seen as an issue because the technology is robust and the physical nHALO product is not too different from traditional production equipment. Technology licensing is also nothing new in the industry, so customers do not see this as an issue.

Observability was also easily addressed, because the production samples produced by the nHALO prototype are tangible and easily observed. Customers are able to measure and test the samples and to draw their own conclusions.

The main issue was the ability to use the process on a trial basis. The production line set-up requires careful planning, and there is no way to undertake plug-and-play testing without disturbing the existing production set-up. Thus, even if the nHALO technology provides a clear list of potential benefits, the biggest effort in the early stages with a customer was to prove that nHALO actually works in practice and in the real industrial production environment. Fortunately, customers have usually tried other technologies in their production environments over the course of time and know how to do it, so the biggest risk associated with a nHALO trial involved possible technical surprises that no one would have anticipated, such as a severe malfunction that cannot be removed and that ruins the product.

6.1.8 Within-case analysis

Many of Beneq's business processes were transferred from Nextrom, which helped to create some common understanding about the nature of the business and its operations. It was also helpful that some of the manufacturers wanted to be at the cutting edge of technology development, and it was easier to approach those firms with radically new products such as nHALO. At the time of the interviews, Beneq had two main processes: a product process and a project process. The product process consists of various activities related to product development, product improvement and product management, while the project processes include sales, design and manufacturing activities. The basic idea is to keep every project profitable, so product success in Beneq is measured based on projects. However, nHALO as a business line is also monitored. In addition, product development projects are separated from customer projects.

One of the key success factors for Beneq and nHALO is that there were no direct competitors when the product came to market. Technical superiority is also one of the key drivers behind nHALO's success. The path towards the final product was not straightforward; rather, it was quite the opposite. Product creation began with just an initial idea; no specifications were

made about the ultimate configuration of the product or the final product outcome during the development phase. That the final product specifications were created during development phase probably created some ambiguity, but it also made it possible to freeze the development at later stages until more insight became available. In addition, during the first phase of nHALO, there was a dilemma about where to apply the technology, since it could be applied to various places in the process. However, the main difficulty had to do with deciding which customer segment to target first and how to target commercialization activities. Beneq learned that the process from technology to ready-made production equipment is a long journey.

When the product was first developed, it focused too much on technology and equipment, rather than on a real solution approach. For instance, the initial customer feedback provided insights that forced Beneq to alter its initial design. The message was that commercialization should go hand-in-hand with development. Proper marketing communication messages are also important. In this case, the glass industry was not ready to buy nanotechnology, so that message was not emphasized in marketing. Thus, Beneq sees customer knowledge as one of the most important starting points for successful commercialization. Technologies are important tools for solving customer problems; firms must understand customer requirements and only then use technology as a basis for products that solve the problems.

> *"If there is no customer need, then there is actually no point to solving anything."*

While nHALO is sold as an individual stand-alone product, customers use it as only one part of their process lines. Thus, even if nHALO is a stand-alone product from the perspective of Beneq, for the customer it is an integral part of the production line and, in that sense, the customer has certain requirements for the product design. Every customer demands a different set of production parameters and equipment dimensions.

One of the key take-away lessons from this case is the observation that Beneq representatives made during customer meetings. Beneq had assumed that customers are more interested in the technology than in the hardware; however, this proved not to be the case. Even if the customers were ultimately buying coating functionality, they were always interested in the physical products. Related to this was the point that, from the customers' perspective, it was essential that any new solution not create

production breakages and that the production output not be diminished. According to the interviewees, one option was to only sell the technology, but customers said they were not interested in the technology without the equipment needed to make it function, so Beneq chose to sell the equipment as well.

For Beneq, convincing the customer was a critical. However, the time it takes to convince the first customers can be surprisingly long, so the timing of the product launch is important. If a firm chooses to only launch its product when it is ready, there may be a long lag time before it sees any revenue, so not only the internal schedule, but also the larger industry cycle, plays a critical role in the success of a product. For instance, it is unlikely that there will be sales during the same quarter in which a product is first introduced to the market. Customers have their own budgeting cycles, and if a new product is launched at the end of a year, it may take 12 months before the first sales occur. This means that the timing of a product launch and customer contact is especially important. Convincing the market in general was also important; the strategy to reach the biggest and most powerful players in the market was unique and went against the going philosophy touted in the management literature, which is to first take "the low-hanging fruit." In addition, a customer will not be convinced by a seller's promise that anything a customer wants can be provided. The offering has to be carefully "productized" so that a customer can easily understand the content of the proposed offering.

Profit analysis of the product life cycle should be done at the beginning of business planning, and the potential for servicing the business should be thought through during the phase when the product concept is created. Product life cycle issues are also of interest to customers, because the process equipment in the industry is typically in use for a long time. The interviewees saw the readiness requirements of the product as a double-edged sword since it is not possible to require that a product be 100% ready before manufacturing can start; however, a certain level of maturity is mandatory before any product should be launched. Product managers have the role of using a product barometer as a tool to monitor the product's status.

The technology and the initial product concept was announced at a tradeshow, although, because of the limited number of potential customers in attendance, tradeshows are not considered to be that important compared to direct customer contacts and personal selling. The initial sales price was set based on the savings customers could gain from using the

product. However, a customer is typically not willing to reveal all of its production costs, so the seller just has to estimate the costs and set the price accordingly. On the other hand, when there are no direct competitors, it can be difficult for a customer to analyze the market price. The initial pricing appeared to be modest; Beneq could have decided to skim the price, but it decided not to do so.

The division of labor is not very strict; there is no separate product development function in Beneq. In practice, that means that the people who develop the technology are also actively involved in its commercialization; technical people participate in customer meetings and present, market and sell nHALO to customers. However, the product manager's role is extremely important: Beneq's policy is to name the product manager at the first milestone of a product development project, so the product manager also acts as the product development manager.

6.2 Case Study: Exact Tools's Exact Pipecutting System

6.2.1 Background

The case product is the Exact Pipecutting System by Exact Tools Ltd. The business strategy of Exact Tools (ET) is to develop and market electrical cutting tools for the industrial plumbing sector that are safer, more productive and easier to use than traditional cutting methods. The product family currently consists of three different sizes of pipe cutter machines. ET's products have been sold under different brands by large, private-label firms, so ET's role in the value chain has been that of original equipment manufacturer (OEM).

The firm was founded in 1998, at a time when there were various problems with pipe-cutting jobs. The traditional working method at on-site conditions was to use an angle grinder, and the blades used to cut steel pipes were large, expensive and not very durable, because they tended to wear out rapidly. In addition, the overall safety and performance level of the blades was not very good, which was the trigger for innovator Seppo Makkonen to develop an improved product for the job.

At first, there were several product concepts, and various prototypes were created, but the final assembly of the first product family was designed in 2000 by Mika Priha, who first began working with the company as a

consultant designer and became full-time designer and partner in 2001. The original idea – that there was a need for a relatively small and lightweight machine – did not change during the development process. However, many technical details changed during the trial-and-error period of the development process. After about six months on the Finnish market, ET appointed distributors for other Scandinavian countries and parts of Central Europe.

In 2001, ET was granted the Innosuomi 2001 Award by the Foundation of Finnish Innovations, and in 2003 it won honorary mention in The Fennia Prize competition, which supports the manufacturing of products with high standards and promotes the competitiveness and internationalization of industry as well as the commercial aspects of the products. In 2003, ET expanded to the Far East and other parts of Europe.

6.2.2 The case product

The beginning phases of a start-up firm are typically aligned with the firm's initial product creation process, and this was also the case with ET. It was particularly important for ET to collect information to ensure that the end users definitely accepted and approved of the new way of cutting pipes. The test phase took about eight months, during which various types of pipe materials were cut. These tests provided plenty of new insights and suggestions for improvement for the product.

The first field study consisted of ten machines and blades that were given to professional plumbers at several construction sites. ET realized that if the end user does not like the product, the employer would not purchase it, so the primary objective of the testing phase was to gather information about any problems the plumbers were having when they were performing the pipe-cutting job. ET requested permission for the field trial from local supervisors and, after about a week, interviewed the workers who had operated the machine. Altogether, over a hundred end users and their superiors were interviewed. The feedback was mainly encouraging, and users seemed to be satisfied with the improvements the new product provided for their working conditions. Some users even claimed that the product was one of the most significant innovations in the piping industry in several decades. Although the field trial produced some suggestions that could not be implemented, it yielded useful insights and made it possible for ET to identify three important criteria for the product: safety of the units, performance of the units, and ease of use.

This field study also provided insights in terms of the price range a customer would be willing to pay. Thus, the field trial not only served technical development purposes, but was also important from a commercial feasibility point of view because it provided evidence that the product would potentially sell quite well; in fact, the trial period yielded pre-orders for 30-40 products. After the field trials, a large local wholesaler, LVI Dahl, expressed interest in the product and placed a pre-order for 350 machines, even though some of the aspects of product development had not yet been completed. Naturally, this large pre-order was an asset for ET when they negotiated funding for continued product development.

After receiving positive results from the field trials, ET approached the financers and secured the required funding to mass-produce the first machine, called Pipecut 220u. However, prior to beginning industrial-scale production of the units, a few more advanced prototype versions of the machine were made in 2001 and 2002.

> *"Our first idea was, let's say, to create a reliable and credible looking product, without committing to massive investments in molds and tools."*

The objective of creating the additional prototypes was to test the mechanical functions and mechanical strength of the machine. Since conditions at the job sites are extremely rough and demanding, these improved versions were also tested at construction sites.

The first production batch of 350 units was then delivered to the domestic market, the production technology was streamlined, and the logistics were improved. The amount of time and resources needed to customize the product for different customers was modest because of the comparatively small production volume, but there are plans to increase the product variations for different customers and to provide basic tools and more sophisticated tools with extra features.

The success of the new product was measured by sales, which have increased every year at the same time that the unit price has decreased. The idea was to reduce the price of a basic model to meet the purchasing barrier for an end user, even if at that level, the product does not fulfill all of the customer's needs. The sales forecast was met and, ever since the first shipment, the firm has seen positive results, although there were no exact dates for when the initial investments had to be amortized.

An additional income stream for ET is based on blade sales, and the market for blades is growing fast as the need for cutting tools increases. ET will gain the benefits of economies of scale because they are able to order

larger quantities from the blade manufacturers and resell those blades later on.

6.2.3 Convincing customers

ET's customers are pipe-cutting professionals in various fields from yards to factory maintenance. Convincing the customers was an issue because ET was introducing a new working method to end users who had to be convinced about the usefulness of the product. It was also difficult to convince the sales representatives from private-label firms to take a new product into their portfolios. The dilemma is that the OEM cannot usually directly influence the sales organization. ET inquired about whether they could help by educating the end user, but this did not work out because the culture was not such that suppliers could bypass the product managers and sales directors of the private-label firms. Still, ET felt that direct contact with front-line salesmen could have been beneficial.

In addition, some customers were reluctant to purchase the product because they thought that some parts of it were not robust enough. The usability of the first models also created doubts and they were considered too complex for the U.S. market.

The product was in compliance with EN-based operational and electrical-device standards. While this is no longer mandatory, ET performed the tests because one of the largest customers required that Exact still acquire certificates from the local authorities. Naturally these certificates worked as a benefit for other customer sales cases as well.

6.2.4 Organizational topics

Internal organizing for commercialization was not an issue because two entrepreneurs made all the decisions. The dilemma of product cannibalization has not yet become an issue, although the manufacturing of two earlier models was terminated when the new, improved model was ready. Thus, termination decisions are made easily because of the size of ET. The OEM sales model, however, has created some dilemmas because every big, private-label firm has many products in its portfolio, and ET's product is just one product among many others. Perhaps a longer business relationship will ease the situation, but, in the beginning, it is a very weak position for a small OEM to be in.

6.2.5 Product launch

> *"When there is a completely new product, there is no demand for it because no one knows to ask for it. Gaining the awareness of end users has been the most fundamental, the most important thing that we have tried to get working during the beginning of sales."*

Since the first products were sold on the domestic market, it was relatively easy for ET to follow up on customer satisfaction and respond rapidly to any complaints concerning the machine. There was no big product launch; instead, the tool drifted onto the market during field trials. There were no dedicated marketing campaigns because the domestic distributor sold the product under its own brand name, as did the German-based distributor, Fisher. Fisher got wind of the novel product during the field trial period and contacted ET directly. Fisher's own technology was somewhat different and they wanted to sell ET's product as a complementary product in their portfolio.

The amount of money spent for the market launch was modest in part because the development period, which had little incoming cash flow, was relatively long and because there were some doubts concerning the technical feasibility of the product. More spending on marketing-related activities could have been beneficial after the second facelift, but that spending, too, was modest. ET touted its product throughout Europe, but it soon became clear that doing so was time- and resource-consuming, so the decision was made to only use the ET brand in Scandinavia and sell the product under big, private-label names elsewhere.

The market entry timing was quite suitable because of the limitations experienced with traditional cutting tools. For example, traditional tools created noise and dust and increased fire risk. In addition, issues related to work safety were becoming more important, and European countries lacked a professional workforce in the pipe industry, so ET's new product was in a favorable position because it was easier to use and it did not require a great deal of professional skill. These timing-related market benefits were not so much planned as fortuitous.

The naming process for the product occurred quickly. ET was suddenly and unexpectedly asked to present its novel product at a FinnTech technical exhibition during the early phases of product development, and the name "Exact" was created during a single weekend because a name was required for the poster. It was considered a good name and the name of the parent

firm was changed accordingly, since the firm's name at that time was Forman-Trade.

The pipe-cutting system is mainly sold under private labels, so there has not been a need for massive branding campaigns for ET. The firm differentiates the products in its current product family via a numbering system: Products include the Exact 170 System, the Exact 200 System and the Exact 300 System, where the number indicates the size and capability of the tool.

6.2.6 Diffusion factors

Advantages to customers included the speed of the cutting work and the fact that plumbers no longer needed to perform extra finishing work on the pipe edges. Work safety and ease of use were also major benefits. ET's pipe-cutting system does not require the use of excessive force, and there is no need to lift the pipes, since the pipes can be cut at ground level. Thus, the new cutting method required less effort compared with traditional cutting methods, and it was faster, safer, more economical, and more versatile than existing methods.

Compatibility with previous values was problematic because ET encountered some resistance by customers reluctant to change their working methods. This issue seemed to reflect cultural backgrounds. For instance, according to ET, Japanese customers have been eager to try out the new product, whereas users in England and Denmark have been more conservative and reluctant to change their traditional working methods. However, the majority of users have been satisfied with the novel way of cutting pipes.

Complexity was also an issue, at least on some level. Even if the basic principle of ET's cutting system is quite simple, the way in which the product handles the cutting process has created problems for some users. Even if they had previously been using machinery and tools in their jobs, ET's tool was a completely new product for them. To learn to handle and operate a new machine is something for which everyone has a different learning curve and, with some people, it just takes more time.

Observability was not an issue when users or buyers were able to see a demonstration for themselves, and many customers were surprised to see how easy the cutting process was with the new product. Thus, the demonstrations have been very important sales tools. Videos have been used to communicate information about the product, and the firm has even

made special instruction videos for workers who cannot read. This has created some problems because some people have refused to believe that the cutting videos are real. They think that the video has been manipulated because the cutting speed seems unrealistically fast to them. Thus, the live demonstration has been particularly valuable. This "believability" factor was an issue that created worries, and the assumption was that the amount of sales would increase if the distributors conducted more live demonstrations.

"It was the demo that, in effect, tackled all of the customers' objections."

Often, the sales meeting started outside the meeting room, where the customer had provided pipes for cutting. The live demonstration is useful for creating a common understanding of what the product is all about and it offers a good starting point for business negotiations.

6.2.7 Within-case analysis

There were no dedicated procedures or written plans concerning commercialization at ET; as is typical with a start-up culture, things tended to proceed on a trial-and-error basis.

Design was seen as very important, and ET made considerable efforts in developing colors, packaging, operating, and maintenance manuals for the products. ET's aim was to create a high-quality look and feel with both a novel and professional image. For example, the blade cover was made from stainless steel instead of sheet metal and was secured with wing screws instead of traditional screws. The reason for this type of mounting was improved usability, even if it required special permission from authorities because it did not conform to existing standards. After all, ET saw the issue of usability as being very important before the tool could be adopted by end users.

"Our product evidently falls into the category of expensive professional tools, which means it is a niche product, so that this means the overall image has to be aligned with the image in that sector."

It was also important that the entrepreneurs believed in the product and that there really was value in the product. That created the spirit to continue the work.

"In this niche professional sector the situation where a colleague comes and tells his friend 'damn, but I just bought a good gadget' is the best marketing. If a salesman comes in, nobody pays attention, but if a trusted buddy says it, it has a totally different value."

There were no specific product-based measurements for success in place at ET. Success metrics were more or less based on the normal business concept that a firm has to make a profit. The awards for which the product was nominated naturally gave it prestige and suggested that the product is above average. These awards are known in Finland and probably created some value within the domestic market. Of course, it was difficult to determine whether they had any value among the end users, but these awards were probably meaningful among the "intermediates." Even though it was thought that these awards might not be terribly important internationally, they were still mentioned in marketing communications.

The novelty of the underlying product is its revolutionary cutting method, which created clear benefits for the product. This also made it difficult, however, for some users to learn the new working methods. It has been time-consuming and demanding to introduce a completely new way to perform a pipe-cutting job. In that sense, the first field trials were very important since they enabled ET to be in direct contact with the end users and to gain insights about real working conditions.

The amount of money spent on market launch was modest and, in hindsight, could have been more. According to the interviewees, spending more on the local market launch, together with offering decreased prices and having more market share in mind, would have been a better way to operate.

ET has seen no need to add features to the product other than those that are necessary. In some other cases, engineering-oriented firms add technically sophisticated features despite the fact that they do not add value to the end user. This creates an effect called "feature fatigue," which is also documented in the literature (e.g. Thompson, Hamilton, & Rust, 2005). ET made a clear decision not to add any unnecessary features, but, rather, to keep the product simple. In fact, the first generation of the product had no electronics; they were only added later on with a reliable partner.

According to ET, patents can have value, but they do not help much in business given the fact that the legal process can take years and consume large amounts of time and resources. The better strategy, according to ET, is to work on decreasing production costs to such a level that they will constitute an entry barrier to firms thinking about creating an imitation or a "me-too" product.

One controversial lesson related to the traditional "more is better" type of marketing message was mentioned during the interviews. ET believes that

sometimes it is actually better not to place too many sales arguments on the table so as to keep the sales pitch believable. As a result, they consider carefully which topics are relevant for which customers.

The opinion at ET was that it is highly important that there are no quality problems during the trust-building phase with a major customer. Once the partnership has been established, there is some room for the types of mistakes that inevitably occur in the longer run, but the initial "dating period" is delicate in nature, and ET works to ensure that this phase proceeds without conflicts. After-sales care was also seen as an important topic in this business.

ET benefitted from the fact that there was no direct competition other than the traditional cutting methods. This gave ET time to develop the product at its own pace. However, the speed to market is increasing, and the traditional design culture that favored careful testing seems to be changing in every industry because testing and tuning just takes too much time and too many resources. Even given some time for testing, it is practically impossible to test or simulate every possible scenario a user can come up with.

6.3 Case Study: KONE's Monospace

6.3.1 Background

KONE is a multinational, industrial machinery firm that produces elevators and escalators for global markets. In addition to selling new units, KONE also provides maintenance and repair services for the equipment and operates in the elevator modernization business. In 2007, KONE had annual net sales of EUR 4.1 billion and approximately 32,500 employees.

Today, all major elevator manufacturers provide complete installations and fully operational, branded elevators as their product. The situation was much different in the 1970s when an elevator was sold as a pile of components from which a subcontractor then fitted and assembled a final installation in order to have a working product. The elevator industry can be divided into two areas: new installations and the service business. The service business covers the maintenance, repair, and modernization aspects of the elevator business. The elevator industry has had a long tradition of using well-established solutions in hoisting technology, with improvements

being made incrementally due primarily to strict industry safety norms and standards, but also due to the maturation of technology.

Traditionally, there have been two main options for elevator drive technology: traction by ropes and a hydraulic option. Rope-type elevators can be further divided into gearless and geared traction systems that consist of an induction motor, a gearbox, and a pulley-and-rope system. The key variables that differ between the three types of elevators are the running speed of the drives, the rise, the cost, and the comfort of the ride. Gearless traction elevators are fast (i.e., 2.5 m/s and above) and smooth but also expensive, so they are typically used in high-rise buildings, whereas hydraulic elevators are mainly used for low-rise buildings. Hydraulic systems are slow (i.e., max. 0.6-0.7 m/s) and jerky and have limited running frequency (i.e., starts per hour). Heat generation causes additional problems with hydraulic systems. Geared systems are used both with low- and mid-rise buildings. The maximum speed of a geared system is 2.0 m/s, with comfort levels better than those of hydraulic systems but inferior to those using gearless technology. Each major elevator manufacturer used to offer solutions in their product catalogue that were more or less similar, and until the beginning of the 1990s, a traction machine with a worm gear was the dominating technology for the mid-rise sector. Travel speed and ride comfort requirements are naturally associated with different lifting technology options, and this is directly connected to the cost structure of the product. In addition, other costs are associated with machine-room installation, controls, and interior cabin design (Das Narayandas & Swartz, 2005; Hakala, 2006).

In Europe, two different "elevator drive cultures" came into being as a result of the maximum building heights that were permitted and the lobbying of elevator manufacturers. In Scandinavia (not including Finland) and Germany, hydraulic elevators were the favored option, due to lobbying by national hydro manufacturers. France, Italy, and Spain favored geared systems for the same reason, but also because they had higher buildings. During the 1960s, when companies in northern Italy began manufacturing hydro components, Italy, Spain, Greece, and the United Kingdom increasingly used hydraulic elevators. KONE, too, got onto the hydro bandwagon in the early 1970s (in Sweden), but this technology was never really competitive, and hydraulic elevators were ultimately abandoned altogether in favor of MonoSpace.

It is worth noting that, from an elevator buyer's point of view, the space efficiency and usability of an elevator are other key variables related to new

elevator installations. According to Das Narayandas and Swartz (2005), "total elevator cost was roughly half equipment and half construction of the shaft and machine room and installation costs. The geared elevator machine room typically represented approximately one-quarter of total elevator cost, hydraulic slightly less" (p. 3). Traditionally, the motor, gear, and control panel of an elevator required a separate room, and such a room naturally increases building costs; however, the importance of different costs and the potential saving opportunities differ dramatically according to the role of the stakeholder. It seems that property developers, construction companies, building owners, building operators, architects, and major tenants all have different attitudes towards the up-front vs. lifecycle costs of an elevator.

> *"It is such a special characteristic, it's just this . . . who actually is the customer of an elevator firm?"*

6.3.2 The case product

The case product here is called MonoSpace, a radical innovation that revolutionized the elevator industry and completely changed KONE's product offerings. To be precise, the entire elevator concept is called MonoSpace, and the hoisting machine that made this new elevator type possible is called EcoDisc™. KONE's marketing material describes EcoDisc as follows: "This slim, disc-shaped machine fits inside a standard elevator hoistway, fixed to a guide rail. The result is an elevator that needs no space other than the hoistway where the car runs."

KONE generally does not sell EcoDiscs separately; rather, it sells them as an integral part of every MonoSpace elevator.[109] For this reason, the name MonoSpace is used to refer to the commercialized product in this study.

According to Hakala (2006), "EcoDisc was in fact a *motorized traction sheave* that could be located in many places in the suspension system" (p. 4) The best position for the EcoDisc was at the top of the shaft, where extra space was already available due to the presence of a sliding door. This positioning of the disc was also patented, thus preventing competitors from coming up with identical solutions.

> *"Actually, related to commercialization, it's worth noting that we understood to patent quite much . . . some firms started to copy*

[109] To be precise, KONE has sold a license to Toshiba, and KONE also provides required mechanisms, including EcoDiscs.

MonoSpace's structure, but we attacked them with resolution . . . and it was, from the very beginning, really strict, that patent policy."

As the name MonoSpace indicates, an entire elevator is placed within one space. In other words, with a machine-room-less elevator, the space previously dedicated to the controls and machine can be eliminated or totally freed up for a new use, which usually provides tangible benefits for all stakeholders. For instance, the machine room has long been one of the main headaches for an architect. Low-rise buildings usually required a not-so-fancy, box-shaped structure on top of the roof to fit the elevator's engine equipment. On the other hand, there are areas where the maximum height of houses has been regulated by authorities, which leads a machine room to "consume" one floor. In these cases, the alternative traditional solution was a complicated rope or hydraulic elevator, but these only resulted in relocating the machine room elsewhere in the building. Typically, the machine room was transferred to the basement. With MonoSpace installation, the extra space in the basement, for example, could be sold as a garage. In some the centers of big cities, that added significant value to buildings.

Another important benefit of MonoSpace was its reduced energy consumption. The amount of energy dropped dramatically because EcoDisc consumed only about half the energy consumed by a traction engine and only one-third that of a hydraulic motor. So the new product also offered benefits for the ultimate end customer who operated the building. EcoDisc could also provide a comfortable ride equal to that of expensive, high-speed gearless elevators. Additional benefits for builders included a specially developed installation method that eliminated the need for cranes and scaffolding.

While the elimination of the machine room created important benefits for stakeholders on the customer side, it also helped reduce costs for the supplier. KONE achieved cost savings because many traditional components, such as the reduction gear, became obsolete. In addition, it became possible to make other elevator components, such as power electronics and contactors, at a lower cost once they were optimized for MonoSpace use.

There were four major competitors at the time of the MonoSpace launch, namely Otis, Schindler, Thyssen, and Mitsubishi. Otis had announced a prototype for a new linear motor solution at the beginning of the 1990s. This created an urgent need for KONE to start developing a competitive response of its own. The project of finding a new hoisting solution was

initiated early in 1991; like Otis's prototype, it was also based on linear motor applications. Due to many technical challenges, the original path was abandoned and a new idea for a rotating machine emerged in 1993. In 1994, the first prototype was in use on KONE's premises, but it was still far from a commercial success story. Hakala lists many critical obstacles for commercialization at the very beginning:

> If a machine room was already included in the drawings during the tendering process, then leaving it out meant design change, which either negated the saving, or the construction company absorbed the benefit. It was not clear in the beginning if it was possible to utilize the same technology throughout the volume range. A partial solution would have meant just adding to KONE's existing selection of hoisting technologies, thus resulting in poor cost structure with the need to maintain several technologies simultaneously. (Hakala, 2006, p.8)

6.3.3 Commercialization activities

The MonoSpace team had to overcome many obstacles. The first issue was whether the hoisting machine concept would be feasible at all. Then, the next question was whether it could be applied as a component of an elevator. In addition to these technical questions, there was also a certain amount of business uncertainty related to the question of whether MonoSpace would be a profitable mass product with sufficient sales volume. It would have been too expensive to keep this type of new product as part of the firm's product offerings alongside other technologies just for the sake of novelty. Then, the final consideration was whether the outcome would be such that authorities would give it their blessing – in other words, whether this kind of product could be sold after all.

It is worth noting here that KONE's marketing department only spent a relatively modest amount of money on MonoSpace, and advertisements were almost non-existent and mainly targeted at opinion leaders. KONE targeted its press coverage and direct mailings mainly at architects. Builders welcomed the elimination of the machine room, and the "green value" of energy efficiency was well received by architects. In addition, the firm organized road shows in a number of countries, but the overall marketing budget remained conservative.

> *"The one item that created cost, probably, was a well-planned and implemented kind of a marketing package developed for the implementation by the national sales companies, which included all the information one could ever imagine needing. Even the installation method instructions were in there."*

In addition to a centrally implemented, Europe-wide direct mailing campaign, the firm used individual customer road shows and launch

meetings by national companies as the main marketing channels for the product. The market demand for the product, however, was strong and, according to the interviewees, there was a real market pull for the product.

The name "MonoSpace" was chosen for the product concept because it indicates that the elevator in effect fits into a single space (i.e., there is no need for a separate machine room). In the Netherlands, the elevator range name was initially called Greenstar. This was used to indicate its energy savings and ecological benefits; however, KONE chose to replace this name with MonoSpace when it began to market the product at more of an international level. Similarly, the power unit was globally branded EcoDisc, even though the technical title for all EcoDisc machines was MX.

The strategic business objective of MonoSpace was to increase new elevator business profitability. Despite being priced well above its conventional competitors, MonoSpace surpassed sales volume expectations. The original ramp up and sales goals were created with a degree of optimism, but MonoSpace still beat them, achieving a far more rapid growth and penetration rate than expected.

6.3.4 Convincing customers and authorities

One MonoSpace-related challenge stemmed from the dilemma of how to convince authorities that the new revolutionary design complied with existing standards and regulations. After all, the safety codes did not mention anything about such a product, and the proposed solution was actually about to challenge conventional regulations related to human safety.

> *"Competitors started then, competitors started to attack it saying 'wait a moment, that lift does not fulfill regulations, there is no machine room.'"*

This was certainly a challenge for commercialization. Luckily, the EcoDisc hoisting machine did not alter the other components of the elevator, which helped to convince authorities. The basic idea behind EcoDisc was still easy to understand – it was basically a motorized sheave.

MonoSpace was first submitted for elevator safety code acceptance in the Netherlands for one simple reason: KONE has a large market share there, and Dutch customers were generally considered "early adopters," meaning that they were open to new ideas. The elevator inspection and safety issues were well organized, and the Netherlands enjoyed a good reputation among the European elevator regulators and development task forces. In addition, KONE was well connected with the Lift Institute in the Netherlands, and it

was known that an acceptance certificate from this Institute would help to generate approval in other European countries. This is simply because, according to EU regulations, if a product is approved in one EU country, then the other countries have to accept it as well. The authorities in the Netherlands were also supportive of the new approach that KONE proposed.

> *"The inspectors said that 'yep, it is not a machine room but now it fulfills all requirements that we have for a machine room'...and that was an innovative approach, so that they did not want to seek ways to ban it, but they did seek ways for how they could interpret that it is [acceptable]"*

MonoSpace questioned existing values and experiences because it deeply challenged the standard interpretation of existing safety regulations. Such a product was completely unknown to current elevator safety codes at that time and, therefore, also created some initial hesitation among customers who did not want to be "guinea pigs." In addition, KONE was the only supplier of this type of elevator. In the first cases, this basically meant that customers had to overcome their fear of committing to only one provider.

> *"The question for customers was that – or actually the one they feared was that they will be committed too much with KONE, when the others did not have an elevator without a machine room."*

This created a so-called customer lock-in effect, which in short means that switching to another supplier would have been difficult or cumbersome. This gives the supplier a certain amount of power. This situation has been discussed in the academic literature (e.g., see Klemperer, 1987, Farrell & Shapiro, 1988, or Gallini & Karp, 1998). Since a separate machine room was left out during the design phase, it was practically impossible to alter the elevator model later on. Such a situation would not be an issue if the elevator worked as it should; however, when MonoSpace was first introduced, there was no evidence that this would be the case. According to Hakala (2006), "After choosing MonoSpace™, there was usually no opportunity to return to conventional solutions. If the machine room was left out, no other elevator type was possible without expensive alterations to the building. Many customers might be concerned because MonoSpace required special permission to be officially inspected and certified." (p. 8)

Convincing the first customers of this new solution required some work. There were clear business benefits that supported the investment decision from the buyers' point of view, but a customer still had to consider whether this was just a temporary concept or something that would last. Customers also had to be convinced that a supplier would stay in business long enough

to provide spare parts and maintenance. To circumvent the challenge of finding the first customer reference, KONE was willing to give customers some initial benefits. Actually, the first sales cases were deals with customers who had already placed an order for a traditional elevator, and these installations were originally designed for hydraulic elevators, but KONE encouraged these customers to convert to MonoSpace based on the arguments outlined above. In other words, they were given an opportunity to convert their existing orders to an order for a new and improved unit at the same price. In addition, KONE also gave warranties to the effect that, if the elevator did not work as promised, KONE would replace it with a traditional elevator. Since these buildings where designed with a machine room, this kind of remedial action would have been possible. Other incentives that were offered included free service packages. KONE has a very strong reputation of being a reliable provider, and that certainly helped, too.

One of the main objectives of these pilot installations was to test installation methods and also to receive initial market reactions (i.e., customer acceptance, pricing level adjustments, and competitor reactions). KONE used the pilot installations to support commercialization and to convince the clientele that the technology worked. Initially, KONE conducted two "internal pilot installations" in its factories in Finland and the Netherlands for precisely that purpose.

One additional obstacle was related to the procurement process of public construction projects. Within EU countries, it is compulsory for large public investments to be subject to competition with at least three competitive bids. The problem here stemmed from the impossibility of comparing and valuing different bids since there was only one solution provider of machine-room-less technology.

6.3.5 Organizational topics

Development projects at KONE follow a stage-gate process. Typically, the business division that has the underlying need also acts as a sponsor and provides funding for the project. The steering group then monitors the project budget, schedule, and resources. In addition, there is a reference group consisting of people from the "front line," and this group is used to spar with the development group on technical topics and user requirements. In other words, the reference group looks after the practicality and feasibility of the project. The product development and marketing functions of KONE are involved in the same projects at the same

time, and therefore, it is up to a project manager to ensure that marketing materials will be produced and that marketing tasks are synchronized with development activities. The ideal situation here is if the project manager is able to "walk with the project" from the ideation phase to the launch. Handovers are always difficult because the know-how and knowledge of failures (tacit info) disappears. KONE's country units (i.e., "front line") have traditionally been quite strong and independent, while central marketing has been in charge of making the marketing approaches similar throughout the company. Technical people do not take an active role in marketing material creation; however, engineers often participate in sales cases to provide technical back-up. The interviewees considered this practice very important because it also provides development teams with significant input regarding customer requirements. On the other hand, engineers may sometimes concentrate too much on technical details. For instance, people in the elevator cab do not want to receive status information about the elevator's performance, no matter how important this is from an engineering point of view. Users may value the information screen but they want to receive notifications about local activities instead.

6.3.6 Internal launch

> *"It was important that the MonoSpace concept was sold correctly. Sales had to train construction companies to look at the total cost of an elevator, to include shaft and machine room with materials and installation."*

At the beginning, some of KONE's local units resisted MonoSpace somewhat. Their main concerns mostly related to circumventing the safety regulations; salespeople worried that customers might be unwilling to accept this type of product. In addition, the traditional hydraulic technology played a very strong role in KONE's technology portfolio and dominated a number of major markets. Therefore, some units questioned whether this kind of new lifting technology was needed at all. The first sales cases in the Netherlands went extremely well, and these positive experiences strengthened salespeople's commitment to the product. It seemed from the beginning that MonoSpace was a product that customers wanted. Traditionally, competitors' sales pitches had for the most part been identical, and MonoSpace offered a well-received change to the familiar sales pitch.

> *"Now they were able to sell something that was perceived as really new from the customers' points of view and something that was actually fun to sell."*

Internal resistance faded quite quickly once it became evident that market acceptance was strong. Cannibalization issues had already been considered long before the MonoSpace concept began to gain a major share of the market. The idea was that MonoSpace was not going to merely complement an existing product range, but that it would actually supersede the other technologies completely. This was an important decision related to product strategy and overall company strategy as well.

> *"Yes, it was … it required guts. We decided to give up with well-served business, and decade's worth of work. And it happened really fast … in less than . . . eight years."*

KONE received operational benefits because the EcoDisc technology replaced three or four different hydraulic elevators as well as three or four different geared elevators. Each of these older types of elevators required dedicated engineering, drawings, components, and installation methods. A single product is naturally much easier to maintain and develop and, thus, MonoSpace has provided significant savings for KONE.

Naturally, there was some resistance among certain markets and internal groups that claimed that a hydraulic lift was here to stay because it was a much cheaper solution in small buildings. Eventually, it was market forces that decided the issue in favor of MonoSpace. Obviously, energy savings played an important role, and it was an obvious decision for KONE management to completely abandon hydraulic technology.[110]

Internal training and preparations were seen as a very important part of commercialization activities, and thus, internal training programs and material created some costs.

> *"The other [important] thing is then the internal training, so that we educate our sales personnel about the product, what it's all about, and where we are aiming with that product"*

KONE made preparations for the internal launch to be successful. More than a year before the initial launch, a special marketing work group began gathering on a monthly basis to strategize about how to sell the product and who to market it to. In addition, six months before the launch a special "teaser" film was shown in the annual KONE meeting attended by all of the national company management teams. The idea behind the film was that an industrial spy broke into a KONE test facility and tried to study a

[110] As of today, KONE provides MonoSpace elevators ranging from slow-speed (MaxiSpace) elevators (0.6 m/s) all the way to an elevator that reaches 17 m/s and is used in the Taipei 101 building in Taiwan.

MonoSpace elevator, but could not find out its “secrets” and left muttering “They’ll never believe me.” This was part of the internal preparation effort to raise interest among management teams that KONE was about to introduce something dramatically new onto the market.

6.3.7 External launch

As mentioned above, the first pilot projects were conducted in secret before MonoSpace was officially launched. These pilots were part of a feasibility study, and customers and external participants were asked not to reveal the new technology to outsiders. MonoSpace was first revealed to the public at a pan-European press launch event in Brussels in March 1996. After that, MonoSpace was introduced to new markets in a step-by-step manner. In part, this was due to caution – after all, the technical functionality of the product concept and its delivery process at higher volume levels was, to a certain extent, untested. KONE has maintained a strict policy that there has to be enough real-life tests, and a new product has to meet strict performance criteria before there will be a full-scale sales release. Despite strong confidence in MonoSpace, there were still some market acceptability considerations that supported a more cautious start as opposed to a global rollout. On the other hand, certain “fast-to-market” objectives created pressure to move fast and stay ahead of competitors. The introduction of the product in the Netherlands was a way to reach technology pioneer status and enjoy the first-mover advantage. On the other hand, production ramp-up took time, which favored a gradual launch approach. For these reasons, the first MonoSpace elevators were machine-room-less versions of the then-existing standard European elevator ranges that were branded nationally.

There was some hurry to launch the MonoSpace because there were rumors that a competitor was also about to launch something new. As mentioned above, the actual pan-European press launch took place in 1996 in Brussels. The actual rollout after the piloting phase in the Netherlands was arranged with different countries so that all European national companies were actively selling MonoSpace some twelve months after the launch event, with the exception of Italy and Spain. These markets joined the campaign only after a new, MonoSpace-specific factory in Pero, near Milan, was opened. At that point, the previous generation of European-standard, rope-and-hydraulic elevator ranges were gradually phased out and replaced by the MonoSpace elevator.

KONE encountered the largest amount of resistance in the United States. The reason for the slow penetration of the U.S. market was due to the fact that the U.S. state-level elevator safety codes did not recognize the machine-room-less product concept. Also, load capacities and running speeds were inadequate, and KONE was still looked upon as “an entry level” firm in the United States. There were perhaps some political issues in place in the U.S. market that slowed down the sales. Presumably, some elevator consultants who worked for customers had their background in hydraulic elevator technology, and those consultants traditionally had close relationships with companies that competed with KONE. Sales in North America only started to boom after the MonoSpace range expanded to speeds of over 1 m/s with loads of more than 1000 kg.

The Japanese market opened up after Tokyo Metro chose MonoSpace as the *de facto* solution in their metro stations. At the same time, a KONE-Toshiba alliance was created in Japan. In other markets, MonoSpace made the KONE franchise attractive to many local elevator firms; many of them wanted to represent KONE because they saw the benefits and business potential of MonoSpace.

One commercialization-related, strategic decision involved launching the product on a country-by-country basis. The pragmatic reason for this decision had to do with the fact that each country has its own regulations, and local authorities had to be convinced. So KONE chose a rollout type of launch to get the country-specific sales permissions; however, this strategy also helped KONE balance supply and demand and scale production in accordance with growing demand. The firm also considered selling MonoSpace licenses to competitors to boost earnings and develop an industrial standard faster, but the idea was quickly shelved. Competitors soon started to create similar solutions, which was a clear sign for the market that this would be the dominant type of technology in the future.

6.3.8 Diffusion factors

According to interviewees, commercializing MonoSpace was a relatively easy task because the technological advantages ad customer benefits of the product were easy to understand. The superiority of the product helped to change the industry standards and, in that sense, there was no “magic” in commercialization after all. Other MonoSpace benefits were easy to demonstrate: the typical assembly costs for an elevator are known, and electricity consumption savings can be calculated indisputably.

KONE found out that all savings combined totaled of 5% of the construction and installation costs in general. In addition, the extra space subsequently available in a basement was of great importance in some city centers, where it could be now used for extra parking spaces or storage. MonoSpace has received many industrial innovation prizes over the years, and from the very beginning, it was perceived as a great product with obvious benefits for the customer.

It can be argued that MonoSpace's success was due to the fact that the diffusion barriers were easy to overcome. Complexity was reduced when there was no need to build a separate machine room. Important reasons behind customer acceptance of the product were that the dimensions of the elevator well remained unchanged and that the EcoDisc supported traditional hoisting technology.

> *"If the dimensions of the elevator well had been changed, then the selling of the MonoSpace idea might have been impossible."*

In brief, MonoSpace simply removed the need for a machine room, and the hoist well was not affected; KONE kept the hoist well in place according to ISO standards. Marketing naturally used this as one of its key arguments.

6.3.9 Within-case analysis

One of the key commercialization-related insights concerning new installations has to do with providing technical advice to the customer in a punctual manner. The creation of marketing, sales, and pricing strategy, in addition to proper customer segmentation, are among the main commercialization tasks at KONE. In general, all new initiatives at KONE have to meet one of the two basic objectives: (a) the project will result in cost reductions or (b) it will produce something unique that will justify a premium sales price.

To a certain extent, the interviewees questioned the need for making a distinction between product development, front-end, and commercialization as separate phases.

> *"I think that when we start to create a product from an idea, the whole process is actually about commercialization …"*

> *"We use the term 'to implement', which means . . . it could very well be the synonym of 'to commercialize.'"*

In addition, the interviewees raised a question - is commercialization a separate phase or is it embedded within an "ideation to sales" process? According to one statement, *"commercialization happens when the idea is*

pushed forward." On the other hand, commercialization was also seen as "*the forming of products and services so that it will lead to actualization of sales."*

According to the interviewees, one of the main difficulties with commercialization has to do with understanding real customer needs and requirements. This is especially true in global business, where customer interests often differ significantly due to geography or industry, segment-related factors. For instance, some customers may value environmental aspects and green values, which may not be of interest elsewhere.

> *"This is, from my perspective, kind of a big problem, a big risk, let's put it that way. So that you imagine what is the need of a customer and do not believe [what is the truth]"*

It is worth noting here that the interviewees saw MonoSpace as representing a technology-push type of project, and it became evident that customers were not that involved with the actual product development. The reason was that the EcoDisc was the result of a series of inventions from internal R&D and, after all, the look and feel of MonoSpace is not much different from a typical elevator from the user's point of view (please see the discussion of cases later on).

The top management had faith in this new product initiative and gave it their strong support. In addition, the development of MonoSpace was kept a secret quite successfully. The first pilot customers were told not to publicly discuss the new solution until KONE gave them permission. The development team at KONE was also quite small, with only a handful of people involved.

Product cannibalization can represent the beginning of a new era, and in KONE's case the EcoDisc actually led to a situation where KONE totally abandoned conventional hydraulic and gear technologies. It might have been very difficult for a new entrant to come up with this kind of a new product concept. KONE, however, enjoyed the unique advantage of having been in the business for a 100 years.

The initial project was actually sold based on the older technology, and the customer was offered the option of converting to a new design during the sales process; however, there were tight guarantees involved in this conversion process in order to mitigate the resistance and hesitation of customers.

Concurrent engineering thinking has taught KONE that the sales and marketing aspects of a product have to be created well in advance. Once

marketing has accepted the product specifications and passed them along for development, then the ultimate function of a product should not be changed anymore.

The role of a project manager is centrally important. It is up to the project manager to make things happen. However, if a consensus prevails that a new product is highly competitive, then a firm should have great faith in it and place high bets on it, too. In addition, different organizational functions have to be synchronized to meet the intended launch date.

KONE had strong technology leadership, but it also understood the situation of the end user quite well. In general, the interviewees stated that engineers may think that some technical aspects are important selling points; however, customer may not ultimately have much interest in them. Thus, it is critical to understand what aspects of a particular product deliver value to different stakeholders.

The MonoSpace generated a situation where KONE gave up all of its other technology almost completely. Competitors eventually came up with similar solutions, but continue to offer other technologies as well. KONE took advantage of this situation and promoted an image that it can offer elevators with consistent technology throughout the entire range of elevators.

Launching a new product globally is not a straightforward task because strong and independent national operating units are involved. It is a challenge to successfully navigate the specifications of the particular country units. Also, the value propositions have to be different in different regions, and this may create tension between local and central marketing.

One of the key ideas of product development at KONE is that they try to "fail cheap." For instance, if there seems to be a serious technical issue related to some technical part of the project, then the firm will target its main efforts at that specific part. On the other hand, if the question is more marketing-related, then the marketing procedures become the critical part of the project. There was support for the idea that the first product of its type introduced to the market will get the most publicity. On the other hand, there was also strong consensus that a product should not be launched before it really works.

There were no global marketing activities before the country-by-country launch was performed. On the other hand, there were some afterthoughts as to whether it would have been possible to go for the big bang and to have

done the global launch after all. This, however, might have been challenging because the local authorities had to be convinced individually and thus a global rollout might not have been successful. By having the Netherlands as a pilot country, KONE was able to obtain the required technical certificates more easily. After that, it was easy to respond to competitors' claims that MonoSpace did not conform to existing regulations.

Local market understanding is important. Choosing the right country in which to launch the product is of importance. In addition, having the right persons to manage the launch is extremely important. In this case, the internal organization in the Netherlands was streamlined and local market share was strong. This was also one of the key reasons KONE decided to use the Netherlands as a pilot region for the launch.

IPRs played an important role and one important detail also had to do with patenting the optimum location for the EcoDisc in an elevator. This prevented competitors from benefiting from a similar elevator design, even though they might come up with motors similar to EcoDisc.

MonoSpace helped KONE's export function in general because many local firms were keen to act as KONE's representative. The reason was simply because these firms wanted to be able to offer MonoSpace elevators to their customers. Eventually, when complemented with product-specific (just-in-time) logistics and an innovative installation system, MonoSpace became a business model by itself – from out of a pile of components, it became a branded, working transportation system.

6.4 Case Study: Marioff's Hi-Fog

6.4.1 Background

Marioff was founded in 1985, and the growth of the firm stemmed from the inventions and patents of the founder and long-time CEO, Mr. Göran Sundholm. Marioff started its operations in marine and offshore high-pressure hydraulics, but the firm's current focus is on providing water mist fire protection systems globally. As of today, Marioff has achieved market leadership in the new installation of marine fire protection systems, but Marioff is also expanding towards new market segments, such as road tunnels, airports, and museums. In 2006, Marioff had 347 employees and a turnover of 93 million euros. The growth of Marioff has not gone unnoticed by incumbent firms, and Marioff was acquired by UTC Fire & Security (a division of the United Technologies Corporation) in the summer of 2007.

Marioff originally operated in the services business and offered maintenance work for the marine and off-shore industry. In 1991, Marioff (the firm's name was actually Marioff Service at the time) was performing hydraulic installations for a Swedish shipping company. During some informal meetings, the customer's technical director revealed that he had a major problem related to the recent fire protection initiatives for ships. The new regulations stated that all ships would be required to have sprinkler systems installed in the near future. Unfortunately, it appeared that it would be practically impossible to meet the requirement by using the commercially available, traditional sprinklers on his ships. The reason behind his concern was the fact that the stability of the ships would have been critically compromised if heavy sprinkler systems were added.

The customer asked if Mr. Sundholm could come up with a new solution for the problem because he knew that Marioff Service had previous experience with the high-pressure systems typically used in hydraulics. The preliminary idea that Mr. Sundholm had in mind was to solve this problem simply by increasing the level of water pressure. This would allow the use of smaller pipes, thus circumventing the problem of too much weight. Without hesitation, Mr. Sundholm made a bold move and promised to deliver such a solution.

No one at Marioff had prior experience with the fire protection industry *per se*, but this promise forced them to learn fast. In fact, Marioff had signed the deal and promised to deliver a groundbreaking sprinkler solution that would meet the customer's request of reduced weight. The problem was that the customer had only given Marioff six months to deliver a working product. It did not take long to realize that increased water pressure alone was not the remedy. Higher water pressure required completely new types of sprinkler heads because the traditional ones malfunctioned under the load.

It took many prototypes and numerous burning tests (as described later) to create new sprinkler and spray heads as well as a completely new system design. Mr. Sundholm and his team went through a very intensive and fast-paced product creation process and ultimately produced the solution for the customer.

6.4.2 The case product

The product that is the subject of this case study is the novel fire protection solution called HI-FOG. In essence, HI-FOG pushes water at

high velocity through specially designed sprinkler and spray heads to create a fine water mist capable of extinguishing a fire at least as fast as traditional sprinklers but with less water. The complete system consists of a combination of different sprinklers with various flow rates, discharge patterns, and droplet sizes to suit different applications. Different types of spray heads, valves, piping, and fittings, as well as power units, can also be used with the product.

Traditional sprinklers use plenty of water and spray it around when they are launched. Thus, the damage caused by the water used for firefighting can be significant – sometimes the damage can be as bad as the fire damage would have been. HI-FOG circumvents this dilemma by discharging a fine water mist at high velocity. It creates a thin mist, dramatically reducing the amount of water required to put out the fire.

A typical sprinkler provides water droplets at the size of 1mm, whereas HI-FOG takes advantage of high water pressure to reduce the size of the droplets to 0.005 mm. These small drops of water together create a surface area that is 400 times larger than that of traditional water droplets. The water mist created by HI-FOG also provides additional advantages. For instance, it vaporizes small droplets quickly, which leads to a high level of energy absorption and gas cooling, which in turn prevents re-ignition or flashovers. Water mist also provides benefits such as radiant heat blocking and smoke scrubbing (i.e., absorbing harmful particles and gases from the air). An additional advantage is that mist does not splash fires or flammable liquids; water mist systems can be used regardless of the type of fire – even with electrical fires.

Naturally, there are other means to extinguish fires, such as with Halogarbon, CO_2, and inert gases. The problem with Halogarbon and CO_2 is that they are harmful to humans. For instance, the disadvantage of CO_2 is that it removes oxygen from the entire space. Water, on the other hand, just removes the oxygen from the point of combustion, so there is no need to check whether the environment has been completely evacuated before turning on the fire system. Gas-based systems typically require that the rooms where they will be used are completely sealed.

The size of the HI-FOG water pipes is smaller than traditional low-pressure sprinkler system pipes. Smaller pipes are often easier to install, especially if the underlying target is, for instance, a ship that is being retrofitted. The smaller piping results in the total system being much

lighter, which is a significant advantage for ship builders and shipping companies.

6.4.3 Commercialization activities

Marketing efforts were quite modest during the first years of HI-FOG due to the fact that Marioff had to carry out the slow, case-by-case approval process alongside the sales project. In that sense, it would not have been reasonable to spend more on advertising. One-on-one meetings and personal sales were considered the main marketing tools. While these activities did not generate much public visibility, they were described as playing a crucial role during the sales process in this type of industry.

Exhibitions and footwork were the main methods of contacting key customers. Still, finding and getting access to the right key decision makers within the customer's organization was considered the most difficult job. Fortunately, there were only a handful of major shipyards and shipping companies to contact, so in that sense, the marine industry was easier to handle than inland market segments later on. Marioff has also been careful in selecting the types of exhibitions in which they want to participate. The idea is that it is unnecessary to join the fire industry-specific fairs, where all of the competitors are present; rather, they choose exhibitions targeted at other industries, such as marine, hotel, and lodging fairs.

> *"In this business, the commercialization is of course the way we do it, we go directly to customers for a face-to-face meeting, and we tell them that we have something … this way of acting is number one in commercialization."*

Marioff received some publicity due to the industry awards it won. For instance, HI-FOG received the "Safety at Sea Award" in 1992, and Marioff as a firm received the Finnish Export Award from the President of Finland, Martti Ahtisaari, in 1999. Despite obtaining a clear technology leadership position in the marine sprinkler market, Marioff also has quite a market-driven business approach.

> *"If you cannot sell it, then there is no point to inventing it. First, there has to be the market and demand . . . or if there is no demand, you have to create that demand. In other words, it's more like – deal first, and after that, you'll make a product that fulfills the deal."*

The single most important asset for marketing was perhaps the acceptance of the new guidelines. As mentioned above, Marioff was able to sell HI-FOG systems to smaller vessels by acquiring case-by-case permission despite the fact that the new guidelines status was still pending.

Large shipping companies became customers only after it began to become evident that HI-FOG would be accepted by the regulators.

Patenting was also seen as a very important asset during the growth of Marioff. Patents can be used as tactical tools for commercialization purposes. Göran Sundholm, who is the author of over 1,000 patents altogether, puts it this way:

> *"A patent means two things. It is a tool for marketing. If a product is patented, then there has to be something in it . . . It creates interest toward the product, and people want to find out what is the thing in it. The second point is that a patent is some sort of insurance. There is no glamour in it; it's just that you buy insurance so that you can make the product alone ..."*

The name of the product also changed during the process. One of the early versions was called the "fog fire fighter," but that name was abandoned in favor of HI-FOG. As an anecdote, "HI" has nothing to do with high water pressure, even though high water pressure is an essential feature of the system – it refers to high technology. However, Marioff does not make a big deal about this because it is up to everyone to interpret the name as they wish.

Marioff has also been using other marketing tools to communicate the benefits of HI-FOG in various application areas. The Internet is seen as an increasingly important medium for delivering marketing material. For example, Marioff has created a specific website, www.tunnelfireprotection.com, to disseminate information about HI-FOG and how it can be used to extinguish tunnel fires. This site provides educational material about HI-FOG, but it also streams a video that provides an overview of how serious tunnel fires can be. This video has also been distributed in DVD format to key decision makers and stakeholders in various organizations related to tunnel projects. This can be seen as a type of marketing, but it is also part of the commercialization process and making HI-FOG known to new market segments.

6.4.4 Convincing authorities

With just six months to fulfill the customer's urgent need, the project schedule was extremely demanding to begin with, but on top of that, it soon became evident that this new technology also required approval from the Swedish maritime authorities if it was to be used in ships. The authorities followed the standards and guidelines that were crafted based on the existing technology and traditional solutions. For instance, existing sprinkler guidelines clearly defined a definite minimum amount of water

that is required to use per surface area of the floor. There was nothing mentioned about using water mist instead.

A first meeting between Mr. Sundholm and Swedish authorities revealed that it would usually take approximately ten years to change these regulations and get approval for a new system. The existing sprinkler guidelines demanded that at least five liters of water per one square meter per minute had to be used. Mr. Sundholm knew that his invention could put out a fire with ten times less water. So there was a need to find a shortcut to somehow bypass those guidelines. In other words, the challenge was to come up with a creative way to circumvent the approval process. The answer was quite simple in principle but not easy to carry out in practice – to demonstrate and prove it.

The existing guidelines included a chapter that was important for Marioff; the chapter stated that administrators can accept the proposed system if it demonstrates its ability to outperform the existing methods. Mr. Sundholm seized this opportunity and sought to validate his invention via field trails. Some intensive negotiations were still needed before authorities were finally willing to grant case-by-case permission providing that the field tests were successful. This resulted in an intensive period of burning tests and trails at the test laboratory in Sweden, and Marioff ultimately received permission to install the new system since the outcome of the demonstrations were clearly favorable. Actually, once the Classification Society in Sweden had accepted the product, Marioff also received world-wide permission to sell this new system to vessels and ships.

Thus, the field trials eventually resulted in the revision of global marine guidelines. The new guidelines were more performance-based and no longer relied on a definition of the amount of water to be used. In 1994, the International Maritime Organization (IMO) provided guidelines for alternative fire protection systems in machinery spaces. The IMO also adopted "equivalent-based" sprinkler guidelines in 1995. So, it took many years to get these new standards in place, but the most important point for Marioff was that they already received permission to sell HI-FOG systems on a case-by-case basis at the time when acceptance of the new guidelines was still pending. Customers also realized that it was inevitable that the new "equivalent-based" sprinkler guidelines proposal was going to be accepted.

> *"it was as a draft status, but already accepted by the committee, and that meant that, in principle, it was taken for granted, waiting only for the final blessing … which meant that we already got the first cruising line deals in 1995."*

The marine industry is still a very important market sector for HI-FOG. However, there were even bigger business opportunities in various inland targets. On the other hand, the inland market segment was much more problematic because each country had its own regulations in place. It is worth noting that London Underground was among the first non-marine customers, and they used HI-FOG to protect their storerooms. Various other targets, such as road tunnels, airports, churches, and museums, have since been equipped with HI-FOG.

6.4.5 Convincing customers

Convincing customers about the superiority of HI-FOG was a relatively easy task. Shipping companies, for instance, needed only to calculate the weight difference between HI-FOG and the old sprinkler systems, realizing the potential for extra cargo capacity, to justify using HI-FOG. In addition, the reduced risk of water damage was an obvious "killer" sales argument. Naturally, burning tests were used to demonstrate how HI-FOG really worked in practice. Burning tests were, and still are, a very important part of the sales process – not only to convince the customer in general, but to help Marioff fine-tune the optimal solution for a customer-specific target. According to Marioff's website, there have been over 5,000 full-scale fire tests since 1991. The website states: "Water mist is not a universal firefighting agent, but its firefighting properties are entirely system-specific. There are no generic design methods to cover all the different water mist systems. The only way to evaluate a water mist system is to test the system using full-scale fire testing."[111] There are also strict requirements for component materials. Life-cycle tests that simulate 25 years of usage are required for the main components before authorities will accept a system. These tests are extremely strict – if one component fails in some phase of the test, the whole process basically has to be started over again. These kinds of tests are tough for the solution provider but naturally support the customer in his or her investment decision.

Fire at sea is a risk that ship companies do not want to see the media focus on. Therefore, customer testimonials and case studies that could be used as public firefighting references were not easily available. This being the case, a special DVD created by the Royal Caribbean cruising company

[111] www.marioff.com / Products > Fire protection solutions > Technology > Testing accessed 4.6.2008

was a real gem for Marioff. The DVD was made in 2002, after an engine-room fire on one of the Royal Caribbean ships was successfully extinguished using HI-FOG. The video compares that fire with an engine-room fire on another vessel in 2001. The second vessel, which was not equipped with HI-FOG, suffered fire and water damage exceeding 8 million USD. The fire in 2002 only resulted in repair costs for one sensor worth 500 USD. The video captured by the surveillance camera illustrates the power of HI-FOG. The DVD was originally created for training purposes to educate the crew members on how to behave in similar fire situations. Marioff got permission to use this video for marketing purposes, and it really is a powerful tool because the customer is the one explaining the benefits of HI-FOG.

6.4.6 Organizational issues

In the beginning, less than five people worked for HI-FOG. The organization grew steadily when the turnover increased. The organizational challenges that a larger firm traditionally faces did not play a critical role in the beginning with HI-FOG. There were no organizational silos or cannibalization problems at the time. The operative mode was basically hands-on, working without any formal guidelines or business process descriptions. This was actually the case for quite a while. The structure and operational modes have been formalized, however, since a new owner has taken over and implemented new ways of working.

6.4.7 Product Launch

There was no need for internal launch tasks during the first years of HI-FOG because the team working on the new product project comprised only a handful of people. The commercial success of HI-FOG and the growth of Marioff actually went hand in hand. Naturally, the situation regarding internal product launch requirements for a new product is different today, now that the organization is much larger.

External launch-related aspects also proceeded a bit differently than they do for most mature firms. The situation was somewhat extraordinary because the firm only conducted the first product-development project when the work had already been ordered and partially paid for by the customer. The customer had actually agreed to pay almost half of the total price as an advance payment, despite the fact that no prototype was available at the time. Naturally, the product evolved during the testing and

development phase, and the lessons learned were then applied elsewhere. All things considered, it is difficult to identify a single, special product launch event for HI-FOG. Naturally, subsequent customer projects required that more and more time be spent with tactical launch topics to support sales efforts.

6.4.8 Diffusion factors

Clearly, HI-FOG offers indisputable advantages, as described above. If the weight of a fire protection system can be reduced to a certain amount of kilotons, it is easy to calculate the return on one's investment because the weight savings can be used to increase the payload in a ferryboat. Today, HI-FOG has approximately an 80% market share in the marine new installation sector, which supports the argument that the system really provides value and advantages to customers.

Compatibility with values and experience was clearly the handicap that the firm initially faced with the HI-FOG product. Though the system itself is only slightly more complicated than traditional sprinklers, it applies water to a fire in a totally different manner. The behavior of the water differs significantly when water mist is used instead of "normal" droplets. Despite this fundamental difference in the underlying physics of sprinkler systems, HI-FOG is seemingly easy to use from a basic user's point of view – one need only press the emergency button. The situation is much more complex with a potentially hazardous CO_2 system, where the person who launches the systems has to think about the tradeoff between fire fighting and risking human lives. The time that the crew has to spend verifying that an area is completely evacuated wastes precious moments by letting the fire grow.

In general, it is also quite easy to understand the mechanism of HI-FOG, and thus the complexity of its operation should not be an issue. Trialability and observability topics do not create any problem for HI-FOG either. As mentioned before, fire tests and burning demonstrations were available, and a customer could burn different materials and observe how HI-FOG works in practice.

6.4.9 Within-case analysis

Understanding the business of a customer is an important task for any supplier; but that is just the beginning. Rewards come to those who can solve their customer's real problems. Sometimes, this takes courage and the willingness to take risks. According to the founder of Marioff:

"We have always swum against the mainstream, so that if someone says that oil fires must not be put out with water, then we go and do it, for sure. Or if [someone says that] electrical fires must not be put out with water, then we for sure go and do it, and we show that it's the best way to do it. And that's exactly the way it has happened [laughing]."

The sale of a new product is a very critical phase. Sales results ultimately determine whether a product will achieve commercial success. The difficulty of identifying and contacting the key decision makers and setting up the first meetings with them was one of the main obstacles that Marioff encountered during HI-FOG sales. An additional fundamentally critical issue was related to the growth of the firm. Marioff had to deposit collateral during the large investment projects, which in turn resulted in additional financial struggles.

The timing of the market introduction of HI-FOG was excellent because the marine industry regulations were about to change, and the new rules required that all new vessels must be equipped with fire protection systems. There were also emerging mandates that required the removal of fire gases, and HI-FOG was able to solve that challenge, too. Simply put, it was the right product in the right place at the right time.

Marioff's success was based on the boldness of its founder, who seized an opportunity to invent and develop the HI-FOG system. However, it took a long time to commercialize HI-FOG to the point that it achieved its current level, and this included the time-consuming lobbying of authorities. Eventually, though, new guidelines based on equivalent performance became internationally accepted, thanks to Marioff's persistent work and sales increased dramatically.

In this case, it is very difficult to distinguish between the traditional phases of the innovation process; the front-end, R&D, and commercialization phases were conducted simultaneous when the first customer project was being created. This type of commercialization is not typically highlighted in the current literature.

Customers, however, were not involved in the product creation process; the first customer had a unique problem and was happy when Marioff was able to solve it. Ever since, Marioff has mainly maintained a technology-push-oriented approach. For instance, customers were satisfied when Marioff proposed to deliver a solution using fewer sprinklers without compromising performance. This type of technology push has been a win-win situation. Marioff has been able to save on costs by using more efficient sprinklers and customers have received a system with less weight.

Trade shows were also important tool for commercialization of HI-FOG, although personal selling and meeting with customers were described as the most important tools in this type of B2B investment business. There was only handful of big shipping companies, so it was not difficult to identify potential customers. The only challenge involved getting access to the decision makers. Marketing was also quite modest; after all, there was no need to boost marketing because the approval process was quite slow, and there was no point to creating massive marketing before the firm obtained the necessary approval.

This case study also supports the idea that references play a crucial role in sales. The RCC video was not available when HI-FOG was first being developed, but it provides an excellent illustration of how various marketing material can be used to create awareness and enhance the credibility of the product.

This case demonstrates that the initial invention as such was developed relatively quickly; it just took time to commercialize it. In addition, it was not only the technological challenges that needed to be solved. Finding a way to convince authorities to accept this new and radical solution for firefighting was the major issue that cast shadows across the firm's path to commercialization. The very first prototypes were in place in 1991, but the development work continued, and a new series of intensive tests led to a second generation of HI-FOG sprinklers in 1992.

This case provides a good example of a continuous process in which the front end and commercialization phases of the process were interconnected. In other words, the commercialization process was not a big bang, but, rather, more of an evolutionary process. Increased sales and an expanding market share were also tied to the growth of the company. Naturally, the situation is different when an established firm launches a new product.

Marioff also solved the question of cannibalization between products in a pragmatic manner – the founder of Marioff actually stated that the threat of cannibalization is best solved if a competitive product is separated from the parent firm completely.

Until recently, the Marioff way of working has generally been hands-on. Thus, no commercialization- or launch-process maps or descriptions have been used. However, we can presume that the company's new North American owner will introduce some changes to this way of working, and more formal plans and processes are likely to be implemented in the future.

The interviewees saw the constant flow of new products as an important factor at Marioff – it was said to be one of Marioff's strengths and a source of its positive image in customers' eyes. It was also mentioned during the interviews that a customer always welcomes a salesperson if that person brings something new with him or her. Naturally, a firm should not reveal all of its novelties if the existing model or product sells. After all, if every customer begins to want the latest model, that could kill sales for the old product. Nonetheless, it is still advisable for suppliers to have some "aces up their sleeve" in case sudden competition arises.

6.5 Case Study: Martela's Combo

6.5.1 Background

Martela is a family-owned, Finnish firm that designs and supplies interior solutions for working environments and public spaces. The firm maintains production facilities in Finland, Sweden, and Poland. Its primary markets include the regions around the Baltic Sea and Norway, the Netherlands, Ukraine, Hungary, and Japan. Founded in 1945, Martela's turnover was EUR 95.3 million in 2009 and it employed an average of 636 employees.

Martela seeks to offer products with a long life span: generally more than ten years. While the company's product portfolio has undergone some change over its life span, in general the company's design decisions follow classic rules, creating timeless-looking products rather than the trendiest lines.

6.5.2 The case product

Combo is a versatile and uniform storage collection that was designed to fit well with various different interiors. Combo cabinets and accessories and combinations of them offer thousands of individual solutions. Combo cabinets and shelves can be modified and equipped with various accessories to create a uniform collection that is compatible with numerous types of desk collections. Options include a plinth or metal base and a base on castors for low cabinets. Combo cabinets are available with or without traditional doors or glass doors, or with vertical or lateral rollers and sliding doors for smaller spaces. Acoustic beech, birch, and oak doors are also available as part of the Combo line.

Combo was created during the economic downturn of 2003-2004, a time during which tight design criteria was necessary. From the beginning, the company's development work required decreased production costs and, thus, better margins. Combo was designed to replace the company's existing cabinet line, which also meant that the market price of the new product could not exceed the price of the present line. These goals were achieved using fewer components and different materials, i.e. the structure of the product was radically simplified. One major topic was added symmetry. Previously, there had been a separate component for the left and right sides of the sideboard, which was unified in the new version. In addition, several technical details were introduced, such as the ability to lock the sliding door from both sides and dual functioning doors.

Naturally, the cost savings realized from Combo could have been used to reduce the market price and enhance market competitiveness. This also happened, but the primary goal was not to pass cost savings along to customers, but, rather, to increase the product's profitability for the company.

> *"Combo is an example in which we had a bit more courage. In other times, we could have introduced a new product line alongside the old one and waited until volumes of the old product began to decline, ramping production down then. The other difficulty was, probably … what was the market's adoption capability? Even if you try to explain things to your customers, the market may not have the adoption capability for the kind of product you have developed. Development has to consider when there is the possibility to create radical novelties."*

End users had very little involvement in Combo's product creation, though some customer feedback was considered for special requirements during the design phase. As a result, certain material changes were made based on difficulties encountered in the previous model and these selections were fine-tuned in collaboration with the company's head of sales. In addition, some of the company's larger customers were approached at the late phase of NPD, when the product's design was already pretty much fixed. In general, the company believes that customers are not good judges of potential demand for novel products in the industry. The firm only considers allowing customers to provide input if something is not functioning well with their existing products.

6.5.3 Commercialization activities

The Martela brand is the company's primary brand. In general, the purpose of naming is to distinguish products in the same category. It was stated in the interviews that there were no resources to start creating

several individual product brands as such. The name Combo was chosen because the Swedish branch of Martela had developed an older product with the same name. In Finland, the old version was called Conti. The company believed that using the product's existing name would help the Swedish organization to adapt to the product more easily. In principle, it was left to the company's designers to create a name for the product.

> *"In general, it is very difficult to create a good name. You find good names in the Latin dictionary and you realize that many names originate there, such as car models, etc."*

As mentioned previously, Combo was designed to replace the company's previous product line. In general, one difficulty pertaining to the furniture industry has to do with how easy it is to introduce a new product, whereas it is often difficult to terminate an existing product.

> *"This is something we have not been too successful at; we will often add new versions of products or a new product without clearly using them to replace existing products."*

When existing products are not terminated, it can be easy to end up with too many products, which is not cost effective. In practice, product termination decisions are made by Martela's product board, wherein all the units are represented.

Actually, another cabinet line also existed, which was targeted at a different segment, but the firm still considered this alternate line to be Combo's competitor at some level, too. However, the nature of this competition was difficult to determine because the overall market situation improved during the time when Combo was introduced to the market.

While sales figures for the new Combo line climbed to the level of the older product during the first two months after launch, the overall transition period between products took approximately six months. On the other hand, there are also downsides to terminating a product completely. The interviewees stated, with a bit of sarcasm, that often the decision to withdraw a product from the product catalogue can actually boost its sales.

> *"We have an internal joke going that if we want to boost the sales figures of a certain product, then we just have to create a rumor that the product will be discontinued and suddenly it will start selling surprisingly well!"*

6.5.4 Convincing customers

Cabinets are not very technical products, so there were no issues related to convincing customers or authorities about the benefits of the Combo line. The Combo line was also made in compliance with European standards.

Though these new, emerging standards were only in their preliminary stages during Combo's NPD phase, Martela chose to follow these design guidelines because the firm expected that the standard would soon be accepted as an industry norm. The fact that Combo was in compliance with the standard was naturally an asset when it came to larger projects, where large customers make purchasing decisions concerning several units at a time.

However, there was little need to convince customers of the benefits of either the features or functions of the Combo line, because cabinets are, in principle, quite basic products. The only issue raised involved the appropriate sales price. There are often pricing issues involved when a new furniture product is introduced; customers may want to continue using the old product and remain loyal to it, especially if the current product is cheaper that the newer version of the product. In Combo's case, price issues were not a concern because the new product did not raise the market price. However, the Combo line was optimized for production purposes, which created some internal worries as to whether or not the market response would be negative. These concerns never materialized and the product was well received once on the market.

While there was no need to convince customers about the functional aspects of the Combo product line, there were a few elements of the line that positively surprised customers. Customers found that the Combo line included several innovative details, most of which were not immediately visible to them; for instance, the product gave customers the possibility to move the lock to either side of the door. However, it was not clear whether or not these minor added features should be highlighted in marketing, since they might not really make a difference when it comes to purchasing decisions. It was considered that perhaps such details may create positive surprises, which may be better left for users to discover for themselves.

6.5.5 Organizational topics

Martela's project managers are in charge of the creation process. In general, once each project is complete, project managers then move onto a new NPD project, and so on. Product managers are typically nominated during the NPD project and they are responsible for analyzing the market situation and providing input for NPD. Product managers also offered details regarding market requirements as a basis for product development, but also for product termination.

The interviewees considered the role of product managers to be exceptionally important in creating the Combo line because that person would be the intermediary between product development and the company's sales team. In creating the Combo line, the product manager's role was also to offer information to the product board and collect field-based data.

There was also a separate Combo project group that gathered once a month or once a week, if necessary, and comprised representatives from all of the functional units. This resulted in a number of compromises throughout the design and production phases. Some problems occurred due to the fact that the product-process people worked full-time on the Combo project, while the project group had other daily duties to attend to as well.

6.5.6 Product launch

Product launch was considered an ambiguous term within the organization. Different organizational units had unique ideas as to when a product is actually launched. In any event, Combo's product launch went well, with it taking approximately two months to ramp down the existing product before the new Combo line was introduced to the market. Measuring Combo's success was relatively easy because there was an existing product with which to compare sales figures, market share and production unit costs. In that sense, Combo was clearly successful because it quickly reached the same or similar sales figures.

Typically, Martela launches new products in the spring because the industry's major trade shows occur during that time. In this case, the timing of the Combo's launch was considered important because the product has a certain life span on the market and, if the launch had been delayed, cumulative sales would have suffered. The firm also expected a certain amount of price disruption as a result of competition; during the next year, Martela would likely have to reduce the product's price while adding new features in order for the company to remain competitive.

The interviewees considered the nature of the basic office furniture business to be such that it does not make sense to use, for instance, magazine advertisements to reach potential customers. The best channel for Martela to reach its potential customers is by organizing special events for its target consumers.

The interviewees considered Combo's internal launch an important part of its commercialization. Martela required that product development

workers take an active role in this process, explaining important product features to the company's sales team.

> *"We had to put a lot of effort into sales training, adding a level of eagerness so that we could obtain the benefits we were seeking."*

However, despite its clear benefits, there was also some internal resistance towards the Combo product line. The persons interviewed assumed that this resulted from the fact that there was still an existing product on the market. They considered the company's older product a good product, one that was selling well. In that sense, there was not necessarily any demand or need for a new cabinet from the sales team's perspective. The interviewees also assumed that the sales professionals were not yet knowledgeable about the fact that the older product had become less profitable and that its lifecycle was ending. In any event, the company managed to convince the sales team about the benefit of Combo, even if it was done the hard way.

> *"Well, the sales team was not given any choice; the old product left and the new one came instead. It was sort of a good situation; there were no room for negotiation."*

The internal launch was conducted by the product manager, but the designer also participated in sales training and customer events. However, the project manager was the individual required to produce the technical data needed for the company's marketing material.

> *"It depends on the individual salesman as to which products he or she likes, which means that the person will sell the products he or she likes the most."*

The statement above reflects the idea that sales professionals are willing to sell the products they know best. In this sense, the interviewees considered it unwise to try to launch too many products at the same time. In Combo's case, the company utilized installation training sessions that the designers and project managers participated in to help provide the best technical knowledge and detailed insights about the product.

6.5.7 Diffusion factors

Combo and the other Martela products are tangible items that do not utilize complicated technology. Therefore, diffusion factors were not an issue; this was especially the case because Combo represented an incremental, rather than a radical, innovation. The product also provided the same advantages as the previous cabinet, so its relative advantages remained unchanged. However, some minor additional advantages were added thanks to modularity. For instance, the Combo line offered

customers the possibility to add more variety to the cabinet's appearance and included certain accessories, such as small compartments and details, which helped end users to tailor the product to their personal tastes and needs.

Compatibility with values and prior experience was not considered an issue because Martela made no radical changes to the product. Similarly, the product encountered no major problems in terms of complexity of use or customers not understanding the product. However, users perhaps did not completely understand certain functional details. For instance, the fact that the magazine locker also acted as a door handle was not intuitive for users.

Similarly, trialability and observability did not create any problems because it was easy for customers to touch and feel the new cabinets. In fact, quite often the architect or buyer for a large customer visited Martela to evaluate the product in person. The ultimate end user, however, often had no final say about the furniture selections in his or her office.

6.5.8 Within-case analysis

The persons interviewed revealed that within the office furniture industry, there is, in general, little room for radical innovations. New products primarily represent incremental improvements or involve certain new added features based on market requirements or dimension changes. The logic of the market is also considered to be such that customer demand forms the basis for product creation, and individual product marketing efforts often have little effect on the demand. is the informants also stated that within the furniture industry, the process of "charming" the customer is in part based on the firm's image. In other words, firms have certain products that are not part of their main product portfolio, but that are presented in a separate conceptual catalogue. These conceptual products represent certain types of product "teasers," which may actually never be mass produced. However, the role of these concept products is to create stories and to grab the media's attention. This also means that such products do not need to sell well in order to justify their existence. In fact, several of these kinds of Martela products have been removed from the market; in some cases, the company decided that the market was not ready for the proposed solution. However, in other cases, there have been certain afterthoughts that perhaps Martela should have tried to re-market some of the conceptual products to determine if market needs have changed.

"The aim is for those (concept) products to be part of the standard catalogue, but only a very few of them will actually reach the goal of turning from a probe product into a classic one."

"There are other means (for innovative products) than higher sales volumes. One of them is to deliver a marketing message about innovativeness."

For the commercialization process to be successful, there must always be a clear understanding of the end user, the market for the product, and the customer who will buy the product.

"Everyday topics in the commercialization of innovative, a new generation (product) plays a tremendous role."

In Combo's case, there was an existing market for currently available products, which made it easier to commercialize the product compared with how completely new products are commercialized. Commercialization efforts were also targeted at the entire product portfolio instead of at a single product.

Sales professionals appreciate it when a new product is easier to explain to customers and when the product generates sales more easily because it provides better provisions. However, there is often organizational reluctance involved in marketing new products, which can affect the amount of time it takes for an organization to successfully commercialize new products. For instance, sales professionals might choose to only sell products they know and are comfortable with; in that sense, an important aspect related to commercialization requires developing products that attract customers.

"A sales channel needs to be up and running, you need to win the time in the soul of a salesman, and get the field to understand the argument … and then you need to train them for so long that they like the product more than any other product."

One dilemma mentioned by the interviewees had to do with feedback from the sales team; according to them, even when the sales team was asked to provide input for the NPD, they often did not. Only once the product was ready and the design frozen—for instance, after the product molds had been completed and production had started—did the sales team offer feedback that something was not working as it should.

At the time of the interviews, Martela had no clear process for the Combo's commercialization. The company had developed sales procedures and training processes and had also begun renewing the product catalog and putting product decisions in place. At Martela, the product development process had been mapped out using only a few details. The

interviewees stated that the process included certain aspects of marketing and sales. However, the commercialization-related activities form a separate, larger process that perhaps should be mapped as well.

"If there would be a ready-made frame for how to do it (the commercialization of innovative products), then we would do it."

One of the issues creating difficulties between the NPD and commercialization interface had to do with the product's design freeze. For instance, quite often it turns out that some of the features must be removed during NPD because otherwise the cost structure and the final sales price would be too high. The informants saw this as a potential moment for disappointment; for example, the sales team might be disappointed if the project manager chose to remove certain features from an early prototype that had already presented to them for approval. They mentioned that an even worse case is when certain preliminary information is provided to customers highlighting particular new features that are never included in the final product.

> *"Previously, we always had trials, which were a risk, as the idea went all the way to the end of the product creation phase with the attitude that let's finish this good idea and let's see if it sells."*

Changes made during the development phase also mean that key sales arguments may have to be changed. Some changes may even create handicaps in terms of commercialization. For example, if the product's selling price needs to be raised to justify an increased cost structure, then the product will be harder to sell. However, if the price is kept close to the cost of the original product, then there are often pressures to give up new features, which can make the product less attractive than it was at the beginning of the NPD phase.

> *"The most difficult thing is to make the final product such that it will coincide with the original target."*

Finally, for this industry it was noted that innovative products that also sell well are the ultimate targets, precisely because they help the firm to stand out from competitors while offering the possibility of improved profit margins.

6.6 Case Study: Vaisala's WRF200

6.6.1 Background

Vaisala's history dates back to the 1930s when Professor Viljo Väisälä started experimenting with radiosondes in Finland, which eventually led to the founding of the firm in 1936. Today, Vaisala provides a variety of environmental and industrial measurement devices and solutions and has approximately 1,000 employees. Vaisala's net sales were 224.1 million EUR in 2007.

Weather radars in general are basic instruments for observing and measuring precipitation in the atmosphere, and they can collect data in real time, producing a massive amount of information. Weather radars are mostly used by national meteorological and hydrological institutes and can be used to serve various purposes on sea, land, and air. Aviation safety increases when radars are in place to detect gusts of wind next to runways and fast changes in the wind's direction. For instance, so-called microbursts, which create local sinking air columns, can be extremely dangerous for landing airplanes. Fortunately, though, new radar technology can now detect microbursts. New radar technology can also help optimize seaport stevedoring operations and create inland storm warning systems that include storm initiation, evolution, and decay phases. Weather radar observations are also used to create warnings for even more severe climatic phenomena, such as tornadoes and hurricanes. In addition, the amount and intensity of rain can be used as a basis for making flood estimates and providing agriculture alerts. Radar data can also be integrated with other climatic measurements, resulting in integrated weather observation systems. In general, the emphasis has shifted from qualitative rainfall estimation to quantitative measurement.

6.6.2 The case product

The case product is Vaisala's Weather Radar WRM200 (WRM200). A WRM100 model is also available, but the more advanced WRM200 is used as the underlying product in this study. WRM200 is a dual-polarized, C-Band Doppler radar system used for various meteorological and climatological applications. The product itself was not new to the world, as weather radars have previously existed. However, WRM200 introduced incremental improvements that also received market acceptance.

WRM200 can be used to detect and issue warnings about high winds, storms, tornadoes, and intense precipitation. The product also has various

civil defense applications, such as providing warnings about the propagation of smoke, pollutants, dangerous emissions, and sandstorms. These kinds of applications were already available with existing weather radars, as mentioned above, but the WRM200 offers additional features based on new technology. Traditional radars transmit horizontal, polarized radio waves. One of the most important technical novelties behind WRM200 is its ability to use dual-polarization modes. The radar simultaneously transmits linear horizontal and vertical waves and receives both polarizations, or it operates in a linear depolarization mode, which means that only horizontal polarization is used for transmissions but that both polarizations are used for reception. This feature allows for better forecasts in terms of hydrometer identification and improved rainfall estimates. The dual-polarization mode also allows WRM200 to perform real-time attenuation corrections, which makes C-Band radar performance equal to that of S-Band radar performance.

The use of dual polarization has made it possible to distinguish between different forms of precipitation. Dual-polarization technology, combined with new software called HydroClass™, a real-time particle identification system, enables WRM200 to classify targets into meaningful categories, such as water, hail, snow, and non-meteorological targets (e.g., birds, sea clutters, etc.). This feature is valued by customers who measure precipitation. For instance, it is now possible to differentiate between heavy and moderate rain. As a matter of fact, dual-polarization technology has been used for research purposes before, but this is the first time that it has been introduced with a radar system that is commercially available.

The mechanical structure of WRM200 is also different from that of existing radars. It has a specially designed pedestal, which is much lighter weight than traditional antenna structures. The decreased weight improves its acceleration and retardation rates. It is also possible to perform faster measurement sweeps due to the low inertia and better agility of the pedestal.

Vaisala provided the customer with an additional benefit by equipping the radar with a remote monitoring system. This is a natural add-on to traditional remote diagnostics that allows its controllers to not only investigate the radar's operation data over time, but also to be instantly notified if the radar system is malfunctioning in some way. Naturally, Vaisala is coming up with new features all the time, such as faster sampling techniques and attenuation corrections.

6.6.3 Commercialization activities

Incumbent firms have various options when planning to add a new product to their portfolio. Instead of starting their internal product development from scratch, a firm can utilize existing firms that have already developed interesting technology, products, or components. For instance, a firm can decide to license the underlying technology from other firms. In addition, a firm with enough financial leverage can buy the complete product line or get access to the desired technology or product through a merger or acquisition. Vaisala also considered such a possibility before they started their radar project.

> *"In 2002, we made the decision to develop our radar. Before that, we investigated various potential acquisition sources around the globe, but we did not find anything suitable ... there was not available anything (that) we wanted, so we decided to make it ourselves."*

Although Vaisala decided not to try acquiring any existing radar manufacturer, they still wanted to boost their product development by sourcing essential technology from outside the firm. To support the radar project, Vaisala acquired a company called Sigmet at the beginning of 2006. Vaisala had actually spoken with Sigmet many times during the previous years and had clearly expressed their willingness to acquire Sigmet if it ever were to go on sale. The acquisition of Sigmet boosted Vaisala's position in the radar market significantly because 400 radar installations worldwide were already using Sigmet's products. Sigmet also had 25 years of experience in the signal-processing industry.

The commercial WRM200 product was preceded by a pilot radar system that was fully operational and actually had much more capacity and performance capability than the final product. This was because the technical components used in this pilot product were quite expensive; a radar system with that level of performance capacity would have been exceedingly expensive to build, and thus nearly impossible to sell commercially. However, this type of high-end pilot radar did help to perform various tests, which, for their part, helped to define the final features that would be implemented within the commercial product. The pilot project was conducted in co-operation with the Finnish Meteorological Institute and Helsinki University, and they had a prototype of the Vaisala Weather Radar for research and testing purposes as early as December 2004. Vaisala and its partners used the pilot radar for testing, validation, and product development purposes as well as for conducting basic research on signal and data processing techniques. According to Vaisala's homepage,

"The new weather radar family is the result of a rigorous €22M research, development and test program. Developed by Vaisala engineers in collaboration with the University of Helsinki, Colorado State University and Sigmet, our own system in Helsinki allows us to check and re-recheck all subsystems for performance, reliability and ease of maintenance."[112]

Vaisala admits that the global market for WRM200 is limited in size. Their prediction was that the annual market for weather radars would be approximately 100 million EUR globally. The WRM200 is a new addition to the company's line of products; however, the WRM200 is sold through the same sales channels as other Vaisala products, and in that sense, the WRM200 can be seen as a product that complements the other existing measurement instruments sold by Vaisala.

Vaisala did not use a vast marketing budget for the WRM200 because the number of potential customers is rather small and the most important contacts were already well known. The main marketing tasks for the WRM200 involved participating in major professional radar conferences. According to Vaisala, there are three such global conferences per year. The official concept launch for the WRM200 happened at the end of 2007 in Australia. Vaisala was the premier sponsor for the American Meteorological Society's 33rd International Conference on Radar Meteorology held in Cairns, and approximately 250 of the 400 major customers attended the conference. The launch of the product concept was mainly organized around a dinner event sponsored by Vaisala, where Vaisala had the opportunity to present the keynote speech. In addition, the firm issued press releases and used targeted direct marketing campaigns to reach potential customers. Vaisala also used product brochures to communicate the features of the new WRM200. The firm used a radar image of a tornado as a symbol in brochures and presentations because Sigmet had traditionally used that image too. In general, the marketing material aimed to use more harmonized color symbols and well-aligned pictures to represent the Vaisala brand. As a related side note; sometimes there were extra delays in creating the marketing material because people had different opinions, as with the brochures, for instance.

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[112] http://www.vaisala.com/weather/products/weatherradar/casehelsinki. Accessed 19.8.2008

Traditionally, Vaisala's products have been positioned in the premium product category. The WRM200 is entering into the existing market, so the pricing policy will follow the market price. However, the purchasing price is not all that matters because customers are looking at life-cycle costs as well. Radars have to be in operation for almost all year with as little down time as possible. The problem has previously been that radar components had poor delivery times. To remove this obstacle and provide better customer service, Vaisala provides maintenance and support services. When customers purchase this option, they can leave the spare part inventory to Vaisala with a guarantee of immediate availability when needed. This kind of extended product offering is not a unique idea; however, it is an important asset for sales negotiations because radar owners seek as much uptime as possible for their radar.

6.6.4 Convincing customers

Products are constantly under observation; for instance, there are independent organizations, such as the World Meteorological Organization, that conduct benchmark tests. In addition, conference presentations are always under expert community peer review, so there is no room for fooling customers with false promises. This results in a requirement to prove that proposed solutions actually do work. In addition, satisfied customer references are important because they help the new product overcome the challenge of proving its trustworthiness.

> *"A key user's role is extremely important. Well, if you find such a key user who is generally acknowledged as an opinion leader in the world, and if you can make him speak on your behalf – this is actually more important marketing than any you could ever perform on your own."*

As a newcomer, Vaisala was clearly a challenger to incumbent radar providers. However, Vaisala has being operating in the weather measurement business for a very long time and the Vaisala brand is well-known in the meteorological field. Leveraging of this brand recognition clearly helped when Vaisala entered the radar market. For instance, tendering processes usually require providers to list their existing references. This kind of situation naturally creates challenges for a new entrant. Sigmet, on the other hand, had been a well-known name among radar professionals, and the acquisition of Sigmet created goodwill for Vaisala.

> *"The Sigmet acquisition made this task much easier. Without Sigmet, we would have had much harder times."*

When Vaisala was planning to enter into the weather radar business and performing market analysis, it also selected the most representative customers and presented its plans and the initial specifications for the new radar initiative to those customers. This group gathered together for the first time in 2002 and provided feedback on the ideas proposed by Vaisala. The feedback was positive and contributed significant input for the final product. However, the first pilot customers were no longer part of the development process due to the fact that the radar specifications were already frozen at that point and defined in a tender, so the actual development work proceeded accordingly.

> *"The image of hidden needs can be crafted based on discussions (with customers). You should try to dig into those needs and then fill that need. A customer does not express it orally, nor in a written format, you just need to get it based on the context, but that just is not too easy."*

6.6.5 Organizational topics

The commercialization tasks were carried out by a small team consisting mainly of four people. The team had plenty of freedom to proceed according to their best insights. The technical development project was manned by various engineers who were otherwise involved in other projects within the organization. The team viewed the radar project as interesting, and engineers seemingly wanted to work on that particular project. This being the case, the project received enough engineering resources. This flexibility to acquire the best resources in a matrix organization was one important reason for its success from a development point of view.

> *"We have gotten almost all of the resources that we have requested. It is a very big thing in here. Well, usually these R&D projects 'stretch and pop' because of resource shortages, it's just that folks make too many things at one time and cannot concentrate on one."*

The actual team that was in charge of commercialization consisted of only a program manager, a product manager, and a marketing manager, who was allocating half of his time to this project.

The role of product manager is important because she or he actively participates in sales and marketing activities. The project manager is in charge of technical development. The product unit actually owns the product within an organization, and they possess a great deal of independent authority over it. However, the annual strategy review meeting is the highest decision-making body related to major guidelines on the product roadmap, i.e. the members decide whether significant extra

investments will be made or whether termination of the product is inevitable, and everything in between.

6.6.6 Product Launch

Vaisala had created a separate product launch checklist. This checklist covered aspects that the team saw as fitting into the category of commercialization activities. The WRM200 did not have any dedicated sales personnel apart from the product manager. In practice, this means that the sales personnel of Vaisala sell many products simultaneously and that there is some level of competition between different products in Vaisala's product portfolio. Despite this, it seems that drawing customers' attention to the WRM200 will not be an issue. The major issue is that the weather radar system is a very complex product, which requires that its users take the time to learn about its details. For instance, the amount of documentation that accompanies the WRM200 is large. This means that training the sales force is an important task.

> *"It is for us, this internal launch, particularly, i.e. that salespeople are informed, that is an extremely important thing. Often, it happens that we speak to our customers ... and customers receive more information than sales, so there really is a need to make sure that sales keep up with the ride and therefore great investments in training are required in general."*

It is worth noting that one training session is not enough; rather, repetition is required. If a salesperson does not "play with the radar," he or she is likely to forget about its capabilities.

The first prototype was installed in 2004 in Helsinki and used by the Finnish Meteorological Institute and Helsinki University together with Vaisala's own development team; however, the official product launch did not happen until 2007. According to normal Vaisala guidelines, a product should be kept in the shadows before the actual launch day; however, the radar business by its very nature differs from the sale of small instruments and requires a project type of sale. Project sales involving governmental customers often proceed slowly; therefore, Vaisala considered the WRM200 as an exception, and the product was revealed to some potential customers in controlled ways. In addition, it also revealed the WRM200 to the public gradually.

The interviewees also mentioned that Vaisala has strategic partners who often hear news about competitors' new products before the information is publicly available. Taking the small market size into account, it was assumed that information about Vaisala's new radar would also be leaked to competitors in a similar manner. Naturally, many new product features will

be added in the course of time and the idea is to introduce them as surprises to the market.

There is one essential factor that significantly influences the weather radar business in general. It is the fact that the majority of radar customers are government-funded meteorological institutions. The business-to-government (B-2-G) model for marketing a product seemingly constitutes a business model of its own when compared with business-to-consumer or business-to-business models. In this study, Vaisala is still labeled under the B2B category, despite some peculiarities involved with B2G business. For instance, the firm's governmental customers are represented by civil servants as opposed to the professional buyers who represent other industrial firms. In addition, sales cycles can be very lengthy because governmental institutions are always under annual budget constraints. The formal and open government bidding process creates requirements for Vaisala's sales and marketing people when commercializing new products.

As mentioned previously, the cycles for radar sales are long because customers' investment processes can take a long time. Therefore, it is expected that some time may pass before Vaisala's radar business becomes profitable. In general, Vaisala's management has been quite patient when it comes to profitability requirements.

6.6.7 Diffusion factors

The WRM200 seemingly provides a relative advantage, as discussed in the chapter on product benefits. Compatibility with values and prior experience is also easy to pinpoint with this product. Vaisala could have implemented a much more radical mechanical outlook for the radar, but they realized that in such a case, it would have taken much longer to receive market acceptance. Complexity in use or understanding is the most critical element when Roger's diffusion elements are considered for the WRM200. The WRM200 includes a wide array of signal processing algorithms, RF components, and software that are complicated and require a certain level of expertise, which makes the final product a really complex entity. A customer needs to be trained before she or he can use the product well; therefore, customer training and customer support are important aspects for helping customers understand the product.

Plenty of construction and support infrastructure must be built before a radar system can enter into full-operation mode. A radar system is often located in a remote place, and all the support infrastructure (i.e. roads,

buildings, electricity, etc.) has to be in place before a radar system can be installed. This makes trialability a problem. The unit cost is around 1 million EUR, and, when taking into account the set-up requirements, it is not possible to send a radar system to a customer's location for an evaluation period, which again highlights the importance of reference customers. To solve this issue, Vaisala has planned to implement a separate test radar system near its headquarters. It might then use the test radar system for customer trials and to support internal development purposes. To help customers overcome their workability concerns, the sales contract includes a chapter that lets a customer terminate the deal if serious flaws are detected. This is, however, mainly a warranty type of arrangement instead of a trial-related topic.

The observability of the WRM200 was also moderate. The user interface of the WRM200 produces color pictures that can be used to communicate the output of the radar and observe the radar's operation. Of course, a customer still has to believe that these measured results are valid and correct.

6.6.8 Within-case analysis

The market entry phase was a work in progress at the time that this study was conducted. Therefore, it is not possible to say how successful the WRM200 will eventually be, but the product seems to be in a good starting position with a few orders already in place. Securing the first customers was not an easy task. The first customers for a new product always take the risk that a product might not work as it should. The truth is that there are quite often "toothaches" with any new product. The first customers realize that they most probably have to work with the vendor to solve a small amount of problems. Therefore, it took almost two years to find the first pilot customer for the WRM200. As a matter of fact, some potential pilot customers refused to participate within the first minute of discussions. The pilot customers ultimately emerged through an open bidding process. Vaisala was determined to have such customers and was willing to offer certain extra services as an incentive.

Vaisala has had a culture that is very strongly oriented towards the creation of technology and products, but it is likely to shift towards a more customer-oriented approach in the future. In addition, Vaisala aims to shorten the lead time required to progress "from research to products." However, with complicated products such as radar systems, it is always time-consuming to turn prototypes into commercial products.

"Well, it always comes to that, that there is a very long process there, so we can prove that everything works …"

The term "commercialization" was not used much as a part of the company's terminology. In addition, the product launch plan was more like a checklist of activities that needed to be done before taking the product to market. Vaisala has aligned its product development process well with its business plan. In this respect, commercialization can be seen as the execution phase of the business plan. On the other hand, the firm mainly saw the launch phase as a tactical tool with no strategic dimension.

As noted before, Vaisala's commercialization-related aspects are a bit different than those of industrial firms in general due to the special B-2-G operation mode. The market dynamics are slow and customers' decision-making processes take time. There are also some industry-specific obstacles, such as export regulations and frequency allocations, which vary from country to country. On the other hand, because the customer base is quite narrow, there is no need to come up with tremendous marketing efforts to reach them. In fact, in this case it seems likely that a modest marketing approach was more appropriate. According to Vaisala, extensive launch and marketing operations would have backfired because governmental institutions using taxpayer money would not have appreciated approaches that were too intrusive or obviously expensive.

"The thing is that customers do not like it if you overdose the launch … we cannot go and implement tremendous advertisement campaigns. It would convey the wrong message to the market."

Thus, a more target-specific marketing approach was considered appropriate. For instance, investing in customer references was seen as much more important. The biggest marketing efforts for Vaisala involve participating in conferences. The conferences gather together almost all of the customers and key decision makers under the same roof a few times a year – a luxury that is not often the case in every industry.

The product process at Vaisala consists of various milestones that accompany the stage-gate type of decision milestones. An annual business review meeting is part of the strategy process as well. The main purpose of this meeting is to evaluate the performance of business units, product lines, and even individual products. This board also has the formal authority to kill the product, if needed. Traditionally at Vaisala, a new product has been granted a relatively long life span for becoming profitable. Usually, it can take three to five years for a product to start bringing in a profit. There have even been cases where it has taken about ten years to reach this status, but

the aim is to shorten that amount of time. On the other hand, Vaisala has also had products that were not profitable for a long period of time before suddenly becoming successful after many years. There have also been products that were removed from the product portfolio quite quickly despite some objections that such products might have been on the edge of taking off. This kill vs. no-kill decision-making process is not the main focus of the study, but it is clearly a dilemma that managers often face when evaluating a company-wide product portfolio - especially when there is some level of overlap between existing and new products. The WRM200 did not raise the question of cannibalization because it was a completely new and complimentary product for the firm.

The decision to begin product development for a new product is always risky for a firm. One of the challenges that the interviewees mentioned has to do with coming up with sufficient specifications for product development. The objective of a comprehensive product pilot then is the removal of uncertainties and the ability to identify the features that customers want.

It is not only profitability that matters when new products are planned. A new product has to have synergies with other product lines in order for it to be accepted into Vaisala's product portfolio. The WRM200 offered a good fit with the firm's existing product portfolio and actually completed Vaisala's meteorological product offerings. On the other hand, there have been cases where a proposed product initiative had been technologically interesting, but based on market estimates, Vaisala determined that the market too small to justify making a business investment.

This case study clearly showed that reference customers and customer testimonials from industry experts are extremely important tools that help with commercialization activities in the business environment.

7 Cross-case Analysis

The case comparison in this chapter is based on the forms the informants filled in at the beginning of the interview. In other words, the researcher has made no attempt to provide interpretations for the tables. The form was filled in by the person who acted as a key contact or who otherwise seemingly had the key role with the case product in question.[113]

7.1 Overview of case firms

> *Success is the ability to go from one failure to another with no loss of enthusiasm.* - Sir Winston Churchill

Table 9 presents an overview of the main figures for the case firms. The size of the firms varied significantly. Since the interviews were conducted in 2007, the turnover is based on the year 2006. However, the other data is based on the situation in 2007. The figures are only meant to give an indication of the size of the firms. KONE is a large corporation, whereas Beneq and Exact Tools are small in size and the rest were medium-sized firms. All of the firms operate within the B2B sector and serve an established customer base (with Marioff being an exception). The size of the marketing budget in relation to the R&D budget indicates that technology development has a central role in all of the firms.

Table 9. Main figures of the case firms

Case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
Turnover in 2006	1,25	1,5	93	128	3601	220
# of employees	19	3	350	663	29321	1069
market budget % of turnover	3-4	2	1,5	-	-	1-2
ratio between R&D budget and marketing budget	2/1	5/1	2,5/1	-	-	5/1
Target market in general	B2B	B2B	B2B	B2B	B2B	B2B
Customer base	established	established	one-off	established	established	established

[113] The initial idea was to ask every informant to fill in the form. This might have created some problems, so I decided to only rely on one answer sheet per case firm. See section 8.3 for more discussion of this issue.

As Table 10 indicates, only Beneq and Vaisala described themselves as technology oriented firms. All of the case-study firms mentioned differentiation as their dominant business strategy. KONE mentioned adding cost leadership as an essential part of their business strategy. The industry dynamic was stable; only ET claimed to operate in a dynamic industry, whereas KONE described the field as semi-dynamic. Each firm claimed to have an established customer base, with Marioff being the only exception. Marioff stated that it engages in one-off type product deliveries. While the theory suggested that commercialization is the costliest phase, the case firms still admitted spending more money on R&D.

Table 10. Business orientation, business strategy and industry dynamics of the case firms

Case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
Business orientation	technology oriented	dual mode	market oriented	Market oriented	dual mode	technology oriented
Business strategy	differentiation	differentiation	differentiation	differentiation	cost leadership and differentiation	differentiation
Industry dynamics	stable	dynamic	stable	stable	semidynamic	stable

7.2 Product strategy and success factors

Whoever wants to reach a distant goal must take many small steps. - Helmut Schmidt

The overview for the case products is shown in Table 11. All of the case products were considered stand-alone, B2B products (except HI-FOG). Combo and WRF200 were considered incremental products from a technology point of view as well as from a market point of view. The actual product development time varies between being relatively short (HI-FOG) to being relatively long (WRF200 and MonoSpace). The product strategies of the case firms varied. According to the interviewees, the main driver for the products developed by KONE, Vaisala, and Beneq was technology push.

Table 11. Case product overview comparison

case firm	Beneq	Pres. Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
Product description	stand-alone	stand-alone	part of a large system	stand-alone	stand-alone	stand-alone
product driver	technology push	market pull	market pull	market pull	technology push	technology push
Radicality from technology point of view	radical	radical	radical	incremental	radical	incremental
Radicality from market point of view	radical	radical	radical	incremental	radical	incremental
target market for the product	B2B	B2B	B2B	B2B	B2B	B2B
First introduced by	2005	2002	1991	2004	1995	2007
Product development time	12 months	24-28 months	6 months	18 months	36-45 months	36 months

The market strategy for the products is seen in Table 12. Only Martela operates in a mass market, Marioff and Exact Tools operate in a niche market. The rest of the firms use selected customer segments for their

products. All of the products were considered from the perspective of being leader products.

Table 12. Market strategy for the product

Case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
niche		x	x			
selected segment	x				x	x
mass market				x		
Product position from market point of view (leader/follower)	leader	leader	leader	follower	leader	leader

The strategic business goals for the product are listed in Table 13. The new product objectives were to increase market share (Marioff and Vaisala), to increase profit (KONE and Martela), and to help the firm penetrate new markets (Beneq, Marioff, and Vaisala). None of the firms mentioned that they intended the products to balance annual cycles, strengthen market share or involve excess production capacity. In ET's case, the company was created around the product.

Table 13. Strategic business goals for the products

case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
increase market share			x			x
use excess capacity /production capacity						
strenghten market share						
balance annual cycles						
penetrate new markets	x		x			x
increase profit				x	x	
other		foundation of the firm				

The success factors for the case products are listed in Table 14. When assessing the more radical products (nHALO, Exact cutting system, HI-FOG, and KONE), it became clear that one thing they had in common was that there were no competitors at the time the case product was first introduced on the market. It is perhaps correct to assume that those products were also new-to-the-world products.

Whether or not the price of the product was lower than that of competitors did not have a bearing on the success of the products. However, Martela and KONE reported that an excellent price / quality ratio is an important factor. Technical superiority was behind the success of nHALO, MonoSpace, and WRF200.

Table 14. Success factors for the case products

case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
There were not competitors	x	x	x		x	
technological superiority	x				x	x
Lower price than competitors						
excellent price / quality ratio				x	x	x
Other						

The interviewees were asked to provide a grade for the different phases of the innovation process.[114] The scale provided in Table 14 ranges from 1 to 5, with number 5 indicating the best possible outcome.

Table 15. Grading for innovation process phases

case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
front-end	3	4	-	4	5	4
R&D phase	4	4	4	4	5	4
commencialization phase	4	3	5	5	5	on-going
comments					sales targets were exceeded	

7.3 Commercialization-related activities

The best way to predict your future is to create it! - Abraham Lincoln

As discussed in the literature review, the applied business strategy and product strategy naturally create certain boundaries for new product initiatives and also for the chosen commercialization activities. This subchapter discusses the principle commercialization activities[115] within the context of case products. While some of the topics were seemingly important in light of the literature review, they did not play an important role in the cases. Therefore, there are no propositions associated with the topics presented in this subchapter, just a general discussion of the findings. It is also worth mentioning that an individual commercialization case might contain some rather case-specific issues. For example, ET and Martela highlighted the importance of industrial design for their products, whereas Beneq and Marioff did not. On the other hand, Marioff had to deposit collateral during the sales process, something that was not an issue with other products at all.

In short, there are always case-specific issues that are highly important for the commercialization of one particular product, but not present at all with some other products. This illustrates that various other topics can easily be "fitted" under the concept of commercialization.[116]

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[114] I was using the traditional, linear innovation process model as a guideline during the interviewees. I only started to question that model later on during the dissertation writing process.
[115] Please see chapter 4
[116] In other words, I am not claiming to provide *a comprehensive checklist* for commercialization.

Market entry strategy and the timing of the market entry differed between the case firms. KONE was in a hurry to launch MonoSpace because they expected competitors to launch some new products as well. Vaisala spent time investigating a potential acquisition option before they decided to create their own radar. Marioff clearly benefitted from good timing because the industry regulations were about to change at the time when HI-FOG was about to enter the market. Beneq and ET had no direct competitor for their products, so they could develop the products at their own pace without having to worry about the issue of market timing. Martela on the other hand had to carefully adjust the timing of Combo because it was about to replace an older product and they wanted to introduce it at a major trade show. Vacon also mentioned similar timing-related concerns. In Vacon's opinion, a completely new product can be pre-announced much earlier than product replacements, which need to hit the market soon after they are announced to keep customers satisfied. One of interviewees at Vacon also mentioned that the overall time to market can be shortened if the launch is postponed so that product development can be completed - if a product is launched before it is ready, then customers will begin to make suggestions about how to improve the product and this will delay the completion of the project.

Naming of the case products seemed to be quite straightforward. Marioff and Beneq both had different working names for their products during the development phase, but they decided to come up with a new name during the commercialization phase. KONE first had a different product name in the Netherlands, but decided to change it later on when entering a more global market. KONE, Martela, and ET used names that basically indicated the functionality of the product.[117] In any event, it seems plausible that the naming of products does not play as important a role in the B2B industry as it does in the consumer industry. A strong brand, however, is still important for industrial firms, too. The role of a brand in global marketing was highlighted in the Vacon interviews.

There were also differences in pricing strategy. All of the firms except ET used skimming pricing for their radical products. ET's strategy was to aim towards more market penetration with lower prices. Martela adjusted the

[117] The interview template missed the question, how and by whom were these names created? That info would have been of interest, but unfortunately the data is not available.

price of the COMBO so that it increased the market share, but it also added to the competitiveness of the product when compared with the product that preceded it. KONE opts for premium price compared to its conventional competitors, but it still enjoys strong demand for its products. Vaisala typically uses premium pricing, but in the case of the WRF200 they had to adjust the market price because of the nature of the radar market. Beneq mentioned that they could have asked an even higher price for its product because the customer estimated savings would have been significant. In any event, investment products typically have a long life span, so the sales price is only one factor that customers consider. Life-cycle costs and profit analysis determine the total cost of ownership for a customer. It is naturally an asset for the commercialization process if a new product can clearly provide savings or increased revenue for a customer. The idea of pricing products based on their customer value was highlighted by Vacon.

Management of sales was left out of this dissertation, but it is worth mentioning as a side comment that the intensity of sales for the case firms varies. Beneq, Marioff, and Martela reported highly intensive sales, whereas the rest reported that their sales are moderate. The case firms themselves mainly handle distribution. Only Vaisala and ET reported using outside expertise to help with distribution. Actually, in ET's case the OEM (original equipment manufacturer) constitute the largest part of the business. Vaisala used partners that have technical expertise and also knowledge about customers and authorities. ET used partners that have existing brand recognition and existing sales channels. In any event, ET, Marioff, and Beneq all emphasized that commercialization requires "footwork" to meet with customers personally.

Advertising and promoting in general seems not to play as significant a role in industrial B2B firms as is the case with consumer industries. Vaisala even reposted facing external pressure to keep advertising and promotional costs low. Similarly, ET mentioned that less is sometimes more, i.e. that not trying to fit all of the product details into marketing message can actually help the customer to better believe the message. Also, a firm does not need to advertise heavily to operate in an OEM role. Martela mentioned that they prefer directing their marketing efforts at the company brand rather than individual products. In addition, Martelas's marketing is mainly targeted at select customers instead of the masses. In Marioff's case, the Hi-Fog had to receive case-by-case approval from authorities and, due to this slow process, the firm did not see any point to engaging in major marketing activities at the same time. Table 15 illustrates the promotional methods

and channels, as well as the communications and marketing tools, used by case firms.

Table 16. Communication and marketing tools

Communication and marketing tools used						
case firm	Beneq	Exact Tools	Marioff	Martela	KONE	Vaisala
case product	nHALO	Exact cutting system	HI-FOG	Combo	MonoSpace	WRF200
sales calls	x		x	x		x
Trade shows and fairs	x			x	x	x
Customer promotional campaigns	x			x	x	x
personal selling	x	x	x	x	x	x
direct marketing	x			x		
Radio/TV adds						
Internet marketing	x					
Advertisements in professional magazines	x			x		x
Conference presentations	x		x			x
Public educational campaigns				x		
Previous references			x		x	
Others		contact's from customer side	demonstrations			

Every case firm reported using personal selling. On the other hand, the various firms do not use radio & TV adds at all. This clearly indicates the nature of the B2B industry and I assume the situation would have been quite the opposite with B2C firms regarding personal selling and advertising on TV and radio. Direct sales calls, tradeshows, and customer promotional campaigns are seemingly important to B2B firms. Marioff pointed out that it used demonstrations as a marketing tool. But Marioff also mentioned that contacting the decision makers can be difficult. When firms are just getting started, participating in trade shows and exhibitions can often represent a significant investment. Beneq used this method of sales to help spread the word about their product, whereas Marioff and ET do not. ET also mentioned the importance of contacts from the customer side. Only Beneq mentioned the importance of Internet marketing. It is worth mentioning that this is retrospective data and the Internet was not as important then as it is now in terms of commercializing products. It is quite likely that the results from the data would be quite different if it had been gathered using more contemporary product cases due to the increased role played by social media and other Internet channels.

Cannibalization effect between an existing and a new product can create some problems, as was briefly discussed in section 3.6.5. KONE's MonoSpace clearly showed that a new product can lead to the elimination of a range existing product families. Similarly, Martela's case revealed some internal issues, especially on the sales side of things, in a situation where the new product is about to replace an existing product. Managing the transition process and properly timing the termination of old products is an important part of commercialization in incumbent firms. Similarly, as new companies mature they will also face product cannibalization issues.

8 Propositions for Managing the Commercialization of New, Industrial B2B Products

This chapter continues the cross-case analysis with the aim of developing a working theory. This theory development is based on generalizations from product commercialization practices, which are in turn based on the case studies and the literature review. In other words, the insights derived from the cases studies are now being combined with the previous knowledge. I then present nine propositions and a conceptual framework for concurrent commercialization. In each of the propositions, I use the term firm to refer to an industrial B2B firm.

While the propositions can be read as managerial suggestions, they are not intended to represent any normative guidelines as such. These propositions represent the researcher's best effort, based on the literature and case studies, to summarize what has been learned during the research process. In other words, while the propositions are formulated in a relevant and practical form, they should be considered more as suggestions (think about this) than normative statements (do this if you want success).

8.1 Commercialization process

> *Organizations don't stumble upon innovation. They don't inherit it, and they can neither buy nor assume it.* – Dobni, 2006

NPD seems to be a quite mature concept and many of the case firms have mapped NPD tasks and processes. With commercialization, the situation was quite different. While commercialization-related tools such as a launch plan checklist (Vaisala) and a product barometer (Beneq) were often in place, neither maps nor descriptions of the commercialization process or other documentation concerning commercialization existed in the case firms. The situation was the same with smaller and larger firms. The concept of commercialization was also considered fuzzy and interpreted

differently among the interviewees. This finding is in line with Prebble et al. (2008), who note that there is little understanding of the actual decision making that goes on when designing a commercialization process.

While it is not possible to generalize, it seems quite likely that many industrial B2B firms lack commercialization processes in general. However, all of the firms under study view the commercialization of new products as an important topic. This leads to the fist proposition:

Proposition 1. *Mapping of commercialization processes benefit B2B firms to manage their commercialization activities better.*

The actual outcome of commercialization activities will typically result in several deliverables. Appendix G provides a tentative list of items that are often required for the successful commercialization of a B2B product. Some of the items listed in Appendix G are not always needed and most likely there are some items (required for some specific business) that are missing. The purpose of the list is to show that there is still plenty of work outside NPD that needs to be done before a firm has created the "the whole product."

8.2 Convincing customers

> *Build a better mousetrap and the world will bring a path to your door.* - Ralph Waldo Emerson.

Soni and Cohen (2004) state that, "companies who are successful at building product that the market demand solicit customer input at every stage in the product's development" (p.265). The limited amount of cases I studied for this dissertation cannot be used to confirm that the opposite is true. However, it was a bit surprising to find that the case firms did not interact more with their customers during the product development and commercialization phases. This also related to the orientation theme, which was discussed in detail in section 3.2.4.

Firms pay attention to and also adapt themselves to the types of issues that concern them. While they can orient themselves in different directions, they cannot take everything into account. Therefore, such an orientation includes selection, choice, and trade-offs. If firms rely heavily upon their internal expertise and technical know-how, they naturally and most likely are less customer-oriented. As the studied cases revealed, the customers were sometimes used as a source for input at the beginning of product

development, but they did not take an active part in the product's development after that. According to Deming (1988),

> *A consumer can seldom say today what new product or new service would be desirable and useful to him three years from now, or a decade from now. New product and new type of service are generated, not by asking the consumer, but by knowledge, imagination, innovation, risk, trial and error on the part of the producer, backed by enough capital to develop the product or service and to stay in business during the lean months of introduction.* (p. 182)

While the above statement was targeted at the consumer business, the idea can be applied to the B2B industry as well. Naturally, this is not to say that B2B firms should simply forget customer interaction during the new product development and commercialization processes. Despite the clear statement above, which dispraises customers as a source of ideas,[118] Deming (1994) actually seemingly contradicts himself later on when he claims that,

> *an educated customer may have a firm idea about his needs. What he would wish to purchase. He may be able to specify these needs so that a supplier may understand them" (p. 7).*

For instance, the case study on Marioff demonstrates that the customer can be an originator and an ideator in an innovation process. In other words, a customer may very well know what he or she wants, without knowing exactly how to achieve or implement those desires. While customer understanding is important, it is even more important to be able to pinpoint and solve the problems a customer is having. The dilemma here is that if a customer cannot express her or his needs and wants, then it is much more difficult for a developer to come up with a product that meets those needs and desires.

In any event, various articles[119] seem to promote the holistic role of customers in the innovation process. However, the insight derived from the case studies suggests a somewhat controversial approach to involving customers in the process. In Vaisala's case, the customers gathered to provide ideas and suggestions, but did not take part in the development phase. It seems that while customers can provide valuable insight during the ideation phase, their active involvement in commercialization and

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[118] While there is no real evidence that Henry Ford actually said this, the following quote is often attributed to him: "If I had asked people what they wanted, they would have said faster horses."

[119] This is especially the case with customer/market orientation literature, but also with lead-user literature (e.g. von Hippel, 1986)

development might not be necessary for a successful industrial B2B product.[120]

In any event, being able to convince customers that a new solution is possible seems to be an important issue for firms, as discussed in section 5.10. This is especially challenging for a young and small firm, which not only has to convince a customer of the relevance of a proposed solution, but also of the trustworthiness of the firm itself. That was the dilemma Beneq had to deal with. And often, it is not only the buyer that needs to be convinced. According to ET, the actual end-users of a product need to be convinced that the product in question will provide them with real benefits in their daily working lives.

Leveraging an existing brand can be helpful when a new entrant launches a product. For instance, Sigmet had a very good reputation and helped Vaisala become a respected name among radar customers. Likewise, KONE has been in business for a long time and customers recognize it as a trusted brand name. Unfortunately, new firms have more difficulties in this respect. Beneq mentioned that its first meetings before launching a new product were to convince a customer about the supplier in general. To overcome initial resistance on the part of customers, many of the case-study firms conducted special pilot programs or beta tests in mutual collaboration with trusted partners. They used these testing periods to validate the product's capability to operate within the field. This was the situation with every case product except for Martela´s Combo. ET needed to provide hands-on cutting demos to prove that its product could perform in real-life situations. Even though Vaisala is a well-known brand in the weather measurement business, the firm had to work hard before customer accepted its new radar system. For instance, it used the availability of spare parts as a guarantee to convince customers of the advantages of the new radar system. Beneq's customers were conservative and wanted guarantees that the technology would really work, which Beneq addressed via various test samples. KONE also had to overcome the initial fear of its first customers, who would not have been able to return to a conventional solution in the event that MonoSpace would not have worked as promised. In contrast, Marioff's customers immediately saw the superiority of the product and so did not need to be convinced about why they should buy it. In addition, both KONE

[120] I was first going to mention this as one of my propositions, but I am not sure if there is enough data to support such a contoversial proposition after all.

and Marioff faced additional problems because their solution did not comply with existing industry standards and regulations. Therefore, they devoted plenty of effort to convincing the authorities to grant approval for MonoSpace and HI-FOG. In Marioff's case, it was not enough to just convince the authorities; the firm needed to engage in active lobbying, too.

Naturally, the level of willingness to work as a pilot customer depends on the industry and the role of the product. In a case in which the firm in question intends the product to replace some critical component in a customer's production line, then it may be difficult to find a pilot customer because customers may not want to a take risk by using such a product. As became evident in Vaisala's case, finding a pilot customer is not always a straightforward process. On the other hand, firms are constantly seeking competitive advantage over their competitors. If a new product is relatively easy to try, does not present any risk to a customer's core business processes, and can yield significant cost savings or other benefits, then it is much easier to find a pilot customer. For instance, it was a "no brainer" for plumbing firms to try Exact Tool's products for free. It is also typical that voluntary pilot customers receive an incentive as compensation. MonoSpace customers received some discounts on the final purchase price as well as extra support.

Naturally, there should be a pilot agreement in place. It should describe, for instance, the rights being granted to the customer, what the product will do for the customer, the level of support, the amount of time the pilot project will last, and confidentially and termination provisions (Soni & Cohen, 2004). The amount of publicity given to a pilot project can vary. In MonoSpace's case, confidentiality was taken seriously and pilot customers agreed not to reveal any information. Hi-Fog on the other hand did not hide the test burns and even invited external parties quite openly to the test burns.

It is important to be in touch with the pilot customer during the test period. The customer's questions, concerns, and suggestions need to be resolved and communicated back to the customer. As Soni and Cohen (2004) put it: "There is no surer way of losing a good beta site than to fail to respond to the customer's input" (p. 266). When the business relationship is new, it is especially important to avoid problems, as was pointed out in the case of Marioff.

Piloting can be seen at different levels. Technical piloting, or prototyping, is used to evaluate whether an idea will work in reality. According to Pfeffer

(2007), "IDEO's[121] idea is that failing early and failing often is better than failing once, failing at the end, and failing big. The principle is simple – learn and fail on a small scale" (p. 37). The same philosophy was explicitly mentioned in KONE's case. The creation process for Marioff's Hi-Fog also followed this approach when they conducted several burning tests at the prototyping phase.

Pilots, test runs, and demonstrations[122] are important tools to convince customers to purchase a particular product. In addition, the initial customer references are very important assets that can be used to convince the rest of the potential customer base of the advantages of the proposed solution. While pilots are often treated as technical proof that the concept will work, they do have an important meaning for the commercialization process, too. For instance, a functional prototype that can be used by key customers or lead users helps to collect not only technical development ideas but also ideas that can be used in marketing communications. Pilots can also work towards educating the internal workforce, as is the case with Vacon. Pilots can used to provide insights on the final market pricing and, thus, a profitability analysis should be iterated during the piloting. For instance, ET received data about the amount of money their customers were willing to invest in a new product. Similarly, KONE reported that pilots help the firm obtain data on pricing level adjustments that might be needed and also on customer acceptance of and competitor reactions to the product.

Of course, the final product may not incorporate all of the features of a pilot product. For instance, Vaisala's pilot radar system was equipped with components that might well have been too expensive if implemented in final product. Pilots can test the evident trade-offs between features and function vs. the benefits they bring in comparison with the actual price the majority of customers are willing to pay for the product. In any event, convincing customers and authorities about the need for new solutions can consumer both time and resources.

Proposition 2a. *Pilot projects and first field trials play an important role in commercialization, especially when a firm wants to commercialize a complex and technology intensive product.*

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[121] IDEO is one of the leading design firms in the USA.
[122] These are labelled under "pilots" in the next proposition.

As the diffusion of innovation theory (Rogers 2003) indicates, there are only a limited number of innovators and early adaptors. Therefore, a firm is better-off in finding those innovative customers as early as possible. In addition, external opinion leaders play a crucial role in convincing potential customers. It is important to use testimonials and reports from industry experts to pave the way for a new product. This can be seen as one of the most important commercialization-related tasks. The customers' role in B2B is mainly highlighted in pilot-customer cases and via reference customers. For instance, Vaisala pointed out the importance of key users, who are generally acknowledged to be opinion leaders. Vacon pointed out that it is important to find a trusted partner in pilot projects. Beneq wanted its first customers to be industry leaders because this would help convince the entire industry about the feasibility of its product. The fact that a major cruise line chose to voluntarily promote Hi-Fog in its educational material clearly shows the importance and value of reference customers. Proposition 2b takes the idea of Proposition 2a a bit further:

Proposition 2b. *Positive customer references and testimonials from industry experts recommending a particular product play an important role in the commercialization of new, industrial B2B products.*

8.3 Organizational aspects

> *There are substantial differences between an organization that conceives and designs an innovative product and one that makes it and takes it to market.* – Grant, 2002

The case studies revealed that the number of individuals fully dedicated to commercialization-related activities is typically quite small. Of course, Beneq, Exact Tools, and Marioff were in a position where the number of employees in the whole firm was small. In these firms, commercialization more or less affected everyone. On the other hand, despite the fact that Vaisala, Martela, and KONE were established firms and employed hundreds of people, the number of people working in commercialization-related activities was quite small. In that sense, could it be so that a small team can make things happen more smoothly? Also, the interviews at Vacon resulted in the idea that smaller teams are more efficient because less energy is wasted on managing the information flows.

Proposition 3a. *There is no correlation between the size of the team working on commercialization and the success of the commercialization process.*

One thing that was common throughout the cases was the role of a project or product manager. The firms in question saw this job as quite important not only for ensuring the technical functioning of a product, but also from the commercialization point of view. The importance of the PM's role was also pointed out in the literature. Martela and Vaisala seemingly emphasized the importance of having a dedicated pair of managers, i.e. having both project and product[123] managers in place. Beneq highlighted the product manager as a central person in the process and KONE clearly pointed out the key role of the project manager and the idea of this individual assuming overall responsibility for the product from the ideation phase to the launch phase. Martela also mentioned the PM's important role as the intermediary between product development and the sales team. The important role of a passionate PM was also mentioned by Vacon. Exact Tools and Marioff were perhaps more driven by the founder of the firm, where the founder and the inventor of the product took the role of a strong PM.

Proposition 3b. *Successful commercialization requires a strong and competent product/project manager.*

8.4 Internal and external product launch

Products are planned and designed to serve markets. - Corey, 1975

As discussed in section 3.3.3.1, the extant literature often divides the launch process into a strategic part and a tactical part. I consider launch differently and choose to divide it into an internal part and an external part.

One of the interviewees pointed out that, actually, there should not be such a thing as an internal launch. The logic behind this argument is simple. If all the key personnel are already involved in the product-creation process, and if those people convey the information to their colleagues, then everyone should be on the same page in terms of the new product. This could work in an ideal world, but unfortunately in reality this just may not happen. Information flows in any large firm are typically problematic. The nature of NPD projects varies, too. Sometimes there are secret projects that just cannot be revealed too widely at too early a stage. Skunkworks is a

[123] The title differs somewhat between the different firms: Beneq used the title marketing manager, whereas Vacon used the title product marketing director.

nickname for those projects that are usually high-priority projects but which are hidden from the main organization and sometimes even from the top management. Examples include products such as the P-80 Shooting Star by Lockheed and the Apple Macintosh (Rogers, 2003; Smith, 2006).

The management of internal information flows and knowledge management in general are much easier tasks to organize in a small start-up firm than in a large corporation with several divisions around the globe. Larger firms view internal training and preparations as very important. A small firm may not need specific internal launch practices because the information is easy to spread. That was the situation with ET, Beneq, and Marioff at the time when their case products were commercialized. Larger, more established firms understood the importance of an internal launch and assigned it a major role.

In Martela's case, the existing product was selling well and the sales team did not have a demand or a need for a new product. It used an internal product launch to disseminate the new product to the company's sales team and this played an important role in the product's eventual success. Vaisala's case revealed that with a complex product, there is a need to repeat the sales training and let the sales team "play with the product." KONE was the largest of the case-study firms and the importance of internal launch practices was the most visible with its product, MonoSpace. There was internal resistance to the new technology, which only faded after obvious market acceptance. KONE also invested in internal training and created marketing material to generate enthusiasm for the new product. The internal teaser campaign was a clever way to raise curiosity among employees in advance. Vacon also mentioned the importance of creating a certain amount of "hype" around a new product. One additional launch-related piece of advice was provided by one of the Martela interviewees, who stated that it is not wise to launch too many products simultaneously. KONE also mentioned the importance of the internal synchronization of operations when the launch date is approaching.

Proposition 4a. *Implementing an internal product launch is an important prerequisite for market success in large firms.*

Based on the case studies, it seems that sometimes new industrial B2B products more or less drift onto the market. That is especially the situation with those products introduced by start-up firms. This drifting is very much related to the theory of "muddling through" (Lindblom, 1959; Rehn & Lindahl, 2011), which in essence means that things happen more in an

iterative way than in a linear way. As an example, it is difficult to distinguish between a special product launch event for nHALO, HI-FOG, or the Exact Cutting System.

Established firms naturally have a more or less planned approach with their external product launch procedures. In addition, the case firms followed different paths regarding the secrecy of a product. For instance, Beneq, Marioff and ET revealed the product to the market before the official launch date and Vaisala also revealed its new radar system selectively and gradually to the outsiders.

The literature review revealed that timing and properly coordinating the activities related to an external product launch play an important role in the eventual success of a product. That seemed to be a common opinion with the case-study firms, too. As was mentioned by Beneq and Marioff, it may take a long time to convince the first customers or authorities of the merits of a particular product. If a firm chooses to only launch its product when it is ready to do so, then it may encounter a long slack period before any revenue accumulates.

Lambert and Slater (1999) provide an example from the airline industry in which Southwest Air's modest expansion outperformed People Express's aggressive product introduction strategy. This illustrates that speeding a product to market is not always the best option. Similarly, Beneq's decision to hunt for big names as the first customer references for its product was perhaps a bit slower of a process, but it yielded better results than rushing to convince smaller customers with less industrial power and influence on the market. In that sense, it is not useful to speed up product development if the outcome is a product that customers do not want. For instance, Lempres (2003) argues that while firms may have fine-tuned their processes as effectively as a fast production line, they also may have become so rigid that they cannot adapt to market changes. The solution is to foster flexibility and to try to keep the process dynamic and information-based (Lempres 2003). Vacon also mentioned the importance of flexibility; interviewees stated that it is better to postpone a launch if the product is not ready. The KONE case also illustrated how a firm can achieve success by rolling out a new product in coordinated manner rather than aiming for a "big-bang" type global launch.

Cooper and Kleinschmidt (1990) suggest that the amount of money spent on commercialization is one of the key antecedents behind its success. The cases studied here show a somewhat more reserved picture. Firms used

seminars and exhibitions to officially launch a product. In addition, one-to-one meetings with customers seem to be very important because they allow the case firms to introduce their products to customers personally. In any event, somewhat counterintuitively with respect to the consumer industry, spending a massive amount of money on the product launch and marketing would actually have hindered sales in Vaisala's case. Similarly, even the biggest of the case firms (KONE) did not boost the launch of its product with a massive campaign. Thus, in contrast to previous theory, I suggest that:

Proposition 4b. *Imposing an expensive external product launch is not a necessary prerequisite for the success of a product within the context of new, industrial B2B products.*

8.5 Diffusion factors and their relationship to commercialization

> *It was not enough to produce satisfactory soap, it was also necessary to induce people to wash.* – Schumpeter, 1939

Diffusion studies are typically conducted retrospectively. Therefore, the features, function, and benefits of a new product are already visible to everyone. Thus the interviewees were also able to provide arguments related to Roger's five criteria quite easily.

All of the products provided clear additional benefits over the existing products[124] or the existing way of doing a particular job. In that sense, the relative advantage of a product was not an issue.

Several of the firms mentioned encountering problems in terms of the issue of compatibility. The challenge of making the product compatible with values and experience created some problems for ET and HI-FOG. ET experienced some resistance from the customers who were reluctant to change their working methods. Similarly, the cultural backgrounds of the customers created some issues and customers in certain countries were more eager to try out a new product than customers in other countries. The challenge of making the product compatible with values and experience created problems for HI-FOG as well because the water was applied in a

[124] Combo was an exeption because it provided only minor additional advantages over the existing product.

totally different manner than it had been with traditional sprinklers. However, some of the products that were radical[125] in a nature, e.g. nHALO and MonoSpace, not encounter problems in that respect.

Goldenberg et al. (2001) argue that a successful innovation must at the same time be both new and easy to comprehend. The majority of the products under study were easy to comprehend. Only Vaisala and ET addressed the issue of what happens when a product is complex and difficult to understand when in use. Vaisala reported that its radar system included plenty of complex components and software, which makes the final product a really complex entity. Even if the basic idea of ET's product was simple, the way to approach the cutting process still created problems for some users because the tool was a completely new product for them.

Beneq and Vaisala primarily expressed concern with the issue of trialability. Beneq had to convince a customer that nHALO actually works in practice and in the real industrial production environment, even if there was no way to undertake plug-and-play testing at the time. Vaisala addressed a similar issue. Its radar system was the most expensive of the products under study and required a large construction and support infrastructure. Therefore, it was not possible to send a radar system to a customer's site for evaluation.

Observability did not create issues for the case products. Only Vaisala's radar system created a certain level of concern because a customer has to believe that the measured results are correct.

These findings are a partially different than those of Boer and During (2001), who state that trialability and observability typically do not create problems for new products. They reported that many firms tend to overestimate the perceived relative advantage and underestimate the complexity of the proposed solution. According to Boer and During (2001), compatibility only creates problems if a firm aims to access new markets with a new product.

In any event, it may take more time than planned to achieve commercial success with a new product because the speed of the adoption process varies. In other words, different products reach their profitability targets within different time frames. In that sense, product termination decisions

[125] In other words, being declared radical by the interviewees.

that are made too quickly can be shortsighted. Therefore, management has to be able to assess the different market dynamics when they set profitability goals for new products. The product development speed of the case-study firms varied, as can be seen in Table 11. In the same manner, commercialization may take time, even if the actual creation of an underlying invention happens quickly. Marioff, for instance, explicitly mentioned this issue.

It is worth pointing out that the diffusion criteria presented above are outlined in retrospective analysis. I think it would be useful to pay more attention to addressing them already beforehand.[126] Naturally, there are certain risks of bias if only the company management tries to provide answers. Most likely, customers perceive the products totally differently because their needs and wants vary. One way to circumvent this issue could be to perform the pro-active analysis of diffusion factors in close co-operation with trusted and friendly key customers.

Proposition 5. *Analysis of diffusion criteria already a priori increases the likelihood of commercial success of a new product.*

8.6 Concurrent commercialization

Perseverance is the lifeblood of innovation. – Souder, 1987

The linearity of the innovation process was briefly discussed in section 3.1.2. The discussion of the actual commercialization process of new products was thin in the section on the review of the extant literature due to the fact that there is a general lack of publications on this topic. However, there are a couple of authors who have presented some ideas concerning it. For instance, Nevens, Summe, and Uttal (1990) and Aaby and Discenza (1993) consider commercialization as a series of overlapping phases instead of a linear process. They also point out that it involves several business units simultaneously. Nonaka (1990) discusses a Japanese approach to managing the innovation process and points out the importance of parallel development activities and information overlapping between the various functional groups. Joly (1997) also notifies that,

[126] Rogers has also suggested such an approach, as discussed in section 9.6.

> "repeated failures of the traditional linear model (in which research results were transferred to development and then to production and marketing) have caused many to prefer viewing innovation as a single, integrated process coupled to a market opportunity from the beginning (p. xix).

I built my analysis on top of theirs and favor an emphasis on parallel phases rather than linear phases for the innovation process. This leads to a new concept - that of concurrent engineering.

Concurrent engineering is a well-known and widely used concept in product development. It means that instead of a sequential process in which each department only concentrates on its own activities, all functions proceed in parallel fashion and involve constant interaction to decrease design changes and avoid costly revisions to the product (Cook 1997). Hutchings and Knox (1995) describe a case study involving the Digital Equipment Corporation (DEC). DEC established a concurrent engineering team, which actually changed the name to concurrent development to emphasize that more than just engineering work is required to create the products that customers want. This new approach also changed the way they perceived their products.

> *Instead of the product being conceived of as a set of capabilities delivered to the customer, the design team adopted the term "whole product" to refer to the additional elements the customer experiences in the full business relationship: marketing messages; the sales engagement; the distribution channel; the pricing, packaging, and licensing policy; and warranty and service agreements.* (Hutchings & Knox, 1995, p. 78)

The principle idea behind concurrent engineering is to speed up the overall process while still preventing excess cost and efforts and maintaining with good quality. The practical implementation of concurrent engineering can be considered a type of overlapping product development. However, to overlap as much as possible is not the best solution. Instead, careful planning and management is required to manage preliminary and finalized information flows between early (upstream) and late (downstream) development phases (Krishnan et al., 1997). In short, the idea behind concurrent engineering is to ensure that better products reach the market faster and with less cost.

Taking the idea one step further, I suggest that firms should also implement **concurrent commercialization**.[127] In principle, this means that commercialization should be considered as a separate layer, one which flows parallel with NPD tasks and activities. This is illustrated in Figure 25 in the next chapter.

The logic behind this proposal follows concurrent engineering principles, but focuses on those *non-technical* activities a firm has to perform in order for the product to become a commercial success.

Proposition 6. *Concurrent commercialization thinking is a suitable way to interlink commercialization with product development.*

The key point here is that the commercialization process should occur parallel to and be well-aligned with the development process, rather than as a separate step following development. For start-up firms such as Exact Tools and Marioff, this type of concurrent commercialization is perhaps an easier way to work because there is not a need to communicate between the different organizational units. Naturally, larger, established firms such as KONE need to spend more effort on getting all the relevant employees on the same page regarding the new product.

It is worth mentioning that similar ideas have been presented in the extant literature. For instance, Newell et al. (2009) critique the traditional linear innovation process and state that most innovations actually do not happen in such a manner. Instead, they consider innovation to be a complex, iterative, and interactive process (ibid). Several articles also point out that product marketing and product-launch planning need to be synchronized and overlaid on top of product development and that change requirements must be communicated to the entire team before trade-off discussions can occur (Copper, 1993; Soni & Cohen, 2004). According to Nevens et al. (1990), the commercialization process should be considered as starting from the point of concept generation and covering all organizational functions. Similarly, according to Holt (1983) and Cooper (1993) the planning for introducing the product on the market should occur at the same time as the technical planning.

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[127] Souder and Sherman (1994) have actually used the term concurrent commercialization, too. They used it to describe a situation where the start of the production ramp-up phase and the go-to-market phase overlap. However, in my opinion concurrent commercialization is a much broader concept that starts already from the ideation phase.

In that sense, I suggest that the traditional *koenian linear model* for NPD has led scholars and practitioners alike to consider commercialization as a *separate "block,"* which will start only after NPD is finalized. I suggest that by implementing a concurrent commercialization approach, firms will be able to receive similar benefits as when they implement a concurrent engineering approach. In other words, the philosophy behind concurrent engineering states that one phase of work need not to be finished before another can be started. The same idea applies in concurrent commercialization. For instance, a firm can start preparing product brochures, data sheets, and so forth before the final design has been finished.

8.7 Concurrent commercialization framework

> *There just does not exist any 'collective institution' that would provide a fair share of markets to each and every participant for granted.* – Parker & Mainelli, 2001

Based on the critical literature review, and by combining it with the case studies, I feel confident in suggesting that commercialization should be seen differently than it is described in the literature today.

The cases revealed that, in reality, it is quite difficult to separate product innovation into distinct ideation, development, and commercialization phases. Thus, traditional linear models hardly do justice to real product-innovation processes. In light of this shortcoming, I propose the idea that commercialization should be treated more broadly and seen as something that is clearly aligned with product development.

The concurrent commercialization framework presented in Figure 25 draws together the theoretical and the empirical findings of this thesis. The fact that commercialization and product development are parallel processes is the main idea depicted in the figure. Commercialization and the activities related to it help convince customers that they should purchase the product, which in turn leads to commercial success and legitimizes the *product innovation*.

In some cases, firms need to convince authorities as well. This is mainly based on technical grounds and, most likely, commercialization activities will not be directly impacted in such cases.

Product development and commercialization are grounded on a firm's business strategy, product strategy & positioning, market entry strategy, competitive environment, and customer & market orientation. However, cross-functional collaboration, skilled product management, and the planning and execution of internal launch activities all play an important role in binding product development and commercialization together.

The *upper layer* of the concurrent commercialization framework shows those key topics that have been discussed already in detail. The *bottom line*, which describes activities related to product development, is taken from the extant literature since the empirical part of this study did not concentrate on that particular topic.

It is worth mentioning that the suggested framework is a high level, general approximation of reality. In any event, the key idea behind this framework is to consider commercialization as a *parallel process* instead of as a separate phase, as suggested by many authors (e.g., Booz, Allen, & Hamilton, 1982; Crawford, 1987; Koen et al., 2001).

Figure 25. The concurrent commercialization framework

9 Conclusions

This final chapter describes the contributions to theory and the contributions to practitioners. It also discusses the validity, reliability, and limitations of this study. Finally, new research avenues are suggested for future studies.

9.1 Contributions to theory

The obstacle is the path. - Zen Saying

Jalkala (2009) studied the phenomenon of customer reference marketing within a B2B context and states that, while customer references are typically considered an important marketing and sales tool, the academic literature has paid very little attention to the phenomenon. I feel comfortable in stating that the same lack of studies applies to the phenomenon of commercialization, too. In other words, the literature concerning commercialization from an industrial, B2B product perspective has been very limited. This study represents one of the first attempts to assemble empirical data about the commercialization activities of firms in an industrial B2B setting. The focus on the operationalization of commercialization will hopefully also contribute to the academic literature by increasing the body of knowledge in that field.

The idea of framing product innovation a novel way hopefully represents a useful theoretical contribution. Similarly, this dissertation presents a new way to consider commercialization differently than it has been presented in the previous literature. The idea that commercialization activities do not happen in a sequential mode (as traditionally considered), but, rather, runs concurrently from ideation to launch, is a statement that should be verified or proved false in forthcoming studies. If the theory of concurrent commercialization presented here holds true, this should also be reflected in and incorporated into NPD and marketing literature.

An additional contribution to the theory is the argument that the term launch should be considered a sub-activity of commercialization and not used as a synonym for commercialization.

9.2 Managerial implications and relevance for industry

> *The only way to find the limits of the possible is by going beyond them to the impossible.* - Arthur C. Clarke

While this study aims to fulfill the academic requirements for the PhD dissertation, it hopefully has some practical relevance for managers in industrial B2B firms, too. Practitioners may benefit from the case studies presented here because they can provide some ideas for the commercialization of other products.

The propositions presented in the previous chapter are not intended to be normative guidelines. As Numagami (1998) points out,

> *there is only a very slight chance, if any, of being able to discover an invariant law that will be useful in suggesting what managers should do to adapt to the future course of events. (p. 10)*

In addition, because the sampling was not carried out from the perspective of the population at large, it is also difficult or even impossible to generalize the findings to any particular population. Therefore, these propositions should be interpreted with caution. However, if the propositions hold true, they can provide some inspiration for practitioners to reflect upon them and even try to apply them in the future. The fundamental point of this analysis was to emphasize the activities that case firms had engaged in when developing their products. The propositions can be considered as suggestions to improve the chances for the commercial success of a new product. A good starting point for managers working on a commercialization assignment for a new product is to ask a few simple questions: What needs to be done? What else needs to be done? And, what happens if something is not done?

The concept of innovation is ambiguous and subjective. I have promoted the importance of commercial success here, even though many respected scholars have presented broader interpretations of innovation. In addition, in my opinion commercialization just cannot be separated out as an individual phase of the development process. Rather, I see it as an integral

part of it. While the rigid process management culture can sometimes prevent the radical innovation and exploitation of new initiatives (Benner & Tushman, 2003), I assume that putting more effort into developing the commercialization process could be useful and provide new benefits for industrial B2B firms.

One thing worth remembering is that luck sometimes plays a certain role, too. According to Rogers (2003), "The innovation process does not always begin with a perceived problem or need. A considerable degree of serendipity may occur" (p. 163). This can be interpreted as meaning that a bit of luck is required with commercialization, too.

9.3 Reflections on the research questions

Innovation is a product of the interaction between necessity and chance, order and disorder, continuity and discontinuity. – Nonaka, 1990

The main research question was, "how do industrial, B2B firms manage the successful commercialization of new products?"

The individual case studies presented here and the cross-case analysis of them aimed at providing an answer to that question. In addition, the propositions presented in chapter 8 and the conceptual framework for concurrent commercialization also aimed at providing an answer to that question.

The supporting research questions were, "what is product innovation?" and "how are commercialization and innovation treated in the existing academic management literature?" These were answered in chapter 3 via an extensive literature review. The literature review in section 3.3.4 and the further discussion of success and failure covered in section 4.2 provide an answer to the question, "what is the role of success and failure in innovation and how are they measured?" The literature review in section 3.3 and the critical discussion in chapter 5 provided answers to the question, "what is commercialization and how can it be operationalized?" Finally, the within-case and cross-case analysis hopefully provided an answer to the question, "how were the case products commercialized by the case firms and what kinds of activities were performed during the commercialization process?

9.4 Validity, reliability, and replicability issues

All your base are belong to us. - Zero Wing

A case study can be tested against the construct validity, internal validity, external validity, and reliability and replicability (Remenyi et al., 1998; Numagami, 1998).

According to Remenyi et al. (1998), the construct validity is "the procedure by which a means for the measurement of a construct is devised and then related to subjects' performance in a variety of other spheres as the construct would predict or imply" (p. 281). Remenyi et al. (1998) suggest three basic tactics to meet this demand. The first tactic is to use triangulation. The data in this dissertation rely mainly on interview data; other data sources play only a secondary role. That would be a major handicap if we were to understand the requirement of triangulation as mandate. However, other scholars have pointed out that triangulation suffers certain difficulties as a validation tool. According to Bloor (1997), the findings collected by different methods will differ in their form and degree, thus making it difficult to compare them. He also points out that there is a logical gap in comparing data gathered by a superior method with that gathered by an inferior method. He poses the following question: "Should the findings from the best available method be set aside on the basis of evidence generated by an inferior method?" (Bloor, 1997, p. 39). While Bloor (1997) agrees that methodological pluralism can bring new insight to a topic under study, he states that triangulation does not allow researchers to conduct validity tests on their findings. The other tactics for increasing the validity of the construct involve establishing a chain of evidence and the links between this evidence and crafting a case study that is reviewed by key informants (Remenyi et al., 1998). The former tactic did not seem useful in light of how this research was set up, but the latter tactic was applied. All of the case-study descriptions were sent to the informants for comments and corrections.

Within the context of business and managementstudies, internal validity refers to the idea that a particular result was caused by a particular phenomenon. In this dissertation, this means that the success of a new

product was caused[128] by commercialization activities. As Remenyi et al. (1998) note, while all of the possible evidence is rarely available, "internal validity may be asserted if not in fact proved, by examining possible alternatives explanations of the phenomenon"(p. 180). The evidence from different cases seemed to converge without too many contradictions and the cases seemed to support each other, thus increasing the credible picture of commercialization as phenomena. As explained in section 1.2, this research project is strongly linked to marketing and product development areas. Commercialization as I see it falls into a gap between these two established areas of business. Of course, someone can disagree with this perspective and not see the choice to focus merely on commercialization as a phenomenon as entirely valid, which might be a handicap in this study in certain respects. In any event, I have tried to address and explain this decision, but it may still create some validity issues at the conceptual level.

The external validity creates some issues because it is seemingly very difficult to make generalizations that can be applied in a broader context beyond the research environment at hand. While some scholars suggest that multiple cases can be used to increase external validity (Voss, Tsikriktis, & Froclich, 2002), the issue of case numbers may not even be relevant. For instance, Loch (2000) studied 90 NPD projects in a single firm and stated that it is simplistic to hope for an application of general best practices. In addition, Loch saw that, while some general recommendations can be produced, they do not do justice to the issue at hand because there are so much strategic and organizational complexities within a single company. Naturally, this holds true for this study as well. It would be naïve to create a comprehensive list of the "10 golden management rules that will guarantee the commercial success of new products." However, according to Numagami (1997) the external validity criterion is only relevant when the study seeks to create a universal law for a variety of groups or an invariant law that can be applied across vast distances. I think that it is quite difficult to find such a law in management studies in general. As Numagami (1997) points out:

> *If the basic premise of the existence or dominance of invariant laws in social phenomena is not sustainable, case study research can be freed from the lingering doubts about its external validity and replicability, and then could be forcefully advocated because of its strong points.* (p. 3)

[128] When taking the technical viability of a product for granted.

Similarly, reliability and replicability are clearly problematic in case studies. Numagami (1997) points out that it is hard to meet the reliability criterion in its most literal sense because

> *Whatever documentation a researcher devises, the ultimate quality of the research findings from qualitative approaches ought to vary with his or her social and conceptual skills because what can be obtained from, for example, interviewing, seems to be dependent more on human and contextual factors of the particular research project than is the case with other data gathering techniques that.* (p. 3)

However, the same dilemma is also present in surveys. According to Numagami (1998), a language system evolves over time and the wording used in questionnaires may propagate different meanings, too.

In any event, as Remenyi at al. (1998) point out, with a phenomenologist approach it can be argued that "all situations and organizations are different and thus the same results cannot ever be obtained again, and consequently reliability *per se* is not an issue" (p. 181).

9.5 Other limitations of the present study

Eighty percent of success is showing up. – Woody Allen

As Langley (1999) notes, it is difficult to isolate units of analysis in an unambiguous way for complex phenomena such as strategy formation or learning. Similarly, commercialization can be seen as a complex phenomenon involving the same difficulties. Naturally, one could enter into an endless conceptual debate about whether commercialization should be considered as a sub-category of marketing or as a sub-category of the NPD process instead of defining it as a separate concept. Someone could even claim that commercialization is nothing but more conceptual clutter to weigh down management literature. As there are hardly any exact concepts in management literature, it would be impossible to provide a solid argumentation against these kinds of claims. However, I have used empirical material to support my argument for considering commercialization differently.

While this study was not a "diffusion study" as such, it does make use of certain elements and interrelationships found in diffusion studies. It is worth mentioning that Rogers (2003) illustrates several limitations to innovation tracer studies. He states that previous studies have focused only on very important technological innovations, which may deviate from

minor or less significant ones. He also argues that the data sources that would allow a researcher to retrospectively reconstruct innovation development are limited due the following reasons:

> *These tracer studies depend almost entirely upon the availability of research publications about technology in order to reconstruct a partial view of the R&D phases of the innovation development process. ...Studies generally describe the research and development phases of the innovation development process but do not tell much about diffusion/adoption phase and consequences of the innovation. Tracer studies imply that the research and development phases are relatively rational and planned. Serendipity and accidental aspects of the innovation-development process are unlikely to be fully reported in research publications written by the inventors and researchers. (Rogers, 2003, p.163-164)*

There can be also several other sources of bias in case studies. Jones and Stevens (1999) argue that an analysis of failure probably provides a more useful lesson for managing innovation. The failure part was discussed in the literature review. The actual cases, however, only focus on success, which naturally can be seen as a bias in this study.

It has already been mentioned several times that the concept of commercialization within the context of new products is not well established. Therefore, it was also anticipated that the different case-study firm would perceive of commercialization as a term differently – probably there were semantical differences in the way respondents at the same case-study firm interpreted the term as well. This may have caused some interviewees to understand certain questions differently, too. However, Gummesson (2003) points out that no matter how rigorous the research strategy, any research project very much involves a certain amount of personal interpretation. Similarly, despite the strategy that was carefully laid out in this study, there will always be an uncodifiable step that relies on the insight and imagination of the researcher (Weick, 1989; Langley, 1999). In addition, according to Gummesson (2003) the outcome resulting from data generation and analysis of the data is, in essence, subjective in nature; in his words, "the completely systematic and objective pursuit of the truth is a myth" (p. 487).

There are also various biases that originate from relying on a key informant. Ernst and Teichert (1998) and Ernst (2002) point out that a respondent-based bias exists in many NPD studies .ie. the informant's role in organizations or her or his hierarchical status seems to affect the way he or she assesses the properties of the organization. Ernst (2002) also points out that empirical studies that are based on only a single informant within one organization suffer a serious bias. In order to avoid such bias, none of the case studies rely on only a single interview.

According to Kumar et al. (1993) and Golden (1992), idiosyncratic sources of error may contaminate informant reports, especially retrospective accounts; an informant may also suffer from memory failure or inaccurately recall past events or even distort past events in her or his memory; likewise, informants may make subconscious attempts to maintain self-esteem or make a good impression. These kinds of sources of bias are difficult to avoid completely, and naturally some level of bias may be present in this study too.

According to Eisenhardt (1989), cross-case analysis is full of potential biases, such as drawing conclusions based on limited data or grouping disconfirming evidence. I have tried to avoid such pitfalls, but it is plausible that some bias is present on my part as well.

The case-study firms were also quite different entities. However, Kennedy (1979) points out that in situations with replicated case studies, where there are many common attributes between the case(s), such studies can also include a few unique attributes in the samples. Naturally, concentrating on some of the underlying cases alone might have enabled me to produce a more detailed theory. Eisenhardt and Graebner (2007) explain this paradox by concluding that,

> *multiple-case researchers retain only the relationships that are replicated across most or all of the cases. Since there are typically fewer of these relationships than there are details in a richly observed single case, the resulting theory is often more parsimonious (and also more robust and generalizable).* (p. 30)

The situation in retrospective analysis is also different when compared to a situation where a researcher is following an on-going social activity. A classic example of a retrospective study involving the latter situation is the famous Milo plant study by Dalton (1959), where the researcher spent one year in the plant as a participant observer, as described by Dyer and Wilkins (1991). Retrospective studies, however, "offer the opportunity to identify patterns indicative of dynamic process" (Leonard-Barton, 1989, p.248).

The amount of required interviews is also a question to which there is no exact answer and different opinions exist in the academic literature. The guiding principle is to perform enough interviews so that theoretical saturation is achieved (Johnson, 2002). I could have concentrated on a single case and used more informants and tried to find more archival data to support the case. However, I feel that the amount of time in the field would have only added to the number of interviews and provided a deeper

understanding of irrelevant details pertaining to a particular case without actually adding more insight on the phenomena as such.[129]

I could also have spent more time in the field and added more cases by approaching additional firms.[130] However, with case studies the typical criteria regarding sample size is irrelevant (Yin, 1994). In other words, adding a few additional cases does not increase the statistical relevance of the study. Thus, the number of cases and interviews seemed adequate for the underlying study and were enough for reaching a saturation point.

One issue that may have potentially caused some misunderstanding has to do with the terminology. At the time of conducting the interviews, I had not yet formulated and positioned the terms launch and commercialization as they have subsequently been described in this dissertation. The decision to take a commercialization-oriented approach (as explained in section 4.1) emerged when analyzing data and during the process of crafting the early version of the manuscript. This being the case, the data has been analyzed from a somewhat different angle than was originally planned. This, however, should not make the findings and results less valid.

9.6 Suggestions for future research

There has to be a better way – find it. - Thomas Edison

Theory building naturally calls for theory validation. The qualitative method was suitable for this study, but quantitative research could take place next in order to test whether or not the propositions presented here are valid.

This study was only able to scratch the surface of commercialization as a phenomenon. It would also be interesting to conduct some longitudinal studies for product innovation projects. This means that a researcher would have to get access to a new product project already from the early phases of the project and perhaps continue the investigation until the ultimate termination of that particular product. In other words, the case analysis

[129] The issue is impossible to verify in reality. The point of saturation is also always diffucult to determine objectively.
[130] It could have been a neverending story; there are numerous firms with successful products.

would be more in-depth in nature if a researcher were to follow the whole life cycle of a product. For instance, participative action research with a hermeneutical approach could provide interesting results.

Cui et al. (2011) suggest avenues for future research related to the launch of new products and state that,

> *the important role of managers' perception of market conditions also highlights the need to study the behavior of new product managers. Perception of market conditions is formed within the context of the managers' individual knowledge and experience, and influenced by their personality traits and management style.* (p. 545)

I think the same idea could be applied to commercialization as well. In other words, it would be interesting to study the role of new product managers' behavior in commercialization.

The importance of social media has grown rapidly and it has been stated that social media has changed the way firms communicate and interact with customers (Parent, Plangger, & Bal, 2011; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). Thus, the importance of the Internet as an information channel can no longer be questioned and, according to Jussila et al. (2011), there are many possibilities to utilize social media within the B2B sector. In addition, a recent study of B2B firms in the U.K. revealed that many firm intend to increase their use of Internet technologies and social network sites to support their brand objectives and attract new customers (Michaelidou, Siamagka, & Christodoulides, 2011). The data for this dissertation was collected and analyzed at a time when social media was just becoming widespread and popular (Also, some of the case-study products were introduced to the market at a time when the topic of social media was not in place at all). In addition, many B2B firms are still reluctant to use social media (Jussila, Kärkkäinen, Leino, 2011), mainly due to the belief that it is not relevant for their line of work (Michaelidou et al., 2011). In that sense, the failure to take social media into account during the literature review and when collecting the empirical data should not limit the value of the findings of this dissertation. However, social media is definitely an interesting topic that needs to be studied within the context of the commercialization of industrial, B2B products.

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11 Appendix

***Appendix A1**. List of interviewees*

Case	Position of the interviewee	Length of the interview
Vaisala weather radar	SBU manager	104 min
	Product manager	92 min
Marioff HI-Fog	Retired CEO & founder	68 min
	Current CEO	53 min
Martela Combo	Marketing director	91 min
	Project manager	77 min
	Designer	52 min
Exact Tools	CEO	69 min
	Partner (design & development)	54 min
Kone Monospace	Market manager	64 min
	Marketing communications manager	85 min
	AVP research	56 min
Beneq nHALO	CEO & co-founder	49 min
	Product manager	65 min
	CTO	not recorded
Vacon pilot	11 interviews with personnel in various positions	
Vacon general insight	CEO	77 min
	Executive VP	61 min
	Marketing director	67 min

Appendix A2. Questionary template

Päiväys:_____

Haastateltavan nimi:_____

Yrityksen nimi:_____

Yrityksen toimiala:_____

Haastateltavan asema ja tehtävät yrityksessä:

_____

YLEISET TAUSTOITTAVAT KYSYMYKSET

Yrityksen liikevaihto on noin (EUR) _____

Työntekijöiden lukumäärä on noin_____henkilöä

Markkinointibudjetti prosentteina liikevaihdosta_____%

Mikä on keskimäärin tuotekehitysbudjetin ja markkinointibudjetin suhdeluku? _____

Yritys toimii pääasiassa

☐ B2B markkinoilla

☐ B2C markkinoilla

☐ sekä että

Mikä seuraavista kuvaa liiketoimintanne lähtökohtia parhaiten?

☐ markkinalähtöinen

☐ teknologialähtöinen,

☐ molemmat yhtä vahvoja

Organisaation liiketoimintastrategiaa kuvaa parhaiten

☐ Kustannusjohtajuus

☐ Erilaistuminen

☐ edellisten yhdistelmä,

☐ Muu, mikä _____,

Toimialalla tapahtuvat muutokset / toimialadynamiikka on:

☐ nopeita (dynamic)

☐ kohtuullinen muutosnopeus (semidynamic)

☐ Hitaita (stable)

Yrityksen asiakaskunta on pääsääntöisesti

☐ vakiintunut asiakaskunta

☐ kertaluontoisia toimituksia

Case tuote

Tuotteen osalta kyseessä on / oli pääsääntöisesti

☐ komponentti

☐ itsenäinen stand-alone tuote

☐ Osa isompaa järjestelmäratkaisua

Tuotteen osalta kyseessä on / oli pääsääntöisesti

☐ technology push

☐ market pull

Tuote on yritykselle teknologian kannalta tarkasteltuna

☐ inkrementaali tuote

☐ radikaali tuote

Tuote on markkinoiden kannalta tarkasteltuna

☐ inkrementaali tuote

☐ radikaali tuote

Tuotteen voidaan luonnehtia olevan

☐ B2B tuote

☐ B2C/ tuote

☐ sekä että

Milloin tuote tuotiin ensimmäistä kertaa markkinoille? _____

Kuinka kauan tuotekehitysvaihe kesti_____

Mitkä olivat mielestänne tärkeimpiä syitä, jotka johtivat tuotteen menestymiseen

☐ Tuotteelle ei ollut kilpailijaa

☐ Tuote oli teknisesti ylivoimainen

☐ Tuotteen hinta oli selvästi edullisempi verrattuna muihin vastaaviin tuotteisiin

☐ Tuotteen hinta/laatu suhde oli ylivoimainen

☐ Muu mikä?_____

STRATEGISET AKTIVITEETIT

<Tavoite>

Mikä oli tuotteen strateginen tavoite yritykselle?

☐ Lisätä markkinaosuutta

☐ Hyödyntää ylimääräistä (tuotanto) kapasiteettia

☐ Luoda jalansijaa markkinoilla

☐ Tasata vuosisyklejä

☐ Penetroitua uusille markkinoille

☐ Muu, Mikä?_____

<Markkinastrategia

Mikä oli tuotteen markkinastrategia?

☐ Niche

☐ Valittu markkinasegmentti

☐ Massamarkkinat

☐ Muu, Mikä?_____

<Leadership>

Tuote on pääsääntöisesti markkinoiden kannalta tarkasteltuna

☐ ensimmäinen laatuaan (leader)

☐ seuraaja (follower)

TAKTISET TOIMENPITEET

<Ajoitus>

Mikä oli aika konseptista tuotteen viemiseen markkinoille

☐ alle 1 vuosi

☐ 1-3 vuotta

☐ Yli 3 vuotta

Kilpailijoiden lukumäärää tuotteen tulleessa markkinoille

☐ Ei kilpailijoita

☐ 1-3 kilpailijaa

☐ Yli 4 kilpailijaa

Julkaistiinko tuote ennen lanseerausta?

☐ Kyllä

☐ Ei

☐ Valikoidusti

<Brandistrategia>

Tuotteen nimeämiseen liittyen

☐ Täysin uusi nimi

☐ Olemassa oleva tuotenimi / sen laajennus

☐ Yrityksen nimi

Mitkä olivat mielestänne tuotteen ominaisuudet kilpailijoihin nähden?

☐ Laajemmat

☐ Lähes samat

☐ Kapeammat

Mitkä olivat promootioaktiviteetit kilpailijoiden vastaaviin nähden?

☐ Suuremmat kuin kilpailijoilla

☐ Suunnilleen samat

☐ Pienempi kuin kilpailijoilla

Mitä kommunikaatiomenetelmiä käytitte?

☐ Myyjien yhteydenottoja

☐ Ammatti messuja

☐ Asiakkaille suunnattuja promootiokampanjoita

☐ Henkilökohtaista myyntityötä

☐ Suoramarkkinointia

☐ Radio/TV mainoksia

☐ Internetmainontaa

☐ Ammattilehtimainontaa

☐ Konferenssiesityksiä

☐ Julkisia koulutus/tiedotuskampanjoita

☐ Aiempia asiakasreferenssejä

☐ Muita, mitä? _____

Mikä oli myynnin intensiivisyys

☐ Erittäin intensiivinen

☐ Kohtuullisen intensiivinen

☐ Maltillinen

Mitä hinnoittelustrategiaa käytitte?

☐ Kermankuorinta

☐ Markkinapenetratio alhaisella hinnalla

☐ Muu mitkä? _____

Miten jakelukanava hoidettiin?

☐ Hoidetaan itse

☐ Partneri hoitaa

☐ Monikanavajakelu

Mitä kriteerejä käytettiin myyntipartnerin valinnassa

☐ Joustavuus

☐ Tekninen osaaminen

☐ After sales tuki

☐ Markkinapenetraatio alhaisella hinnalla

☐ Muu, Mikä?_____

Arvio asteikolla 1 -5 miten onnistuttiin seuraavissa vaiheissa:

Front-end vaihe 1 2 3 4 5

Tuotekehitys vaihe 1 2 3 4 5

Kaupallistamisvaihe 1 2 3 4 5

Mitä perusteluja kuhunkin arvosanaan liittyy? Eli miksi joku kohta onnistui tai epäonnistui?

OPEN QUESTIONNAIRE

<General questions>

- What do you think that a term ”commercialization” means in your firm?
- Is commercialization process mapped or described in your firm? (if compared with e.g. product development process?)
    - IF YES: Is it stand alone process or a part of other main process?
    - IF NO: Should it be perhaps describe?
- What are the most essential activities management is required to do during commercialization of a new product in order the product to become successful?
- Why do you think these activities need to be done; what happens if they are not done?
- What is the most difficult thing in commercialization?
- What is the role of timing when launching new product?
- How much time you give for a new product before it needs to be profitable?
- How do you measure or follow that in practice?
- Have you seen cases where a product, which seems like a failure right after the introduction has become successful later on?

<Case product>

- Could you please describe briefly the market and special characteristics of it
- Who are the key customers for this product?
- What is the life cycle for this product (technology)
    - i.e. How long a customer most likely uses the product before it become obsolete?
- What kind of activities and critical events happened during the commercialization of the product?
- Who were the main actors during that? Please describe with own words.
- What kind of problems you encountered during the market entry?
- Did the product change from the original during the development?
    - if positive, then why?
- What is the role of that product in the product portfolio?
- How important the product launch was for the overall business of the firm?
- What kinds of criteria were considered before a decision to launch this product was made?
- What kinds of topics were related to pricing of this product?
- Was there enough budget for the go to market of this product? Please explain.
- What were the main things behind the success of commercialization?
- How did you measure the success of commercialization?
- What are the key metrics?
- What do you think are the most important activities that ensure a product to become successful?
- What was the customers' role during the product development?
- Is the product customized based on customer requirements?
- Was it easy to convince customers that the product will work as promised?
- Was there any standards or legislation related issues?
- How these were taken into a consideration during commercialization?
- Could you please describe what was the role of different organizational units during commercialization.
- What kind of teams there were?
- How many people were involved with commercialization?
- Who actually is 'the owner' the product?
- When do you dedicate a product manager for the product?
- Do you monitor the technical readiness and is that related to market entry anyhow?
- What kind of co-operation there was between R&D and marketing personnel during commercialization? / How much involvement R&D had during go to the market phase?

- Is there any internal competition between this product and other products?
- How much competion for resources there are between different products and what this means in reality?
- Who decides about the termination of a product or market withdrawal of a product?
- What kind of criterias there are related to that?
- How did you come up with the name for the product and what were the things related to that?
- What kinds of activities were performed during product launch?
- What was the timing of those activities?

<Characteristics of a new product that influence adoption based on Rogers>

- **What kind of benefits the product provide for customers?** Relative advantage ("the degree to which an innovation is perceived as being better than the idea it supersedes")
- **What about compatibility with values and experience?** Compatibility with values and experience ("compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters")
- **Is the product complex to use / understand how it works?** Complexity in use or understanding ("the degree to which an innovation is perceived as relatively difficult to understand and use")
- **What is possible to try-pout the product?** Trialability ("*trialability* is the degree to which an innovation may be experimented with on a limited basis")
- **How about observability, where the results easily visible?** Observability (he degree to which the results of an innovation are visible to others)

Appendix B. *Innovation definitions*

Afuah 1998 p. 13	Innovation is the use of new knowledge to offer a new product or service that customers want. It is invention + commercialization
Betje 1998, p1	Innovations are new things applied in the business of producing, distrubuting and consuming products or services
Boer and During 2011	Innovation is the creation of new product-market-technology-organization-combination
Bradbury 1989	Innovation is therefore a creatively initiated process which is then developed and progressed to a definable goal by the application of further creativity allied to logical analysis and work organization in which the creative element continually introduces 'change' as a 'horizontal shift' in the logical progression of the chain
Crawford and Di Benedetto 2006 p. 18	Innovation refers to the overall process whereby an invention is transformed into a commercial product that can be sold profitably.
Crossan and Apaydin 2010	Innovation is production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and arkets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome
Dodgson 2000 p. 2	Innovation includes the scientific, technological, organizational, financial, and business activities leading to the commercial introduction of a new (or improved) product or new (or improved) production process or equipment.
Freeman and Soete 1997, p 1	The first commercial application or production of a new process or product
Hult 1983 p.13	Innovation is a process which covers the use of knowledge or relevant information for creation and introduction of something that is new and useful
Knight 1967, p.478	An innovation is the adoption of a change which is new to an organization and the relevant environment
Morton 1971 p. 4	Technological innovation is the process of perception or generation of relevant science and its transformation into new and improved products and services for which people are willing to pay
Myers and Marquis 1969	Innovation is not a single action but a totol process of interrelated sub processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things acting in an integrated fashion.
Narayanan 2001 p. 68	Innovation refers both to the output and the process of arriving at a technologically feasible solution to a problem triggered by a technological opportunity or customer need.
Padmore & al. 1998	An innovation is any change in inputs, methods, or outputs which improves the commercial position of a firm and that is new to the firm's operating market
Parker 1980, p 55.	Innovation involves the birth of a new idea, often an invention, together with its successful progression to a new material, process, product or system. It implies a discontinuity and a radical change in the way a company should be managed.
Pessemier 1977, p 460	The act of introducing something new or novel (making an addition to the things previosuly available)
Robertson 1967	Innovation has been defined as a process whereby a new thought, behavior, or thing is conceived of and brought into reality
Rogers 2003 p.12	Innovation is an idea, practise, or object that is perceived as new by an individual or other unit of adoption
Rogers and Shoemaker 1971 p. 19	An innovation is an idea, practise, or object perceived as new by an individual
Schumpeter 1939 p. 87	Setting up a new production function
Scott and Bruce 1994	Innovation is a process involving both the generation and implementation of ideas
Souder 1987 p. 3	Innovation refers to a high-risk idea that is new to the sponsoring organization, and which the organization believes has high profit potential or other favourable commercial impacts for them.
Trott 2002 p. 12	Innovation = theoretical conception + technical invention + commercial exploitation
Trott 2002 p. 12	Innovation is the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new (or improved) product or manufacturing process or equipment
Van de Ven 1986	Innovation has been defined as the development and implementation of new ideas by people who over time engage in transactions with other within an institutional context

***Appendix C**. Reasons for product failures*

Market/Marketing Failure – The Better Mousetrap No One Wanted	-
Ignored or misinterpreted market research	Calantone and Cooper (1981), Kotler and Keller (2009)
Misunderstanding of customer needs	Cooper (1976), Jain (2001), Leadbeater (2006), Lee and O'Connor (2003a)
Small size of potential market	Jain (2001)
Changing market requirements not understood	Parker and Mainelli (2001)
Competitors' aggressive actions	Kotler and Keller (2009)
Incorrect positioning	Crawford (1977), Kotler and Keller (2009), Rehn & Lindahl (2011)
Stronger competition than expected	Cooper (1975)
No clear differentiation	Jain (2001)
Market newness to the firm	Calantone and Cooper (1981), Kotler and Keller (2009)
Product newness to the market	Calantone and Cooper (1979)
Ineffective advertising or lack of selling and promotion resources	Calantone and Cooper (1979), Kotler and Keller (2009), Udell and Hignite (2007)
Misdirected marketing efforts	Cooper (1975), Lee and O'Connor (2003a)
Insufficient distribution support or lack of channel partner motivation and incentives	Kotler and Keller (2009); Hill (1988), Berggren and Nacher (2001), Udell and Hignite (2007)
Product focus crowded on customer needs	Rackham (1998)
Prototyping neglected	Rehn & Lindahl (2011)
Poor product launch advertizing strategy and communication with customers	Lee and O'Connor (2003b)
Special characteristics of culture and market not understood	Sheth and Ram (1987)
Financial Failure - The Price Crunch	-
Unexpectedly high development costs	Crawford (1977), Kotler and Keller (2009)
Low return on investment	Jain (2001)
Wrong price	Cooper (1975), Crawford (1977),
Inadequate margins	Udell and Hignite (2007), Kotler and Keller (2009), Calantone and Cooper (1979)
Poorly undertaken product launch	Calantone and Cooper (1979), Udell and Hignite (2007)
Timing Failure – The "Me-Too" Product Meets a Competitive Brick Wall	-

Simultaneous introduction of multiple products[1]	Barnett and Freeman (2001)
No differential advantage	Calantone and Cooper (1979)
Late in the market	Jain (2001)
Too early in undeveloped market	Grayson (1984), Jain (2001)
Timing failure	Udell and Hignite (2007)
Inadequate selling efforts	Calantone and Cooper (1979)
Lack of network effect	Lee and O'Connor (2003a), Rehn & Lindahl (2011)
Technical Failure – The Technical "Dog" Product	-
Lack of product uniqueness or superiority	Cooper (1975), Crawford (1977)
Poor design or poor prototype testing	Jain (2001), Calantone and Cooper (1979)
Product not working correctly or otherwise flawed	Cooper (1975), Crawford (1977), Jain (2001), Folkes and Kotsos (1986), Calantone and Cooper (1979), Rehn & Lindahl (2011)
Bet on the wrong technology	Carroll and Mui (2008)
The newness of production process	Mishra et al. (1996)
Organizational failure – Competitive One-Upmanship	-
Lack of organizational support	Grayson (1984), Crawford and Di Benedetto (2003), Jain (2001), Rackham (1998), Calantone and Cooper (1979)
Lack of R&D resources and skills	Calantone and Cooper (1979)
Enthusiasm crowded on facts	Crawford (1977), (Grayson (1984), Rehn & Lindahl (2011)
Product lacked a champion	Crawford (1977)
Poor fit with the organizational culture	Dipak Jain (2001)
Company politics	Grayson (1984), Crawford (1977), Jones and Stevens (1999)
Lack of sharing and using market information	Crawford (1977), Hill (1988), Calantone and Cooper (1979)
Management losing course of action	Grayson (1984), Boulding et al. (1997), Carroll and Mui (2008), Biaylogorsky et al. (2006)
"Sliding to failure" i.e the series of decisions that slowly pushed the project towards a slide and that accelerated until failure was inevitable. Projects might thus slide rather than fall into failure — muddle up in a manifold of ways.	Rehn & Lindahl (2011)
Companies trapped in their own thinking and	Leadbeater (2006), Dundas and Richardson

traditions	(1980)
Inadequate customer service	Udell and Hignite (2007)
Environmental failure – Environmental Ignorance	
Running afoul with government regulations	Jain (2001), Calantone and Cooper (1979)
Macroeconomic factors in general or misreading external environment	Jain (2001), Calantone and Cooper (1979)
Disruptive new technology made a product obsolete	Anderson and Tushman (1991), Bower and Christensen (1996)

[1] Barnett and Freeman (2001) state that "managing several changes simultaneously threatens to overwhelm a company. The greater the number of such changes occurring at once, the more we multiply the agony". (p556). I interpret this to implicitly mean that also individual projects and products will start suffering and ultimately failing too.

***Appendix D**. Check list for a new product proposal. (Hoover & Jones 1991, p.31)*

- **Customer—**Who is the customer? What does he or she really need?
- **Stakeholders—**Understand the positions of those who have stakes in the product's success or the status quo.
- **Ease-of-use—**Human factors design needs to be addressed early in the process.
- **Documentation—**Essential; match to user's needs; start early.
- **Cultural change—**If development or production of this product or process requires cultural change, its introduction will not be easy or swift.
- **Patent/Copyright—**Plan for this early to avoid pitfalls and to get high quality coverage.
- **Legal/Regulatory—**Consider early. Such obstacles have delayed or damaged many projects.
- **Environmental Impact—**Determine if the manufacture or use of any product may adversely affect the environment.
- **Manufacturability—**Has the manufacturing engineer been on the team?
- **Aesthetics—**These hard-to-define characteristics are also critical.
- **Dynamics—**How does the product or process behave in non-steady state conditions?
- **Testability—**How will the product be tested? Where, by whom, at what cost?
- **Prototypes—**Consider how the final product may differ from the prototype if prototype and production processes are not identical.
- **Universality—**Universal solutions almost never work.
- **Simplicity—**Strive for beautiful, simple designs. They often work well.
- **Appearance—**If the design doesn't look right, watch out!
- **Interfaces—**Many otherwise sound designs fail because of unanticipated problems at interfaces.
- **Maturity—**Where is the product on its “S-curve”? Is it time to jump to a new approach?
- **Partitioning—**Consider partitioning to provide additional degrees of freedom.
- **Models—**Do the mathematical models used in design apply over the anticipated range of use?
- **Scale-up—**Do not undertake this lightly. Proceed by small increments.
- **Transportation—**What happens to the product in transportation?

Appendix E.

The Market Evolution and Sales Takeoff of Product Innovations (Agarwal & Bayus, 2002)

Table 2 Key Dates for Our Sample of Product Innovations

Product	"Invention" year	"Commercialization" year	Firm takeoff year	Sales takeoff year
Sewing machine	1830	1849	1853	1859
Automobile	1771	1890	1899	1909
Phonograph record	1877	1897	1917	1919
Vacuum cleaner	1907	1911	1928	1934
Outboard engine	1905	1913	1916	1936
Electric blanket	1914	1915	1923	1952
Dishwasher	1898	1915	1951	1955
Radio	1912	1919	1922	1923
Clothes washer	1901	1921	1923	1933
Freon compressor	1930	1935	1938	1964
Cathode ray tube	1897	1935	1943	1949
Clothes dryer	1930	1935	1946	1950
Electric razor	1928	1937	1938	1943
Styrene	1831	1938	1943	1946
Piezoelectric crystals	1880	1941	1944	1973
Home freezer	1924	1946	1947	1950
Antibiotics	1928	1948	1950	1956
Turbojet engine	1934	1948	1949	1951
Ballpoint pen	1888	1948	1957	1958
Garbage disposer	1929	1949	1953	1955
Magnetic recording tape	1928	1952	1953	1968
Heat pump	1851	1954	1960	1976
Computer printer	1944	1960	1971	1979
Home microwave oven	1947	1970	1974	1976
Monitor	1927	1971	1975	1981
Microcomputer	1962	1974	1977	1982
Home VCR	1951	1974	1975	1980
Compact disc player	1979	1983	1984	1985
Cellular telephone	1970	1983	1985	1986
Optical disc drive	1979	1984	1987	1993

***Appendix F**. Topics a Marketing/Launch Plan should include (based on Kitcho 1998, Nagle, 2005)*

- Executive Summary
- Strategic business objectives
- Product description
- Target customer description
- Market trends
- Market size
- Market segmentation
- Competition
- Pricing
- Positioning
- Value Proposition
- Goals and Measures
- Project Plan and Resources
- Customer Trials
- Pricing Strategy
- Competitive Assessment
- Rollout Strategy
- Communication and Messaging plan
- Channel and Distribution Strategy
- Strategic partners
- Operations Ramp up
- Sales and Channel Training Plan
- Marketing programs
- Customer Service and support Plan
- Obsolescence Plan
- Outstanding Issues and Risk analysis and mitigation

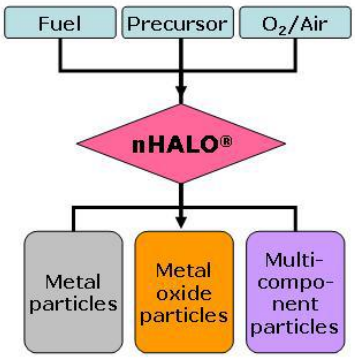
- ***Appendix G.*** This list describes several deliverables a firm needs to create to support the sales of a new product. The list is just illustrative. Some of the items are not necessarily needed and there can be items that are missing. (Based on the extant literature and author's own experience.)

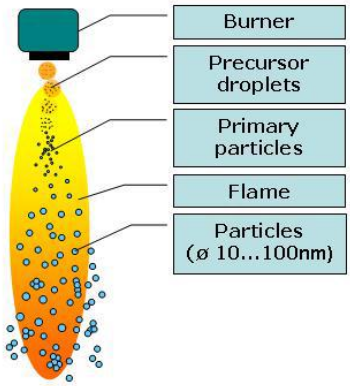
- Public marketing material
- Product (and service) brochure (printed and online versions) describing features, function and benefits.
- Audience specific data sheets with more technical description of a product
- Posters / banners
- Name & branding
- White paper(s) / leaflet(s)
- Exhibition stands and demos (+ company specific marketing material, handouts, gifts, takeaways etc.)
- Review articles by magazines, newspapers analysts etc.
- Customer testimonials
- Letter/certificate of compliance (proof that a product meets standards, regulations, directives etc.)
- Sales and marketing presentations of a product (content typically tailored for different audiences and decision makers)
- Video clips about a product and its usage
- Visual aids i.e. pictures, 3D images, virtual tours/demos etc.
- Roadmap (public version) of forthcoming features
- Product specific website (where all the above mentioned items can be viewed or downloaded)
- Samples (either the product samples or test samples i.e. output of usage of a product)
- Prototypes or physical mock-ups if a product is still under development
- Packaging & artwork
- Press release material
- Press tour plans
- Sales support material
- Sales training material
- Social media programs
- Websites / digital press room
- Webinars/seminars
- blog pages / on-line forums
- Price list
- Advertising material & campaigns
- Sales process descriptions
- Launch plan (see the previous appendix)
- Distribution plan and channel selection
- Tradeshow, event and seminar plan & calendar
- PR activities (press tour / analyst coverage)
- Action plan for social media presence
- Non-disclosure agreements
- Licensing agreements

- Internal technology and product roadmaps
- Competitor analysis
- Cost justification analysis
- Product support and warranty policy
- Shipping terms
- Legal notes and disclaimers regarding the proper use of a product

Appendix H. Pictures of case products

Appendix H1, Beneq nHALO



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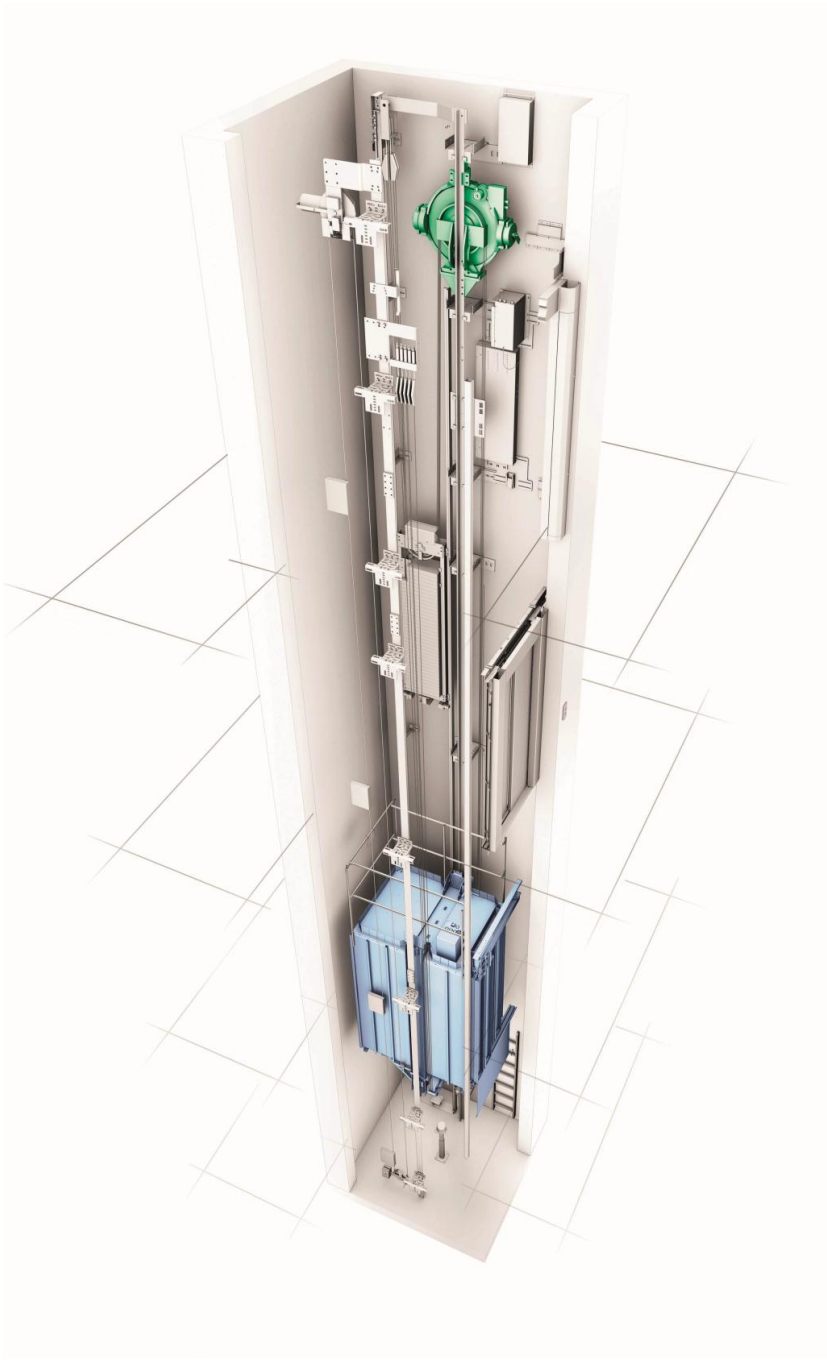
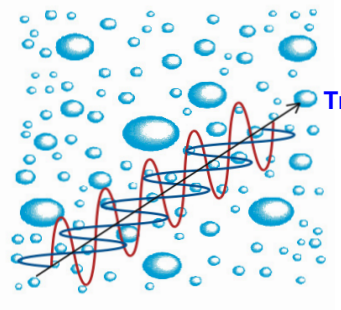


Appendix H4, Marioff HI-FOG

Appendix H5, Martela Combo


Transmitted pulse

Begin at the beginning and go on till you come to the end; then stop.
- Lewis Carrol, (Alice in Wonderland)

Product innovations are the cornerstones of growth and profit in business. One of the main arguments put forward in this dissertation postulates that commercial success is required for a new product to become a product innovation. Commercial success does not happen automatically; it requires the proper management of commercialization. The purpose of this dissertation is to study and understand commercialization within the context of industrial, business-to-business (B2B) product innovations and to develop a new theory for it. As a research method, the empirical part of the study makes use of case-study research and builds a theory based on the cases. The B2B case firms under study included Beneq, Exact Tools, KONE, Marioff, Martela, and Vaisala. New theoretical constructs and propositions for the successful management of commercialization are presented based on combining the case studies and the literature.

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