MASTER'S THESIS

MARKET-ENTRY STRATEGIES ALIGNED TO THE DYNAMIC BRANCH OF THE SEMICONDUCTOR INDUSTRY

executed at

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Innovation Management

by

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Signature

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PRINCIPLE OF EQUALITY

For readability purposes, gender-specific formulations have not been used in the present piece of work. It is, however, hereby expressly stated that when the masculine form is used to denote people, both sexes are being referred to.

ACKNOWLEDGEMENT

At this proud moment, I would like to thank all people who have contributed to the successful completion of this thesis. The development of this master's thesis would not have been possible without the support of many individuals.

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ABSTRACT

The semiconductor industry is a dynamic, fast-moving branch with the overall aim to facilitate people's lives. Therefore many inventions and innovations have arisen by this industry. After proving a technology's efficacy in one market, additional markets and applications are identified. Hence, managers of semiconductor companies have to think about an appropriate market-entry strategy. Regularly, market-entries fail because of missing structures or defined procedures.

The current master's thesis deals with designing a procedure model regarding market-entry strategies for the semiconductor industry. Firstly, the conceptual basis is outlined to define important topics within the thesis. After that, an intense literature review covers the semiconductor industry with its characteristics and generic market-entry strategies. With the insights and results of the literature review, a theoretical procedure model for market-entry strategies is designed. The model is validated and proved through a workshop of NXP Semiconductors on a real targeted market. Moreover, an in-depth study incorporating interviews with experts on NXP Semiconductors and other semiconductor companies verifies and requests feedback with respect to the newly designed procedure model. Finally, the model is adapted and recommendations for implementing it are made.

The semiconductor industry is a complex and very dynamic branch with specific characteristics and requirements, properties which a procedure model for market-entry strategies must consider. This thesis develops and designs a procedure model to offer an approach to that effect, with final recommendations for an implementation at NXP Semiconductors.

KURZFASSUNG

Die Halbleiterbranche präsentiert sich als eine dynamische, schnelllebige Branche mit dem Ziel, das Leben der Menschen zu erleichtern. Daher gehen zahlreiche Erfindungen und Innovationen auf diese Branche zurück. Nach erfolgreicher Einführung einer Technologie in einem Markt werden weitere identifiziert und adressiert. Demnach müssen sich Manager von Halbleiterfirmen über die passende Markteintrittsstrategie Gedanken machen. Oftmals scheitern diese Markteintritte aufgrund fehlender Strukturen oder nicht definierter Vorgehensweisen.

Die vorliegende Masterarbeit beschäftigt sich mit der Erstellung eines Vorgehensmodells hinsichtlich Markteintrittsstrategien für die Halbleiterindustrie. Zu Beginn werden grundlegende Begriffe definiert, um ein einheitliches Verständnis der Arbeit sicherzustellen. Nach eingehender Literaturrecherche werden die Halbleiterindustrie und die generischen Markteintrittsstrategien beschrieben. Aus den Erkenntnissen und Ergebnissen der Literaturrecherche wird ein theoretisches Vorgehensmodell für Markteintrittsstrategien entwickelt. Anschließend wird das Modell im Zuge eines Workshops bei NXP Semiconductors anhand eines realen Zielmarktes angewendet. Des Weiteren wird eine empirische Studie in Form von Experteninterviews durchgeführt, um das Modell zu validieren und Rückmeldungen für Adaptierungen zu erhalten. Abschließend soll das Vorgehensmodell dementsprechend angepasst und Handlungsempfehlungen für die Implementierung gegeben werden.

Zusammenfassend wird festgehalten, dass die Halbleiterbranche eine komplexe und dynamische Branche mit speziellen Eigenschaften und Ansprüchen ist. Diese Besonderheiten müssen bei der Erstellung eines Vorgehensmodells berücksichtigt werden. Das in der Masterarbeit entwickelte Vorgehensmodell bietet einen Lösungsansatz, der diesen Gegebenheiten Rechnung trägt. Zusätzlich werden Handlungsempfehlungen für die Implementierung bei NXP Semiconductors gegeben.

TABLE OF CONTENTS

1 INTRODUCTION

The current master's thesis deals with market-entry strategies in the semiconductor industry, with a dedicated focus on the procedure for deciding upon a strategy.

1.1 Initial situation

The semiconductor industry is unique among other industries. With the invention of numerous technologies and the development of various innovations, the industry has revolutionized people's lives. Semiconductor companies are situated in a business ecosystem comprised of suppliers, customers and complementary actors, like device manufacturers. Each of these players exerts a crucial influence on the ability of the semiconductor companies to create value from their own products and technologies.

For the past 60 years, the semiconductor industry has evolved rapidly with respect to Moore's Law. Transistor scaling associated with doubling the number of transistors every two years has been and continues to be the unique feature of the semiconductor industry.[1] This law, which is rather a prediction, can be best observed on the consumer electronic market, where innovations and new products arise month by month, a fact that points out clearly how dynamic and fast moving this industry is.

With regard to the value chain, the semiconductor companies remain at its very beginning, developing and inventing technology. For the end customer, the semiconductor companies have to offer applications insofar as little chips and sensors are intangible. In proving a technology successfully in one market, additional markets are identified. At this stage, managers face the decision of a market-entry strategy. The following subchapter outlines the problem regarding decisions for market-entry strategies.

1.2 Problem statement

As mentioned above, the semiconductor industry is very dynamic and develops many inventions and ideas. When it comes to the point of new market entries, managers face the problem of missing structure, or rather missing a defined procedure. Hence, market entries regularly fail and other alternatives are pursued. Besides the wasted time and money, the relevant decisions, or rather the decision path, are neither comprehensible nor replicable.

1.3 Objectives

As the master's thesis is written in cooperation with NXP Semiconductors, the thesis aim and the company aim will be outlined separately. In general the research question for the whole process is as follows: What does the ideal procedure model for a market-entry strategy for the semiconductor industry look like?

1.3.1 Thesis aim

The aim of this thesis is to develop a procedure model for market-entry strategies for the semiconductor industry, with focus on the specific characteristics of that industry. Moreover the thesis aims to test the

[1] Cf. Nenni/McLallen (2013), p. 13.

model with a real-world example, an aim accommodated by NXP Semiconductors, allowing for final recommendations for action.

1.3.2 Company aim

The main business goal of NXP Semiconductors is to enter successfully the event market through an appropriate market-entry strategy. A successful entering is reached in case of holding a minimum of 75% market share within events with contactless technology by the end of 2016.

Furthermore, advice regarding the implementation of a procedure model for market-entry strategies is sought.

1.4 Study design and relation to innovation management

After the introduction, the chapter 2 outlines the thesis's conceptual basis, including necessary background topics and the methods used in the theory to ensure a consistent understanding. The third chapter deals with the semiconductor industry. In that respect, Porter's five forces are described to enable an overall view on this dynamic branch. Furthermore, the field of applications and marketing are considered to present the various activities of semiconductor companies. This chapter gives appropriate insight into this industry and its specific characteristics. Afterwards the generic market-entry strategies are covered that can be generally divided into dependent and independent strategies. Moreover, the several timing strategies and market-entry barriers are pointed out. With insights and results out of the semiconductor industry and the market-entry strategies, a procedure model for market-entry strategies is detailed.

In the next step, the company NXP Semiconductors is described, where the designed procedure model was tested on a real targeted market. This testing produced results regarding the practical use of the model, which are explained. Also discussed is that later, an in-depth study, which included interviews with experts of NXP Semiconductors and some external semiconductor companies, validated the model and generated some valuable feedback. With these results, the procedure model was adapted in general and, if required, for NXP Semiconductors in particular, as described. Additionally recommendations for implementing the procedure model at NXP Semiconductors are given. The first figure illustrates the frame of reference to enable a graphical overview.

The relation of this master's thesis to innovation management is obvious regarding the definition of an innovation. Only a successful market entry changes the status of an invention to an innovation. Hence, structured market-entry strategies are indispensable for an innovation. With regard to the designed procedure model, it is stated that well-founded methodological competence is required as relations between tools and knowledge about adapting tools for a specific situation or branch are demanded. Moreover, an interconnected thinking is needed when analysing a technology industry like the semiconductor industry and market-entry strategies. Furthermore, the execution and testing of the procedure model with an interdisciplinary team requires specific social skills. The kind of project of the current master's thesis is generally undertaken by educated innovation managers.

1.5 Frame of reference

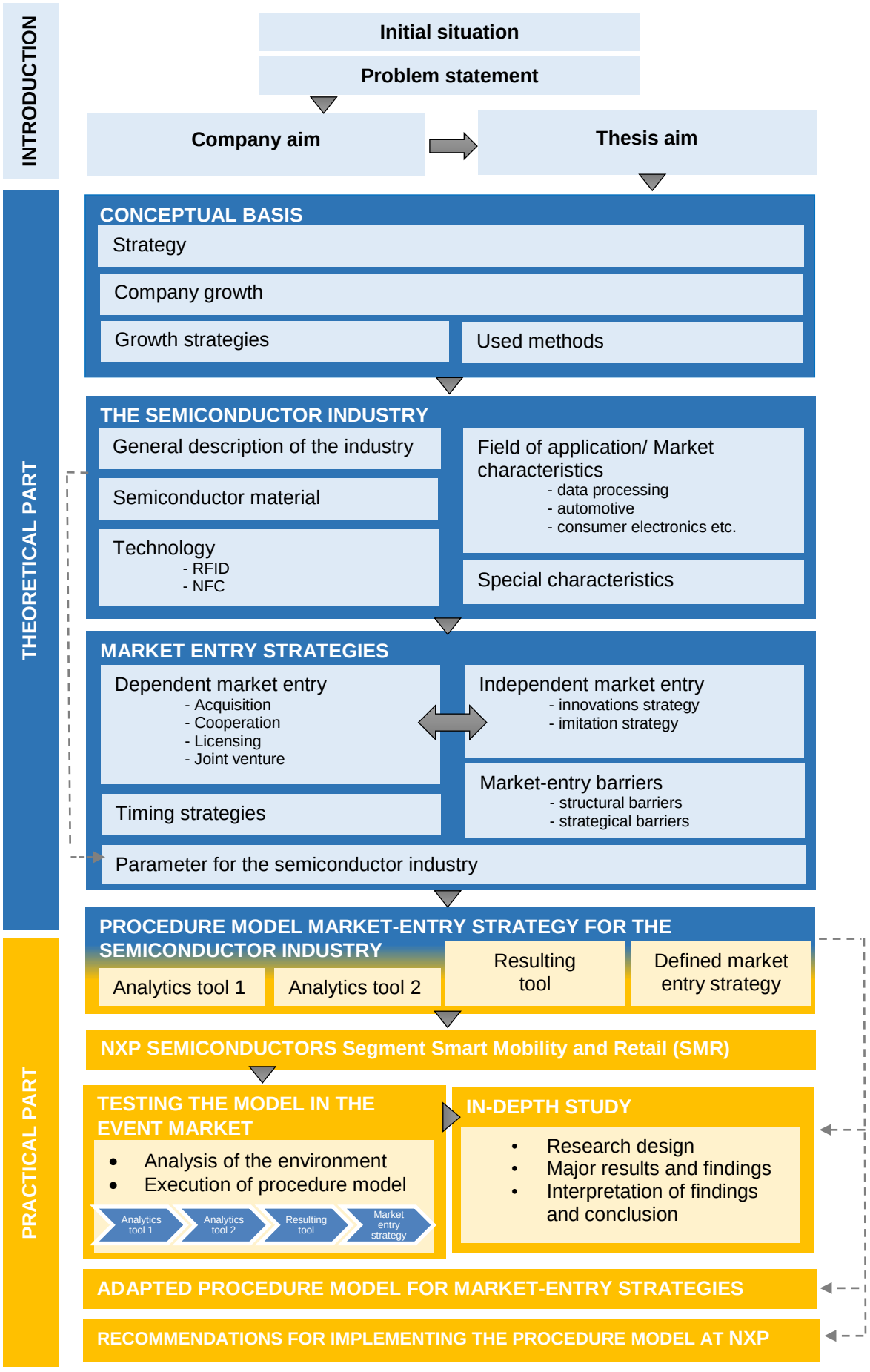

Figure 1: Frame of reference, source: compiled by the author.

2 CONCEPTUAL BASIS

Before turning to the semiconductor industry and market-entry strategies, the thesis will explain some general terms to establish a consistent understanding. Furthermore, the author will discuss in simple terms when, how and why it is important to think about an appropriate market-entry strategy.

2.1 Strategy

For the term 'strategy' there is a variety of definitions, which vary broadly. The spectrum runs from roughly explained company values to exact guidelines how and with which resources targets have to be achieved. Moreover there is a differentiation between intended and evolved or rather intuitive strategies. The second results more from independent decisions than from planned measures.[2]

As far as this thesis will deal mainly with intended or planned strategies, the following definition will be adequate.

'Strategy' is a long-term guideline for build-up and survival of success potentials, which are essential for a company's success or for the fostering of significant business.[3]

Further there are different forms of strategy:[4]

- The corporate strategy determines the competitive position in defined markets or rather with the choice of the strategic business unit.[5] Beside this focus, the objectives of market positioning in the form of market share are added, as well as the investment objectives, which means that sort and priority of planned investments are mentioned.
- The business strategy describes which competitive advantages in offering and in resources per business unit have to be built up or obtained for achieving the targeted competitive position. At this level, the synonym 'competitive strategy' is often used.
- Functional or internal strategies refer to long term schemes for internal functional areas. Effective and efficient processes and organizational structures are the main targets to support corporate and business strategy.

The following graphic gives a visual overview of these three strategic forms.

[2] Cf. Mintzberg et al. (1995), p. 30.

[3] Cf. Kühn/Grünig (2011), p. 41.

[4] Cf. Kühn/Grünig (2011), p. 67.

[5] A strategic business unit is a definable business with a high importance of success and within the strategy can be planned independently.

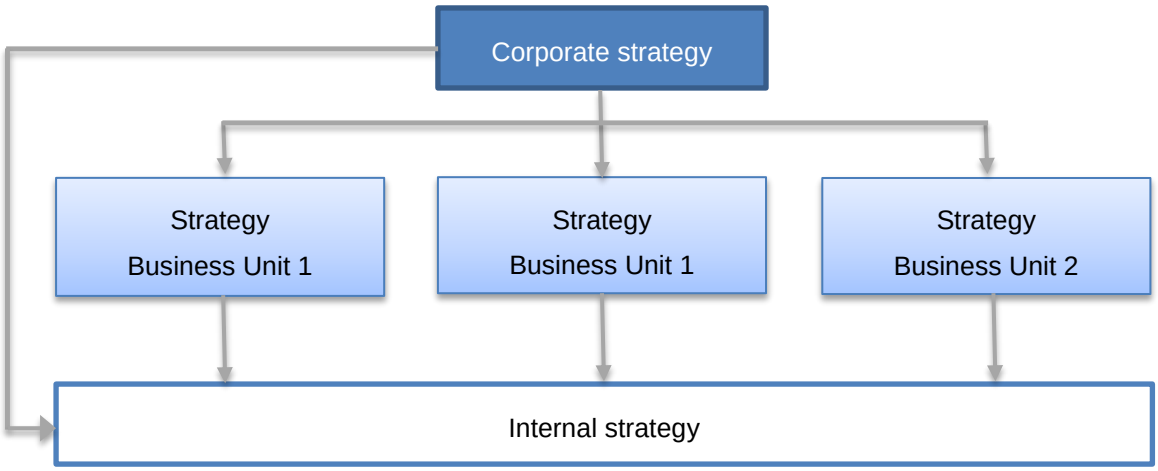

Figure 2: Strategic forms in companies, source: Bopp (2007), p. 9 (slightly modified).

2.2 Process of growth

Managers always try to gain more market share and take advantage of new business fields related to their responsibility to find and utilize opportunities. For decades scientists have attempted to uncover the secrets of successfully growing several companies. Some findings have been arrived at, but a comprehensive and universal formula does not seem to exist.[6]

The literature states that 'growth' itself stands for increase in a defined period. In economic terms, growth means an increase in revenue, in turnover or in gross domestic product. Furthermore, the objectives of growth are not often clear; moreover it has to be clarified which objectives are meaningful. Economists and management experts point out that the objectives depend on external factors. Since 18th century economist Adam Smith, increase in prosperity has been the overall aim of economic activity.[7]

Independently, systems give the impression that there is an inward tendency to grow. Therefore the principle of C. Northcote Parkinson shows that work expands in the same way like as time becomes available and depending on complexity. Furthermore companies grow because every head wants to have as many employees as possible.[8]

Despite effort tendency toward steady growth, there are periods of contraction and stagnation in enterprises as well as in economics. There is a very popular principle which accounts for those upturns and downturns, the Kondratieff-cycles, which highlights that the economy is subject not only to short-term economic cycles, but also to long term periods of upturns and downturns, which endure for at least 45 to 60 years, roughly. The so-called basic innovations, like the steam engine or the automobile, initiate those cycles and create immense social, economic and political changes and developments.[9]

[6] Cf. Hegele-Raih (2004), p. 16.

[7] Cf. Hegele-Raih (2004), p. 16.

[8] Cf. Weinart (2014), p. 42.

[9] Cf. Vahs/Brehm (2013), pp. 4-5.

None of the named theories necessarily indicate the one and correct way to foster growth, but they support consideration of widespread assumptions. Hence, it is possible to generate new concepts and solutions which are appropriate to individual environments.[10]

To summarize, growth is a very important factor in the success and survival of an enterprise. The need for growth cannot be ignored, so growth strategies for companies are important, some of which will be explained in the next section.

2.3 Growth strategies

Decision makers often make use of the generic strategy model of Igor Ansoff (1988). Ansoff's model concerns whether growth will involve new or existing products and markets. Each growth option implicates its own benefits and risks. Hence, a selection and strategy evaluation stage usually involves a full analysis of these.[11]

The subsequent framework illustrates the Ansoff product/market matrix.

	EXISTING PRODUCTS	NEW PRODUCTS
EXISTING MARKETS	**Market penetration** Intensifying market development, relaunching products, cutting costs and prices, marketing activities	**Product development** New products, new product lines, new services, new problem and system solutions
NEW MARKETS	**Market development** Expanding the market, new customer strata, new distribution channels, new uses for the products	**Diversification** New products for new markets - related - unrelated

Figure 3: The product/market matrix, source: Kotler et al. (2010), p. 36 (slightly modified).

The matrix expresses potential areas where core competences and generic strategies can be positioned. There are four alternatives:[12]

[10] Cf. Hegele-Raih (2004), p.17.

[11] Cf. Campbell et al. (2011), p. 212.

[12] Cf. Campbell et al. (2011), p. 214.

- **Market penetration** points out the offering of existing products to the existing markets. Appropriate methods for increasing revenue and gaining market share are marketing activities. These may include new promotion of the product or repositioning the brand. Furthermore a low-cost strategy will be integrated to offer low prices. Thus the existing products are not altered and the organization does not seek any new customers.[13]
- **Market development** is based on entry into new markets or new segments of existing markets while retaining existing products. Entering new markets seems to leverage present competences. Moreover there is the opportunity to develop new competences that serve the particular needs of customers in these segments. Globalization and internationalization are the most common examples of market development. Due to linguistic, logistical, cultural and other potential problems when a company enters a new market, it is natural to build up new competences to handle these circumstances.
- **Product development** integrates all strategic efforts for developing a new product for an existing market. The intention is to attract new customers, retain existing ones and further increase market share, as with the previous two growth directions. The offer of new products centres on exploiting existing competencies but may also require that new ones be built up. Product development offers the advantage to a business of dealing with customer requirements and needs of which it has some experience, because they operate in its existing market. For many organizations, product development has become a crucial direction of strategic growth related to a world of shortening product life cycles.
- **Diversification** describes a business growth where new markets and new products get developed. It is a suitable option when products are reaching the end of their life cycle or when the current markets are saturated. This option leads to new synergies and spreads risk by expanding the product and market portfolio. The literature specifies two different forms of diversification, depending on how different the markets and products are to current ones. On one hand, there is the *related diversification* where the new products or markets share some degree of commonality with existing ones. In practice, it usually means growth into similar industries or forward or backward in a business's existing supply chain. On the other hand, the growth takes place with completely new products and market areas with which the organization has never dealt before. This direction is called *unrelated diversification*.

Ansoff's matrix claims the differentiation on new and existing markets and new and existing products, which leads to variable growth strategies and is used as lead in strategic decisions.

After creating an overall strategy and furthermore defining a growth direction, the organization has to think about an adequate market-entry strategy.[14]

The different generic market-entry strategies are discussed in chapter 4. The methods used to describe the semiconductor industry will be initially explained in the next section.

[13] Cf. Vashisht (2005), p. 39.

[14] Cf. Kamlage (2001), p. 15.

2.4 Methods used in the theory

To describe and understand the complex branch of the semiconductor industry, the author will benefit from certain methods, specified below. Furthermore, they will appear again in the designed procedure model. Hence, the term 'procedure model' will also be explained.

2.4.1 Porter's five forces

Once the boundaries of an industry have been acknowledged, the task facing managers is to analyse competitive forces in the environment of the industry. Such analysis helps to identify opportunities and threats. The well-known framework of the five forces model, developed by Michael E. Porter, helps managers to conduct these analysis.[15]

The model, shown in the following figure 4, illustrates five forces that shape competition within an industry:[16]

- the risk of entry by potential competitors,
- the intensity of competition among established companies within an industry,
- the bargaining power of buyers,
- the bargaining power of suppliers, and
- the threat of substitutes to an industry's products.

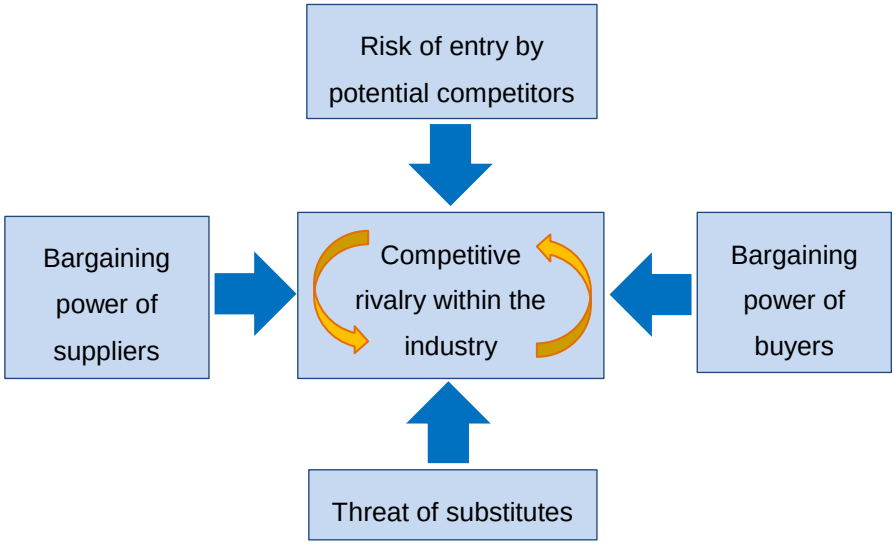

Figure 4: Porter's five forces, source: Hill/Jones (2009), p. 43 (slightly modified).

Porter expressed that the stronger each of these forces, the more limited the ability of established organizations to raise prices and increase revenue. Hence, a strong competitive force can be considered a threat because it reduces revenue and causes decreased profit. In contrast, a weak competitive force may be an opportunity to earn greater profit. The model is not fixed, it will always be adapted related to the changes of the industry conditions. Managers are stipulated to recognize how changes in the five forces give rise to new threats and rather opportunities and to construe appropriate strategies.[17]

[15] Cf. Hill/Jones (2009), p. 42.

[16] Cf. Hill/Jones (2009), p. 42.

[17] Cf. Hill/Jones (2009), p. 43.

2.4.2 Value chain

The value chain defines a series of actions and is designed to install and value successfully a product or a service in a market. In general it is used for strategic management and especially to identify competitive advantages. This model allows the user to analyse each step or rather action to improve and optimize it. The value chain targets three main objectives: service improvement, cost reduction and value creation. Finally, this tool accounts for a significant proportion of a company's success in economic, ecological, and societal terms.[18]

The value chain covers all stages of the lifecycle, from the idea or concept, raw material sourcing, production, distribution, and end customer use to the point where the product goes back to a biological or technical cycle, in this way closing the loop.[19]

The value chain with its illustration will be shown in relation to the semiconductor industry in the next chapter.

2.4.3 Procedure model

The literature states, in general, that a procedure model organizes a process in different and structured stages, where defined methods and tools are connected with regard to the organization. Therefore the required tasks and activities are combined in a logical order. Procedure models are used for structured and transparent realization of projects to avoid risks, time delay and unnecessary costs. In the end, the procedure model should lead to an action plan.[20]

The following image shows the basic illustration of a procedure model.

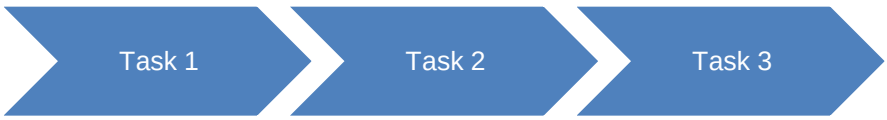

Figure 5: Procedure model basic, source: compiled by the author.

With the conceptual basis of this thesis established, the semiconductor industry will be analysed in chapter 3.

[18] Cf. D'heur (2015), p. 5.

[19] Cf. D'heur (2015), p. 6.

[20] Cf. ITWissen, online source [12.11.2016].

3 THE SEMICONDUCTOR INDUSTRY

The semiconductor industry and its innovations have the power to change the world. About 60 years ago, when the semiconductors arose, only a few people really saw that promise. That power of semiconductors to innovate has by far exceeded of its original applications. Also the way to manufacture and further the value chain has changed tremendously. Over the first 30 years, the semiconductor industry followed the proven integrated manufacturing model of the time. Those companies who owned the manufacturing assets made, marketed, researched and developed their own products. But this model changed over the intervening decades.[21]

In the main, an industry, or as formerly named 'branch', is defined as a group of companies that independently or in cooperation produce similar or complementary goods. Companies with the same manufacturing process or the same raw materials, like petroleum processing, can be banded together. A single industry is often named after its principal good, for example the automotive industry. Furthermore, an industry is defined as any general business activity or commercial enterprise that can be isolated from others, such as the tourist industry or the entertainment industry.[22] Connected to the term 'industry', the literature often states the 'relevant market'. The relevant market contains all products and services in the market, which participants are able to choose in the act of purchasing and selling.[23]

Generally, the semiconductor industry is dependent on economies of scale effects. This manufacturing industry is one of the most investment-intensive industry. Furthermore the complexity of the product itself and its frequently fluctuating and unpredictable markets produce a very difficult business environment.[24]

With regard to manufacturing, the literature states that there are three types of semiconductor companies:[25]

1. integrated device manufacturers (IDMs) are organizations that design, manufacture and sell their chips;
2. fabless manufacturers design and sell chips but outsource manufacturing to foundry companies; and
3. hybrid companies own part of the manufacturing but also outsource some of the manufacturing.

The global semiconductor industry is dominated by USA, Japan, South Korea and European Union. The Semiconductor Industry Association (SIA) announces that the semiconductor industry was a $335 billion market in 2015. This valuation represents a slight decrease of 0.2 percent compared to 2014, which was the industry's best year.[26]

[21] Cf. Nenni/McLallen (2013), p. vi.

[22] Cf. Business Dictionary, online source [12.11.2016].

[23] Cf. Backhaus (2007), p. 126.

[24] Cf. Leitner (2004), p. 1.

[25] Cf. Brown/Linden (2011), p. 10.

[26] Cf. Semiconductor Industry Association (2016), online source [12.11.2016].

The table 1 outlines the three leading semiconductor companies to offer some insight into the market.

Rank 2014	Rank 2013	Company	Country of origin	Revenue (million $ USD)	2014/2013 changes	Market share
1	1	Intel Corporation	USA	49 964	+6.3%	14.1%
2	2	Samsung Electronics	South Korea	38 273	+15.6%	10.8%
3	3	Qualcomm	USA	19 266	+11.9%	5.5%

Table 1: Semiconductor rankings for 2014, source: compiled by the author, simplified referring to IHS Inc. (2014), online source [12.11.2016].

The semiconductor industry has been growing virtually nonstop for 60 years, where the global sales have increased with an average compound annual growth rate (CAGR) of about 9% per year. Furthermore, several negative effects in the economy, like the bursting of the internet bubble in 2001 and the financial crisis from 2008 to 2009, impacted the industry definitely. This correlation between economic development and semiconductor sales will be explained in the section 3.6, 'special characteristics'. Despite its high market growth, the semiconductor industry has been characterized by rapid technological innovation, perhaps best expressed by the oft-quoted Moore's Law, as explained in the next section. Another characteristic of the industry is its need for huge amounts of capital to support both growth and technological progress.[27]

Even though the technology behind the electronic devices is mainly hidden from sight, its influence on daily lives, health, economics, and entertainment is incontrovertible. Nowadays, digital electronics are indispensable and ubiquitous to the daily life of modern people. Two remarkable incidents happened to bring consumer electronics, more precisely the semiconductor, into every household: the invention of the transistor in 1947, and the invention of the integrated circuit (IC) in 1959.[28]

3.1 The semiconductor and consequential inventions

A semiconductor is a material which is neither a good conductor nor a good insulator. The semiconducting material mainly used in IC manufacturing is silicon, but gallium arsenide is also used for some less-common applications. In conductors like metal, electric current is carried by free electrons to move about the atomic lattice of the used material. In insulators, electrons typically stay tightly bound to their atoms and are not available to serve as charge carriers. In semiconductors, free carriers are not ordinarily present, but they are able to be generated with a modest amount of energy.[29]

Electronic devices are made of active active circuit elements, like transistors, and further passive elements, like resistors and capacitors. Before the appearance of the microelectronic technology, these basic functional units were manufactured separately and wired together with metal conductors to form electronic

[27] Cf. Ballhaus et.al. (2012), p. 12.

[28] Cf. Nenni/McLellan (2013), p. 11.

[29] Cf. Leitner (2004), p. 2.

devices. This so-called circuit elements microelectronic technology has not, mostly, changed the nature of these basic functional units. Moreover, it has made their electronic functions more reliable, more reproducible, and less expensive by fabricating miniaturized versions of them on a single semiconducting substrate of silicon or, more seldomly, of gallium arsenide. Finally, an increasing number of logic circuits have been implemented using the basic circuit elements that are most easily fabricated in silicon and perform best, even the transistors. Diverse research into some of the mysterious electrical properties of semiconductors initiated the development of the transistor, a device for controlling the flow of electrons in a solid crystal.[30]

The next big invention after the transistor was the IC, which connects diodes, transistors, resistors, and capacitors on a single chip. The IC turned out to be the big breakthrough in the semiconductor sector and furthermore for the whole society. Until that point, transistors were built one at a time and wired together manually using the so-called 'flying-wire' connections. Through the planar manufacturing process, multiple transistors could be created and connected together simultaneously. After a short time, in 1962, ICs were produced with dozens of transistors. Much has changed in the intervening years, but the same principle to build modern billion-transistor chips is still in use. Those two inventions, the transistor and the IC, are the key electronics today and turned out to be the winning technology.[31]

Related to transistors and ICs is Moore's Law, which has been already mentioned previously.

"The whole point of integrated circuits is to absorb the functions of what previously were discrete electronic components, to incorporate in a single new chip, and then to give them back for free, or at least for a lot less money than what they cost as individual parts. Thus, semiconductor technology eats everything, and people who oppose it get trampled."[32]

Moore's law is the observation that the number of transistors in an IC doubles approximately every two years. The law is named after Gordon E. Moore, the co-founder of Intel and Fairchild Semiconductor, whose paper from 1965 described a doubling every year in the number of components per IC, and predicted this rate of growth would continue for another decade. Ten years later, he revised the forecast, and as it can be seen, his prediction proved accurate for several decades. Moore pointed out that ICs would lead to wonders such as home computers, automatic controls for automobiles, and personal portable communications equipment. These outcomes were predicted about 50 years ago, and he was right because of observed facts about the trajectory of computational capacity.[33]

The law can be also seen from another angle. The cost of any given functionality implemented in electronics halves nearly every two years. Over a period of twenty years, this is a thousand-fold reduction, which is for example represented with video games in a very good way. A modern video game console has far more computing power and much better graphics than the highest-end flight simulators of the 1970s. Every ink-jet printer has considerably more computing power than the National Aeronautics and Space Administration (NASA) had for getting to the moon. The exponential reduction of electronic costs transformed everyday

[30] Cf. Najmi (1993), p.3.

[31] Cf. Nenni/McLallen (2013), p. 13.

[32] Moore (1965), p. 8.

[33] Cf. Nenni/McLallen (2013), pp. 13-14.

life, especially when ICs became cheap enough to be implemented into consumer electronic products. Because of this fast growth in semiconductor technology, the law is still used for guiding long-term planning and setting targets for research and development (R&D) in the semiconductor industry.[34]

For decades, the semiconductor industry has distinguished itself by the rapid pace of improvement in its products. The principal categories of improvement trends are illustrated in the following table with examples of each. The majority of these trends have resulted principally from the industry's ability to exponentially decrease the minimum feature sizes used to fabricate ICs. The most quoted trend, of course, is in the integration level, which is expressed through the Moore's Law. The decreasing cost per function is the most significant trend for the society, which has led to radical improvements of productivity and quality of life through expansion of computers, electronic communication, and consumer electronics.[35]

Trend	Example
Integration level	Components/chip, Moore's Law
Cost	Cost per function
Speed	Microprocessor clock rate, GHz
Power	Laptop or cell phone battery life
Compactness	Small and light-weight products
Functionality	Modern application processors combining analogue and digital functions

Table 2: Trends for semiconductor technologies, source: Leitner (2004), p. 3.

The manufacturing process of semiconductors, specifically transistors and ICs, will not be explained, since it does not effect the stated objectives of this thesis.

3.2 Porter's five forces of semiconductor industry

As stated in section 2.4.1, Porter identified five competitive forces that shape every industry and market. These forces help in analysing an entire industrial environment, from the intensity of competition to the profitability and attractiveness of the industry.

Regarding to the semiconductor industry, the five forces can be explained as follows:[36]

- **Competitive rivalry:** Between individual companies there are intense rivalries. This industry is marked by its pressure on chip makers to come up with something cheaper, faster and better than the defined the state-of-the art only a few months previously. Chip makers, foundries, designers and distributors – in fact everybody who is connected to the business of bringing chips from R&D

[34] Cf. Nenni/McLallen (2013), p. 14.

[35] Cf. Leitner (2004), p. 3.

[36] Cf. Leitner (2004), pp. 26-28.

into high-tech equipment – are all effected by this pressure. The outcome of these rivalries is an industry that continually produces cutting-edge technologies while handling volatile business conditions.

- **Threat of new entrants:** Design engineers with good ideas, and hence with often profitable innovations, would often leave the company to establish their own start-up in the early days of the semiconductor industry. After years of maturing, it turned out that setting up a chip fabrication factory requires billions of dollars in investment. The price of entry makes it painful or rather impossible for newcomers, but the biggest player will still keep up with state-of-the art. Thus, established players in this industry have an immense advantage. Nevertheless, there are signals that systems could be changing again. Alliances get formed by several semiconductor companies to spread the costs of manufacturing. In the meantime, the appearance and success of fabless chip makers point out that factory ownership may not last as a barrier to entry.
- **Bargaining power of suppliers:** Especially regarding to the large semiconductor companies, suppliers have little power. As an example, Toshiba can be named, which has for instance over 400 suppliers registered and leads to a high diffusion of risk over many companies. This principle keeps the bargaining power of any supplier to a minimum. Due to increasingly expensive production, many smaller chip makers become more and more dependent on a small choice of large foundries. Merchant foundries, the suppliers of cutting-edge equipment and production skills, enjoy significant industry bargaining power, which should be kept clearly in mind. The largest US-based foundry belongs certainly to IBM, which is also one of the top chip maker in its own right.
- **Bargaining power of buyers:** Most of the industry's key segments are dominated by a handful of big players. Intel, for instance, has preeminence in the microprocessors market. Therefore buyers have, like the suppliers in this industry, very little bargaining power. That does not mean that they have no power, as also shown with Intel with not being able to keep up with demand in the past.
- **Threat of substitutes:** With regard to the different segments and markets, the threat or availability of substitutes can be different. For a very brief period of time, well-organized intellectual property protection might stop the threat of new substitute chips or components, but afterwards other companies start to develop similar products at lower prices. That results in a big problem as far as semiconductor companies spend millions of dollars on the development and invention of faster and more reliable chips, resulting in high R&D costs. On the other hand, another semiconductor player comes along and reverse engineers the development of the others by launching a product for a fraction of the price.

3.3 Value chain

As already mentioned in chapter 2, the value chain defines a series of actions and is designed to install and value successfully a product or a service in a market. There can be a micro or macro perspective. The micro perspective examines the value chain within a company, all stages that happen in-house. On the other side there is the macro value chain, which covers all stages of the lifecycle from the idea or concept, raw-material sourcing, production, distribution, end-customer use to the point where the product goes back to a biological or technical cycle, in this way closing the loop.

For the semiconductor industry, the value chain would, in general, take the form represented in figure 6:

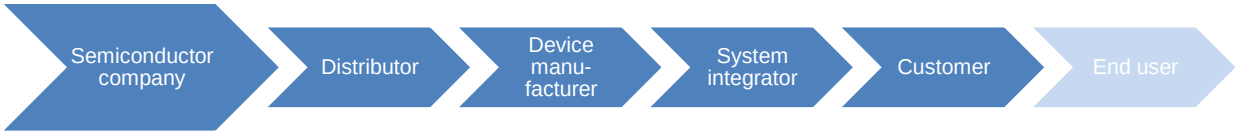

Figure 6: Value chain semiconductor industry, source: compiled by the author, simplified referring to Semiconductor Industry Association (2016), online source [12.11.2016].

Most of the semiconductor companies work with one or more distributors, which help them to spread their products globally and also into small business. About a quarter of the semiconductor's revenue is handled by the distributors; hence, this is one of the most important partnerships.[37]

After the distributing companies come the device manufacturers, which means that the product (i.e. the bought chip) has to be implemented into a form factor or another electronic housing. Form factors can be cards, wristbands or key fobs. In the end, a system integrator combines all necessary products into one system for a whole offering to the customers. In this case, customers are operators, for example from a hotel chain or a theme park. In the graphic above the end user is coloured differently, since there is typically no direct communication from the semiconductor companies to them. For reasons of completeness it is mentioned, that before the semiconductor company there are the suppliers of raw material or wafer. These are intendedly skipped because of their marginal impact on the value chain and often missing consideration regarding strategy decisions within the semiconductor companies.

3.4 Technologies and their features

As already mentioned above, Moore's Law has reflected technological progress within the semiconductor industry. At its formulation in 1965, Moore's Law predicted that semiconductor integration would double every 18 to 24 months. The conclusion of this 'law', which is really just an empirical observation, is that as performance increases, power consumption decreases, and prices fall at this same compound rate. Initially, Moore's prediction was intended to look only 10 years ahead, but it has remarkably held true for more than 45 years.[38]

Several times, experts have predicted that semiconductor production technology would soon reach its physical limits, beyond which further compaction would no longer be possible. Yet a number of technologies under development will continue to advance Moore's Law, especially with regard to nanotechnologies.[39]

Because this thesis does not really deal with production technologies, the author wants to detail the technologies which have been enabled through semiconductors. Particularly, the technologies of radio-frequency identification (RFID) and near-field communication (NFC) will be explained due to their importance as a key technologies and their specific relevant for this thesis's practical part.

[37] Cf. Batra et al. (2016), online source [12.11.2016].

[38] Cf. Ballhaus (2012), p. 33.

[39] Cf. Ballhaus (2012), p. 33.

3.4.1 Radio-frequency identification (RFID)

The generic term 'radio-frequency identification', more commonly referred to by its acronym, RFID, describes a system that transmits the identity of an object or person wirelessly by radio waves. RFID technology consists of auto-identification technologies, including bar codes, optical character readers and some biometric technologies. Auto-identification technologies have been introduced to reduce the amount of time and labour needed to input data manually and to improve data accuracy. Some of these technologies, like bar codes, often require a person to manually scan a tag or a label to record the data. RFID is designed to enable readers to capture data on tags and transmit them to a computer or data system without needing a person doing manually tasks.[40]

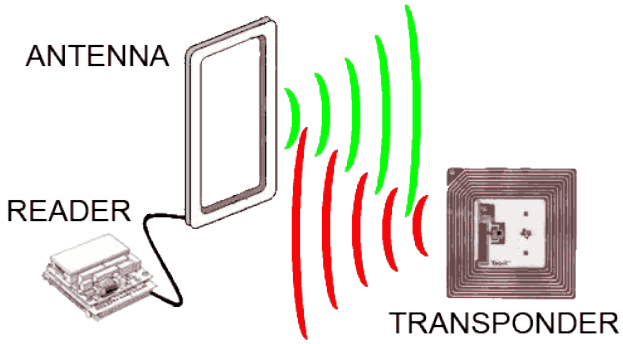

Figure 7: RFID mode of operation, source: Electronics Hub (2015), online source [12.11.2016].

A typical RFID tag consists of a microchip, made mainly of silicon, attached to a radio antenna mounted on a substrate, which is an underlying layer. The chips can store amounts of data from a few bits up to several hundred kilobytes, for information about a product or a shipment, for example. Related to this function, the date of manufacture, destination, and sell-by date can be written on the RFID tag. To retrieve the data stored on a tag, a reader is needed. A characteristic reader is a device which has one or more antennas that emit radio waves and receive signals back from the tag. Afterwards the reader passes the information in digital form to a computer system. Another fundamental advantage of RFID technology is that the RFID device is not required to be placed exactly near to the scanner or RFID reader. These devices can function from few centimetres away, even approximately 100 metres for devices, from the scanner machine.[41]

The most common versions of RFID tags are the active and the passive tags. On the one hand, active tags have a transmitter and their own power source, typically a battery. The power source is needed to run the microchip's circuitry and to transmit a signal to a reader. On the other hand, passive tags require no battery to work. As a replacement for the battery, they draw power from the reader, which sends out electromagnetic waves that induce current in the antenna of the tag. There are also the so-called semi-passive tags, which use a battery to run the chip's circuitry, but transmit by drawing power from the reader. Another difference between these three tag types is the reading range. While active tags can be read at

[40] Cf. Violino (2005), online source [12.11.2016].

[41] Cf. Hahndorf (2009), p. 13.

about 100 metres, passive and semi-passive tags have a read range of 10 centimetres up to a few metres, which also depends on the used frequency.[42]

The broad range of frequencies used by RFID will be illustrated in section 3.4.2, focusing on NFC.

RFID technology enables the optimization of many business processes through the improvement, the automation or the elimination of existing processes. Such eliminations lead to the emergence of new processes called intelligent processes or rather smart processes. The major applications that have driven the commercial deployment of RFID technology are as follows:[43]

- automated fare collection (AFC),
- logistics,
- supply chain management,
- library item tracking,
- medical implants,
- road tolling,
- building access control, and
- aviation and homeland security.

These systems are used for a wide range of applications that track, monitor, report, and manage items as they move between different physical locations. Especially supply chain management has been revolutionized through RFID.[44]

3.4.2 Near-field communication (NFC)

NFC is a wireless transmission method to enable data exchange between devices with a maximum distance of 4–10 centimetres. In 2002, NFC was co-invented by the former Philips-subsidiary NXP Semiconductors and Sony. Therefore they made use of standards of RFID.[45]

The improvements or changes on RFID to arrive at NFC technology can be summarized as follows:[46]

- short range communication, where RFID may use long range, especially for active tags that contain embedded energy;
- the use of only passive tags, which actually occurs in reader/write mode, while within RFID active and passive tags are possible;
- ensurance of inherently secure data exchange through short range communication;
- implicit matching of pairs that express their willingness to perform NFC communication by bringing themselves close to each other; and

[42] Cf. RFID Journal (ed.) (n.d.), online source [01.12.2016].

[43] Cf. Ahson/Ilyas (2008), p. 9.

[44] Cf. Ahson/Ilyas (2008), p. 9.

[45] Cf. Schnabel (2007), online source [12.11.2016].

[46] Cf. Coskun et al. (2011), pp. 18-19.

- companies' interest in integrating many services like payment or access control via NFC technology, because of the secure communication and implicit matching as described in the previous item.

As already mentioned above, RFID operates in a wide range of frequencies, while NFC is more specific, working on only one frequency. The 13.56 MHz frequency of NFC is standardized, which enables secure connections between two devices.[47]

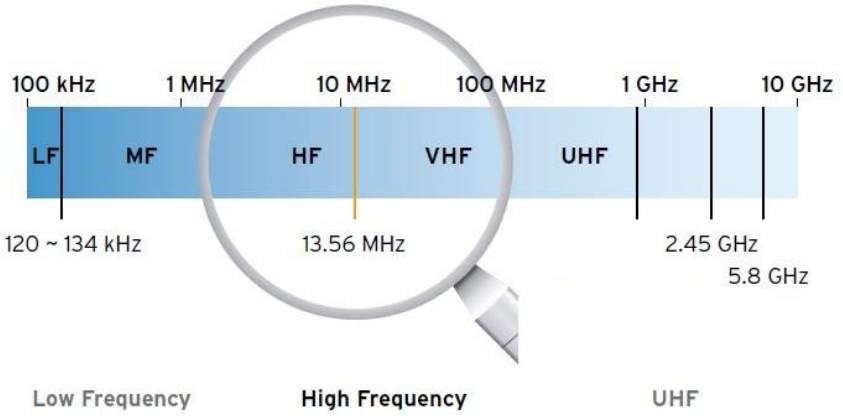

Figure 8: Frequencies in RFID and NFC, source: Cardz Group, online source [12.11.2016] (slightly modified).

Several producers of smartphones and mobile phones have already implemented the NFC-function to their products. With this integrated technology, they offer convenient payment or data exchange. Beside this kind of integration, there are some additional applications that can be handled by other form factors, like a smart card or a wristband:[48]

- loyalty,
- payment,
- access control,
- transport ticketing,
- identification (i.e. passport), and
- authentication.

Summarized, NFC is a specific form of RFID technology, which enables especially secure data exchange with a maximum read range of 10 centimetres. Many applications driven by RFID and NFC have been listed above; the following section will focus on the general application and markets of the semiconductor industry.

3.5 The field of application and market

Generally, the semiconductor industry's targeted market can be divided into the regional market and application market. Most of the semiconductor companies operate in nearly every continent. The global picture indicates a growth rate of 6.5% per year until 2017, and regional variations will probably be

[47] Cf. Schnabel (2007), online source [12.11.2016].

[48] Cf. Smart Card Alliance (2013), online source [12.11.2016].

significant in the coming years. While Europe will not grow so fast, due to its stagnating economy and the persistence of the unresolved sovereign debt crisis in some member states, America will see stronger growth. South America, for its part, will play a more and more significant role in driving the growth of the semiconductor industry. Asia is also considered a growth market, with the exception of Japan. China, particularly, will retain and expand its position as the number one semiconductor market in the world, a result of strong general economic growth and the rapid growth of its IC design sector.[49]

Although a huge number of semiconductor companies act globally, the market's entry into foreign countries, the so-called expansion will be not in the focus of this thesis. In fact, the application market, and furthermore the ability to address markets with new applications, will be the main topic. Hence, the author will explain these markets in more detail.

The semiconductor industry is linked to application markets, which are themselves diversified. The major application markets for semiconductor companies are as follows:[50]

- data processing (including personal computers [PCs], laptops, servers and tablets),
- communications (including fixed-line telephone systems, broadband, internet, mobile phones, smartphones and more),
- consumer electronics (television sets, music players, gaming consoles and household appliances),
- automotive, which comprises both light vehicles and trucks, and
- industrial (including infrastructure, rail services, the military, fossil and regenerative energy, smart grids and more).

The following diagram shows the percentage of each application market of the semiconductor industry. The author points out that military is less than 1% and is included in the industrial/government segment.

[49] Cf. Chitkara et al. (2013), p. 7.

[50] Cf. Ballhaus et.al. (2012), p. 14.

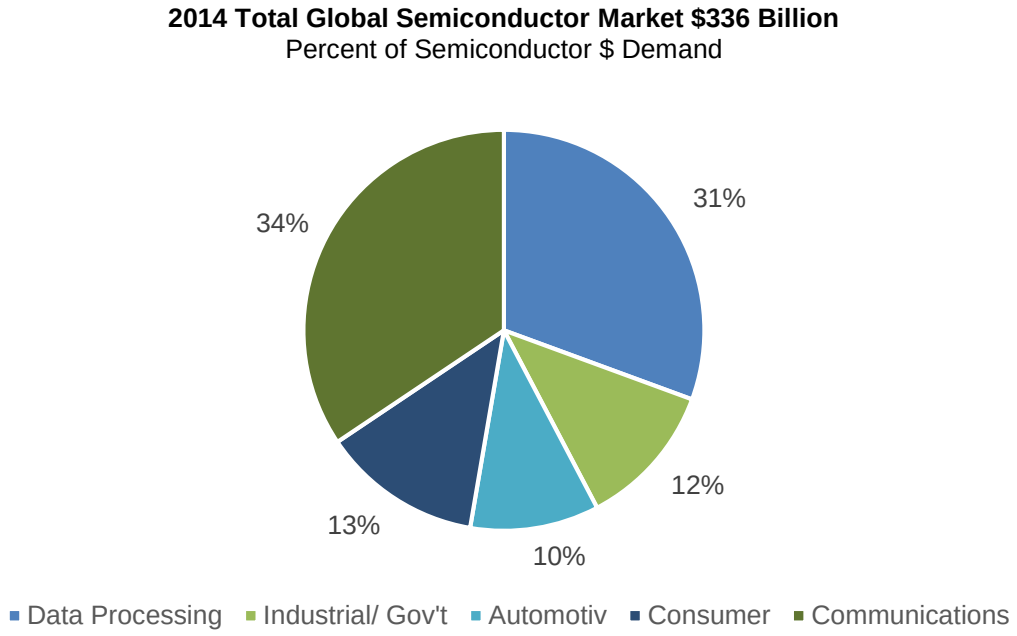

Figure 9: Application markets, source: compiled by the author, simplified referring to Semiconductor Industry Association (2015), online source [12.11.2016].

3.5.1 Data processing

The data-processing market is driven by digitalization, mobility and connectivity. With increased unit sales in new notebook computers and tablets, this market has seen steady growth. More and more products compete with Apple's iPad and its iterations, leading to a strong rise in unit volumes. With the maturity of the market, sale prices are now under pressure. While the average selling price for semiconductors in the data-processing segment will decline, however, the segment itself will grow through the maturing smartphone market.[51]

The whole PC, and furthermore the data-processing market, is characterized by high price sensitivity. The key attributes of this market are as follows:[52]

- price sensitivity,
- leading edge technology,
- high competition, and
- saturated market.

Notebook computers will remain the most powerful driver of semiconductor sales in the data-processing segment, with total billings rising up to US$ 34 billion by 2017. The rise of the tablet market and the decline of the desktop PC will manifest a shift in the market by approximately 2017, with the scale of semiconductor billings for tablets supposed to exceed those for desktop machines. However, things have been changing over the years, especially in this industry. Within the convertible devices segment, which forms a bridge between PCs and tablets, higher growth is predicted. Moreover, internet-enabled devices that can access

[51] Cf. Ballhaus et al. (2012), p. 21.

[52] Cf. Leitner (2004), p. 10.

cloud-based services and applications are also likely to make a noticeable impact on the semiconductor industry.[53]

3.5.2 Communications

Growth in communication devices will continue to be determined by the extent to which they offer smart capabilities. The immense rise of smartphones will continue to eclipse traditional, basic and feature handsets. In emerging markets, the demand for a more basic smartphone is likely to reduce the requirement for semiconductors compared to more sophisticated and complex devices that will continue to hold preeminence in developed markets. The introduction of high-speed broadband networks, like 4G[54], will drive smartphone sales. Smartphone penetration continues in developing markets, where feature phones dominate. Therefore that situation will also increase semiconductor content per phone.[55]

The main characteristics of the communications market can be summarized as follows:[56]

- standardization,
- price sensitivity,
- strong growth,
- high competition, and
- very short product cycles.

3.5.3 Consumer electronics

The consumer electronics market is one that is continually growing and evolving through its exciting new developments in recent years.[57] Every day, millions of customers worldwide make buying decisions on a wide range of electronic products for the home, office or for use on-the-go.[58]

Similar to the data-processing market, the consumer electronics segment benefits from good sales prospects for digital set-top boxes, as well as for digital cameras, game consoles and TV sets. The average sale prices show a decreasing trend, hence the semiconductor's growth in this market is slow.[59]

Particularly, this market is characterized by its high prices and high expenses in the first months after launching a product and very low prices at medium costs when the product has matured. Therefore the key attributes of the consumer electronics market are these:[60]

- market strongly influenced by macroeconomic cycle,
- various profit margins,

[53] Cf. Chitkara et al. (2013), p. 9.

[54] 4G is the short name for fourth-generation wireless, the stage of broadband mobile communications that replaces the third generation, called 3G.

[55] Cf. Chitkara et al. (2013), p. 9.

[56] Cf. Leitner (2004), p. 11.

[57] Cf. Statista, online source: [12.11.2016].

[58] Cf. IHS Inc. (2016), online source: [12.11.2016].

[59] Cf. Ballhaus et al. (2012), p. 22.

[60] Cf. Leitner (2004), p.15.

- dedicated product life cycles,
- necessity and difficulty of keeping up with changing market trends,
- swift-moving competitors, and
- complex dynamics of the consumer electronics supply chain.

3.5.4 Automotive

One of the reasons for increased semiconductor content in cars is the the increased use of electronic systems in conventional cars. Particularly in high-end segments, it can be seen that there is a high demand for improved safety systems and consumer electronics. Furthermore, the emergence of new technologies and new trends like electric and hybrid cars is also one of the favourable factors.[61]

A fraction of such electric and hybrid cars is expected to remain comparably small. At the moment, the automotive sector is driven by the growth of vehicles produced in the BRIC[62] countries and by the increase in average semiconductor content per vehicle.[63]

The key attributes from the automotive market are[64]

- steady market growth,
- high profit margin,
- high quality and reliability demand,
- long product cycles, and
- high entry barriers.

3.5.5 Industrial

The industrial sector exhibits strong growth because of increasing energy demands, seeing a continuing trend toward renewable energies and the expansion of high-speed rail transportation. Particularly in emerging markets, energy consumption is strongly linked to economic growth; hence global energy demand is growing. An enormous number of semiconductor elements is required by the installation of new power plants, new concepts of power transmission and more efficient power consumption.[65]

As mentioned, the expansion of railway traffic is beneficial for the semiconductor sector because many electronic components, including amplifiers, mixed-signal analogue devices and switches, are important elements within high-speed trains, as well as in the controlling infrastructure around the rail network.[66]

Summarized, the main attributes of this market are the following:[67]

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[61] Cf. Ballhaus et al. (2012), p. 19.

[62] BRIC is an acronym that refers to the countries Brazil, Russia, India and China

[63] Cf. Ballhaus et al. (2012), p. 17-19.

[64] Cf. Leitner (2004), p. 14.

[65] Cf. Ballhaus et al. (2012), p. 20.

[66] Cf. Ballhaus et al. (2012), p. 21.

[67] Cf. Leitner (2004), p. 15.

- market strongly influenced by macroeconomic cycles,
- various profit margins, and
- dedicated product life cycles.

3.6 Special characteristics

In every industry there are some unique and specific characteristics which outline the different originalities of each. The semiconductor industry stands out, with its extraordinary correlation to economic developments and the distinguished chance to benefit from the Internet of Things (IoT) expansion.

3.6.1 Correlation between economic context and profit

The literature states that the development of the semiconductor industry is cyclical, which points to the influence of economic factors. On closer inspection the distinct cycle of semiconductor sales closely mimics that of global economic cycles.[68]

A review of the past two decades shows that earnings before interest and taxes (EBIT) for major semiconductor companies were highest in 2000, at the height of the dot-com craze. Otherwise, in 2001 profits reached their lowest points, when the economy struggled, and during the recession from 2008 to 2009. As with the semiconductor industry as a whole, especially the memory segment is strongly influenced by economic trends. From 2008 to 2009, for instance, memory's EBIT collapsed as consumer demand fell for mobile phones, PCs and other high-tech products.[69]

The following illustration figure 10 shows this correlation between the average EBIT margins of the semiconductor industry. It is mentioned that the EBIT points out the average across various value-chain steps, for example electronic design automation, equipment, fabless, foundry and more.

Although a weak economy and, furthermore, economic crises may contribute to poor results, particularly in the semiconductor industry, fundamental structural factors also influence the course of business.[70]

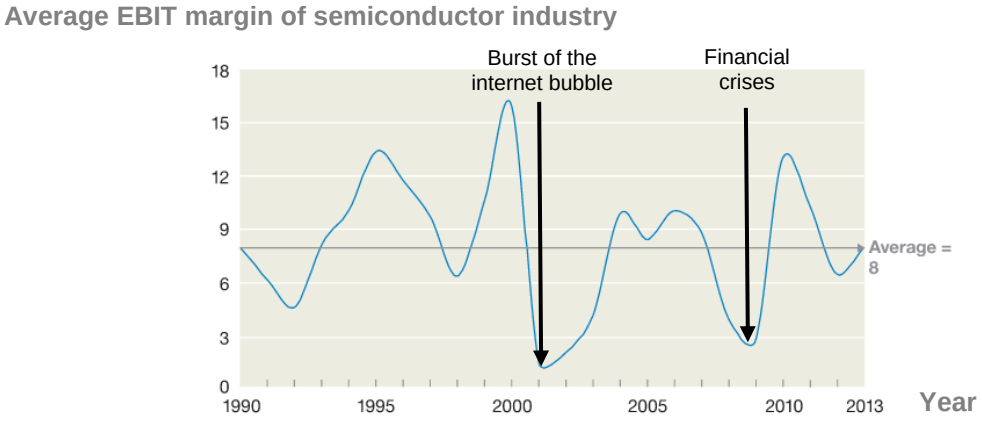

Figure 10: The semiconductor industry's EBIT are highly cyclical, source: Bauer et.al. (2015), p. 29 (slightly modified).

[68] Cf. Ballhaus et.al. (2012), p. 15.

[69] Cf. Bauer et.al. (2016), p. 28.

[70] Cf. Bauer et.al. (2016), p. 28.

To be in the right place at the right time is one of the most important issue for every company, as outlined in the next chapter, which expands upon IoT.

3.6.2 Internet of Things (IoT)

Within this thesis, the term IoT is defined as a network containing all 'smart' devices that have some sort of sensing mechanism which can communicate via the internet with other smart devices or the cloud, without human interaction. Indeed, IoT has generated excitement for some years now, with several start-ups and established business placing bets on the industry's growth. Some innovations have already become mainstream and begun to pay off, like smart thermostats or wearable fitness devices.[71]

Semiconductor companies, perhaps even more than other industry players, might benefit from the IoT's expansion. With a slight increase in the smartphone market, the IoT could serve as an important new source of revenue. Thus, the IoT present an avenue semiconductor companies should begin pursuing, while the sector is still developing.[72]

One of the most important issue is that the timing and magnitude of the IoT's growth may depend on how quickly industry players can address several problems, including limited customer demand, inadequate security protections, marketplace fragmentation, a lack of standards, and technological barriers. Semiconductor companies, which have encountered similar obstacles in other emerging technology sectors, are well positioned to serve as leaders in resolving these issues.[73]

Another important insight relates to the nature of semiconductor companies themselves. Their traditional focus has been on silicon, which allowed them to profit in many industries. This may not be optimal for the IoT, because chips represent only a small portion of the value chain, as already mentioned in section 3.3.

As an alternative, semiconductor companies will be required to provide comprehensive and complete solutions: for instance, solutions that involve software, security, or systems-integration services as added offerings to hardware. As with any major change, this direction involves some risk. On the other hand, it could help semiconductor companies transform from component suppliers to solution providers, allowing them to capture maximum benefits from the IoT.[74]

So, it can be clearly seen, how dynamic and fast the semiconductor industry is. The complexity within the industry and its whole ecosystem points out the specific requirements to all involved parties. After defining and exploring the several characteristics of the semiconductor industry, the generic market-entry strategies will be explained.

[71] Cf. Bauer et al. (2015), online source: [12.11.2016].

[72] Cf. Bauer et al. (2015), online source: [12.11.2016].

[73] Cf. Bauer et al. (2015), online source: [12.11.2016].

[74] Cf. Bauer et al. (2015), online source: [12.11.2016].

4 MARKET-ENTRY STRATEGIES

As already mentioned in chapter 2, organizations define strategies to realize their vision and to achieve their defined objectives. For a well-working company, it is essential to provide methods and processes to support and execute the strategies.

If a company operates in a market where they have never before been active, the organization face a question of how most successfully and efficiently to enter the new market. The answer to this question is given by the different market-entry strategies.[75]

Before the different market-entry strategies are discussed, the term 'market entry' has to be defined.

The literature states that market entry is the commencement of business of an organization in a market in which they have not operated previously. A market entry is always subjectively related to the business, and both 'start-ups' and expanding companies can enter a market.[76]

Market entry is also a possible strategy to avoid economic risk in case of stagnation in the current market. In the grip of stagnation in a present market, a company considering market entry starts from the premise that there is no chance to increase market share or to hold one's market position. Hence, organizations enter into more lucrative markets, which are highlighted as expansive markets with sufficient growth potential. In general, high risk is present when entering into new markets, especially with diversification into markets unrelated to a company's present focus, where the product also is new. The rate of failure and insolvency relating to new market entries reflects these risks. Nevertheless, innovation is important to ensure long-term potential for success. This multifaceted picture of market entry shows the urgency and necessity of a systematically planned market-entry strategy.[77]

Market-entry strategies represent one of the different growth directions of an organization. Unless the organization comes to the decision that new markets have to be addressed and that market penetration or product development (as described in section 2.3) is not suitable, a market-entry strategy is required.[78]

Figure 11 depicts the diverse options of a market-entry strategy, which are mostly dealt in the literature and was created by Remmerbach. As visualized, there are initially two different types of a market-entry strategy: independent market entry with regard to internal growth, and dependent market entry with reference to the external growth. Additionally, entry into new markets can also to take place in foreign countries, in which case the market entry classified as an export.[79] Because semiconductor companies mostly operate globally, this study uses Remmerbach's description, which excludes the option of export market entry. Another reason for this exclusion is that the semiconductor industry has its main focus on application markets, as already outlined.

[75] Cf. Remmerbach (1988), p. 7.

[76] Cf. Mengele (1994), p. 74.

[77] Cf. Remmerbach (1988), pp. 2-3.

[78] Cf. Remmerbach (1988), p. 22.

[79] Cf. Piercy (1982), p. 26.

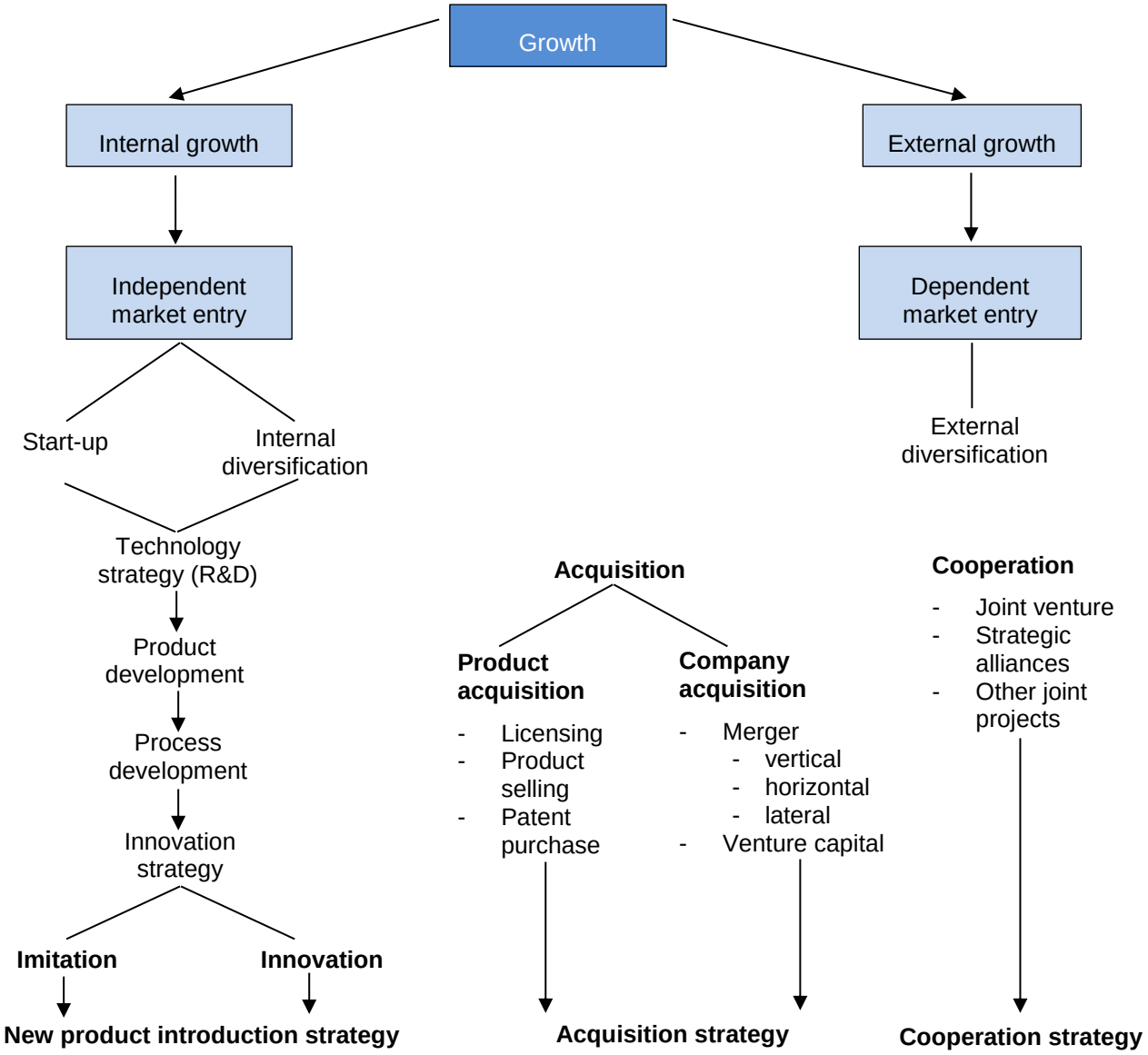

Figure 11: Illustration of the market entry strategies, source: Remmerbach (1988), p. 23 (slightly modified).

4.1 Independent market entry

The independent market-entry strategy gets realized by newly established companies (start-ups) or by internal diversification through development and commercialization of new products or by expansion. Independent market entry is always connected with building up new business units, leading to new relationships in distribution.[80] Moreover, it is a matter of internal growth with regard to independent market entry. Remmerbach defines the independent market strategy as 'new product introduction', which can be realized through innovation or imitation. The current thesis does not address pure imitation as the second possibility of this strategy, but rather product differentiation (see 4.1.2).[81]

[80] Cf. Porter (1992), p. 423.

[81] Cf. Kamlage (2001), pp. 5-6.

4.1.1 Innovation strategy

The innovation strategy is used by companies, which are really new in the business, so-called start-ups, or companies with the willingness to grow by entering a new market with a product or service new to that market. Therefore the literature classifies the innovation strategy within the new product introduction strategy. The reason for adopting this strategy can be that an invention is introduced into a new market as an innovation or that a competitor launches an innovation which reveals chances for the company itself. Furthermore, technology-induced innovations, known as 'technology push', arise and have to be proven though their technological impact. Seldom is a new technical offering successful on the market as long as there are customer requirements or future needs which can already be satisfied. On the other hand, market demand may call for innovations, which is called 'market push'. Within a market analysis, the company identifies systematically customer needs and problems. Also, via complaint management for customers, concerns get directly communicated to the company.[82]

An innovation can be classified through different characteristics. The literature states the differentiation on the basis of a universe of discourse, trigger, and level of newness and scope of change.[83]

Related to the universe of discourse, the product innovation represents the most obvious type of innovation. This can be entirely new products, new technologies applied to existing products, new applications of existing products or new designs. Process innovations often come along with product innovations. New or adapted processes, which link different activities and factors, get introduced to create new products or services. Otherwise the production of current products and delivery of existing services will be made faster, better or cheaper. Aside from these two types of innovation, there are the forms of organizational, business model, marketing and social innovations, although these are not pursued in this paper.[84]

With regard to the trigger, the literature points out two different forms, already mentioned above. On one hand there is the pull-innovation, initiated through the needs and concrete demand of customers. Generally, this pull-innovation is also called market-pull or demand pull. On the other hand newly developed technologies, which do not yet offer fields of application yet, are titled push-innovations. Especially the R&D department triggers this kind of innovation, often called technology-push.[85]

Furthermore, innovations can be differentiated with respect to level of newness. A basic innovation leads to a breakthrough in technologies or organizational principles, and it indicates many subsequent innovations in the form of improvements and new applications. Generally, extreme changes in the market appear.[86] Contrarily, an innovation of improvement targets improvements of single or diverse quality parameters. Then, an innovation of adoption defines already existing solutions which will be adapted for specific customer requirements, relying on imitation, a reproduction of companies' solutions, and pseudo-innovations which pretend pseudo-improvements without any benefit for the customer.[87]

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[82] Cf. Kamlage (2001), p. 13.

[83] Cf. Vahs/Brem (2013), p. 52.

[84] Cf. Scholtissek (2011) , pp. 27-28.

[85] Cf. Vahs/Brem (2013), p. 63.

[86] Cf. Vahs/Brem (2013), p. 64.

[87] Cf. Pleschak/Sabisch (1996), p. 4.

Finally, the scope of change is characteristic to structure innovations. The figure 12 shows the different manifestations related to customer benefit and to the developed solution.[88]

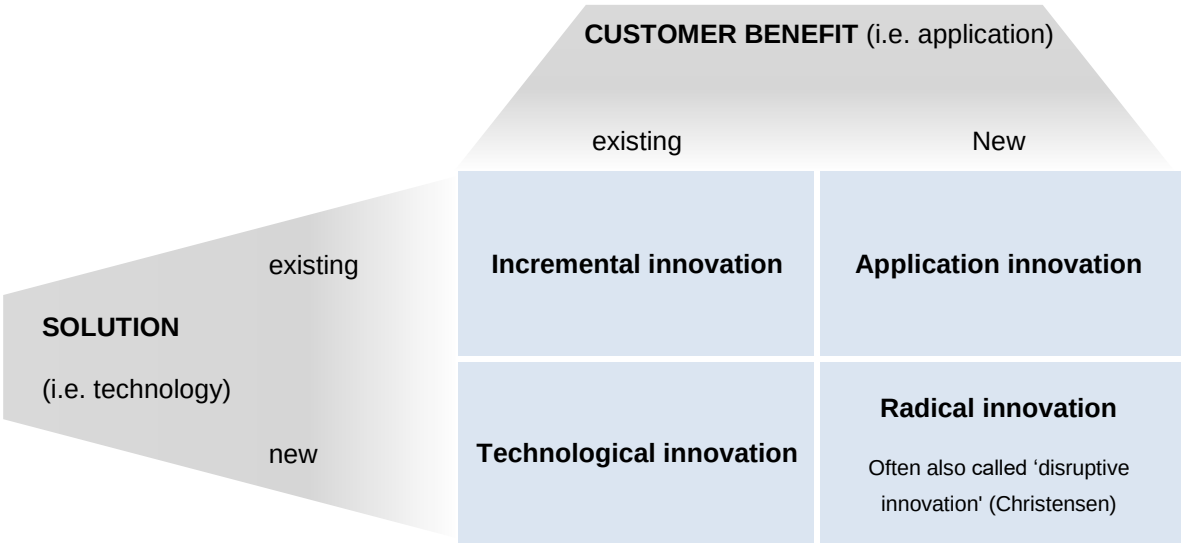

Figure 12: Types of innovation, source: Hutzenschreuter (2015), p. 419 (slightly modified).

Before a company can operate in a new market, it has to develop a product or service within an innovation strategy. Furthermore, with entry, connected infrastructure has to be built up, like production facilities or distribution.[89] Generally, an innovation should significantly differ from the existing products, creating a new market. New product introductions, particularly in the course of an innovation strategy, often require process innovations. Process innovations generate efficient production, saving costs and increasing the quality of the product.[90]

4.1.2 Imitation strategy

Despite that Remmerbach mentions imitation as the second option for new product introduction, this thesis will focus on product differentiation because of the better distinction.

Product differentiation exists when there is a variety of similar but not identical goods within a product class. This definition explains the difference between the terms 'differentiation' and 'diversification'. Product differentiation takes place within a product category, while product diversification includes activities in more than one product class, business segment or geographic segment.[91]

Considering the the varying definitions of product differentiation, this thesis defines product differentiation in terms of products without a significant change but rather with modifications related to existing products.[92] These products are classified into three categories:[93]

[88] Cf. Hutzenschreuter (2015), p. 419.

[89] Cf. Porter (1992), p. 423.

[90] Cf. Kamlage (2001), p. 10.

[91] Cf. Magin (2007), p. 111.

[92] Cf. Kamlage (2001), p. 11.

[93] Cf. Pleschak/Sabisch (1996), p. 15.

- Product differentiation includes improvement in performance. Certain product features get modified, in which a bigger part of these changes are developed in-house.
- Product variation describes minor novelty, including changes in detail. A customer's changing desires precipitate these developments.
- Product unification explains the standardization of products with the aim of saving costs.

The present thesis shows the different characteristics of differentiated new products. Figure 13 illustrates systematization, which enables the classification of every newly introduced product. Innovation is ordered related to the level of novelty. This classification helps to determine the appropriate market-entry strategy.[94]

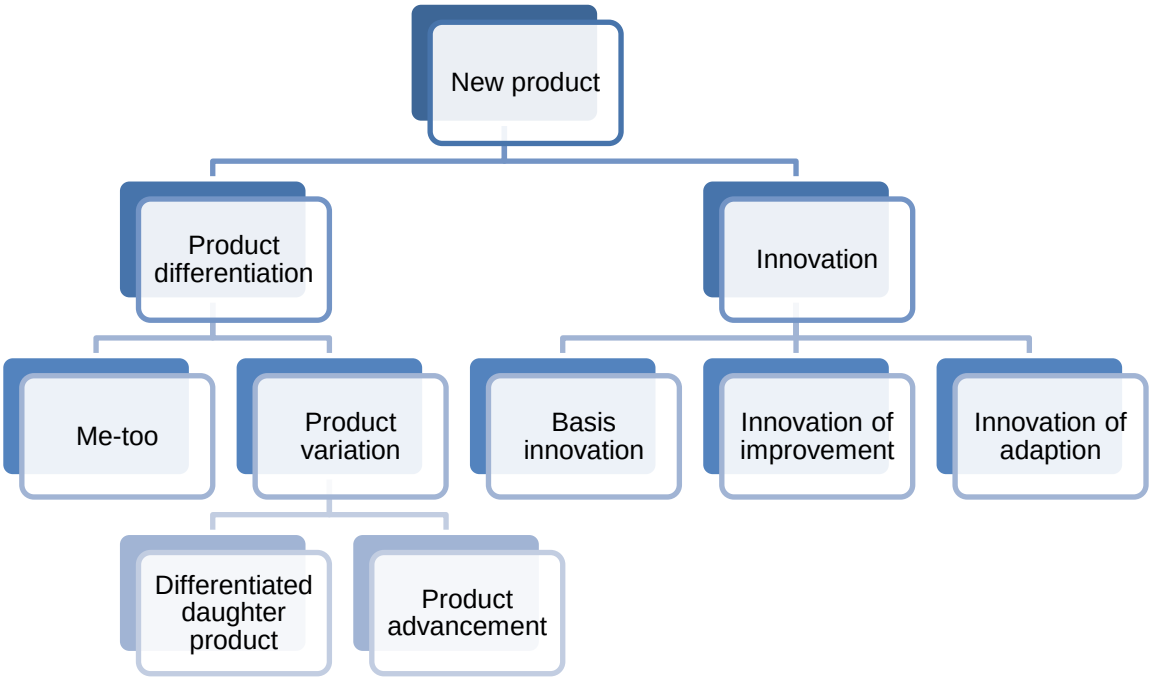

Figure 13: Classification of new products, source: Kamlage (2001), p. 12 (slightly modified).

Firstly it has to be defined whether an innovation or a product differentiation is present. In the case of product differentiation, and when the only difference to the existing products is another manufacturer, another product name or a lower price, it is a matter of product imitation or of a me-too product. Otherwise, product variation occurs, and additional characteristics are modified. A further distinction criteria is the producer of the product. If the producer has never sold a product in the concerned product market, the product is a differentiated daughter product, although from the organization's perspective it is an innovation. This is the most common form of new product introduction.[95] Relating to this classification are all products that are introduced into the market after the innovation, manufactured from a different producer than the innovation itself, and modified. A further product type falls under product advancement. Within this form of differentiation, the organization introduces a product in the same market in which it already operates. As far as it is not a market entry in the typical way, this last form will receive no further discussion.[96]

[94] Cf. Kamlage (2001), pp. 11-12.

[95] Cf. Cohen et al. (1997), p. 117.

[96] Cf. Kamlage (2001), pp. 12-13.

4.2 Dependent market entry

The dependent market-entry strategy is in some cases characterized by buying up product lines or companies. In this case, a company pursues an acquisition strategy. Otherwise, the company can pursue an opportunity to collaborate with other companies, taking advantage of a cooperation strategy.[97]

4.2.1 Acquisition strategy

Within an acquisition strategy, a company acquires a product or company. The aim is to enter a new market, which was not previously worked by the company.

4.2.1.1 Product acquisition

Managers decide on a product acquisition strategy, if they want to buy an innovation. Risk reduction is one of the main arguments for this strategy, but lack of time or missing resources are also reasons to go in this direction. The companies avail themselves of others' innovations.[98]

One of the specifics of product acquisition is licensing. The literature concurs that licensing is an acquisition of a right to use foreign product innovations that are protected by a patent or a utility model. Within licensing lies the opportunity to establish innovative technologies or to broaden one's range of products with protected products.[99]

In conjunction with licensing, franchising is often named. The often used description of franchising is that it is the same like licensing, only that the company establishes the property right of services and not of goods. It seems that these two forms have a strong family resemblance, but the differences far outweigh the similarities. This false premise can lead to faulty analysis. Considered in more detail, franchising is about lending one's business idea or rather business model for money.[100] Licensing and franchising offer low-cost and low-risk means of entering new markets and a much shorter lead time. Particularly in the case of licensing, however, the danger of creating a competitor is always present.[101]

Although licensing is the most common strategy related to product acquisition, for the sake of completeness the two other specifications are product selling and patent purchase.[102]

4.2.1.2 Company acquisition

Many industrialized countries classify a separate market for businesses for sale. The price for these companies depends on their business situation. Within a solid operation, the price can be set in the upper conditions. In contrast, if the company's situation is very poor, a lower price than the book accounting value

[97] Cf. Remmerbach (1988), p. 24.

[98] Cf. Meffert (2000), p. 385.

[99] Cf. Meffert (2000), p. 158.

[100] Cf. Gründerszene, online source [12.11.2016].

[101] Cf. McDonald et al. (2002), p. 235.

[102] Cf. Remmerbach (1988), p. 23.

will be demanded. However, the buying company should have an eye on the environmental clean-up costs, which may lead to tremendous price increase.[103]

One of the most famous kinds of company acquisition are mergers. Within a merger, two or more companies join forces and are united legally and in economic terms, losing their individual autonomy.[104]

Furthermore, mergers are effected by exchange of the pre-merger stock for the stock of the new firm, and the owners of each pre-merger firm continue as owners. The resources of the merging companies are pooled for the benefit of the new entity. The most common forms of mergers are horizontal and vertical integration. While horizontal integration describes the merger between competitive companies, vertical integration stands for merged companies, where they were supplier and customer of one another before.[105]

On the other hand, there is venture capital, which is an equity or equity-related financing form for growth companies. In Europe, financing growth in younger or start-up companies is called 'venture capital', whereas financing buy-outs of established businesses is called 'private equity'. In America, by contrast, both forms of financing are considered. Often, venture capital is seen not only as a provision of financing the growth of companies, but it also includes non-financial support. This thesis will deal only with venture capital, which is an equity or equity-related form.[106]

4.2.2 Cooperation strategy

Similar to the acquisition strategy is the cooperation strategy, with the difference that there is no adoption of another company, and moreover a cooperation between two or more.[107] A cooperation strategy describes a voluntary and restricted amalgamation of firms with the preservation of legal autonomy but not economic autonomy. Subtasks are excluded and the coordinated completion aligned.[108]

The cooperation is normally operated by companies, which realize that concession of competitors leads to higher profit than acting separately. It is also preferred by companies that have no chance to dominate the market without cooperation, because of missing resources.[109]

A further aspect of using this strategy presents itself when a company does not yet have a competitive product with which it would be possible to enter the market. Through a cooperative proceeding and bundling its constituents' resources, the development time of the planned product can be shortened.[110]

Generally, cooperation strategies are specified through joint ventures, strategic alliances or collaboration arranged by contract.[111]

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[103] Cf. Porter (1992), pp. 436-437.

[104] Cf. Pepels (2000), p. 704.

[105] Cf. Business Dictionary, online source [12.11.2016].

[106] Cf. Kleinschmidt (2007), p. 17.

[107] Cf. Kamlage (2001), p. 5.

[108] Cf. Pepels (2000), p. 703.

[109] Cf. Bruhn (2002), p. 78.

[110] Cf. Mengele (1994), p. 115.

[111] Cf. Bruhn (2002), p. 78.

4.3 Timing strategies

If a company has the opportunity to be an early mover in a market, its managers face two main strategic questions. Firstly, the decision to attempt market entry at all has to be made. If entry in general is assessed to offer a sufficient chance of success, the second issue to consider is the optimal timing of entry. In general, the literature states the pioneer strategy and the follower strategy. Another distinction can be made between so-called early and late followers.[112]

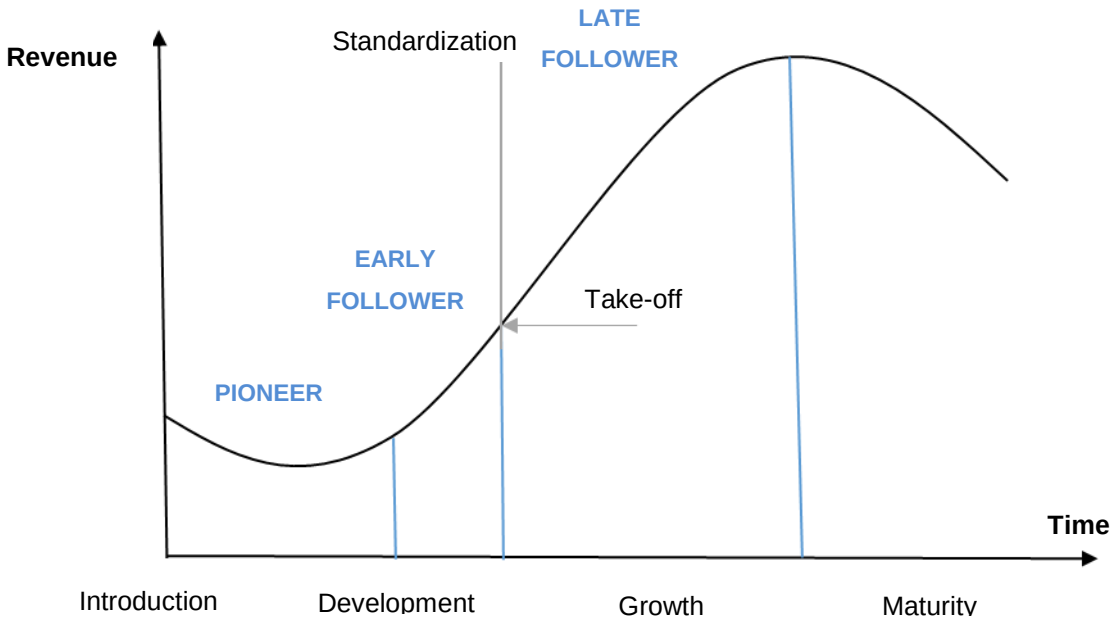


Figure 14: Timing strategies depending on industry lifecycle, source: Rüggeberg (1997), p. 64 (slightly modified).

4.3.1 Pioneer strategy

Usually the company which first enters a foreign market with its products and services is considered a traditional pioneer. The pioneer strategy aims to develop a market according to the pioneer's own ideas and to realize a sustainable competitive advantage in the form of higher profit margins, which are frequently described as first-mover profits. This strategy entails the implementation of product standards and creation of brand preferences in customers, along with fostering their commitment to the company. The pioneer requires resources, market intelligence and an excellent network of decision-makers. The company has to identify whether it possesses the full repertoire of skills needed to enter and compete effectively.[113]

Pioneer strategies are appropriate only for companies that are flexible and dynamic and have a clear vision. The advantages of this strategy are diverse, in particular in young and dynamic markets. By definition, the pioneer will have a monopoly position for a certain time, where it can make use of the technological

[112] Cf. Shankar et al. (2012), p. 353.

[113] Cf. Neubert (2013), pp. 50-51.

innovation and the price-political scope. It is rather a question of systematically maximizing potential opportunities and advantages while limiting disadvantages and risks.[114]

A substantial advantage is the opportunity to create new industry standards or market standards, allowing the company organic growth through their defined and emerging market. Within the realm of pioneer products, customers accept the risk of a mispurchase rather than with offerings of laggards.[115]

4.3.2 Early follower strategy

A company is described as an early follower if it enters a market after the pioneer. The early follower strategy takes place in the introduction or development stage, soon after the so-called take-off as visualized above.[116]

From the very beginning, they try to benefit from the pioneer's experience and ground work, and furthermore they learn from the pioneer's mistakes. This approach reduces the costs and risks of their own market entry and increases its speed. At the same time, they try to differentiate themselves by attempting to become cost leader, copying the successful products and services of the market leader while offering them at a lower price. Beyond these characteristics, the early follower occupies the remaining market niches. With lower market-entry costs and high economies of scale effects, they try to persevere in their role of cost leaders as long as possible.[117]

At the time of market entry, the early follower faces the market-entry barriers established previously by the pioneer. Additionally, the company has to set up new barriers for the late followers. Sometimes it is not a planned decision by the followers; in fact, the pioneer was faster with its innovation process.[118]

A main disadvantage faced by the early followers' results from the issue of convincing customers to make a supplier change. As far as the product is often an imitation or differentiated version of the pioneer's product, the have to stand out with lower prices or added value, as with longer lasting guarantees. Standing out in this way can be a big challenge in case that the customers are very satisfied with the product and services of the pioneer.[119]

The late followers, which will be explained next, leave the developing the market entirely to their competitors or rather to the pioneers and early followers.[120]

4.3.3 Late follower strategy

The literature states that late followers are companies who enter into the market within the growth or even maturity stage. At this time, there is no risk for a failure of innovation; on the contrary, demand and

[114] Cf. Remmerbach (1988), p. 58.

[115] Cf. Kreutzer (2006), p. 43.

[116] Cf. Backhaus (2007), p. 200.

[117] Cf. Neubert (2013), pp. 52-53.

[118] Cf. Buchholz (1998), p. 28.

[119] Cf. Kamlage (2001), p. 30.

[120] Cf. Neubert (2013), p. 53.

technological aspects are relatively predictable, and products can be adapted entirely to the needs of customers.[121]

Late followers are able to watch the market precisely and take advantage of the pioneer's and early follower's mistakes, discovering their weaknesses. Furthermore, these companies make use of expenditures, like infrastructure costs, which have been made by the earlier competitors. The imitation strategy is the primary strategy at this stage, entailing sales of me-too products for a very low price in the mass market. This form is adopted operated by large scale enterprises, who make use of their advantages for a low-cost production.[122]

The disadvantage of the late follower strategy is facing market-entry barriers that set up by the pioneer and early followers. With regard to late entry, they have to distinguish themselves extraordinarily to compensate for the preferences of potential customers. They also have to be aware of the exhaustion of the market potential in general.[123]

With an imitation strategy, the brand change is targeted through low prices. As far as the companies, who earlier entered the market have already concluded contracts with customers and suppliers, late followers are also at a disadvantage due to the pressure to agree to less advantageous contracts. As already mentioned, the late follower strategy is mainly used by large companies who can realize high market share due to the advantages of their size and experience. In association with this strategy is an aggressive low-price policy, and communication policy and customer relationship management are implemented.[124]

As characterized, every timing strategy has it specific advantages and disadvantages. They depend strongly on the industry and where the company operates to decide which strategy is the most appropriate. Furthermore, a company has to come up with a strategically fundamental decision for timing an entry into the market, which has to be suitable for the addressed market and market situation.[125]

4.4 Market-entry barriers

Generally, entry into a new market is always in some way possible, except in purely theoretical descriptions. The literature states two extremes: on one hand there is the state-supported absolute monopoly, and on the other hand there is a totally barrier-free market with zero entry costs. In practice, new market entrants commonly face barriers, because some investment is always required, however minimal. In existing markets, some extraordinary effort to make customers buy and to create channels to distribute the goods will be necessary. Therefore, the subject of barriers in academic or policy contexts turns on the concept of maintaining a healthy way to compete. Within international contexts, businesses speak about fair access to market.[126]

[121] Cf. Fischer et al. (2007), p. 542.

[122] Cf. Kamlage (2001), p. 30.

[123] Cf. Remmerbach (1988), p. 63.

[124] Cf. Kamlage (2001), p. 31.

[125] Cf. Neubert (2013), p. 54.

[126] Cf. Inc. Magazine (2002), online source [12.11.2016].

Barriers can be erected intentionally by one or more incumbents, and these are called strategic barriers. By contrast, other structural barriers naturally exist in the market.[127]

Within the *structural barriers*, the literature often states the barrier of economies of large scale production. New entrants will have immense problems if a market has significant economies of scale that have already been exploited by the incumbents. Moreover, economies of scale are an additional form of cost advantage, especially lower acquisition costs for raw material.[128] Another point is the network effect where customers transport the value of a product or service to other users. The greater the number of people using the specific product or service, the greater the people's benefits. If a strong network already exists, it will challenge new players to create a positive network around them. In the 21st century, the spread of the popularity of the smartphone and of social media are good examples for strong network effects.[129]

Furthermore, pioneers and also followers will fail miserably if they rely on scarce resources, which other firms own or control. Such reliance can create a considerable barrier, which can be seen in the example of an airline controlling access to an airport. Furthermore, these new entrants sometimes face high set-up costs, which are often sunk costs, meaning that they cannot be recovered when a company leaves a market; these costs include advertising and marketing, along with other fixed costs. This fact deters companies initially in the course of a market entry. With regard to costs, high investment in R&D signals new potential competitors that the acting companies have large financial reserves. In order to compete, new entrants have to spend the same or more money on R&D. Such spending is widespread in the pharmaceuticals industry and the chemical industry. Of course, in some other industries new competitors will profit from the R&D completed by others and will not have to invest as much as their forerunners.[130]

More particularly, *strategic barriers* are actively used by incumbents to protect their position, and hence they are often called entry-deterring strategies.[131] Related to pricing, there are two types of barriers: predatory pricing hinders new entries with deliberately low prices and forces rivals out of the market; limited pricing sees the incumbents set a low price, accompanied with a high output, so new entrants cannot make profit at that price. Here, the incumbents take advantage of their superior knowledge of the market and production costs. With respect to costs, the literature states the well-known cost-switching that customers incur when trying to switch suppliers. These costs may involve the cost of purchasing or installing new equipment, loss of special services during the switching process, and the effort required to search out a new supplier and learn a new system. These costs can be also interpreted as structural barriers, but as far as they are exploited by suppliers, they are considered strategic barriers.[132]

A further strategic barrier is a strong brand in the market, which creates loyalty in some ways and draws customers. The real loyalty club or mode of companies is, of course, another barrier, because these schemes retain customer loyalty and deter entrants who need to gain market share. Besides these

[127] Cf. Lutz et al. (2010), p. 20.

[128] Cf. Karakaya (2002), p. 378.

[129] Cf. Economics Online, online source [12.11.2016].

[130] Cf. Economics Online, online source [12.11.2016].

[131] Cf. Besanko (2009), p. 202.

[132] Cf. Economics Online, online source [12.11.2016].

contracts, there are licenses and patents that protect existing firms and make entry difficult for others. Contracts between suppliers and retailers, for instance, can exclude other retailers from entering the market.[133]

Rank	*Barrier*
1	Absolute cost advantages enjoyed by the incumbent
2	Economies of scale
3	Product differentiation
4	The degree of firm concentration
5	Capital requirements to enter a market
6	Customers' cost of switching
7	Access to distribution channels
8	Government policy

Table 3: Barriers to entry, source: Karakaya (2002), p. 381 (slightly modified).

Table 3 shows the top-ranked barriers for new entrants. This ranking is the result out of a literature search that aims to determine barriers to entry by all kinds of enterprises.[134]

Since the barriers of product differentiation and government policy are mentioned in no way above, the author will describe them shortly here. Product differentiation concerns the consequences of investment in new and diverse products which may be easy for incumbents with high capital reserves and expert knowledge. Hence, companies will be deterred from such an investment. Government policies have to be researched very carefully before entering market. Furthermore, different countries have different policies that require much effort and patience.[135]

In sum, many barriers may deter companies when entering a new market. Hence, a well prepared and defined strategy helps to handle or break through such barriers and leads to a gain of market share and alarm incumbents.

4.5 Parameters for the semiconductor industry

After theoretical insights into the semiconductor industry and the generic market-entry strategies, the author defines parameters to be integrated and needed in the procedure model within the morphological matrix. This list of 14 parameters, detailed below, is not intended to be exhaustive.

Table 4 shows the several parameters in order of how they are integrated into the resulting tool of the procedure model, which can be seen in section 5.3.

[133] Cf. Economics Online, online source [12.11.2016].

[134] Cf. Karakaya (2002), p. 381.

[135] Cf. Inc. Magazine (2002), online source [12.11.2016].

No.	Parameter
1	Product/service
2	Required product/service
3	Trigger for product/service
4	Understanding of customer needs
5	Available financial resources
6	Manufacturing process
7	Distributor engagement in the market
8	Availability of partners
9	Presence of competitors in the market
10	Technological awareness
11	Customer satisfaction with current technology/product
12	Effect of upcoming trends
13	Available time for market entry
14	Compatibility with current business/company strategy

Table 4: Parameters for the semiconductor industry, source: compiled by the author.

The first three parameters are chosen with respect to insights into the relevance of product-related topics in section 4.1. Parameters 4 and 5, ‘understanding of customer needs’ and ‘available financial resources’, are also connected to the previously named chapter of independent market-entry strategies. Furthermore, the financial parameter is also linked to section 4.2, when it lines out the different acquisition strategies.

Parameter 7, which deals with the manufacturing process, is selected with regard to its importance, explored above in discussion of the generic market-entry strategies. In addition, the production process

may occupy an important role within a semiconductor company, as explained within the definition at the beginning of chapter 3.

The availability of partners is a crucial factor for a semiconductor's business. As can be seen in section 3.3, where the value chain is clarified, the ecosystem with its partner network around a semiconductor company is very important. When entering a new market, the knowledge of operating competitors is quite essential, stated in section 3.2 and further in chapter 4.

Chapter 3 in general, and section 4.1 in particular, approach the technology issue, which results in parameters 10, 11 and 12. The timing strategies are handled in section 4.3 and give reason to integrate parameters 6, 9 and 13.

The final parameter is a real knock-out criteria. In case of missing a strategy fit, which is crucial in every company, a market entry can be completely rejected; thus parameter 14 is included.

In sum, the major insights into the semiconductor industry and the generic market-entry strategies have been explained and analysed. The findings of that analysis are the basis for the newly designed procedure model, which will be created and represented in the chapter 5.

5 PROCEDURE MODEL MARKET-ENTRY STRATEGY FOR THE SEMICONDUCTOR INDUSTRY

As indicated above, the semiconductor industry is a very dynamic branch, which has enabled numerous innovations in recent decades. Regarding its existence of about 60 years, the industry has recorded strong growth until now. Semiconductor companies are always looking for new applications and additional markets for the future. Thus, it is essential that the managers are aware of the importance of an appropriate strategy when focusing on a new market. After an extensive market analysis and especially with the decision to operate in a new market, an adequate market-entry strategy has to be defined.

With regard to the dynamic and often changing conditions in the semiconductor industry, an adaptable direction for the strategy has to follow, is required. Therefore, figure 15 offers a procedure model to help the managers of the semiconductor industry to formulate a market-entry strategy related to their individual surrounding conditions. Again, the wilful neglect of the cost component should be noted. The procedure model should give preliminary direction and illustrate the scope possibilities for entering a new market. Furthermore, for the whole team, which is regularly interdisciplinary in the semiconductor industry, an understanding of the market entry should be established, and decisions should be reproducible and transparent.

The procedure model comprises two analytics tools, a resulting tool, a so-called morphological matrix, and a value chain with the outcome of an individually defined market-entry strategy.

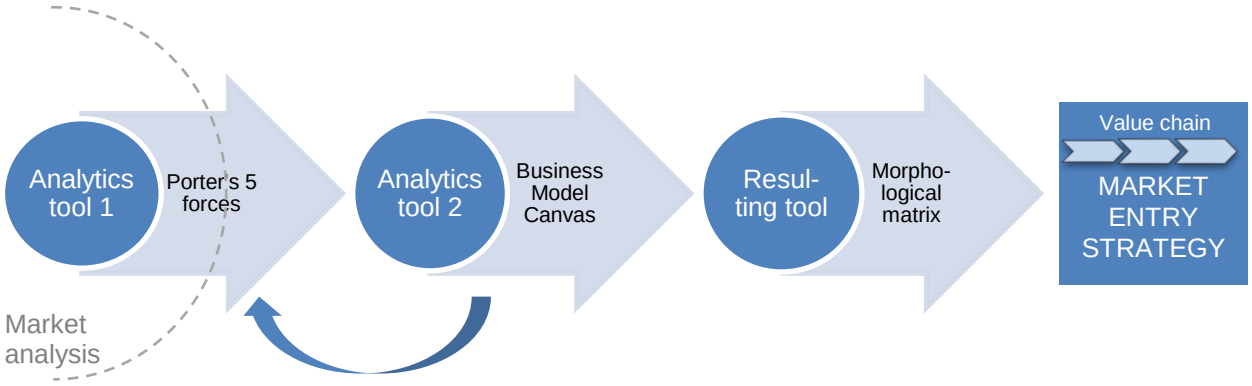


Figure 15: Procedure model market entry strategy for the semiconductor industry, source: compiled by the author.

The analytics tools are chosen with regard to gather external and internal information on the targeted market and own offering. To analyse several tools for this purpose would go beyond the scope of this thesis, therefore it is exactly described subsequently, why the present tools are selected. The first analytics tool is Porter's five forces, used to gain knowledge about the competitive environment and its relation to customers and suppliers. At the forefront, the market analysis is visualized as far as is necessary initially for the decision of whether a market is attractive, and secondly for processing this model. Indeed, Porter's five forces is also a tool for analysing a market or industry; hence, it is an explicit a part of this model.

With Porter's framework, a strategic market analysis includes five topics, often examined before deciding whether to enter a new market. These topics are segmentation, analysis of the market size and

development, analysis of the competitors, analysis of customer branches and the market potential, including the trends of the targeted market.[136]

Again, the strategic market analysis is not described in detail because it is executed before a company decides to enter a new market, and such detail lies outside of the scope of the thesis.

Afterwards, a Business Model Canvas has to be filled out to consider the company's offering, other key issues, and the customer system, potentially leading to insights that may also needed to be accounted for in analytics tool 1. After completing the Business Model Canvas, the team has to go through the morphological matrix with the preliminary findings and insights of the market environment, the offering and the company itself. Finally, the results of the morphological matrix are transferred to the semiconductor's value chain. This transfer helps the team to show the appropriate market-entry strategy to upper management in a timely and illustrative manner. The following sections will specify each tool with regard to its procedure and rationale.

5.1 Analytics tool 1: Porter's five forces

Within the designed procedure model, Porter's five forces is the first analytics tool. The framework itself has been described in section 2.4.1. As already mentioned, it is a suitable tool for identifying the competitive environment and other external factors, like suppliers and buyers, which effect and influence a company's market position.

The reasons for using this tool within the procedure model are as follows:[137]

- The framework allows a structured and systematic analysis of market structure and the competitive situation.
- After analysing the industry, market decisions about entry or exit can be supported.
- It supports creating a new competitive strategy.

When the five influences are defined, analytic tool 2 can be used. The Business Model Canvas may also interact in some way with Porter's five forces due to the different points of view that may lead to new insights in each tool.

5.2 Analytics tool 2: Business Model Canvas

The Business Model Canvas is a framework with nine building blocks for describing, visualizing, rating and changing business models. A business model is itself defined as the guiding principle for what a company creates, imparts and considers winning value.[138]

[136] Cf. Meyer (2009), online source [12.11.2016].

[137] Cf. RapidBi (2012), online source [12.11.2016].

[138] Cf. Osterwalder/Pigneur (2011), pp. 16-18.

All nine fields of the Business Model Canvas have to be filled out very carefully to draw out missing thoughts or aspects necessary for the business's operation. The value proposition describes a bundle of products and services that create value for a defined market or customer segment. Therefore a group of people or organizations targeted by a company is called a customer segment in this model. For this group, the company elaborates a value proposition with what value is created especially for them. Within the field customer relationships, the company has to identify which form of relationship with each customer segment should be generated and maintained. Furthermore, it expresses how customers get canvassed. The way to communicate and distribute a created value is discussed within the channel issue. Hence, as the name suggests, the different channels for communication and distribution have to be identified.[139]

The mentioned fields are issues visible for the customers, while the 'left' side of the model shows the needed requirements for creating the defined value that are noticeable only for the company. The key resources are the offered goods and the provision of the elements described above. The sum of the key partners is the network of suppliers and partners, which deliver external resources and activities. Within the field of key activities, the company has to think about the most important activities needed to operate successfully.[140]

Moreover, two fields are left to describe the monetary aspects of a business model. The cost structure points out all arising costs in the course of implementing a business model. On the other hand is the profit, which gets calculated by subtracting the cumulative costs of the cost structure from all revenue streams.[141]

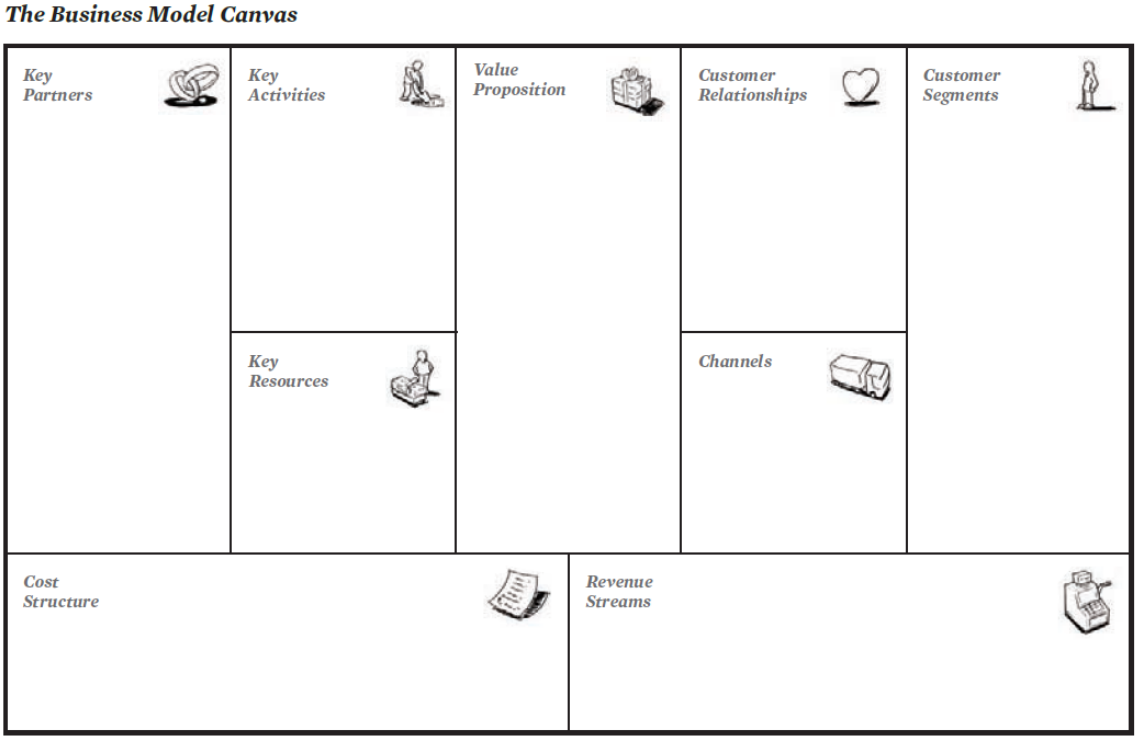


Figure 16: Business Model Canvas, source: Strategyzer AG, online source [12.11.2016].

[139] Cf. Osterwalder et al. (2015), p. XVI.

[140] Cf. Osterwalder et al. (2015), p. XVI.

[141] Cf. Osterwalder et al. (2015), p. XVI.

The literature specifies many advantages of this model, but within this thesis five strengths should be highlighted, since they constitute the motivation to use the model as an analytic tool for the procedure model:[142]

- Due to the size, the user or team very quickly discusses and notices the most important topics in starting a new business. With the one-page business model, it can soon be seen whether the idea has a chance on the market or whether there is some more effort and thoughts needed.
- The nine 'building blocks' help to structure discussions and bring all team members to the same level of knowledge. Furthermore, they can be used for brainstorming and commenting, and generating ideas under the nine issues quickly gives ideas shape.
- As already mentioned above, ideas can be noticed really fast. Moreover, it is great for developing a whole portfolio of ideas and adopting the business model as the ideas require. Hence, bad ideas can be sorted out quickly.
- The model makes intuitive sense, and in its simplest form it has a front and back stage, as already mentioned above. The front stage points out what creates value, how customers can be reached and how to generate profit or revenue. The backstage, for its part, shows what is required to enable the front stage. Besides, one field leads automatically to the next.
- The heart of the Business Model Canvas is the value proposition that forces the organization to think deeply about their offering to the market, which problems it helps solve, and what the customer needs are.

Of course, there are limitations and disadvantages of this model. For example, in the literature it is several times mentioned, that the competition is missing in Osterwalder's model.[143] For this reason, analytic tool 1 is implemented, Porter's five forces, wherein the missing required aspects for the procedure model can be elaborated.

Another important issue is appropriately describing business related to the several big semiconductor companies. Often, they have more than one business unit and hence business lines with some different segments. In using the tool, it is preferred to go through the nine fields with the business size of which the user and team have access, resources and the most knowledge. In many cases, this should be the business line.

5.3 Resulting tool: Morphological matrix

The morphological matrix is a specific tool for generating ideas or rather creative options, based on potential variations in a problem's characteristics. It can be used solo or in a group. This creative technique is ideal for generating ideas when there is an idea about what you wish to do but not how to achieve it.[144]

[142] Cf. Featherstone, online source [12.11.2016].

[143] Cf. Kraaijenbrink (2012), online source [12.11.2016].

[144] Cf. InnovationManagament.se (2013), online source [12.11.2016].

In general, the premise of the term 'morphology' is that by understanding the underlying parts of a system, the entire system will be better understood. While looking at a system's morphology, the essential question always arises, 'What parts make up the whole?' With regard to the system, the user or team of this method must have significant expertise or have previously gained it. Some topics might not require specific knowledge, and that allows the involvement of several diverse people, which often leads to more creative and unusual ideas.[145]

The procedure of the morphological matrix is as follows:[146]

1. Each column has to be named with a different parameter of the considered system.
2. The user or team will generate varied characteristics of each parameter and fill the columns.
3. Then one characteristic of each parameter has to be chosen. To generate new ideas, the characteristics are selected randomly without looking, if it make sense as a whole. In that way, unusual concepts are conceived.

Figure 17 illustrates how the framework should look. Furthermore, it shows the procedure for choosing, namely for randomly creating unusual ideas.

Parameter I	Characteristic I/1	Characteristic I/2	Characteristic I/3	Characteristic I/4
Parameter II	Characteristic II/1	Characteristic II/2	Characteristic II/3	Characteristic II/4
Parameter III	Characteristic III/1	Characteristic III/2	Characteristic III/3	Characteristic III/4
Parameter IV	Characteristic IV/1	Characteristic IV/2	Characteristic IV/3	Characteristic IV/4
Parameter V	Characteristic V/1	Characteristic V/2	Characteristic V/3	Characteristic V/4

IDEA 2 IDEA 1

Figure 17: Procedure of the morphological matrix, source: compiled by the author.

The system with respect to this thesis is a market-entry strategy. There are various ways to enter a new market, but especially for the semiconductor industry, every company has to define their own. The outcome of considering each parameter is not merely an idea; in fact, the result is an individually defined market-entry strategy.

The parameters with their characteristics for this morphological matrix are, first, the 'components' which have been identified through the generic market-entry strategies with its timing strategies and barriers, mentioned in chapter 4 and, second, the results of the insights of the semiconductor industry as described in chapter 3. The procedure model within this thesis requests a systematic selection with regard to the two

[145] Cf. Silverstein et al. (2013), p. 37.

[146] Cf. InnovationManagament.se (2013), online source [12.11.2016].

previously elaborated analytics tools and market analysis. Note that when the term ‘market’ is used in the matrix, it always refers to the new market that the semiconductor company wants to enter.

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
1	**Product/service**	Replaces an existing one in the market	Is an additional one to others in the market	Has incremental enhancements	Is futuristic	
2	**Required product/service**	Is an idea	Finished concept with prototype	Exists in the product portfolio, but not core competence	Represents core competence, well-engineered	Does not exist in the product portfolio; competitors have it
3	**Trigger for product/service**	Customer demand	Latent/potential customer need	‘Technology push’	Competitor(s) launched new one	
4	**Understanding of customer needs**	Yes, fully aware of	Yes, but not in detail	Few needs are identified	Not present	
5	**Available financial resources**	Enough budget	Low budget, but support if aligning with strategy	No financial resources		
6	**Manufacturing process**	Very efficient, cost-effective, outsourced/fabless	Partly fabless, cost sensitivity	Manufactured in-house (IDM), high costs		
7	**Distributor engagement in the market**	High effort	Need push from company	Are waiting for orders; are not active		
8	**Availability of partners**	Some are operating in the market	No partners, but other business units of the company operate in the market	None, but interest from partner side is given	None, no awaking interest or efforts on the market	
9	**Presence of competitors in the market**	Just one	A few are operating	Many activities/competitors on the market but still demand	‘Red ocean’	
10	**Technology awareness**	Well known and accepted on the market	Market has heard about it, but not in detail	Some points of contact, but no usage	Completely new to the market	
11	**Customer satisfaction with current technology/product**	Well established, but already many years, change is needed	Customers are just happy that they have learned to deal with the existing one	Disadvantages are not seen until now, not aware of them	Many little problems with the existing solution, but advantage is still bigger	Immense problems, market requests actively a new technology/product

12	**Effect of upcoming trends**	Accommodates the entry	Supports and requires greatly the entry	Does not effect the entry	Does not support the entry	
13	**Available time for market entry**	3 months	6 months	1 year	2 years	
14	**Compatibility with current business/company strategy**	Indeed, aligns totally with strategy to follow the vision	Offering itself is not compatible, but company is solution provider	No compatibility	Yes, but morally reprehensible	

Table 5: Morphological matrix 1 for semiconductor industry, source: compiled by the author.

After running through and answering all parameters, the team has to transfer the resulted 'line' from matrix 1 into matrix 2. In matrix 2 each characteristic shows what is behind each and what the recommendations for action are. Furthermore many fields show which generic market-entry strategy would be preferable according to it. But at the end, the result can show a mix of two or more strategies, leading to an individual market-entry strategy aligned with the specific conditions of the semiconductor company, which implements the procedure model.

Of course, there might be the opportunity that the outcome of the procedure model will be indeed a generic market-entry strategy, but all the better that the decision will be replicable without many weeks of calculation. Aside from the option or willingness to enter a market, some critical fields will discourage the company from entering the new market.

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
1	**Product/service**	Disruptive/radical innovation, innovation strategy	Product differentiation, cost leader, imitation strategy	Improvement innovation, innovation strategy or more likely an imitation with less improvement	Invention; can it be an innovation?	
2	**Required product/service**	Will it be a ready product or service within planned entry; ensure the needed timeframe	Determine whether it is a matter of innovation or imitation on the market	Available resources for doing it alone or look to outsource the idea, external growth	Ready for new product introduction strategy	Be early follower and go by imitation strategy or buy up the competitor
3	**Trigger for product/service**	Can be an innovation or product differentiation	May lead to radical innovations, innovation strategy	May lead to radical innovations, but external partners can be important to prove the necessity of the	Be early follower and go by imitation strategy or buy up the competitor	

				product/service		
4	**Understanding of customer needs**	Full awareness of the market	Partners may help to fulfil the knowledge gap	External or public facilities can provide information	No dependent market entry as long as the value proposition cannot be defined	
5	**Available financial resources**	Enables dependent and independent market entry	Dependent market entry possible, ensure low risk	Find a partner or competitor for collaboration		
6	**Manufacturing process**	Wait and learn from mistakes and problems of the pioneers and early followers	If possible, be early follower or pioneer within a new product introduction	Pioneer strategy, otherwise no chance on the market without distinguishing feature		
7	**Distributor engagement in the market**	Collaboration should be very close	Look for additional distributors to make pressure	Choose other partners		
8	**Availability of partners**	Get in touch with them	Gain knowledge from the other business units; market knows the company name, dependent entry possible	Strong collaboration with one or more future partners	Raise awareness and inform the market and partner system	
9	**Presence of competitors in the market**	Option of an early follower	Early followers too many, or within the late follower phase	Be late follower	Efforts should be put into other projects	
10	**Technology awareness**	Market can be entered up to now	Raise technology awareness, sponsored partner projects	Raise technology awareness intensively	Soft introduction, collaboration with external/public facilities	
11	**Customer satisfaction with current technology/product**	Fast market entry, replace old technology/product	Slow integration, check availability of partners who provide existing technology	Collaborate with a strong opinion leader in this market	Collaborate with a strong opinion leader in this market	Fast market entry, replace old technology/product
12	**Effect of upcoming trends**	Dependent entry supported	Option of pioneer or early follower	No impact	Market entry not recommended	
13	**Available time for market entry**	Buy up other companies, which are already on the market; licensing, or	Carefully plan the market entry, alone or cooperatively	Extensive collaboration possible, also well-planned	Acquisitions are possible to expand offering	

		come up with an existing product as innovation or imitation		dependent market entry		
14	**Compatibility with current business/company strategy**	Dependent market entry, independent when resources are missing	Found a separate company/organization	Market entry not recommended	Market entry strongly not recommended	

Table 6: Morphological matrix 2 for semiconductor industry, source: compiled by the author.

As already mentioned above, an individual market-entry strategy with its timing should be the outcome of this matrix and, further, of the designed procedure model. The result can be that the market needs some additional products to the semiconductor's product, and acquiring an appropriate company may be the solution. With that solution, the semiconductor company creates an innovative product as a whole and enters the market finally dependent with a new product introduction strategy. Outside of this example, there are many possible results for this strategy. As often stated, each semiconductor company will have their individual outcomes related to the markets that they want to enter, their environment and internal conditions.

5.4 Value chain for illustrating resulting market-entry strategies

Finally, the previous outcome will be transferred into the semiconductor's value chain to illustrate it in a more proper way. This transferral is necessary due to the limited time of the upper management, where the duration for proposals and new ideas is very restricted. Furthermore, the value chain has a very important role in the semiconductor industry, as already mentioned in chapter 3. Hence, it is also an appropriate tool to raise awareness within the team.

The framework itself was also already explained within this chapter.

The different parameters from morphological matrix 1–14 are all related to one stage in the value chain or to the timeframe in terms of the timing strategy. The various reasons for choosing a market-entry strategy are explained in chapter 4. With the second matrix, the user should gain insight into where resources are missing and which parameter speaks for a dependent or independent strategy. To transfer this insight in an appropriate way, the numbers get coloured.

To simplify the colouring, a so called traffic light system has been chosen:

	Market-entry strategy proposed	**Timing strategy proposed**
	Dependent strategy	Late follower strategy
	Clarify, dependent or independent strategy possible	Early follower strategy
	Independent strategy	Pioneer strategy

Table 7: Traffic light system for value chain, source: compiled by the author.

Within each stage of the value chain, a clear direction to a dependent or independent market-entry strategy results. Hence the user of the procedure model gets a visible direction indicating what actions are needed. For example, if the product parameters are all red or orange, and the others tend to be green, then it is clear that the product required is not available in-house. That result may lead to a dependent strategy, and further to product acquisition or licensing, which ultimately enables an independent market-entry strategy by being ready with the other parameters.

The grey boxes describe companies and products which are outside of the company's ecosystem. These will be needed in case of a dependent market-entry strategy. With the help of arrows and some other graphics, like flashes, the proposed market-entry strategy, with the aid of the value chain, should give a first illustrative and comprehensible direction within approximately three hours of workshop.

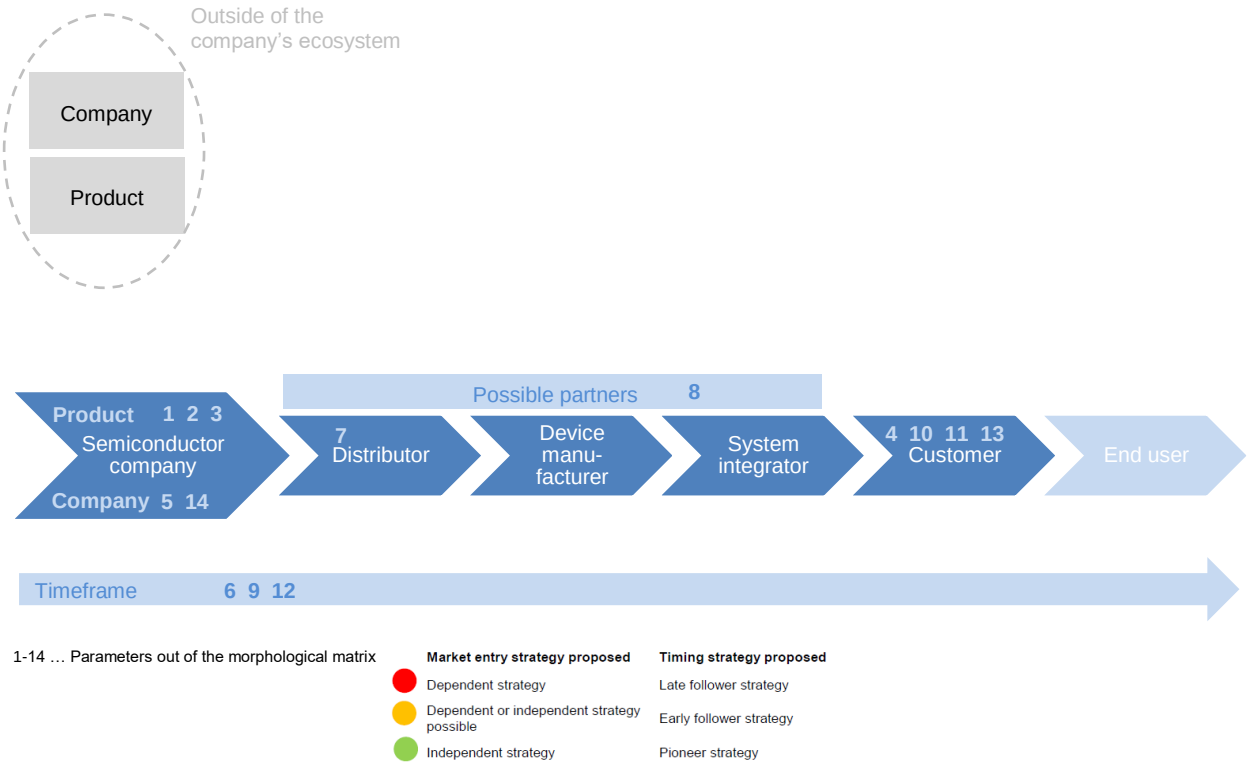


Figure 18: Value chain of the procedure model, source: compiled by the author.

Within the practical part of this thesis, a completed procedure model is offered to ensure a better understanding of the final result.

After completing the value chain with the results, it will be shown to upper management. At this stage, the user of the procedure model is finished and hands over responsibility to upper management. Now they have to decide whether the proposed and comprehensible direction will be followed and in which way this should happen, as far as this procedure model leads only to a preliminary direction and not to a final result. As mentioned at the beginning of the description of the procedure model, calculating is explicitly excluded to ensure a concise suggestion of a first direction. In conclusion, defining and executing a market-entry strategy is essential for entry into a new market. Furthermore, semiconductor companies have to come to decisions very quickly due to their rapid developments with regard to Moore's law. An individual defined strategy with recourse to the procedure model furnishes a first comprehensible direction to achieve successful market entry.

6 NXP SEMICONDUCTORS N.V.

NXP Semiconductors N.V. is a global semiconductor company with its headquarter in Eindhoven, Netherlands. The company was founded in 1953, with development and manufacturing in Nijmegen, Netherlands. It was formerly known as Philips Semiconductors, and after being sold to a consortium of private equity investors in 2006, the company's name changed to NXP. NXP itself stands for **N**ew e**XP**eriences. After the merger with Freescale Semiconductor in December 2015, NXP became the fifth-largest non-memory semiconductor supplier globally, with approximately 45,000 employees, who operate in more than 35 countries. It was reported that NXP reached a revenue of 6.1 billion USD in 2015, including one month of revenue contribution from the acquired company Freescale Semiconductor. Furthermore, NXP is the leading semiconductor provider for the secure identification, automotive and digital networks industries.[147]

Figure 19 illustrates NXP's core IP and technology in processing, connectivity and security that enables secure connections for a smarter world.

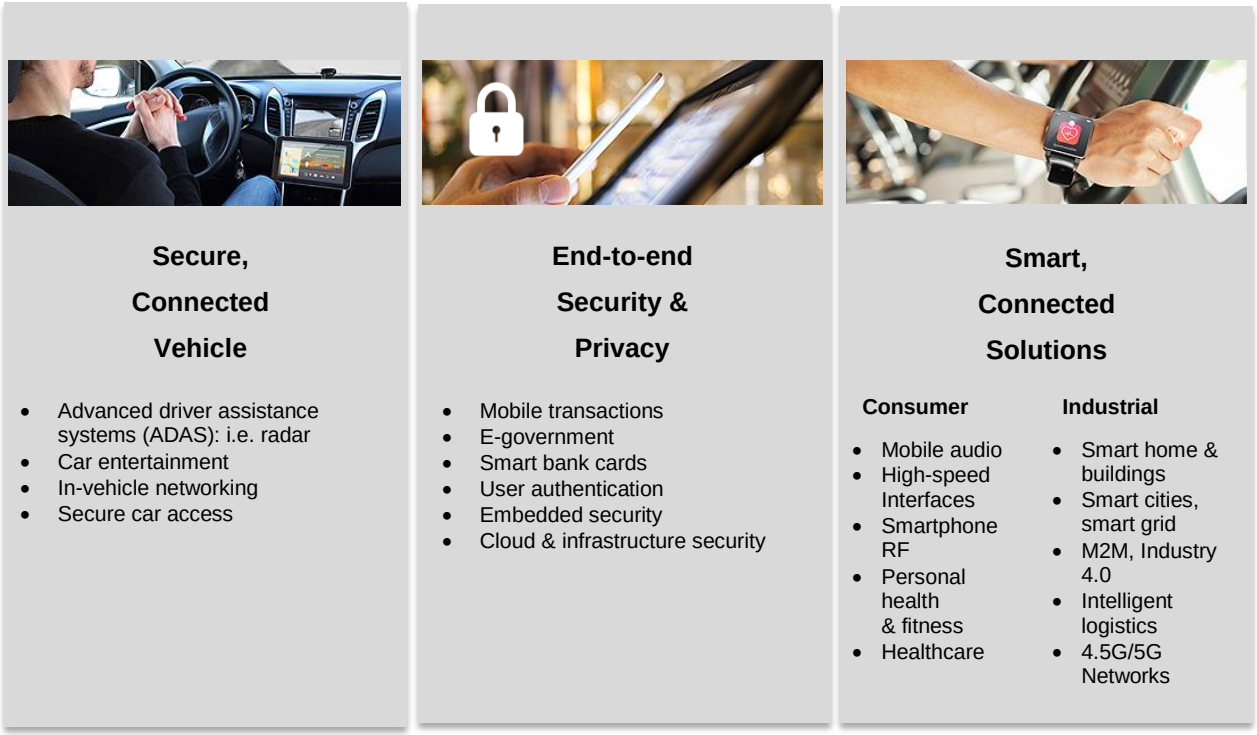


Figure 19: NXP's core IP and technology, source: NXP Semiconductors (2016), online source [12.11.2016].

To ensure fluent reading within the master's thesis, New eXPeriences Semiconductors will be shortened to NXP.

6.1 NXP Austria GmbH

The site in Gratkorn, next to Graz, is the Austrian office of the global acting company. This location is also well known as a competence centre of secure contactless identification systems. About 500 well-qualified

[147] Cf. NXP Semiconductors (2016), online source [12.11.2016].

and international employees work on innovative solutions in the areas of design, development, product management, marketing and application support for the business units Secure Identification Solutions and Automotive.[148]

Some global marketing and R&D activities are executed by NXP Gratkorn. The technology NFC, one of the most famous innovations of NXP's history, was co-invented in Gratkorn.[149]

6.2 Business Line Smart Mobility and Retail (SMR)

As already mentioned above, in Gratkorn is the location of the business units corresponding to Secure Identification Solutions (SIS) and Automotive. SIS covers different business lines, one of them being Smart Mobility and Retail (SMR), which needs to be explained in more detail due to its importance in testing the designed model. SMR is divided into the following segments (see figure 20).

Figure 20: Business line SMR within NXP, source: compiled by the author.

[148] Cf. NXP Semiconductors (2016), online source [12.11.2016].

[149] Cf. NXP Semiconductors (2016), online source [12.11.2016].

SMR is mainly responsible for introducing RFID and NFC technology into several markets. As illustrated previously, there are three different segments, which does not mean that they operate independently from each other. In the time of the IoT, where everything seems to be connected, close collaboration and coordination is assumed.

The practical part of this thesis will test the model with a targeted market in a workshop with members of the SMR team. At this point it is mentioned, that company specific terms are not explained. The practical use of the model is central.

Moreover, an in-depth study, which represents interviews with experts inside and outside NXP, evaluates underlying theory and the model itself. Furthermore, the remarks of the interviewees are integrated in the model depending on how compatible they are. Finally, the practical use case and the results of the interviews lead to an adapted model for general use, but more specifically for NXP. Additionally, recommendations for implementing the procedure model at NXP will be outlined.

7 TESTING THE MODEL WITH THE EVENT MARKET WITHIN NXP

The first part of the practical part of this thesis will focus on testing the above model on a targeted market. For this issue, the event market, which is one of the main interests of NXP's business line SMR, is chosen.

At the beginning of 2016, the latent demand of NFC was higher and higher in this market. Several applications, like access management or micropayment, can be operated in a very convenient and efficient way by implementing NFC technology. As the SMR team is the responsible business line for such market requirements, the question of how to enter this market arose. Therefore the model is tested within this market.

The execution of the procedure model takes place within a workshop of four SMR team members, where the author takes the lead. For that meeting, three hours are allowed for the most expedient result, which is a main requirement from the author to the procedure model. The workshop itself starts with a short introduction and general rules of using these tools. The SMR team members, who contribute in the workshop, are from the marketing and product management side.

Before coming to a more detailed description of this test, some information on the event market will be provided. At the end of this initial practical part, a preliminary evaluation of the procedure model and its handling will be presented.

7.1 Analysis of the event market

Some necessary and important information on the event market will be given to explain the following stages and results of the procedure model.

The term 'event' has established usage. More than two billion results are shown when entering this term into the search engine Google, which also makes its varied usage of it visible. The myriad meanings and associations of the word induce the team to formulate their own definition of an event. The three following categories are offered:

- professional events, like exhibitions and conferences,
- sport events, such as football games, and
- cultural events, like days-long concerts and festivals.

Of course, there are similar circumstances, such as managing a huge crowd of people or the ticketing process. On the other hand, there are significant differences in requirements which lead to the previous classification. Within this thesis only one event category will be chosen due to the study's limited scope. Therefore, the team wants to execute the procedure model with the music event market.

The literature does not state an exact global number of attendees per year in this market, but considering some of the biggest music events provides some appreciation of the market's huge potential. The festival Austin City Limits counts half a million attendees within two weeks of the party, and the multi-day concert Coachella registers about 200,000 visitors per year.[150]

[150] Cf. Canal (2016), online source [12.11.2016].

Moreover, the numbers in the European music event market are very promising, as represented in figure 21.

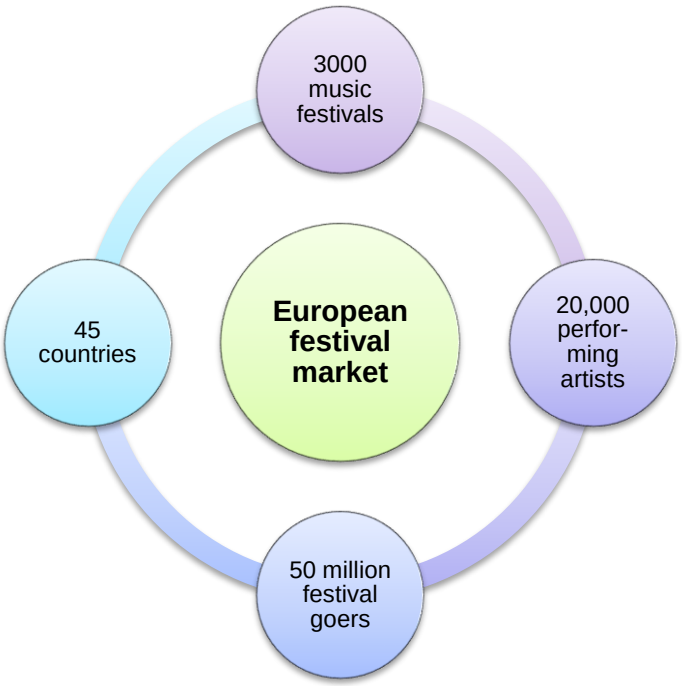


Figure 21: European festival market, source: Yourope Association (2011), online source [12.11.2016] (slightly modified).

While the volume of this market is the most important criteria for semiconductor companies, the requirements of its customer must also be identified. In case of NXP the event operator is the focused customer. The end user is also analysed, but for the purpose of showing the need for the technology event operators and them some reasons to resell the solution. Figure 22 illustrates these requirements.

- Security
- Enhance event experience
- Attendee engagement, omni channel experience
- Real/ live data, crowd streaming
- Interactivity, gain loyalty
- No cash

- Fun, consume service
- Gain experience and share it
- Get away from everyday life
- Involvement and interactivity
- Quality and secureness

Figure 22: Event market requirements, source: compiled by the author.

In sum, only with this information can it be clearly seen that the event market, and especially the music event market, holds huge potential for NXP. It definitely makes sense for NXP to think about market entry, and hence to execute the proposed procedure model.

7.2 Analytics tool 1: Porter's five forces

At this moment, when the market analysis speaks for an accessible market, the procedure model will be applied. Therefore the first analytics tool gets briefly explained and then executed. Figure 23 shows the first analytics tool and its outcome as presented on the white board after the workshop.

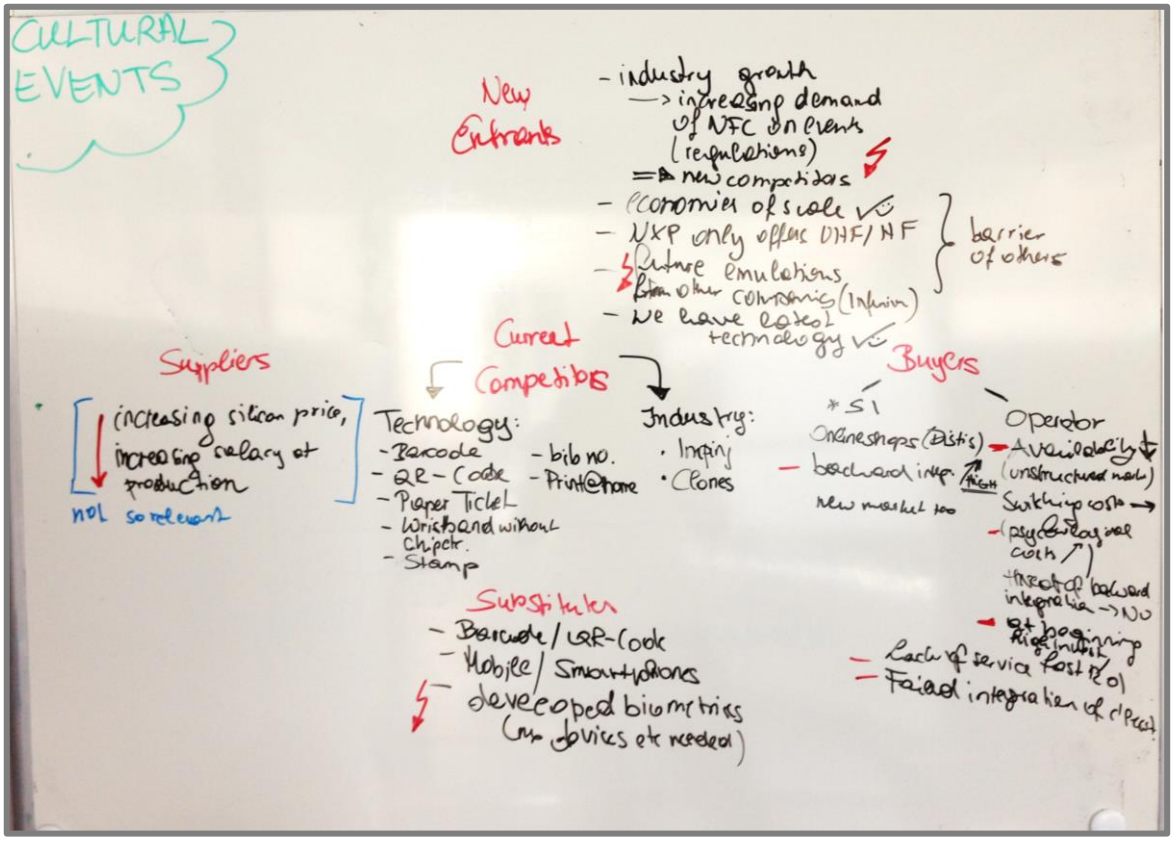


Figure 23: Porter's five forces event market, source: compiled by the author.

Current competitors

Starting from the middle of the white board in figure 23, the current competitors are identified. As NFC is an upcoming technology, the team decides to divide this category into two, namely competitive semiconductor companies and competitive technologies.

Competing technologies	Competing companies
Barcode/ QR-Code	Impinj
biometrics	Infineon Technologies
Paper ticket	Several companies, which manufacture/supply clones
Wristband without any technology	
stamp	

Table 8: Current competitors event market, source: compiled by the author.

Some competing technologies have been established in the market for some years. The barcode or QR-code became popular at the time of the print-at-home technology, when consumers could order and print their tickets from the comfort of their homes. Furthermore, every smartphone is able to display these codes with an app. With regard to NFC, unfortunately one of the most successful brands has not yet opened their NFC interface; therefore none of these users are able to access information from a NFC chip.

Risk of entry by potential competitors

With respect to the increasing demand for contactless technology and the industry growth of the event market itself, new semiconductor companies will try to enter and offer their technology. Furthermore, future emulations of other semiconductor companies may cause unforeseeable losses of market share. On the other side, NXP is nowadays the only semiconductor company with an offering of RFID and NFC, which will be a market entry barrier to others.

Bargaining power of buyers

This category is also fragmented into system integrators and event operators, which is appropriate from the team's perspective. A system integrator may buy the chips through online shops or unknown distributors to negotiate better conditions. Furthermore, they will beat down the price out of integration reasons. Finally, sometimes it is difficult or impossible to replace an existing contactless system with a new one.

Threat of substitutes

Of course, barcode and QR-code are also current competitive technologies in this market. The team decides to mention them in this category too due to their potential and their unrecognized features. Moreover, the substitution with smartphones is similarly an often discussed issue when thinking on the event market. Nevertheless, as already mentioned above, not yet do all smartphone users have the chance to use their NFC function. With a view to the future, the ideal technology for this market would not require a product at all. So far, the team is thinking on what might arise in the future, where the guest does not have to wear or show anything. With biometrics, which will be greatly developed in the coming years, that may be possible.

Bargaining power of suppliers

From the semiconductor company's perspective, this category is not very relevant, in accord with the low silicon prices on the market. When this resource becomes scarce the company will need to re-evaluate, but this circumstance does not seem likely at the moment or in the near future.

7.3 Analytics tool 2: Business Model Canvas

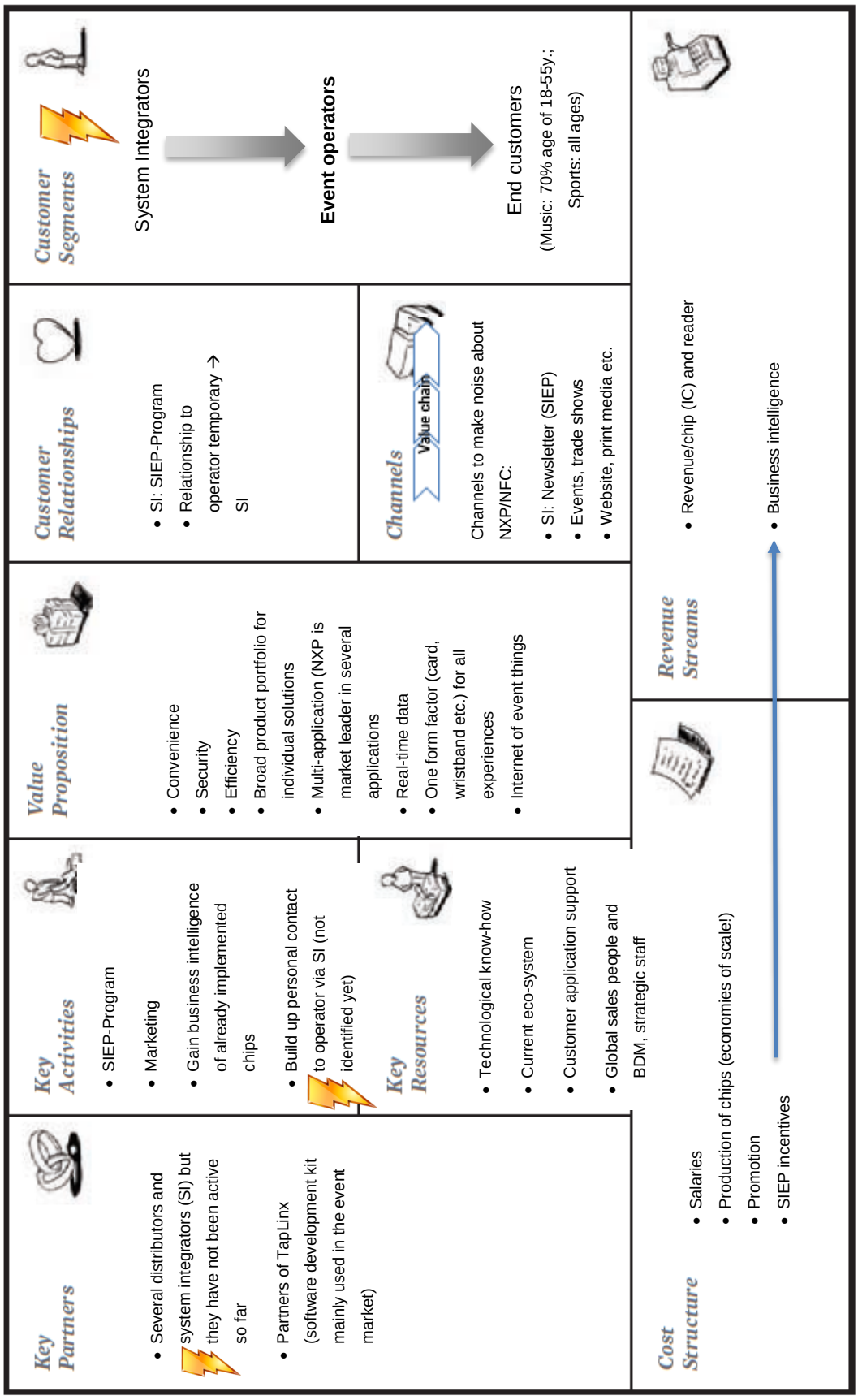


Figure 24: Business Model Canvas event market, source: compiled by the author.

7.4 Resulting tool: Morphological matrix

With the execution of the two analytics tools finished, the morphological matrix is completed. As already mentioned, the insights and the intentional analysis of the relevant topics of the Porter's five forces and the Business Model Canvas lead to comprehensible decisions with respect to each parameter.

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
1	**Product/service**	Replaces an existing one in the market	Is an additional one to others in the market	Has incremental enhancements	Is futuristic	
2	**Required product/service**	Is an idea	Finished concept with prototype	Exists in the product portfolio, but not core competence	Represents core competence, well-engineered	Does not exist in the product portfolio; competitors have it
3	**Trigger for product/service**	Customer demand	Latent/potential customer need	'Technology push'	Competitor(s) launched new one	
4	**Understanding of customer needs**	Yes, fully aware of	Yes, but not in detail	Few needs are identified	Not present	
5	**Available financial resources**	Enough budget	Low budget, but support if aligning with strategy	No financial resources		
6	**Manufacturing process**	Very efficient, cost-effective, outsourced/fabless	Partly fabless, cost sensitivity	Manufactured in-house (IDM), high costs		
7	**Distributor engagement in the market**	High effort	Need push from company	Are waiting for orders; are not active		
8	**Availability of partners**	Some are operating in the market	No partners, but other business units of the company operate in the market	None, but interest from partner side is given	None, no awaking interest or efforts on the market	
9	**Presence of competitors in the market**	Just one	A few are operating	Many activities/competitors on the market but still demand	'Red ocean'	
10	**Technology awareness**	Well known and accepted on the market	Market has heard about it, but not in detail	Some points of contact, but no usage	Completely new to the market	
11	**Customer satisfaction with current technology/product**	Well established, but already many years, change is needed	Customers are just happy that they have learned to deal with the existing one	Disadvantages are not seen until now, not aware of them	Many little problems with the existing solution, but advantage	Immense problems, market requests actively a new technology/product

					is still bigger	
12	**Effect of upcoming trends**	Accommodates the entry	Supports and requires greatly the entry	Does not effect the entry	Does not support the entry	
13	**Available time for market entry**	3 months	6 months	1 year	2 years	
14	**Compatibility with current business/company strategy**	Indeed, aligns totally with strategy to follow the vision	Offering itself is not compatible, but company is solution provider	No compatibility	Yes, but morally reprehensible	

Table 9: Morphological matrix 1 event market, source: compiled by the author.

As described in the theoretical part, the chosen categories get transferred to the second matrix.

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
1	**Product/service**	Disruptive/radical innovation, innovation strategy	Product differentiation, cost leader, imitation strategy	Improvement innovation, innovation strategy or more likely an imitation with less improvement	Invention; can it be an innovation?	
2	**Required product/service**	Will it be a ready product or service within planned entry; ensure the needed timeframe	Determine whether it is a matter of innovation or imitation on the market	Available resources for doing it alone or look to outsource the idea, external growth	Ready for new product introduction strategy	Be early follower and go by imitation strategy or buy up the competitor
3	**Trigger for product/service**	Can be an innovation or product differentiation	May lead to radical innovations, innovation strategy	May lead to radical innovations, but external partners can be important to prove the necessity of the product/service	Be early follower and go by imitation strategy or buy up the competitor	
4	**Understanding of customer needs**	Full awareness of the market	Partners may help to fulfil the knowledge gap	External or public facilities can provide information	No dependent market entry as long as the value proposition cannot be defined	

5	**Available financial resources**	Enables dependent and independent market entry	Dependent market entry possible, ensure low risk	Find a partner or competitor for collaboration		
6	**Manufacturing process**	Wait and learn from mistakes and problems of the pioneers and early followers	If possible, be early follower or pioneer within a new product introduction	Pioneer strategy, otherwise no chance on the market without distinguishing feature		
7	**Distributor engagement in the market**	Collaboration should be very close	Look for additional distributors to make pressure	Choose other partners		
8	**Availability of partners**	Get in touch with them	Gain knowledge from the other business units; market knows the company name, dependent entry possible	Strong collaboration with one or more future partners	Raise awareness and inform the market and partner system	
9	**Presence of competitors in the market**	Option of an early follower	Early followers too many, or within the late follower phase	Be late follower	Efforts should be put in other projects	
10	**Technology awareness**	Market can be entered up to now	Raise technology awareness, sponsored partner projects	Raise technology awareness intensively	Soft introduction, collaboration with external/public facilities	
11	**Customer satisfaction with current technology/product**	Fast market entry, replace old technology/ product	Slow integration, check availability of partners who provide existing technology	Collaborate with a strong opinion leader in this market	Collaborate with a strong opinion leader in this market	Fast market entry, replace old technology/ product
12	**Effect of upcoming trends**	Dependent entry supported	Option of pioneer or early follower	No impact	Market entry not recommended	
13	**Available time for market entry**	Buy up other companies, which are already on the market, licensing or come up with an existing product as innovation or imitation	Carefully plan the market entry, alone or cooperatively	Extensive collaboration possible, also well-planned dependent market entry	Acquisitions are possible to expand offering	

14	**Compatibility with current business/company strategy**	Dependent market entry, independent when resources are missing	Found a separate company/ organization	Market entry not recommended	Market entry strongly not recommended	

Table 10: Morphological matrix 2 event market, source: compiled by the author.

Due to the numerous parameters and the little time of the upper management, the results will be transferred to the value chain. Immediately after the graphical value chain, the market-entry strategy is explained that results out of this second matrix.

7.5 Value Chain for illustrating resulting market-entry strategy

After executing the two analytics tools and the morphological matrix, the results will be transferred into the value chain.

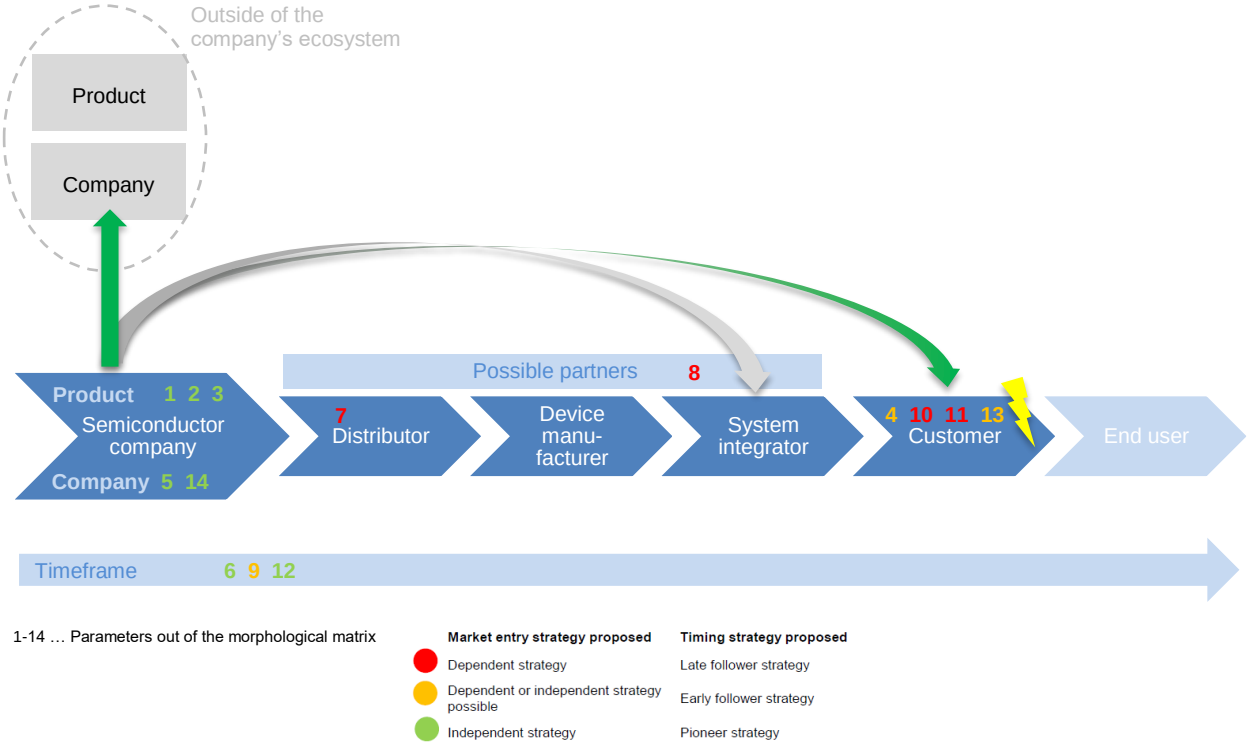


Figure 25: Value chain event market, source: compiled by the author.

Figure 25 shows that the product and company itself are suitable for entering the market independently. NXP has a strong product portfolio which fulfils several requirements when contactless technology is demanded. Moreover, the event market is aligned with the growth strategies of the SMR team and latent demand from customer side has been already identified.

Still, the partner and customer aspects are not well-covered by the semiconductor company. With regard to the partner section, it points out that there is not an appropriate partner in NXP's current company ecosystem, which operates in this market. According to the customer categories, NXP is not aware of the exact needs and requirements; furthermore the market insights are very limited. In addition, NFC is a very new technology connected with some threats in the market. Customers are not sensitized enough to adopt

the technology immediately. Therefore NXP or rather the SMR team has to go one step back and has to engage with the nearest organization next to the customers. Hence the target will be to identify a strong system integrator in the market, which already has the customer's trust and may raise awareness for the NFC technology and NXP's leading products.

Regarding the timing strategy, a pioneer or early follower strategy is recommended because of the competitive situation and upcoming trends.

7.6 Résumé of the workshop

Firstly, the author wants to reflect the handling with the procedure model within the team. At the beginning of the workshop, the procedure model with its tools were explained briefly. The participants quickly understood and began to like the tools, mostly because of structured sorting of the information and concurrent knowledge sharing. After the two analytics tools, everybody was on the same page, and the execution of the morphological matrix was supported almost unanimously.

Of course, some feedback indicated that the possible answers in the first matrix and hence the recommendations in the second matrix, are not complete, that there are many more possibilities. Indeed, especially in this complex industry, there are various conditions. As has been outlined in the theoretical part of this thesis, the list with its several parameter and characteristics is not intended to be exhaustive. It is rather meant to suggest a plausible first direction and, further, some general answers which should fit roughly the company's goals.

The illustrative result on the basis of the value chain was appreciated by the team. Some further suggestions with usage of the value chain have been given. It seems that there is much need for some structure within the SMR team. For the procedure model itself, the value chain plots a clear forward. Also, the traffic light system was easy to transfer to the parameters and was easily understood.

In sum, the team actively engaged in executing the procedure model, and it seems that some of them would embrace a procedure or a model. Detailed remarks and comments on the procedure model will be found subsequent to the interviews with some of the team members.

8 IN-DEPTH STUDY

The decision about an appropriate method to collect, analyse and interpret data is the basis of each empirical study.[151] Within the scope of this thesis, the method of guideline-based interviews with experts is suitable, as far as some specific knowledge from the interviewees will be required. The aim is to verify and complement the insights and results of the theoretical part. The research design, the procedure, and the assessment of the collected data are subsequently described.

8.1 Research design, procedure and implementation of the empirical study

With regard to the study design, it is written down that the interviews are executed on the basis of the theories of Mayring and Gläser/Laudel. Mayring, especially, is famous for his theories about analysing content, which will be explained in detail a little bit later on. In the empirical social research, interviews with experts are mainly used for requesting concentrated and specific knowledge according to a chosen topic.[152] The prepared guideline gives the necessary structure to the interview and operates as a controlling tool.[153] The guideline for the interviews within this thesis can be found in the appendix.

Every interview starts with the salutation and introduction to the process and rules within the interview. It is explained that the results and answers are needed for market research purposes only within this thesis. Everything discussed during the interview is handled strictly confidentially; hence, the names of the interviewees are not stated. The job title and company will be mentioned afterwards. To create a comfortable atmosphere and build a collegial relationship, the author starts with an ice breaker question, which deals with the general opinion on the current situation of the semiconductor industry and the company of the interviewee itself. As far as the empirical study is a qualitative interview, mainly open questions are asked, while polar questions are necessary for solidifying unclear answers. Within this one-hour interview, the following topics are covered:

- the general situation according to market-entry strategies in the company,
- the existing procedure for market entry, and
- the examination of the designed procedure model of the thesis.

As mentioned, the first part of the interview covers the general situation of the interviewee's company with regard to new market entries. Hence, questions about the willingness to enter new markets and the communication within the company and the team itself are examined. Also, the availability of required knowledge of the new market is one of the main topics in this first section.

[151] Cf. Böhmer (2006), p. 207.

[152] Cf. Gläser/ Laudel (2009), p. 186.

[153] Cf. Gläser/ Laudel (2009), p. 186.

The author wants to learn about the existing procedure for entering new markets. Furthermore, it is explored how it was developed and which advantages and disadvantages it implicates. Therefore the interviewee has also the chance to express wishes for a new procedure model.

Before entering the last part of the interview, the most important criteria when focusing a new market exclusive volume are questioned. Afterwards, the author shows and explains the designed procedure model with its stages and illustrative results within the value chain. The main objective of this third part is to verify the in the theory designed model and get some further feedback and input for adaptions. Hence, the interviewees are asked about their general point of view on the analytics tools and, if it seems appropriate at this stage, which advantages and disadvantages they face. The same questions can be found for the morphological matrix; moreover, there is an additional question on the chosen criteria. To conclude, the value chain is considered in terms of its comprehensible and clear function, and certainly there is some space for final remarks and feedback.

The selection of the experts is executed in-house and in external organizations to get an overview of this topic. Interviewees are chosen from the management and strategic departments and from the product management side, due to the interdisciplinary operating teams within the semiconductor industry. To make this interdisciplinary factor visible, the type of education, economic or technical, is added.

Job title	Education	Company
Marketing Manager Smart Mobility	Economic	NXP Semiconductors
Product Marketing Manager	Technical	NXP Semiconductors
Product Marketing Manager	Economic	NXP Semiconductors
Senior Manager for Partner Program	Technical	NXP Semiconductors
Business Developer	Technical	Advanide
Global Sales and Marketing Operations Manager	Economic	ams
Strategy & Business Development Manager	Economic	AT&S

Table 11: Selected interviewees, source: compiled by the author.

Before explaining the exact procedure of the interviews, the external semiconductor companies, which all operate globally, will be described briefly to better rationalize the selection.

AdvanIDe

Advanide's name stands for 'Advanced ID Electronics'. This company is one of the leading silicon distributors, concentrated on components for chip cards, RFID transponders and RFID readers and

terminals. Advanide belongs to the ASSA ABLOY Group that is the global leader in door-opening solutions, dedicated to satisfying end-user needs for security, safety and convenience.[154]

Hence, this company is not really a semiconductor company, but as they are placed in the second stage of the value chain, their opinion and insight can be rather important. Furthermore, it is known that the interviewee was employed at a semiconductor company some months ago. Therefore two insights can be provided with one person. With regard to NXP Semiconductors, Advanide is a premium partner for distributing NXP products.

Figure 26: Logo Advanide, source: Advanide, online source [12.11.2016].

ams

Austrian Micro Systems, also known as ams, develops and manufactures high-performance analog semiconductors. The products are aimed at applications that require extreme precision, accuracy, dynamic range, sensitivity and ultra-low power consumption. The company is known mainly for its sensor portfolio, but its product range also includes power management ICs and wireless ICs for customers in the industrial, consumer, medical, mobile communications and automotive markets.[155]

The company's relationship to NXP Semiconductors is a more competitive one. In some areas, the two companies do not effect each other.

Figure 27: Logo ams, source: ams, online source [12.11.2016]

AT&S

AT&S, which signifies Austria Technologie & Systemtechnik, is currently Europe's largest printed circuit board manufacturer and one of the market leaders in high-end printed circuit board technology. Depending on technological and economic requirements, AT&S offers a wide range of printed circuit boards with focus on customers' needs. The core businesses are mobile automotive and aviation, devices and substrates, medical, industrial and advanced packaging.[156]

According to NXP, the company AT&S is more a partner than a competitor as far as they complement each other in some markets.

Figure 28: Logo AT&S, source: AT&S Austria Technologie & Systemtechnik, online source [12.11.2016].

[154] Cf. Advanide, online source [12.11.2016].

[155] Cf. ams, online source [12.11.2016].

[156] Cf. AT&S Austria Technologie & Systemtechnik, online source [12.11.2016].

Having an accurate procedure within these interviews is an important issue. As the interviewer discusses with experts and has to interpret the given answers correctly, it is necessary to deal with the extant professional literature.

As mentioned, sufficient experts are selected and remain anonymous for reasons of data privacy and to maintain the reliability of the interview. The selected interviewees are contacted in person or via mail to arrange an appointment and are informed that the interview will take one hour. Before an interview starts, they are shown the recorder and approval is sought from them. On the basis of the guideline, the interviewer leads and controls the discussion. As the literature suggests, at test interview is conducted to accommodate final adaptions to the interview guideline.

Afterwards, the recorded answers get transcribed (see appendix 2). The content is analysed based on the theories of Mayring. As a consequence of the small number of interviews, the main results and core statements are filtered, and a harmonized text is created within this thesis. After that these findings are then interpreted, and recommendations are derived to adapt the designed procedure model.

8.2 Major findings and results

As mentioned above, the major findings and results are subsequently compiled. To give them structure, the text is divided into the three sections, which are also used for the guideline and which have been mentioned already.

First of all, the interviewees outline their impressions on the semiconductor industry itself and on their own company in particular. All agree that the semiconductor industry is a very fast, dynamic and vibrant branch. This statement reflects the previously elaborated theory, which identifies these special characteristics as well as the development in cycles. Much potential and promise is seen, which will enhance people's lives.

Moreover, this industry has changed everybody's life without people realizing it. Semiconductor elements have been implemented pervasively in urban lifestyles and cities. On the other hand, this industry, where all is about volume and the mass market, has much pressure with regard to pricing. Hence, they often compete in the market while relying on old products because time spent in so-called 'price battles'.

The majority of the experts face the same emerging trends. Firstly, more and more big semiconductor companies are becoming giants because they are merging with each other, making huge investments in acquisitions. Another trend is presented by start-ups in the branch. Semiconductor companies really like to acquire such start-ups to bring new ideas into the organization without hiring new people.

From NXP's perspective, the company is growing very fast, overall faster than the market. The merger with Freescale makes NXP the fifth largest non-memory semiconductor company in the world. Therefore, the portfolio is complemented, and overlaps are minimal, which speaks for a well-decided development for both companies. The issue often arises that the market and its requirements are not understood, which sometimes lead to late development of solutions. In general NXP, wants to offer more of its strong portfolio to the market and will be eager to increase more and more the next years.

The other surveyed companies are also interested in strong growth. One of them always expands their business, mainly by acquiring others, and sometimes a cooperation is arranged. New opportunities are seen in the IoT, wearables and Industry 4.0.

8.2.1 General situation according to market-entry strategies in the company

When the experts are thinking about the *eagerness* of their companies to enter new markets, everybody is confident about being quite active in identifying and stepping into new markets. Some state that there is also this comfort zone with the old products in known markets, because of which starting to rethink and going in other directions disrupts operations. Hence, sometimes the willingness and courage to branch out are missing. Furthermore, resources like staff or know-how are often unavailable, so analysing new markets or trends does not happen in a sufficient way.

From NXP's point of view, the company operates much because they can with regard to their position in the market, but from time to time that leads to solutions beyond the market's requirements. At the moment, NXP tries to position themselves not only as a chip provider, but also as a company who supports their customers with service and software solutions.

The *duration between new market entries* depends strongly on the market itself, but normally it would not take longer than between six months and two years. This statement demonstrates Moore's law. For instance, an expert in an external semiconductor company mentioned that they usually buy three to four companies a year. This development can be also seen in the set merger and acquisition targets, which face all of the companies.

Furthermore when reflecting the situation, from where the *suggestions for new market entries* come, everybody ensures that this is not a question of allowance. On the contrary, every employee is encouraged to propose new directions if something attracts attention. Certainly, the whole organization is not responsible for following new trends in the market or doing analysis. For this purpose, the business lines, particularly the marketing and sales departments, are mainly concerned.

Firstly, the interviewed experts highlighted good *knowledge transfer* when it comes to the question of whether communication works well. But, on subsequent reflection, the majority also mentioned that there is a considerable lack of knowledge within the team and especially within the company when talking about market entries.

As the figure 29 illustrates, much communication work needs to be done in the semiconductor companies. Moreover there is also the issue that departments or people talk with each other at cross-purposes. Hence, the complete information is never connected, and an overall knowledge about new markets and the potential for entry is not available.

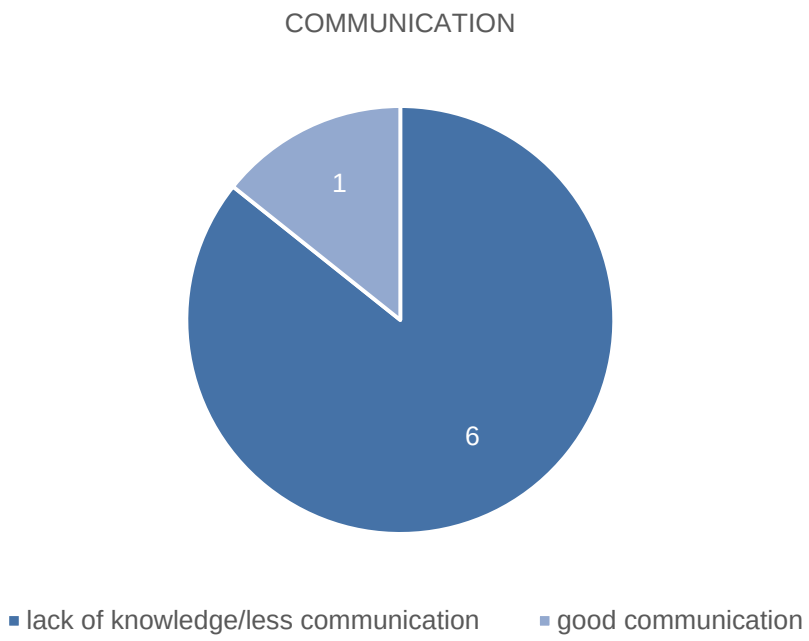


Figure 29: Graphic communication, source: compiled by the author.

Some of the interviewees notice that there are people in the organization who are well advanced. So, the awareness level of the team members is not the same, which may cause enormous consequences within interdisciplinary teams. On the other hand, there are touchpoints within the week, like the weekly alignment meeting (WAM) at NXP, where information can be shared. With regard to the information, the most difficult issue seems to be to get the right information, either from the internet or from the market itself. An expert mentioned that the strategy of travelling to potential customers is not very successful when done by the marketers without technical staff, like product managers.

The main results of this first section of the interview are as follows:

- The semiconductor industry is a very fast branch.
- Products are developed without regard to customers' requirements.
- The duration between market entries is 6 months up to 2 years.
- Everybody is encouraged to suggest new markets
- There is a lack of knowledge within the team and company.

8.2.2 Existing procedure for market entry

Neither NXP nor the other semiconductor companies have a *defined procedure model* according to new market entries.

With regard to NXP, there is a more informal procedure, which is also well known as 'learning by doing'. Order and structure are missing. Normally the market is tested by the business development managers. They try testing the potential for market penetration; if that is inefficient, the organization thinks about mergers and acquisitions. Besides this strategy. One expert mentions, there is missing know-how concerning the definition of market-entry strategies within the team. These kinds of strategies are not really discussed; either it is clear that there will be a merger or acquisition or when entering the market on their own they skip such strategic consideration and simply start operating in the market.

According to the external semiconductor companies, it is pointed out that there is a high interest in defining a procedure due to the fast-changing industry and the markets.

The following table shows the several *advantages and disadvantages* with respect to not having a procedure model, as explained by the interviewees.

WORKING WITHOUT PROCEDURE MODEL

Advantages	Disadvantages
Flexibility	No structure and less guidance
Employees have each their own responsibilities	Each carries much responsibility
'Fluency' and more freedom	Replication to the next market is not possible
	Decisions are not comprehensible
	Urgency of entering a market cannot be shown to the upper management (for raising financial resources)
	Success depends on an individual person or team; it is not institutional

Table 12: Advantages and disadvantages of working without a procedure model, source: compiled by the author.

As table 12 depicts, flexibility is one of the main advantages, as emphasized by nearly every expert. This advantage, however, leads naturally to a lack of structure and guidance. Responsibility is understood as both a positive and a negative. Every individual or a small team has much responsibility, which may cause much pressure on everyone.

As well, market entries are not replicable, which causes much effort for another team if they want to understand how to approach the task. This effort goes hand in hand with the topic of comprehensibility, which concerns information that might not be available until a solution is found and concerns decisions are not transparent and replicable. One of the last points mentioned is the absence of an opportunity or tool to raise awareness or show the urgency of entering a new market to upper management. Therefore the company is sometimes late to enter.

Furthermore there are initiatives coming from an individual or from the team that are rejected or held over by upper management without explanation. Again, communication within the team is never enough. On the other hand, upper management makes *decisions* very late, sometimes no more than a day earlier than the public announcement. This timeline also shows the incomprehensibility of the procedure, but also how fast this industry operates.

Within in the interview, the experts are also requested to declare their *wishes according to a future procedure model* for market-entry strategies. The following illustration shares the most often mentioned wishes.

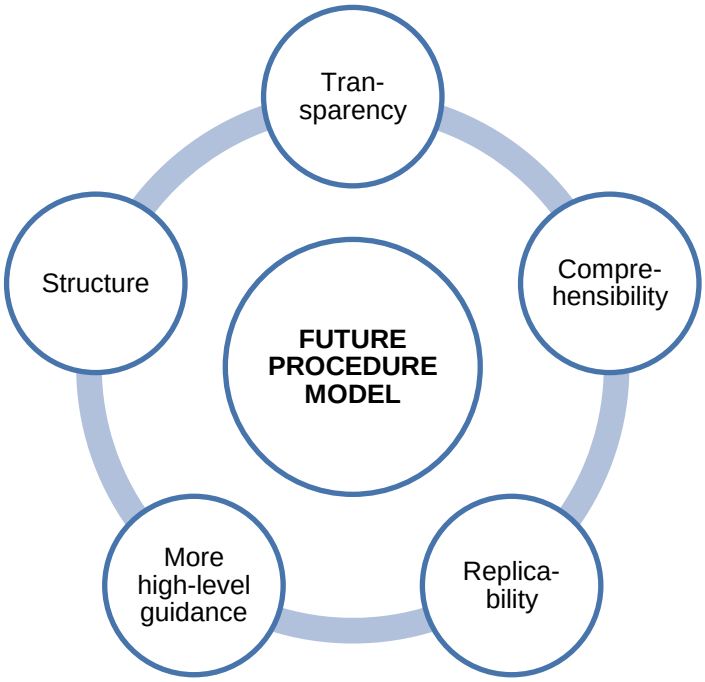


Figure 30: Wishes to future procedure model, source: compiled by the author.

As depicted in figure 30, there are several motivations for a procedure model. Furthermore, one expert of an external semiconductor company noted that there are serious considerations of implementing fixed templates in several processes. With that approach, employees should become more and more familiar with the fixed templates or tools and take them for granted when starting one of these processes. Hence, also for new market entries such permanent templates can be appropriate.

The main results of this section are the following:

- No semiconductor company has a defined procedure model.
- Table 12: Advantages should remain, disadvantages should be eliminated.
- Decisions of the upper management are not transparent.
- Figure 30: Certain wishes should be realized by the new designed procedure model.
- The importance of discussing and defining market-entry strategies is unclear (NXP).

8.2.3 Examine the designed procedure model of the master's thesis

Before presenting the feedback and remarks to the new designed procedure model, the *most important criteria* when focusing a new market are stated by the experts. The volume is excluded in advance as far as this criteria is always the first one ensured due to the importance of economies of scale in this industry. The majority of the interviewees mentioned that the long-term potential and growth in the targeted market is crucial. It does not make sense to enter a market with a short demand. Furthermore, appropriate trends in the market that support the offered technology have to be confirmed. Moreover, an important criteria is the strategy fit and whether the market is well understood.

In particular, the NXP experts also point out that replicability due to scalability is significant when new markets are discussed. Another central topic is that to avoid price battles there is the possibility to gain market shares very quickly or to be the first in the market.

The *first impressions of the experts on the model* are completely positive. Especially the simplicity of use and well-chosen tools are appreciated. Also to demonstrate the result within the value chain is an appropriate template for showing it to the upper management. Some tools are already used in isolation, but not in combination, as in the designed procedure model. One expert expresses that it is significant that the external analysis within Porter's five forces is the first tool and after that the internal analysis through Business Model Canvas has to be executed.

The experts are next asked for the *advantages and disadvantages* they face, according to the tools within the designed procedure model. The first analytics tool is **Porter's five forces**; hence its advantages and disadvantages are pointed out in table 13.

ANALYTICS TOOL 1: PORTER'S FIVE FORCES

Advantages	Disadvantages
Right tool to understand an industry	Missing view on the internal capabilities
Shows quickly the complicity and simplicity of entering a new market	Ineffective when using it in a wrong way or rather without extensive discussions
Easy to understand, especially also for technical people	
Structured focus on all five topics, nothing can be missed out	

Table 13: Advantages and disadvantages of Porter's five forces, source: compiled by the author.

The value of Porter's five forces can be seen in the breakdown of advantages and disadvantages. On the other hand, the experts mentioned that they do think about these five topics, but without the graphical structure. Hence, it can be easy to assume the important issues are not covered. With regard to the declared disadvantages, the missing internal view is integrated within the second analytics tool, the Business Model Canvas. The wrong usage of the tool is of course an important issue, in particular when it comes to the third tool of the designed procedure model.

The next table points out the *advantages and disadvantages* of the *Business Model Canvas*, as noted by the experts.

Every interviewee is familiar with the Business Model Canvas and uses it for several strategic questions. Nearly all experts consider that the model is still not well structured for people who do not know this

framework. For example, technicians may be unable to cope with these many elements. However, after a short introduction, the way to handle these elements should be clear to every interdisciplinary team.

ANALYTICS TOOL 2: BUSINESS MODEL CANVAS

Advantages	Disadvantages
Good illustration to show company's value or rather value proposition	May be complex the first time; structure and explanation of the elements has to be explained
It forces one to think about the problem and solution	Decision makers may not be convinced by 'one' page
Appropriate for interdisciplinary teams (as usual in this industry)	When using it in the wrong way or without extensive discussions, it will not be effective
	Only one target group, whereas in the semiconductor company you have more than one

Table 14: Advantages and disadvantages of Business Model Canvas, source: compiled by the author.

The Business Model Canvas is also popular because of its simplicity and logical flow through the nine building blocks. The involvement of the value proposition, which is often missing, is especially appreciated. On the other hand, it is very important that this tool is used seriously by the whole group; otherwise the result is not sufficiently concrete and complete. Such incompleteness may cause problems, particularly when upper management wants to have insight into the used tools. A significant disadvantage is that only one target group can be listed. Semiconductor companies face more than just one target group, though,, as can be also seen in the value chain.

At least, it is outlined, the iterative character of both analytics tools complements each tool.

The *morphological matrix* itself is not very known by the interviewees, but within the explanation of the procedure model they become familiar and in general welcome it. One of the experts, who knows that tool, likes the idea of using it in this way because he knows that the morphological matrix is usually used for creative solutions. This expert also believes that the stage for this tool is plausible within the designed procedure model.

Moreover, the experts appreciate its fixed template and high usability. A solution can be find very quickly arrived at, but there is also space for discussions. The logical flow through the several parameters and their characteristics is efficient, and the team is further able to come expediently to a solution or a first impression.

By contrast, the team has to take care of every decision in a serious way and concentrate on the tool. That may be a problem, with people simply going through the matrix and not taking appropriate time for each parameter. The following table summarizes the advantages and disadvantages seen by the interviewees.

RESULTING TOOL: MORPHOLOGICAL MATRIX

Advantages	Disadvantages
Simplicity in use	False or thoughtless use leads to divergent results
Get a solution quickly	Useful characteristics may be missing
Logical flow and efficiency	
Good for interdisciplinary teams	
Fixed template leads to reliability	

Table 15: Advantages and disadvantages of morphological matrix, source: compiled by the author.

With regard to the selected *parameters* within the morphological matrix, the experts consider that they seem comprehensive and that they seem to fit for the semiconductor industry. These parameters lead to a structured result, which is often a challenge. Additionally, some more parameters are recommended, which might also be helpful when it comes to new market entries:

- substitutes or rather competitive technologies,
- scalability: a question of how easily the company may scale the solution to other markets or applications,
- capability: may be better to combine the three specified extra parameters into one parameter, and
- spillover effect with other technologies and applications: especially mentioned with regard to NXP.

In respect to the illustration of the result within the *value chain*, every expert considers this solution to be an appropriate one. Notably, because of its importance in the semiconductor industry, the value chain is the right template to share the results with upper management.

Beside this insight, some experts recommend adding a key to the graphic. One reason for this recommendation is that the illustration should be self-explanatory, and another relates to the analytics: not everybody is familiar with or satisfied with the results presented within a graphic; they would like them to be presented in a more analytic way. For reliability it is suggested to add the traffic light system to the second morphological matrix. Hence, every characteristic has its defined colour, which is not firstly shown to the team but when transferring the result to the value chain. On the other side, one expert mentioned that the colouring is very clear due to the recommendations within the second matrix.

Additionally, it would be appreciated to have this value chain for the ongoing process within the market entry as a controlling tool, which is especially mentioned by the NXP experts. Therefore it is possible to check whether every necessary aspect is considered and covered. Particularly at NXP, the people start to act without thinking of many of these relevant issues.

In general, the way through the procedure model and how to come to the result is comprehensible, clear and structured. The value chain will help to rethink the stages and call the semiconductor companies' attention to the external factors. One expert expresses that the aim should be to solve external problems and not to push the internal turnover.

The main results of the last section of the interview are these:

- The most important criteria are the long-term growth and potential of the market, strategy fit, scalability, trends that support the technology.
- Mainly advantages are found in the use of both analytics tools; disadvantages have to be weakened or eliminated.
- The morphological matrix is also seen beneficial, although (again) disadvantages have to be weakened or eliminated.
- Additional parameters within the morphological matrix are recommended: Substitutes or rather competitive technologies, scalability, capability perspective, spillover effect (NXP).
- The value chain is much appreciated. Some recommendations for it include adding a key, eventually giving defined colouring for each characteristic, using it as controlling tool through the execution new market-entry, and adding software and service to the semiconductor stage (NXP).

There are not many findings that relates only to NXP Semiconductors, but those items are indicated above by (NXP). In the semiconductor industry, there appears to be the same situation or challenges in every company.

8.3 Interpretation of findings and recommendations for adaptions

Within this chapter, the major results of the interviews, stated in section 8.2, will be reflected in terms of its recommendations. These recommendations lead to adaptions that are integrated into the designed procedure model. On the other hand, whether the designed procedure model already fulfils some findings or requirements will also be noted.

Tables 16–18, divided into the three sections of the interviews, show the main findings on the left side, while the recommendations follow on the right side. The right fields are coloured green when the procedure model already considers results or requirements. They are red when adaptions are needed to consider the results.

1st SECTION

Major results/requirements	Recommendations
Semiconductor industry is a very fast branch	The procedure model fulfils this requirement due to its execution time of approximately three hours.
Product development without regard to customers' requirements	The procedure model considers this aspect within its two analytics tools.

1st SECTION	
Major results/requirements	**Recommendations**
Duration between market entries is 6 months up to 2 years	The timings strategy is also covered by the designed procedure model to ensure a successful entry.
Everybody is encouraged to suggest new markets	The model is geared to support interdisciplinary teams; hence, economists and technicians may execute it.
Lack of knowledge within the team and company	The procedure model will enhance this situation and step-by-step eliminate this lack.

Table 16: Interpretation of findings and recommendations for adaption, 1st section of interview, source: compiled by the author.

To summarize, according to the first section of the interview, the new designed procedure model will most likely manage the requirements and solve mentioned problems, the lack of knowledge, for instance.

2nd SECTION

Major results/requirements	**Recommendations**
No semiconductor company has defined procedure model	This gap can be closed by implementing the newly designed procedure model.
Advantages of missing procedure model should remain, disadvantages should be eliminated	
Advantages: Flexibility, own responsibility, fluency and more freedom	The flexibility will not fully remain, as a procedure brings some structure with it, but this procedure also absorbs some responsibility by following the tools step-by-step. Flexibility, fluency and freedom can be offered through flexible usage of the model or single tools → this has to be pointed out.
Disadvantages: No structure Carry a lot of responsibility (see above) Replication to the next market is not possible Decisions are not transparent	The newly designed procedure model will eliminate these disadvantages.

2nd SECTION	
Major results/requirements	**Recommendations**
Urgency of entering a market cannot be shown to the upper management	The newly designed procedure model will eliminate these factors.
Success depends on an individual person or team	
Decisions of the upper management are not clear to others.	The designed procedure model will ensure a clear decision-making method.
Wishes that should be realized by the new designed procedure model:	
Transparency Comprehensibility Replicability Structure	These wishes will be satisfied by the newly designed procedure model.
More high-level guidance	It has to be ensured that the designed procedure model is supported by the management; moreover an active recommendation including help to use it will add more guidance.
Importance of discussing and definition of market-entry strategies is unclear (NXP)	With the introduction of the new procedure model, NXP employees will raise awareness about market-entry strategies. Generally, within the introduction. the term 'market-entry strategy' will be explained.

Table 17: Interpretation of findings and recommendations for adaption 2nd section of interview, source: compiled by the author.

The inferring of recommendations shows that the model has to be adapted according to the advantages that have been through a missing procedure. On the other side, the newly designed procedure model eliminates all disadvantages and satisfy nearly all wishes.

For NXP in particular, the correct understanding of market-entry strategies and its importance to discuss has to be involved while introducing the procedure model.

The following table points out the results and recommendations for adaptions of the third section of the interview.

3rd SECTION

Major results/requirements	Recommendations
Most important criteria are long-term growth and potential of the market, strategy fit, scalability, trends that support the technology	The long-term growth and potential of the market are criteria covered within the generic market analysis, which happens usually before thinking about an appropriate market-entry strategy. Strategy fit and considering trends is already covered within the morphological matrix in the procedure model. Scalability will be explored for integrating in the model.
Mainly advantages are faced within both analytics tools; disadvantages have to be weakened or eliminated	
Disadvantages of Porter's five forces (P5F):	
Missing view on the internal capabilities	The internal view is covered by the second analytics tool, the Business Model Canvas.
When used it incorrectly, without extensive discussion, it will not be effective	The correct and effective execution has to be ensured through a short introduction and explanation at the beginning of the workshop.
Disadvantages Business Model Canvas (BMC):	
May be complex the first time; structure and elements have to be explained	The correct and effective execution has to be ensured through a short introduction and explanation at the beginning of the workshop.
When used it incorrectly, without extensive discussion, it will not be effective	
Decision makers may not be convinced by 'one' page	As above, the correct usage has to be ensured, and managers have to raise awareness about these tools. Therefore the procedure model should also be introduced to them in a more detailed way with a focus on beneficial effects out of the tools.
Only one target group, but in the semiconductor company there are more than one	It has to be pointed out that the morphological matrix is aligned only with the customer and operator within the value chain.

3rd SECTION	
Major results/requirements	**Recommendations**
The morphological matrix (MM) is also seen as beneficial; disadvantages have to be weakened or eliminated Disadvantages:	
False or thoughtless use leads to divergent results	The correct and effective execution has to be ensured through a short introduction and explanation at the beginning of the workshop.
Useful characteristics may be missing	This issue should be clarified within the implementation.
Additional parameters within the morphological matrix are recommended: substitutes or rather competitive technologies, scalability, capability perspective, spillover effect (NXP)	The recommended parameters substitutes or competitive technologies, scalability, capability perspective, spillover effect (NXP) will be explored for integration in the model.
Value chain is much appreciated, some recommendations: add key, eventually have defined colouring of each characteristic, use it as controlling tool through the execution of new-market entry, add software and service to the semiconductor stage (NXP)	A key to the value chain should be added. A colouring scheme for the second morphological matrix will be not created created due to only one comment on this. NXP's additional offering of software and services is included in the parameters, where it says 'product/service'.

Table 18: Interpretation of findings and recommendations for adaption 3rd section of interview, compiled by the author.

Finally, the third section also leads to important action points that will be integrated and considered for the adaption. One of the most significant findings is the consideration of analytics people within the illustration of the value chain. Therefore the necessity to show the results in a way appropriate also for them is indispensable.

8.4 Résumé of the in-depth study

The method of the interviews for verifying and complementing the insights and results out of the theoretical part was suitable. Thereby the experts were questioned in detail, and an intensive discussion led to usable insights. Interviewing people from NXP and other semiconductor companies ensures an overall view.

The study clearly shows that there are not many differences between companies according to a procedure of market-entry strategies. Of course, they belong to the same industry or are nearby, but the findings show that there are the same challenges and problems to solve. Moreover, it has been confirmed that there has

not been yet a defined procedure model in any company. Hence, the procedure model will be adapted in general, and one particular to NXP is not required.

The interviewer faces the urgent need of a procedure model according to the statements mentioned by the experts. On the other side, they do not want to be restricted to processes and fixed structures. So, a dilemma has to be solved. The author is willing to satisfy all requirement within the newly designed procedure model for market-entry strategies.

Finally, besides NXP, the external companies requested to receive the whole procedure model with its templates. Hence, the practical application and need are given and indicate the intended value of the master's thesis to the semiconductor industry, in particular, and to economic planning, in general.

9 ADAPTED PROCEDURE MODEL FOR MARKET-ENTRY STRATEGIES

The previous chapters addressed the testing and examining of the designed procedure model for market-entry strategies. On the one hand, the findings endorse the implementation of a procedure model; on the other side, some recommendations and suggestions for improvement for adapting the model result. Within this chapter, the theoretical procedure model will be adapted according to the recommendations. In addition, a proposal will be made for implementing the procedure model at NXP, due to some remarks from the interviewees for this stage. Finally, the author depicts the limitations of the master's thesis.

The following table summarizes all recommendations that have been inferred from the in-depth study.

Topic	Recommendations for adaption	Effected stage
Advantages: Flexibility, own responsibility, fluency and more freedom	The present extent of flexibility will not remain, as a procedure bring some structure with it, but such structure also absorbs some responsibility by following the tools step-by-step. Flexibility, fluency and freedom can be offered through flexible usage of the model or single tools → this has to be pointed out.	Implementation
More high-level guidance	It has to be ensured that the designed procedure model is supported by management; moreover an active recommendation including help in using it will add more guidance.	Implementation
Importance of discussion and definition of market-entry strategies is unclear (NXP)	Within the introduction, the term "market-entry strategy" will be explained.	Implementation
P5F, BMC, MM: Used incorrectly or without extensive discussions, it will not be effective	Correct and effective execution has to be ensured through a short introduction and explanation at the beginning of the workshop.	Implementation
Decision makers may not be convinced by 'one' page	As above, the correct use has to be ensured and managers have to raise awareness about the tools. Therefore the procedure model should also be introduced to them in a more detailed way, with focus on beneficial effects out of the tools.	Implementation

BMC: Only one target group; but semiconductor companies have more than one	It has to be pointed out, that the morphological matrix is aligned only with the customer or operator within the value chain. Hence, the Business Model Canvas has to be executed with this stage of value chain. → Further matrices can be developed for other target groups.	Implementation, further developments
Maybe useful characteristics are missing	This issue should be clarified within the implementation.	Implementation
Additional parameters within the morphological matrix are recommended: Substitutes and competitive technologies, scalability, capability perspective, spillover effect (NXP)	The recommended parameters substitutes and competitive technologies, scalability, capability perspective, spillover effect (NXP) will be explored for integration in the model.	Resulting tool: Morphological matrix
Value chain is much appreciated; some recommendations: add key, eventually define colouring for each characteristic to be used as controlling tool through the execution of new market-entry, add software and service to the semiconductor stage (NXP)	A key to the value chain should be added. A colouring scheme for the second morphological matrix will be not created since only one interviewee requested this and the other did not see an issue in the missing colouring.	Value chain Resulting tool: Morphological matrix

Table 19: Summarized recommendations for adaptions, source: compiled by the author.

The designed procedure model itself remains as can be looked up in chapter 5. Alterations will be made in the resulting tool, the morphological matrix, and in the value chain.

With regard to the recommended parameters, no expert wanted to exchange a parameter or cancel one. One of the important properties of the designed procedure model is its general usability and simplicity. It should not be made more complex and confusing. Therefore only recommendations for adding parameters are shared. Every semiconductor company should decide on their own for themselves whether an exchange of parameters is necessary. The following table lists the parameter and notes significant

considerations. These considerations indicate whether a certain parameter already covers the topic partly and where the company should consider its scope (see table 20).

Parameter	Significant consideration
Substitutes or rather competitive technologies	Partly covered by the parameter 'presence of competitors in the market' and 'effect of upcoming trends'
Capability perspective	Capabilities are the combination of parameters 'available financial resources', 'manufacturing process' and 'product/service'
Scalability	Parameter is not covered in any way; will be added
Spillover effect (NXP)	Parameter 'compatibility with current business/company strategy' includes this

Table 20: Recommended parameters and significant consideration, source: compiled by the author.

As explored above, scalability will be added to the morphological matrix; hence, a 15th parameter has to be created (See tables 21 and 22).

MATRIX 1

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
15	Scalability	No other possibilities	Few options in other markets	High scalability to many other applications		

Table 21: Parameter scalability matrix 1, source: compiled by the author.

MATRIX 2

No.	Parameter	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5
15	Scalability	Outsource the idea or rather overrule it	Independent market entry or dependent with cooperation strategy	Independent market entry		

Table 22: Parameter scalability matrix 2, source: compiled by the author.

The value chain will be adapted according to the proposal to add a key and a resulting description for analytics people. Therefore a table is added to the descriptive value chain to act as a key, or in respect, as resulting tool for analytics people, on the other. Moreover the parameter will be coloured with the traffic light system to show the stages, which suggests dependent market entry or not.

Finally, the value chain, including the table 23, is illustrated on one slide, since presentations to upper management are often done by the tool PowerPoint and generally every slide should be self-explanatory.

Value chain stage	# Parameter	Parameter	Characteristic
Semiconductor company	1	Product/service	
	2	Required product/service	
	3	Trigger for product/service	
	5	Available financial resources	
	14	Compatibility with current business/company strategy	
Distributor	7	Distributor engagement	
Possible partners	8	Availability of possible partners	
Customer	4	Understanding of customer needs	
	10	Technology awareness	
	11	Customer satisfaction with current technology/product	
	13	Available time for market entry	
Timeframe	6	Manufacturing process	
	9	Presence of competitors	
	12	Effect of upcoming trends	

Table 23: Key and resulting table added to value chain, source: compiled by the author.

To more clearly visualise this adaption, the example with the event market is added. Therefore the value chain is transferred as exemplified above, and the new table is added (see table 24 and figure 31).

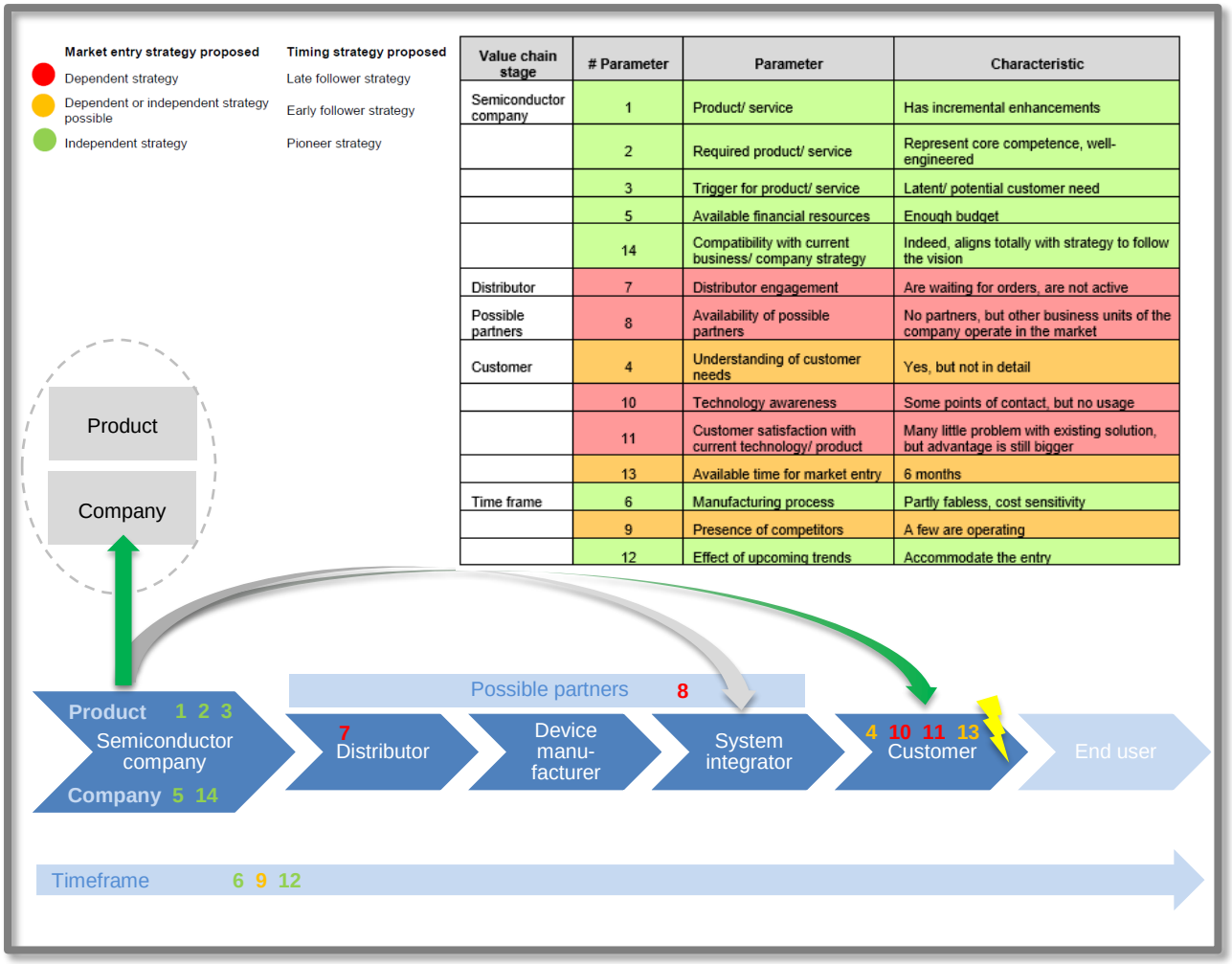
Value chain stage	# Parameter	Parameter	Characteristic
Semiconductor company	1	Product/service	Has incremental enhancements
	2	Required product/service	Represents core competence, well-engineered
	3	Trigger for product/service	Latent/potential customer need

	5	Available financial resources	Enough budget
	14	Compatibility with current business/ company strategy	Indeed, aligns totally with strategy to follow the vision
Distributor	7	Distributor engagement	Are waiting for orders, are not active
Possible partners	8	Availability of possible partners	No partners, but other business units of the company operate in the market
Customer	4	Understanding of customer needs	Yes, but not in detail
	10	Technological awareness	Some points of contact, but no usage
	11	Customer satisfaction with current technology/product	Many little problems with existing solution, but advantage is still bigger
	13	Available time for market entry	6 months
Timeframe	6	Manufacturing process	Partly fabless, cost sensitivity
	9	Presence of competitors	A few are operating
	12	Effect of upcoming trends	Accommodates entry

Table 24: Resulting table on the example of the event market, source: compiled by the author.

Figure 31 simulates a PowerPoint slide to demonstrate the final presentation of the result.

To cover all recommendations, the semiconductor companies will feel free to decide on their own whether a colouring of the second morphological matrix is necessary. As only one interviewee did see such colouring as necessary, it will be not outlined in this thesis. All other experts saw the transition of the second matrix with the right colouring clear and understandable.



Value chain stage	# Parameter	Parameter	Characteristic
Semiconductor company	1	Product/ service	Has incremental enhancements
	2	Required product/ service	Represent core competence, well-engineered
	3	Trigger for product/ service	Latent/ potential customer need
	5	Available financial resources	Enough budget
	14	Compatibility with current business/ company strategy	Indeed, aligns totally with strategy to follow the vision
Distributor	7	Distributor engagement	Are waiting for orders, are not active
Possible partners	8	Availability of possible partners	No partners, but other business units of the company operate in the market
Customer	4	Understanding of customer needs	Yes, but not in detail
	10	Technology awareness	Some points of contact, but no usage
	11	Customer satisfaction with current technology/ product	Many little problem with existing solution, but advantage is still bigger
	13	Available time for market entry	6 months
Time frame	6	Manufacturing process	Partly fabless, cost sensitivity
	9	Presence of competitors	A few are operating
	12	Effect of upcoming trends	Accommodate the entry

Figure 31: Adapted resulting value chain and table for event market, source: compiled by the author.

To summarize, the adaptions lead to a complete morphological matrix and to an illustrative value chain for all preferences. The next subchapter approaches the implementation of the procedure model at NXP, including the recommendations above.

9.1 Recommendations for implementing the procedure model at NXP

After adapting the model, a consequent implementation has to be ensured. With the example of NXP, an accurate implementation will be described.

As far as the first test of the procedure model is executed within the SMR team, namely by means of the event market, that business line is the starting point.

After the final review and approval through the University of Applied Sciences Campus 02, the author convenes a meeting with the management team within the business line SMR. As the findings of the interviews show, it is necessary to introduce the procedure model in a more detailed way to them. Thus, especially the benefits of each tool and of the procedure model itself have to be outlined. First, the management team has to be convinced of the designed procedure model; only then is high-level guidance and support through them possible. This order of operations implies that they actively recommend and offer their help for using the procedure model. In a final step, the confirmation will be obtained, and the range and distribution of responsibilities will be presented and fixed.

RANGE AND DISTRIBUTION OF RESPONSIBILITIES

Responsible person	Area of responsibility
All SMR team members	- Be open with the procedure model. - If somebody requests you for a workshop, then participate. - Be serious and careful within the execution of the procedure model. - Remark on ambiguities. - Suggestions for improvements should be forwarded directly to the author.
Workshop leader	- Give a short explanation of the procedure model and the necessity to execute it correctly and seriously. - Be a moderator through the whole workshop. - Define a timekeeper: do not surpass three hours. - Transfer and present the results of the workshop to upper management (max. one week between workshop and presentation). - Interface between the team and the upper management for the current project. - Integrate the results and completed procedure model into SharePoint (sharing platform at NXP) for others
Management team	- Support the procedure model as a fixed tool in the organization. - Take the procedure model as a basis for the final decision on market-entry strategies to ensure comprehensibility and reliability, - Finalize a decision,

Table 25: Range and distribution of responsibilities, source: compiled by the author.

It is stated that the other semiconductor companies have to align the parameters with the characteristics of the morphological matrix before presenting it to the management team. This alignment requires an interdisciplinary team to view the issue in its entirety.

As mentioned, within the SMR team there is a regular WAM once a week. Hence, after introducing the procedure model to the management team, the whole SMR team will be integrated and instructed. This integration happens within the following WAM after the management meeting to ensure fluent implementation without interruptions.

The introduction session will not take longer than one hour to avoid loss of concentration. As the interviews show, knowledge on the definition of market-entry strategies is missing, and the importance of discussing this topic is underestimated. Therefore, the term itself and the necessity of thinking about market-entry strategies have to be explained first.

After that explanation the new designed procedure model will be expounded. At this point, it is necessary to clarify the correct and effective execution of each tool within the procedure model. Due to some concerns from the experts, such clarification should be done briefly at the beginning of each workshop. With regard to the morphological matrix, it will be stated that the frame is aligned only with the customer or rather operator in the targeted market.

Moreover the range and distribution of responsibilities will be shared to ensure a clear structure within the procedure model. Some time will be left to give the people the chance for remarks and questions. Finally, the confirmation of the whole team will be obtained for implementing the procedure model. Immediately after this introduction session, the model will be a fixed element in the workday when thinking about entering new markets.

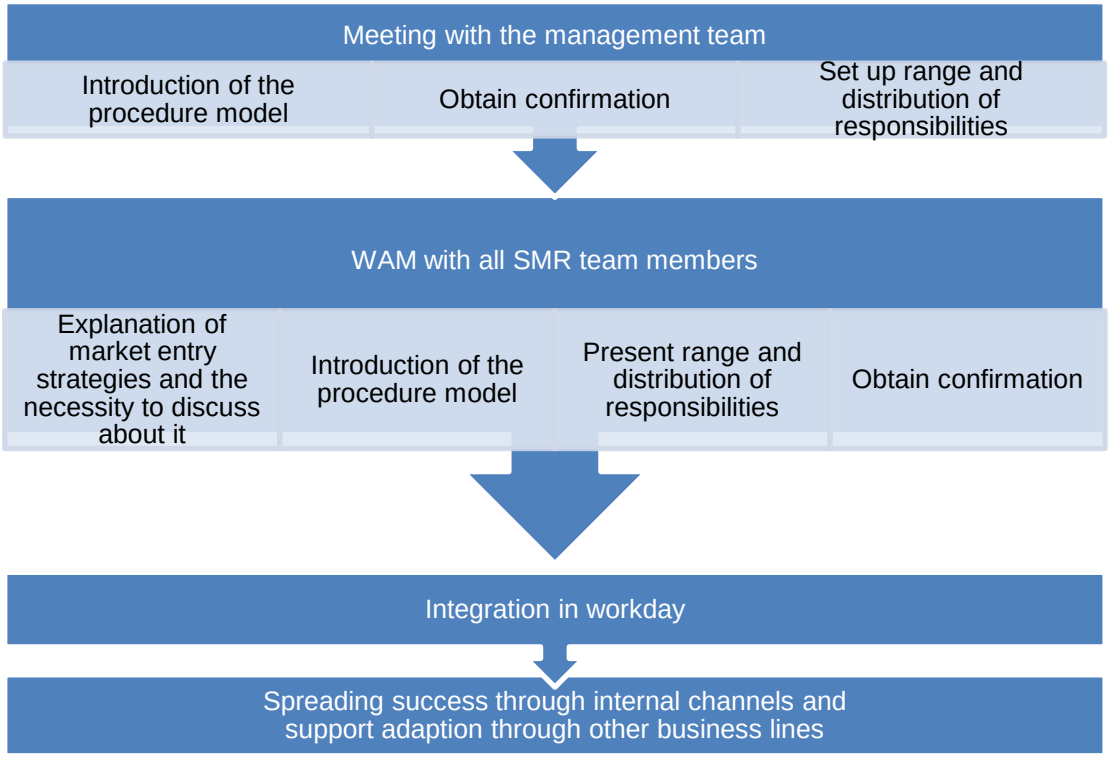


Figure 32: Procedure for implementing the procedure model at NXP, source: compiled by the author.

After half a year there should be a feedback round to analyse the use and effectiveness of the procedure model. In case of problems and ineffective results, the procedure model has to be revised, but such revision falls outside of the scope of this master's thesis. If it is successful, it should be spread through the different

internal channels. Furthermore, other business lines of NXP will be supported to adapt and integrate the procedure model. Figure 32 illustrates the implementation procedure.

Lastly, the team will raise awareness of the different tools within the procedure model. It will be stated that the tools can be also used separately or in other combinations to produces variations in strategy. The value chain is mentioned several times by the interviewees, especially its integration in every WAM to illustrate the actual situation of a project or new market-entry.

9.2 Limitations of the master's thesis

After testing and validating the procedure model, some limitations regarding the master's thesis in general and the procedure model in particular are notable.

Firstly, the numbers within the description of the semiconductor industry can become outdated after few months because of the fast-paced changes and developments in that industry. Especially in 2016, a so-called 'merger mania' has arisen that effects the ranking and position of several semiconductor companies in the market.

With regard to the empirical study, seven interviewees may not be a representative number for an industry of that size. The target was to gain insight through the interviewees, and that definitely happened. For results and insights a globally broad study has to be executed that would go beyond the scope the current thesis.

Moreover, some critical competitors were left out of the interviews on instruction from the cooperating company NXP Semiconductors. Maybe some valuable insights are missing now according to the similar targeted markets. On the other hand, the external interviewees also brought in appreciated feedback that enables an overall view.

Summarized, there are limitations that cannot be avoided due to the size and scope of a master's thesis. The following chapter summarizes the current thesis and will give some prospects.

10 CONCLUSION AND PROSPECTS

The research question of the current thesis was, what does the ideal procedure model for market-entry strategies for the semiconductor industry look like? This question was the basis for formulating the thesis aims and the company aims. The thesis aims were to develop a procedure model and test it on a real example within NXP Semiconductors. The company aims were to enter the event market successfully with an appropriate market-entry strategy and to get advice for the implementation of a procedure model for market-entry strategies.

The beginning of the master's thesis dealt with the necessary terms and topics regarding market-entry strategies. Furthermore, some methods and tools used within the theoretical part were explained to ensure a consistent understanding. Afterwards, the semiconductor industry was described with all its characteristics, which have been established the last 60 years. It was clearly seen that this industry has changed everyone's life and developed numerous innovations according to its short existence. Furthermore the generic market-entry strategies on the basis of Remmerbach's theories were covered. In this respect, the timing strategies and market-entry barriers were also pointed out. After that a procedure model for market-entry strategies was designed with regard to the specific characteristics of the semiconductor industry. That was proven and validated through a workshop and an empirical study. With the insights and results of these two methods, the procedure was adapted and recommendations for implementing it at NXP were given.

Summarized, the interviews indicated that a defined and structured procedure model for market-entry strategies is definitely required. The dynamic branch needs some structure due to the fast developments it deals with, expressed through Moore's Law. The interviewees appreciated the designed procedure model with the two analytics tools, a resulting tool and the illustrative result through the value chain. The two analytics tools are in the format of the Porter's five forces and the Business Model Canvas with an iterative character. Hence, the workgroup gained knowledge about external and internal conditions. The resulting tools, two morphological matrices, points out fourteen parameters with their possible characteristics regarding the insight into the semiconductor industry and market-entry strategy. With the results of the two analytics tools, the workgroup can easily execute the matrices and quickly come up with a result. The result is an individual market-entry strategy that is transferred to the value chain to show it in a proper and illustrative way to the upper management. Especially the matrices' simplicity for an interdisciplinary team was noted by the experts, and the illustration of the result through the value chain enjoyed popularity. Regarding the value chain, the literature research showed that it is one of the most important characteristics of the semiconductor industry due to their position at the very beginning. In general, the interviews pointed out that all semiconductor companies face the same challenges and problems when thinking about market-entry strategies. Hence, the designed model was adapted and a particular one for NXP Semiconductors was not required.

The testing of the procedure model at NXP Semiconductors demonstrated its practical use. The people involved were highly engaged in executing the procedure model and welcomed its simplicity. However, aspects were covered that have not been considered yet due to a missing procedure. With the result of the workshop, which was a market-entry strategy for the event market, the workgroup presented it to the upper management. Since it would go beyond the scope of the thesis, the process after the presentation is not

explained. Nevertheless, the suggested market-entry strategy was included into the decision, and NXP Semiconductors has positioned itself very well in the event market this year. With status of November 2016 NXP has gained market share up to 80% within events with contactless technology.[157]

As already covered in the master's thesis, the procedure model will be implemented into the business line SMR with the beginning of 2017. Therefore recommendations were given and a range and distribution of responsibility were set up. Moreover, also the external interviewees asked to receive the procedure model. The implementation of the procedure model in other semiconductor companies will be allowed through limitations that are stated by NXP Semiconductors.

Finally, the designed procedure model for market-entry strategies is much appreciated by the semiconductor industry. Therefore it seems to be the ideal procedure model for the present.

[157] Cf. NXP Semiconductors (2016), internal company documents.

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LIST OF ILLUSTRATIONS

LIST OF TABLES

LIST OF ABBREVIATIONS

4G	Fourth-generation wireless
AdvanIDe	Advanced ID Electronics
AFC	Automated fare collection
ams	Austrian Micro Systems
AT&S	Austria Technologie & Systemtechnik
BMC	Business Model Canvas
BRIC	Brazil, Russia, India and China
CAGR	Compound annual growth rate
EBIT	Earnings before interest and taxes
IC	Integrated circuit
IDM	Integrated device manufacturer
IoT	Internet of Things
MM	Morphological matrix
NASA	National Aeronautics and Space Administration
NFC	Near-field communication
NXP	New experiences
R&D	Research and development
RFID	Radio-frequency identification
P5F	Porter’s five forcers
PC	Personal computer
SIA	Semiconductor Industry Association
SIS	Secure Identification Solutions
SMR	Smart Mobility and Retail
QR	Quick response
WAM	Weekly alignment meeting

APPENDIX 1: INTERVIEW GUIDELINE

Interview guideline within the master thesis, 'Market-entry strategies aligned to the dynamic branch of the semiconductor industry' (duration ca. 1 hour)

START

Name of interviewee	
Company	
Job title	
E-mail address	
Telephone number	
Date	

Hello, my name is Susanne Schadler, and currently I am doing my master's degree in innovation management at the University of Applied Sciences *Campus 02* in Graz, Austria. Part of my master's degree is a diploma thesis that focuses on the topic of market-entry strategies within the semiconductor industry.

Your answers will be treated absolutely confidentially.

Thank you very much for your time and for helping me to collect valuable information for my master's thesis. The estimated time to complete the interview is 60 minutes.

Course of action

- Introduction and salutation
- Explanation of the process and the rules
  → This interview is for market research purposes only. Please be assured that everything discussed during this interview will be handled strictly confidentially. So, be open minded and honest with your answers.
- Starting with an ice breaker question (number 1) to create a comfortable atmosphere and build up a collegial relationship
- Resolve outstanding issues

1. What is your impression of the situation of semiconductor companies/ NXP/ your company on the market?

GENERAL SITUATION

2. How eager is your company to identify and enter new markets?
3. What is the approximately duration between new market entries?
4. Who is allowed to suggest new markets (entries)?

5. How is the communication within your company and your team? Do you have the feeling that everybody is on the same level when speaking about new markets and possible entries?
6. Do you always have good knowledge of the industry or market you want to enter or is there sometimes a lack of information?

EXISTING PROCEDURE

7. Does a defined procedure for entering a new market exist?
8. How was this procedure developed and further introduced?
9. What are the advantages and disadvantages within the current situation or procedure?
10. Are the directions and decisions comprehensible to each member of the company or at least to the concerned people?
11. What are your general wishes regarding the existing or potential procedure?
12. Have you or your company or team ever thought about designing a procedure model for market entries?

CHECKING PROCEDURE MODEL OF THE MASTER THESIS

13. What are the most important criteria to think about when focusing on a new market (besides the volume)?

    → **The designed procedure model is shown and explained by the author**

14. What is your first impression of this model?
15. What is your opinion to the two analytics tools at the beginning?
    a. How do you feel about Porter's 5 forces? Is it appropriate to get a good understanding of the targeted industry or market?
    b. What is your point of view on the Business Model Canvas? Is it easy to understand? What value, advantages or disadvantages do you see when using this model in this phase?
16. What do you think about the morphological matrix in general?
17. Please have a look at the several criteria in the morphological matrix:
    a. Are any crucial criteria missing?
    b. Do you disagree with some criteria?
18. Is the way to come to the market-entry strategy with the use of the value chain clear and comprehensible?
19. Do you have any further remarks or feedback you want to add?

APPENDIX 2: TRANSCRIPTION OF THE INTERVIEWS

Questions of the interview guideline	Marketing Manager Smart Mobility, NXP	Product Marketing Manager, NXP	Product Marketing Manager, NXP	Senior Manager for Partner Program, NXP
1. What is your impression of the situation of semiconductor companies/NXP/your company on the market?	Its vibrant, its booming—a lot of demand, but to be honest we don't understand the market. We are a market leader in the NFC business; the rest is not transparent, many technical horizons.	I can talk about the areas I see—retail, mobility, banking—what I see is that they are really good application-wise; the semiconductor companies always compete in the market. They are still relying on old products, pressure on ASP. Quite bit lazy in developing new products, or getting new solutions…	This is basically my first job in the semiconductor industry. I think that the industry is really doing quite well, that there is a lot of promise and potential for this industry to form a significant part of people's lives without people realizing that they have products and solutions from this industry. Many of them make life easier, and it is everywhere we are. For NXP, after the merger we have become bigger; we are now the 5th largest semiconductor company in the world. There is a growing possibility in the things we do and also in strengthening what we are able to do. We want to offer	Always goes in cycles, quite usual in the industry, and regarding NXP, after the merger there is a bit of friction of different sales, trying to get things streamlined, as usual after mergers. But overall we are growing faster than the market. The merger wasn't an overlap—brought us some leading positions. They are in a good way to streamline processes, and putting things together in one system, so all the things which are not working, like reporting line, seem to get in good line. Bigger growth is always good to make shareholders happy.

			more of our strengths to the customers and industry.	
2. How eager is your company to identify and enter new markets?	My company is very ambitious to enter new markets but not eager to understand the market; they try to enter a lot of new markets; resources are theoretical not available in terms of HR and know-how (analytics of the market).	We are really eager to do that. We are currently do this with new product features, which should solve problems in existing markets and also new markets. We really try not to offer only the semiconductor part, which means it includes support in customer service and software solutions: that's the strong position of NXP, strong tag-side and strong reader side and also well-developed on this software side.	For example, I joined NXP in a new created world. That's a good illustration, because MIFARE has been really used only for transport ticketing—so it's 'MIFARE', so automatic fare collection; that's why it's called this. And so it had been for many years for contactless ticketing. And then they saw that the market was not only using it for mobility and transportation, but also for payment and loyalty and access. At this time we realized that we have to look into these markets, and there's huge potential for different applications and segments. NXP/SMR explore other markets and don't limit ourselves. It is the same with smart cities, all of these	We try to create a lot of activities because of our position as number 1 in contactless. Some markets are not established yet. CI has seen some growth, but still a lot to do. Another market, I feel, we do things because we can, but I am not sure that this is the market requirement. Too often not market or consumer minded, market is often not asked, sometimes of course they do not know but you can also listen to the market… with regard also to pricing, features etc. We should have a look where the things are going to develop, sometimes we did this successfully, but on the other side, we are not aware.

			different applications in a single solution.	
3. What is the approximately duration between new market entries?	6–12 months	It depends on the projects. Mobility projects from first contact to delivery 9–15 months; market entry with first contact in such market until seeing sales effects takes two years.	It depends, e.g. the gift card market: There are more than 4 billion cards per year—so huge potential. If you go to the markets, you have to look the different regions. It's really different how they adopt the technology. Or closed-loop payment, you have really understand the market—a general strategy is ok, but you have to drop down it to the regions. Like US don't pay contactless; on other side UK really do that.	It's a question of the understanding of the market. It could take some time to find the right customers and get to talk to the appropriate ones. It's a challenge to see the first entrants or early adopters. The benefits should be clear for the customers. So the duration can be 6–12 month.
4. Who is allowed to suggest new markets (entries)?	If the demand of the market is that high that we could sell millions of units, everybody will listen and everybody can suggest; if it's worth; volume is the first and most important thing.	Within NXP it's not allowed; it's expected from everybody, no matter it's a student or a vice president, from everybody.	The dynamic within the team is very open and fluent—knowledge and information sharing is usual. When opportunity arises, or one of the team members sees that that's a market to explore, thye basically transfer	Usually the guys at the customers, salesforce, product managers and the marketers, that are the resources, and getting the trends from them, what's the next way. If you see them they are really making things

			knowledge through the whole team. It's really each team member included.	compatible. There is also the question whether I can sell benefits and bring money back.
5. How is the communication within your company or your team? Do you have the feeling that everybody is on the same level when speaking about new markets and possible entries?	I don't think so → I think that there is relevant know-how of 90% of the employees in SMR; especially in our team we have a huge lack of entering a new market. Market entry means how to enter the market with all technical staff and not with the big picture, and what's sustainable. And if we would ask the segment manager what market entry is, they would define it: they would say that's the market plan behind.	That's one thing, when we look on some markets, there is a crazy nut to which someone looks. First of all you explore it and discuss it with a smaller team and then you investigate. At the beginning not everybody knows a lot, but when there's potential and we have solution, the basic info is known by everybody in the team—not the whole company of course because of size.	The market is really big, at least for me the team has people with much experience (transport), or the WAM to learn about everything. And then there are the experts, who really know a lot of the market and share their findings.	Good question. I think there are individuals who are trying to drive entry into markets, but I am not sure that everybody is on the same level. The guys who are proposing new markets are they technical enough in order to position a product we have or offer feature set which is pushing our products.
6. Do you always have good knowledge about the industry or market you want to entry or is there sometimes a lack of information?	I am feeling very confident, but in terms of reports, there's a lack to get know the customers, because the entry is global and in every region,	If it's a new market either application-wise or geographically, what you see first is the information that is on the web; that can give you	Yes, there are people who are well advanced. We have our touchpoints every week. Obviously it can be improved. There are things which I find	Marketing guys without travelling product management is not that successful. There is a lack of information. I am not sure if

	with different requirements and behaviours and environment (micro).	false direction. When you talk to the people, you get a complete picture. The basics were correct from web, but details for shaping a specific market and its offering mostly was not sufficient in the beginning.	out later on. The team doubled within two years—communications becomes more complicated.	the awareness level of the involved people is on the same page.
7. Does a defined procedure for entering a new market exist?	I don't think so, but if we would have one it would be wrong because of the false understanding, always speaking about roadmaps.	Not really. There's one for products, the NPI-process, which does not really cover the new markets. Unofficially, we started with this procedure or some questions, established quite a good routine: is there a market, which has a problem, can we solve it, is it big enough? Market entry: Normally we test the market, we have a broad base of BD in each region. In the industry we always have someone who knows somebody. So first we	Not really, some say 'can you look in this and that market' and then you start, and then meet people, attend conferences. There's no order for that topic. Nobody who says how to do it, and it is really learning by doing, no structure.	I am not aware of it. We have a lot of things which could be.

		test and poke and penetrate the market by ourselves, and it depends on the competitive situation. If you want to enter the mobile or barcode ticketing-market, to get into this business, you have to look to who is established in the market and think about acquiring one of these. You have of course a target list with merger and acquisition, but in the beginning we test the market with local BD-force, but when we see it doesn't work or we have a lack of information we think about M&As.		
8. How was this procedure developed and further introduced?		That's an informal procedure, learning by role model. It's basically, you never enter a market alone, taking the best parts of the individual approach.		

9. What are the advantages and disadvantages within the current situation or procedure?	Advantage: To be very flexible, every employee has his own responsibility. You are not limited to some people; you can ask anyone. Disadvantage: Market entry is often carried out in the wrong way, which you can experience in NXP, because the strategic partner, etc., is often missing.	The advantage is that it's quite flexible. We are in fast markets and big markets, we are having tons of applications globally. That gives you the flexibility to say Approach A doesn't work; take approach B, which is quite nice. Disadvantage: Replication of the success in one market to have the same in another market with other team members. Basically you have to start the process again, the learning and the analysis. why it was successful is more on the individual not the institution, and is and not written down.	It's more fluent, more freedom to explore—it puts a lot of responsibility on you. But you get guidance, but without structure it's also difficult—a combination of both would be great. It's really about going out there and finding out what the best strategy is.	
10. Are the directions and decisions comprehensible to each of the company or at least to the concerned people?	It's not: always a lack of information and communication; no transparency; a personal	This is covered by way of working at NXP and corporate culture. There are strict rules for what to do. The good thing about it is that you	Sometimes, yes, it's not clear—there are things where the initiative comes from the team and is held by the management. Sometimes	Sometimes I guess they are stumbling over new opportunities for stepping into new segments. You have to look where the technology

	influence in decisions, which is not comprehensible.	learn from others, from other segments/BL. That's the good thing on NXP, what does the market look like, who are the people to talk to, when is another BL already in?	there are other people who are not fully aware of what initiatives there are; either they're not involved in it or aware of the reasons. It's also communication in the team; it's never enough.	makes sense; i.e. it does not make sense to tag every yogurt. I would appreciate a process and not that it's only driven by opportunity. I am not sure that the ground work is done. Sometimes you have to assess to markets.
11. What are your general wishes regarding the existing or potential procedure?	Wish that someone is really making things transparent to everyone; set up a workshop and define what it means to enter a new market; work out a process how it should look in NXP.	The wishes would be one thing if you are going from market entry; we are a third party. To have an easier way to buy in, to get into a market, to have reflections, and learn why something worked and why not, that's very important, to show that also other people, that they can learn from that. To see also the reason why it fails.	Wishes would be good to have more guidance, high-level guidance. I think it would be really good to have a structure with a kind of flexibility. The market is really fast. You don't have years to develop. When everything is structured that could take longer, when locked into a process. You adjust and you are able to say these are the changes. Obviously, with these quarterly team meetings, we have templates, but it's that you are going to the team,	Sure, it is really about trying to understand what a trend in the market is and what the requirements are. You need to go for new markets, and that should be better structured. If they are running in the right times to the right markets.

			present what you want to do. There is some brainstorming, but that doesn't happen often.	
12. Have you or your company or your team ever thought about designing a procedure model for market entries?	I don't think so.	Parts of it is in the NPI-process, but only a bit for new market entries. I wouldn't have a process on that one that would kill opportunities. I think the benefits would outweigh the risk. For me personally it's better to have this flexible way, standing around with a coffee and discuss what to do.		
13. What are the most important criteria to think about when focusing on a new market (besides the volume)?	I would say to have a deep insights in the market, if it's stable, a long-term growing market or a small trend, to know the customers, to be focused on staff you want to sell.	In general, that's of course size, volume and accessibility. For NXP it's important that it's replicable to have this scalability, that you can grab market share quickly. Have designed good solutions and IP.	The potential, currently we don't have any gift cards projects, but there's much potential. You can offer value to a market, then examine what the value is, the revenue you pursue. We offer value to the market; that's important, along with which	The question is whether we have the right technology for the market requirement. It's all about time, and also attractiveness; if you want to be successful in the market you need to be the first. The right product at the right time.

			problem we solve. Does it fit for us? Understand the ecosystem, to whom do we talk? It's more building partnerships not acquiring, like SIEP. Also training sales people BDs globally.	Otherwise you will have a price war and lose money.
14. What is your first impression on this model?	What I really like, that Porters 5 forces is part of the analytics tool, because it's very important to understand the industry. And also the combination of the two tools: they are really complementary and can influence the results, good combination.	Good idea. The thing is always, where you get the data for the tools—data collection is always underestimated. My experience is, when you use a tool you get a lot of personal views in there; the tools are good, but if you use estimates or you get information from the BD, a customer tells something different, then it's difficult to see what's the right. But it helps you to get a lot of information and get a structure.	I think it's useful.	Sounds good. BMC I like, I love it.

15. What is your opinion to the two analytics tools at the beginning? a. How do you feel about Porter's 5 forces? Is it appropriate to get a good understanding of the targeted industry or market? b. What is your point of view on the Business Model Canvas? Is it easy to understand? What value, advantages or disadvantages do you see when using this model in this phase?	a) From my marketing perspective, it is the right tool to understand an industry and enter a new market. With all 5 forces, we can see whether it is complex or easy, quickly showing to technical people, very easy to understand. Maybe good support would be to show it visually; then it's more tangible, maybe on the white board. A missing part in the five forces is to have an overview of the internal resources, so we don't have a look on the company itself. b) But BMC, this is covered. I think there are a lot of different elements to understand. There is a first time for everyone, but if you explain it, and if you show the structure and procedure how it works in the background,	a. It's basically what I already mentioned, bargaining power is always interesting and important to know if you go by yourself or acquire. If you have five strong competitors and a strong buyer, maybe buy one of the competitors. The risk of substitutes and threat of competitors is the IP-story. If you bring in good IP, that solves problems, and you can of course legally defend it you can minimize risk of entry, because they have to develop in the beginning, and the solution is replicable. They need time, while we can gain market share and that's a big barrier for others. The advantage to covering these 5 points…. Understandable to everyone, how to use, and basically we always think about these	I still use BMC. It's really helpful. P5F, as well, but not structured, but we think of those points.	a) Has always been proven to be a good thing, but e.g. with SWOT, most of them use these tools wrongly, applying them in the right way. b) BMC I love; it makes you think about the value proposition, and that is so important. You definitely need this as input for the value chain. I like the approach, simple enough for guys who should work with them to put this in their brain. Maybe SWOT would be also good to add, but an example would be good to see, if something is missing in the two analytic tools; to clarify.

	everybody can easily understand what is the company value to the customer. What I especially like in this procedure, when you miss the value proposition, you can go back to the 5 forces and search for other potentials. Another threat, when you always go back, it should be very oriented to the market and not to personal perspectives.	things but don't draw it up, so it could be that we miss something. You can take a step back and look at the big picture and don't get lost in the details. Disadvantage: it's a formalized way, what you do anyway. b. For people, who don't know BMC, it's quite unstructured. We do use it, so I know it. It forces you to really think about the problem, the solution, what's the value proposition, the partners… and afterwards to define the action plan. The danger in the BMC is to show it to some decision maker, that the answer you get is, "that's bullshit and I don't believe it"; it's nicely written down, so it has to be written down crystal clear. And you really have to think		

		about value proposition, and think again, and put it all down on one page.		
16. What do you think about the morphological matrix in general?	It's a good tool to find a solution quickly related to some parameters—tool with logical flow and very efficient. The threat about it that you have really to concentrate on it and take care with every decision and take it seriously, because of its easy use.	Good tool.	It's very quick to get through and get a first impression. Sit in one place after having the main information of the tool previously. Makes logical sense.	Yeah, it's a good tool to go through very quick.
17. Please have a look at the several criteria in the morphological matrix: a. Are any crucial criteria missing? b. Do you disagree with some criteria?	To my knowledge, nothing is missing.	One thing is missing, that would be substitutes or rather competitive technologies. I would watch out to see whether it's something new, if there's something with which you can also solve it. I might not solve everything, but still I would also check how much it would cover, and what exactly is the weakness of the others. But that's partly covered in the customer		Maybe for compatibility with technology and strategy fit, there is something you can add; no, but that is ok.

		satisfaction… Especially semiconductor companies always think they have the best product, but then reality comes up. Maybe scalability is also missing—basically semiconductor companies sell semiconductors, but the end customer can't do something with it—the problem for one company, how easily can I scale it to other markets and applications? The easier I can scale something, the higher is the entry barrier for competitors. The IP-issue is also very important. With regard to solutions, there's always a question of with which partner you go in sometimes. Parameters especially for NXP/SMR: spillover effects		

		with other technologies and applications.		
18. Is the way to come to the market-entry strategy with usage of the value chain clear and comprehensible?	It's clear and quickly understandable.	The value chain is a good illustrative tool for showing the result. We have to understand the problems of the customer and of the end user. I would add the end user. Market entries depend, but from our team that would be nice to have this tool to check whether we consider everything and covered all topics and to put it bi-weekly on the table… My recommendations, put 2 to the customer.	It's clear and comprehensible; this is really something what we need. People really 'shoot' and do not sit down and think about how we do this. That's what we are missing, it would be good to present this.	In NXP, it is also to have a solution around the products. So we see without tools and some services and just selling chips is not good enough. So, a one-stop shop. So looking at the value chain of a semiconductor company, going through a distributor, I am not sure if you not miss out on something here. Getting our ICS, but where do you reflect—isn't there something missing in between semiconductor and distributor? We focus more on getting around the product, also services. A software package would sell to a different partner, maybe the SI, could be consultants, they are the end customer. That's something which

				effects NXP, the newly defined strategy or vision. It's good to show, where you directly interface—you don't have to go step by step. That's the best way to show, to show where we are.
19. Do you have any further remarks or feedback you want to add?	In general the decision methods are good and clear and structured; everything is understandable. 2 hours are enough.	It's nice and the value chain would help then quite a lot for semiconductor companies to rethink the parameters and have a better view of external factors—because you try to solve the external problem and not the internal turnover. And that's what many semiconductor companies forget.		I would love to see this in an example. I like it.

Questions of the interview guideline	Business Development Manager, Advanide	Global Sales and Marketing Operations Manager, ams	Strategy & Business Development Manager, AT&S	
1. What is your impression of the situation of semiconductor companies/NXP and your company on the market?	General: I think the market is very under price pressure, but I see in the moment a lot of new opportunities in the IoT, wearables and Industry 4.0. Advanide will try to understand these markets and create a new markets and grow with the markets.	My impression is that the semiconductor industry is very fast, very dynamic. Currently there are many acquisitions, we have this big player—a lot of companies are merging. There are more companies coming who becomes these 'giants'; this is a trend which I see. AMS is in a good standing, because they are focused on sensors. So one trend is these acquisitions, while another is start-ups. My feeling is that this semiconductor industry has a quite high barrier to entry; you need a fab or a lab, or rent it. I think, start-ups in general, more people are willing to invest. They are sometimes extremely good at	In general, it is very dynamic. Dynamism is very much increasing. Also the boarders within the value chain are not that strict, as in the former years. So it's very important to always have a look at all steps of the value chain and also when it comes to disruptive technologies all over the value chain and not just in your own stage. You have to consider the whole value chain.	

		doing acquisitions and bringing new ideas in the company. Of course when giants merge, there are also a lot of synergies, but they are less dynamic; there are many approval steps.		
2. How eager is your company to identify and enter new markets?	It depends, we will do that and have to learn that. My position is very new. Learn what are the new customers, markets—our customers are card manufacturers and labels, and the change. With new ideas and markets to the manufacturers, and they have some new ideas and products—they are very careful when entering a new market; with old products and markets they feel comfortable. To understand the business is one of the most important things, convincing new markets to	We are probably more eager than others or other big player. We really buy these resources, do acquisitions, or cooperation. Also divesting a part to ST.	We are very eager to enter the new market. But we have to have technological leadership there and competitive advantage—it must make sense. My department is identifying new markets and its attractiveness.	

	buy or use RFID. Not easy. Sometimes there are new ideas, but people say it is interesting but they are not interested in… the discussion cannot be start.			
3. What is the approximate duration between new market entries?	12 months is a good time to implement new products in the market. Sometimes 2 years, sometimes a very, very long way.	It is very fast; we usually buy 3–4 companies a year. We are at the size where it needs many resources to integrate them. Some companies keep them separately, but we fully integrate acquired companies.	It depends how you define markets. It really depends. Every year we enter a market, because the applications change very fast, could be the same customer, but with changing requirements.	
4. Who is allowed to suggest new markets (entries)?	Everyone is allowed to have a look on the market and make aware of it, some are more creative and active—some are reactive, kind of running. Not a question of allowed; everyone should be flexible and doing new things. Some are focused on their customers; some are looking over their horizon.	In general, our strategy is driven by the business lines. As a separate department we have global sales and marketing. Normally, the strategy is done by sales and the business lines. In alignment with the sales in the field is feeding them with the information, what's going on in the market. Everybody	Allowed are all. Typically it's from our department, because we analyse the markets. And R&D, that's of course technology-driven, but they also bring in some new ideas. Furthermore, the business units and sales bring up new markets.	

		can suggest who is in a business line, as well as the sales department.		
5. How is the communication within your company or your team? Do you have the feeling that everybody is on the same level when speaking about new markets and possible entries?	No, not really. Some people say you're crazy, and some say that's cool—new things and new understanding,	I think there is a huge lack of information in my company, we have sales and marketing separately, and we do have this business lines, and they are responsible for the roadmap, and often they work without the sales team, but they know what the market needs. This alignment process has a lot of potential here.	Not really, especially in this for us new markets, i.e. this packaging marketing, we have now new customers and suppliers. And of those new players we have less knowledge. But within the BU, there is a huge lack of knowledge when it comes to the new fields.	
6. Do you always have good knowledge about the industry or market you want to enter, or is there sometimes a lack of information?	Yes, but lack of information is not the right word—you have to understand the markets and how they work, and what the challenge is. Understand business models. For special information, it takes time to get the info about a new market.	I definitely feel this by myself. We do have specific key customers, and the account managers are better informed. We have to have a focus on the rising stars. There is a lack of information but not with all account managers.	The management board has to drive decisions, but we do training and workshops, also pre-workshops, to bring everybody on the same level for a meeting. Not that systematic.	

7. Does a defined procedure for entering a new market exist?	A little bit different, we want to distribute, so identify new markets and opportunities, identify form factors, look for partners; more a project manager.	No, we don't have any market-entry strategy. I think we are working on that. There is a new person, newly hired. Normally we enter a market by acquisition.	If we try to push a technology on the market, we do not have an approach or procedure. But bringing applications there is an informal process, but not written down. It's more based on experience. But that went sometimes wrong.	
8. How was this procedure developed and further introduced?			But there is no real systematic approach.	
9. What are the advantages and disadvantages within the current situation or procedure?	We are in the middle of the value chain, when we see to the end customer. We have to understand the market, better understanding; semiconductor companies see our activities as a profit to grow in the market.	Currently, it's quite clear, because we are so small that we can't say to someone 'you work on this new idea'; we don't have this resources. Market-entry strategy would be definitely useful. At least a roadmap, what markets want we enter when. Having already specific customers. Some managers do fail: they don't want to invest now, but then they are too late. You	Disadvantage: You are a little bit blind to the other options, and mix it up. Advantage: Alignment of the people, they have a high confidence level, because they are very motivated, because they can be flexible.	

		have to built up account managers, globally. When you are a big player, it's easier to enter a market—like NXP, because the market knows the brand.		
10. Are the directions and decisions comprehensible to each member of the company or at least to the concerned people?	Different, many people see that and understand. We have to learn that, if you are looking for your market and have price pressure—when you are the first you don't have the margin of pressure. Question of learning and surviving.	That's done by upper management, but rolled out very late. So the communications department communicates also internally. They often get the information so late that we cannot share any day earlier than the external announcement. Would be good to have it earlier to feel more integrated.	We use methods, but the decision itself is experience-based. In the end, it is sometimes not comprehensible.	
11. What are your general wishes according to the existing or potential procedure?	We have to learn and find a way to find for someone very openly to discuss new opportunities, a circle of people to discuss new markets.	Whenever it is about market-entry strategies, you need an interdisciplinary team. Of course, it is super-confidential, but you can trust this person, but you need someone who prepares that.	We currently running a project, how can we do the general processes more efficiently? Just offering fixed templates for specific reasons, also for market	

		The sales team will have questions about when the product is available, etc. Otherwise it looks like a mess, and that doesn't look professional. It should be structured and not when upper management is in a shopping mood.	entry—it would be good to have something like that.	
12. Have you or your company or your team ever thought about designing a procedure model for market entries?		I have the feeling that there will be a new guideline within this new position in the strategy department.		
13. What are the most important criteria to think about when focusing on a new market (besides the volume)?	Everybody must have a huge quantity, application must have sense, we are really open to every market—RFID must be needed.	Does it for to the strategy? Because it could damage you, you have to be focused; it could damage you when you just do a little bit everywhere. Then for the potential customers risk has to be clarified. Not just looking on the volumes; the customer is very important.	The value added by our technology compared to the competitors: competitive advantage. Profitability is in general very important. Attractiveness within the growth or future, covered by trends or mage trends.	

14. 14. What is your first impression of this model?	It's ok, I understand it, and I try to go the way to do it. I agree.	I like it because it's easy and get to the point. As you said, upper management don't have much time, so it needs to be clear and focused. Feeding the upper-management with information, and they decide then, that's good.	I like it because I know the tools, and they are quite powerful when using it in the right way, and they are in general simple to use. Especially the morphological matrix I like in that combination. The first two make perfect sense, but for upper management it's good to show it within the value chain.	
15. What is your opinion of the two analytics tools at the beginning? a. How do you feel about Porter's 5 forces? Is it appropriate to get a good understanding of the targeted industry or market? b. What is your point of view on the Business Model Canvas? Is it easy to understand? Which values,	I am friend of all, to have control, to think of every part of the business, but many people forget topics to cover. Very structured, I like it. ontrol thinking	a) I really like the Porters Five forces, that's crucial that you that. It's really important to do that. It's good that it's the first one, because analysis should no start internally. Always start externally. b) I think it's a good tool, so it illustrative. You can look does it fit together. What I see that the technical people are really technical but they	A: I like it because it gives you the right perspective and you don't miss something, and have a full picture at the end of the day. D: When you use it in the wrong way it's not effective, not much value.	

advantages or disadvantages do you face when using this model in this phase?		love reduced things, and when it's like in one model, very easy and not too much detail- more getting to the point. That really fits to the industry. It's really easy understandable for everybody. Especially for the interdisciplinary team, which is crucial, it is cool. As disadvantage is that you always think on one target group, so in the semiconductor companies you need one for every customer group → there are different target groups.		
16. What do you think about the morphological matrix in general?	I like the structure, and to have deeper thoughts and so, and to understand and self-control, very good	For the interdisciplinary team it is easy to understand, because it is fixed.	A: This method I really like much, you can use it on different levels with different people. And I really try to push that tool, where you see everything on one page. Also when you have technology based ideas, you have to	

			think about this building blocks. It's very easy to use. Also when you use it iterative, very effective. D: when you use in a wrong way. Also for an interdisciplinary team, that you have concrete points you can discuss about. Here you have a clear pre-formulated strategies/templates.	
17. Please have a look on the several criteria in the morphological matrix: a. Is there any crucial criteria missed out? b. Do you disagree with some criteria?		I like it, it's good. They cover the decision how to come to the strategy.	Make sense to me to use it in that way, or at this stage within the procedure model. It's quite clear how it works here. It seems comprehensive. Market itself for example is missing, (but that's covered at the beginning). Maybe include also the market, because sometimes a market requires partners or something like that. Market entry barriers? (are covered within the	

			parameter “competitors”). Capability perspective?	
18. Is the way to come to the market entry strategy with usage of the value chain clear and comprehensible?	Structured Result, that’s the challenge in a company	Not put the colour behind it because it can influence the people. You need a legend for the parameters. You have to think that every graphic/slide needs to stand for itself. You have to understand for what everything stands. It is important that you define the colours that is reliable. Discuss with someone internally if the coding is appropriate.	You don’t have to colour the characteristics; maybe it could be helpful, but it was now really clear to me when you explained. Then it’s more self-explained maybe. It make sense; it’s quite easy to understand. But it’s not self-explained—you should add an explanation to the graphic. Also, the value chain is a good illustration for the result, especially for that industry.	Details, which partner strategy etc. will be discussed afterwards, just to show the first direction, in which we have to go.
19. Do you have any further remarks or feedback you want to add?		I really like that, especially graphics etc. But some managers are very analytic, so I recommend that you do a table with all results to catch the analytics and also graphics people. Just also to show the risk.		