Master Thesis

BUSINESS MODEL DEVELOPMENT FOR E-COMMERCE WITH NICHE PRODUCTS IN THE ELECTRONICS SECTOR

accomplished at

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Graz, 05.07.2020 .....

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Furthermore, my gratitude goes to all the experts who contributed with their time and shared their opinions during the interviews.

KURZFASSUNG

Das Handelsvolumen über das Internet hat in den letzten Jahren stetig zugenommen. Es wird zunehmend einfacher Produkte oder Dienstleistungen aus der ganzen Welt mit ein paar Mausklicks zu bestellen aber auch Kunden anzubieten. Diese Entwicklung bringt für kleine Unternehmen, die bereits Produkte der Elektronikindustrie in einer Nische über das Internet vertreiben, eine Reihe an Chancen aber auch Risiken mit sich.

Diese Arbeit befasst sich mit der Entwicklung eines Vorgehensmodelles, das von Unternehmen die bereits Produkte der Elektronikindustrie in einer Nische über das Internet verkaufen, genutzt werden kann um das bestehende Geschäftsmodell weiterzuentwickeln oder sofern nötig komplett neu auszurichten. Die vorhandene Literatur zu Geschäftsmodellen, Geschäftsmodellentwicklungsprozessen und Entwurfsmustern wird studiert und der Einfluss der aktuellen Entwicklungen und Trends im Online-Handel und in der Elektronikbranche auf das Geschäftsmodell von Unternehmen, die mit Nischenprodukten handeln, analysiert. Der aus theoretischer Sicht abgeleitete Geschäftsmodellentwicklungsprozess wird durch Anwendung des Modells auf ein Referenzunternehmen in der Praxis umgesetzt. Die Umsetzung erfolgt in einem mehrstufigen Prozess mit firmeninternem Workshop, zahlreicher Recherchen und Auswertungen sowie Experteninterviews. Es werden zwölf Geschäftsmodellvarianten gefunden, von denen nach erfolgter Vorselektion sechs Varianten durch Experten hinsichtlich Praxistauglichkeit geprüft werden. Das Ergebnis sind zwei Geschäftsmodellentwürfe. Der Entwurf „Multilingual Offerings“ ist als eine Erweiterung des bestehenden Geschäftsmodelles zu sehen und befasst sich mit der Erweiterung der Zielgruppe des bestehenden Geschäfts durch mehrsprachiges Produktangebot. Der Entwurf „Fever Screening Thermal Solution” stellt ein komplett neues Geschäftsmodell dar und befasst sich mit der Entwicklung eines Systems zur genauen kontaktlosen Messung der Körpertemperatur mit Hilfe von Wärmebildkameras.

ABSTRACT

The volume of trade on the Internet has increased steadily in recent years. It is becoming increasingly easier to order products or services from around the world with just a few clicks of the mouse, but also to offer them to customers. This development brings with it a number of opportunities but also risks for small companies that already sell electronics products in a niche via the Internet.

This thesis explores the development of a process model that can be used by companies that already sell electronics products in a niche via the Internet to further develop the existing business model or, if necessary, to realign it completely. The existing literature on business models, business model development processes and design patterns is reviewed and the current developments and trends in online trade and the electronics sector on the business model of companies trading with niche product is analysed. The business model development process derived from a theoretical perspective is put to practical use by applying the model on a reference company. This implementation includes a multi-stage process with an in-house workshop, gathering and evaluation of lots of data and interviews with experts. Twelve business model variants are found, of which six are checked by experts for practical suitability after pre-selection. The results are two detailed business model designs. The first business model "Multilingual Offerings" is to be seen as an extension of the existing business model and deals with the enlargement of the customer base of the existing business through multilingual product offerings. The second business model "Fever Screening Thermal Solution" represents a completely new business model and describes the development of a system for the exact contactless measurement of body temperature with the help of thermal imaging cameras.

TABLE OF CONTENTS

1 INTRODUCTION

The following chapters describe the initial situation, the research question and goals of this thesis. The underlying structure of this work is shown in the research design.

1.1 Initial situation

The volume of trade using the internet has steadily increased in recent years. E-commerce giants like Amazon[1] or Alibaba[2] are dominating the market and have been hitting new records highs in turnover. These companies helped to increase public acceptance of E-commerce with increasing number of customers year after year for several years in a row. It is becoming increasingly easier to order products or services from around the world with a few mouse clicks, but also to offer products to customers. While online sales are still growing, the competition is getting fiercer among sellers and the market in general is moving at a faster pace. In other words, the E-commerce business gets more dynamic. E-commerce giants like Amazon invest a lot of money to stay on top of these changes and acquire new customers, but smaller companies do not have the financial power. While big E-commerce platforms that allow 3rd party sellers like Ebay[3], Amazon, and Alibaba compete among themselves and against traditional retail stores, the sellers on these platforms are also in competition with each other. An example is low value smartphone accessories and computer cables sold on platforms like Amazon and Ebay. While five years ago this was a profitable business to run for many local E-commerce merchants, nowadays this market is dominated by Chinese sellers. These local sellers that remain have positioned themselves in a niche to avoid direct competition. Experts in E-commerce also predict that many E-commerce companies will not survive unless they change their business strategy. Focusing on a niche is seen as a very suitable option. This development brings a range of opportunities and risks for small e-tailing companies with niche electronic products and may require adjustments to the business model to effectively leverage opportunities and avoid risks as much as possible.

The purpose of this thesis is to investigate the influence of the current development in online trade and the electronics sector on companies trading with niche products and develop a business model innovation process that can be used to create and test multiple business model options for small scale E-commerce businesses that trade with niche products in the electronics sector in an efficient way. This process is then used to improve the business model of the company Voltagezone Electronics e.U..

[1] URL: www.amazon.com

[2] URL: www.alibaba.com

[3] URL: www.ebay.com

1.2 Research question

Following research questions are getting answered within this thesis in the theoretical part:

- What are the major trends in the electronics industry and in E-commerce?
- How can a business model innovation process for small scale E-commerce with niche products in the electronics sector look like?

Following research questions are getting answered within this thesis in the practical part:

- Which business models have potential for online retailing of niche products in the electronics sector?
- How could the business model of Voltagezone Electronics e.U. be adjusted to stay competitive?

1.3 Goals

The goals for the thesis are the following:

- Gain knowledge about key influencing factors of the progressing development in online trade in companies with niche products in the electronics sector.
- Have a lean business model innovation process as a tool for ongoing business model optimization and business model development, similar to strategy development but including the business model level.
- Have a business model variant (or variants) that show how the current business model of example company Voltagezone Electronics e.U. can be improved upon or adapted.

1.4 Research design

Figure 1 shows the structure of the thesis. In the theoretical part literature on business model theory, E-commerce the electronics sector is studied to create a business model innovation process suitable to improve the business model of companies that sell electronic products in a niche online. The chapter about the E-commerce industry provides an overview in online business to get a better understanding of how this industry works. Business models relevant in this industry, niche markets and trends are described. The chapter about the Electronics industry mainly deals with numbers and trends to provide the context of the industry for which the business model is developed. The chapter about business models reviews the work of researcher in the area of business model theory. The key elements of a business model are described. The chapter on business model innovation describes the different ways on which steps need to be taken to develop a business model. At the end a business model innovation process is developed that combines the findings from all the chapters into one business model innovation process. In the practical part the developed model innovation process is applied on an existing company to generate several business model variants. These business models are then validated by experts.

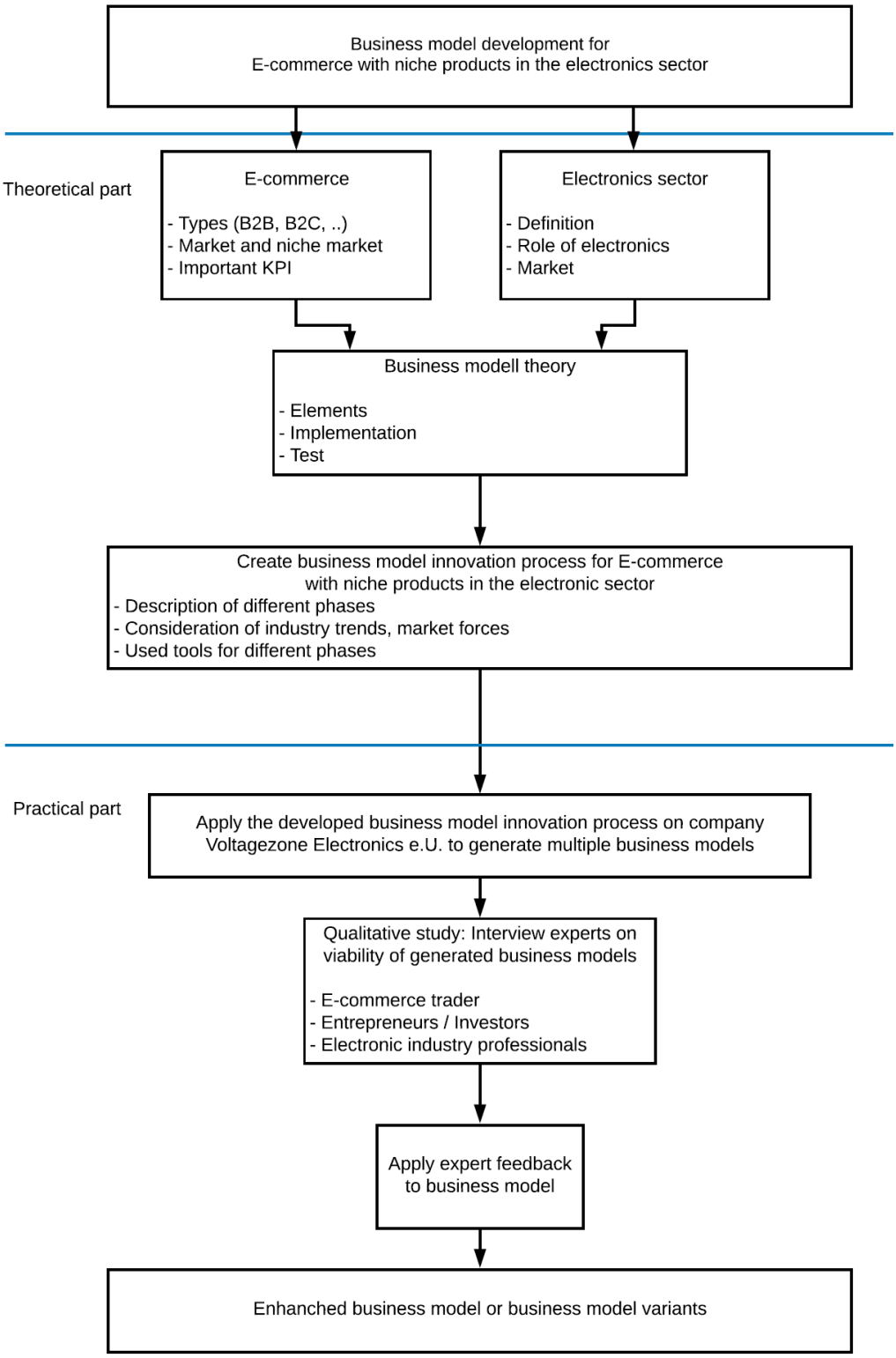

Fig. 1: Research design of master thesis, source: own illustration

2 E-COMMERCE

To be able to develop a business model for an E-commerce company it is required getting an understanding of this industry. In this chapter the relevant details of the E-commerce industry will be described and important findings for the thesis will be summarized at the end of the chapter. As a first step the definition of E-commerce is explored.

VanHoose describes Electronic commerce or E-commerce as any process that entails exchanging ownership of or rights to use goods and services via electronically linked devices that communicate interactively within networks. He notes that in most instances, the electronically linked devices that people use to engage in electronic commerce are computers, or other devices that include microprocessors. The most important type of interactive communication network for electronic commerce is the internet.[4]

Sealey defines E-commerce as buying and selling products and services over the Internet.[5]

According to E-commerce giant Shopify, E-commerce, also known as electronic commerce or internet commerce, refers to the buying and selling of goods or services using the internet, and the transfer of money and data to execute these transactions. It is described that E-commerce is often used to refer to the sale of physical products online, but it can also describe any kind of commercial transaction that is facilitated through the internet.[6]

2.1 Types of E-commerce

E-commerce can be divided into different categories depending on who the buyer and who the seller is. The category definitions are also known as transaction types of E-commerce which are shown in Tab. 1. The most relevant types are business-to-business (B2B), business-to-consumer (B2C) and consumer-to-consumer (C2C) E-Commerce which will be described in detail further below and are marked in bold.[7]

Transaction Type of E-commerce		Consumer of product / service		
		Consumer	Business	Government
Provider of Product / Service	Consumer	**C2C**	C2B	C2G
	Businesses	**B2C**	**B2B**	B2G
	Government	G2C	G2B	G2G

Tab. 1: Digital Economy, source: Warmerdam (2016), online source [12.06.2019].

[4] Cf. VanHoose (2011), p. 7.

[5] Cf. Sealey (2013), p. 44.

[6] Cf. Shopify (n.d.), online source [02.06.2019].

[7] Cf. Laudon/Traver (2017), p. 22.

B2C E-commerce

Laudon and Traver define business-to-consumer (B2C) E-commerce as the most commonly discussed type of E-commerce in which online businesses attempt to reach individual consumers. As per this definition B2C E-commerce includes purchases of retail goods, travel and other types of services, and online content. B2C is comparatively small with an estimated $600 billion in 2016 in the United States but it has grown exponentially since 1995 and is the type of E-commerce that most consumers are likely to encounter.[8]

B2B E-commerce

Business-to-business (B2B) E-commerce as defined by Laudon and Traver focus on businesses selling to other businesses. This is the largest form of E-commerce, with around $6.7 trillion in transactions in the United States in 2016. As the estimated market size of online and offline business-to-business transactions are $14.5 trillion in exchanges it is believed that B2B E-commerce has significant growth potential. There are two primary business models used within the B2B arena: Net marketplaces, which include e-distributors, e-procurement companies, exchanges and industry consortia, and private industrial networks.[9] There are some similarities but also many differences between B2B and B2C buyers which are shown in Tab. 2 below. Knowing the differences allows tailoring the E-commerce business to the customers' expectations. Most noteworthy is the type of relationship with the customer sales cycle. While B2C customers are product feature oriented and typically have a short term relationship with the merchant, in B2B business long term relationships with multi staged sales cycles are the norm.[10]

	B2B	**B2C**
Similarities	Both require excellent customer service and experience. Both entail a consistent and customer-centric sales process. Authenticity and credibility are key engagement requisites. Customer loyalty is an overarching goal. Contemporary buyers in both markets are more knowledgeable Compared to prior generations of customers.	
Driving Factor	Relationships/product Features/customer support	Product features/brand appeal
Primary Motivation for Purchase	Establish strategic advantage or Generate value	Status-related personal Gratification, emotional Attachment, economic Considerations (affordable Pricing, etc.)

[8] Cf. Laudon/Traver (2017), p. 22.

[9] Cf. Laudon/Traver (2017), p. 24.

[10] Cf. Altschuler (2017), online source [11.06.2019].

Product Pricing & Complexity	Relatively more complex and costlier	Pricing aligns with individual capacity/comparatively less complex
Typical Branding Methodologies	Website, whitepaper, research, Industry forums, professional networks	Broadcast commercials, celebrity endorsements
Market Size	Focused/small/niche	Large
Key Purpose of Sales Team	Relationship building	Maximize transaction value
Number of Stake-holders/Decision Makers	Multiple	One
Duration of Decision-making Process	Requires longer engagement period	Takes shorter time for opt in/opt out
Sales Cycle	Longer sales cycle with more stages	Shorter sales cycle, with fewer stages
Required Level of Product Knowledge	High, jargon use is pervasive, demos are often necessary	Low to Moderate, jargon use is minimal
Primary Sales and Marketing Activities	Relationship building, customer Education, brand awareness	Merchandising, point of purchase actions
Typical Length of Relationship	Long-term	Short-term

Tab. 2: Difference B2B and B2C market, source: Altschuler (2017), online source [11.06.2019].

C2C E-commerce

Consumer-to-consumer (C2C) E-commerce is where a consumer sells to another consumer via the intent over a digital platform. Examples are eBay or Etsy where mainly products are sold or Airbnb and Uber where on-demand services are sold. The digital platform acts an intermediate between the consumers to provide catalogue, search engine, and transaction-clearing capabilities. The product or service that is sold is offered by the consumer which places the product for auction or sale, and relies on the marketplace so that products can be easily displayed, discovered, and paid for. The size of the C2C market is estimated to be around 100 Billion USD in 2016.[11] Many C2C businesses use a disruptive business model which has its roots in E-commerce technology and the sharing economy. The margins for the consumer that sells the products can be very high as the seller reaches a large audience through the platform to get a good price, but only has minimal costs. For the buyer it has the advantage that they benefit from the variety of products and can find items that are difficult to locate elsewhere. The general advantage of

[11] Cf. Laudon/Traver (2017), p. 24.

ecommerce, where the buyer does not have to visit a brick-and-mortar store also applies. While the transactions of goods or services are handled between consumers, the platform is managed by a company that makes money from the transaction. This is usually done by fees charged to the seller either for listing their products, getting a commission when the product is sold or from promotional features or facilitating payment. The C2C market is very cost-effective and has the potential for further growth in the future.[12]

2.2 E-commerce generations

While there are many definitions to categorize the different generation of E-commerce, the most relevant aspect for the topic is the technological capability the E-commerce software has. It's not a sharp cut between each generation, but more a like transition. Many seller today, still run with systems that can be classified as first generation or second generation technology with all its disadvantages, while leading firms invest heavily in the latest E-commerce technology to gain a competitive advantage.[13] Tab. 3 shows an overview of the generations with their basic functions and features.

First Generation	Second Generation	Third Generation
1995-2005	2006-2011	2012-Current
Basic functions based on B2C Markets	In-depth functions for B2B Customers	Advanced functions reducing cost and increasing sales
Simple stock transactions with limited information and service choices	All transaction types with controls, numerous service choices and transparent, real-time information	Cloud-based systems, full integration of bolt- on advanced functions of cross referencing, catalogue expansion

Tab. 3: E-commerce generations, source: Benfield (2014), p. 7. (modified)

The E-commerce offerings of companies of the second generation were mainly oriented on physical products. The book "E-commerce-Leitfaden" which was published in the 3rd edition in 2012 and was one of the most relevant books on E-commerce back then, described in detail on how to handle physical products, but only briefly mentions digital goods and services.[14]

2.3 Value chain in E-commerce

To understand the impact of E-commerce technology on the overall business environment the value chain in the industry today needs to be analysed. A value chain is the set of activities needed to transform raw inputs into final products and services. A comparison between the value chain in the traditional

[12] Cf. Schroeder (2019), online source [12.06.2019].

[13] Cf. Benfield (2014), pp. 6-7.

[14] Cf. Stahl, et al. (2012), pp. 3-5.

industry and the E-commerce industry is given in Tab. 4. The typical value chain in the industry has 5 players and it takes 4 transports till the goods are at the customers place. Compared to that the value chain in E-commerce is much simpler and has only 3 players involved and it takes only 2 transports to get the products to the customer. This decreases the cost and the customer can buy the products for a lower price while the manufacturer can keep or even increase the margin.[15]

	Value chain traditional industry	**Value chain E-commerce (shortest version)**
1	Suppliers	Supplier
2	Manufacturer	Manufacturer
3	Distributor	Customer
4	Retailer	
5	Customer	

Tab. 4: Value chain in E-commerce, source: Laudon/ Traver (2017), p. 89. (modified)

2.4 Customer benefits / disadvantages

Since there are also other means of purchasing goods or services available, like buying something in a traditional brick and mortar store, the benefits and disadvantages for the customer perspective is important. There is not only one reason, but there are many different reasons on why customers shop online. The most frequently expressed reason according to a survey on Statista is the ability to shop 24/7 which 58% of online shoppers have. This is followed closely by the ability to compare prices (54%), get better prices (46%) or to save time (40%). Other factors are the convenience of not going to the store (39%), having a greater variety/selection (29%), free shipping offers (29%) and the convenience of having everything in one place (27%). Some less often mentioned reasons for buying online is the ability to locate hard to find items (20%), to avoid crowds (15%), to get products that are not sold locally in the city or country (15%) or to avoid checkout lines (11%).[16]

On the other hand there are also reasons given why people not purchase goods and services online. According to survey data provided by Angelovska for customers in the EU, the biggest disadvantage of online shopping is that the real product cannot be seen or touched which leads to a preference or force of habit to shop in person. 20% of survey participants shared that belief. Other described disadvantages were payment security concerns (7%), the lack of necessary skills (6%), trust in the e-shop (5%), lack of payment card (4%) and longe delivery times (2%). Addressing the customer concern and breaking old habits is the key to gaining addition customers in E-commerce. This is currently being done on a massive scale by big marketplace companies like Amazon and Ebay with TV advertisement and media content created to attract more buyers to their platforms.[17]

[15] Cf. Laudon/ Traver (2017), pp. 88-89.

[16] Cf. Statista (2016), online source [04.06.2019].

[17] Cf. Angelovska (2018), online source [04.06.2019].

2.5 Business models in E-commerce

E-commerce has many facets and the business models have evolved over the years from the sale of physical goods (E-tailer), to sales of services, sales of advertising, sales of digital goods, online subscriptions and affiliate referral fees. With the widespread use of smartphones, the latest E-commerce business models are now also shifting towards mobile devices. This is sometimes referred to as m-commerce. It is also important to note that there are also hybrid models that combine for example E-commerce with a traditional brick and mortar store.[18]

Tab. 5 gives an overview of the most common E-commerce B2C business models. While all business models use internet technology, the revenue models are quite different and range from revenue of the sales of goods or services to advertising-, subscription- or transaction fees or a combination of several elements. Also if looked at the example company names in Tab. 5, it can be seen that many well-known names are listed that do business in many different industries. This shows the great variety of business model variants that are available in E-commerce. While it is important to have an overview of the most common business models in E-commerce, the business models of the E-tailer will be described in more detail in chapter 2.5.1. This doesn't mean that the other business models are less important or relevant. The business model of the E-tailer is the most common E-commerce business model with millions of entrepreneurs using this business model (E-commerce software provider Shopify hosts of 1 Million shops for their clients). Furthermore the communalities and differences of an E-commerce marketplace and a platform that include business models like Market Creator, Transaction Broker, Community Provider, Portal or Content provider will be explored in chapter 2.5.2.[19]

Business Model	**Examples**	**Description**	**Revenue Models**
E-tailer	Amazon Blue Nile Blue fly	Online version of retail store, where Customers can shop at any hour of the day or night without leaving their home or office	Sales of goods
Community Provider	Facebook Linked in Twitter Pinterest	Sites where individuals with particular Interests, hobbies, common experiences, or social networks can come together and *meet* online	Advertising, Subscription, Affiliate referral fees
Content Provider	Wall Street Journal CNN Netflix Apple Music	Offers customers newspapers, magazines, books, film, television, music, games, and other forms of online content	Advertising, subscription fees, sales of digital goods
Portal	Google Yahoo MSN	Offers an integrated package of content, search, and social network services: news, e-mail, chat, music downloads, video streaming, calendars, etc. Seeks to be	Advertising, subscription fees, transaction fees

[18] Cf. Laudon/ Traver (2017), pp. 457-461.

[19] Cf. Laudon/Traver (2017), pp. 71-73.

	Facebook	a user home base	
Transaction Broker	E- Trade Expedia Monster Orbitz	Processors of online sales transactions, such as stockbrokers and travel agents, that increase customers productivity by helping them get things done faster and more cheaply	Transaction fees
Market Creator	eBay Etsy Amazon	Businesses that use internet technology to create markets that bring buyers and sellers together	Transaction fees
Service Provider	Visa Now Wave Rocket lawyer	Companies that make money by selling users a service, rather than a product	Sales of services

Tab. 5: B2C Business Models E-commerce, source: Laudon/Traver (2017), p. 73. (modified)

B2B business models, according to Laudon and Traver, can be divided into two large categories shown in Tab. 6. One category is the net marketplace with many sub-segments, the other is the private industrial network.

Business Model	**Examples**	**Description**	**Revenue Models**
Net Marketplace			
E-distributor	Grainger Amazon Business	Single-firm online version of retail and wholesale store; supply maintenance, repair, operation goods, indirect inputs	Sales of goods
E-procurement	Ariba Supplier Network Perfect Commerce	Single firm creating digital markets where sellers and buyers transact for indirect inputs	Fees for market-making services, supply chain management, and fulfilment services
Exchange	Go2Paper	Independently owned vertical digital marketplace for direct inputs	Fees and commissions on transactions
Industry Consortium	The Seam Supply on	Industry-owned vertical digital market open to select suppliers	Fees and commissions on transactions
Privat Industrial Network			
Walmart Procter & Gamble		Company-owned network that coordinates supply chains with a limited set of partners	Cost absorbed by network owner and recovered through production and distribution efficiencies

Tab. 6: B2B Business Model in E-commerce, source: Laudon/Traver (2017), p. 82.

2.5.1 E-Tailer and long tail retailer

An E-Tailer is a merchant that offers his goods on the internet. The customer places the order electronically with the merchant and the product is then shipped to the buyer. Registration with the

merchant or upfront payment by the customer may be needed in some cases or the buyer can place the order as a non-registered user or guest.[20]

A special version of the E-Tailer is the long tail retailer. According to Anderson most successful Internet businesses are capitalizing on the Long Tail in one way or another. For example Google makes most of its money not from huge corporate advertisers, but from small ones (the Long Tail of advertising). E-Bay is mostly Tail as well niche products from collector cars to tricked-out golf clubs. Amazon also has a very long tail inventory. The long tail theory is based on the economic cut-off points that different types of retailers have that can be seen in Fig. 2. This cut-off point is reached when the costs associated with additional inventory that sell slowly do not contribute to the profits.[21]

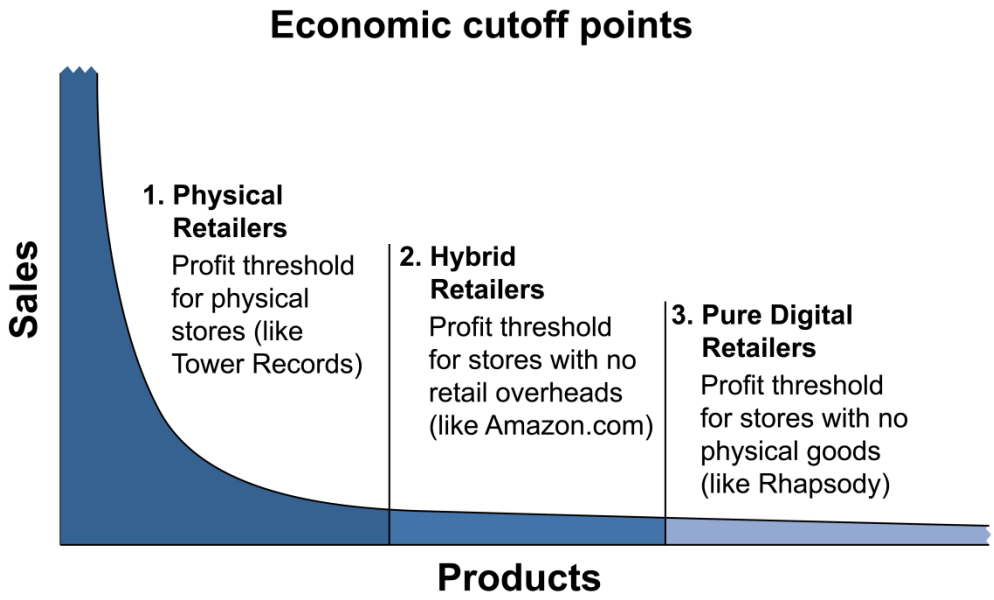

Fig. 2: The long tail theory, source: Anderson (2008), p. 24. (modified)

A traditional bricks-and-mortar retailer has significant inventory costs. Products that don't sell well tend to be unprofitable which is based on the 80/20 rule. Nearly all the profit comes from the 20 percent that do sell well. For a Long Tail retailer the situation is very different. If this retailer has ten times as much inventory as a bricks-and-mortar retailer, the 20 percent of products that make up most of the revenues of the first retailer become just 2 percent of the Long Tail retailer's inventory. The online-only inventory which makes up 90% of all products has a share of 25% of total revenue. However, as visualized in Fig. 3 it contributes 33% to profits because as the costs for keeping online-only inventory is significantly lower.[22]

[20] Cf. Laudon/ Traver (2017), pp. 68-71.

[21] Cf. Anderson (2008), p. 24.

[22] Cf. Anderson (2008), p. 131.

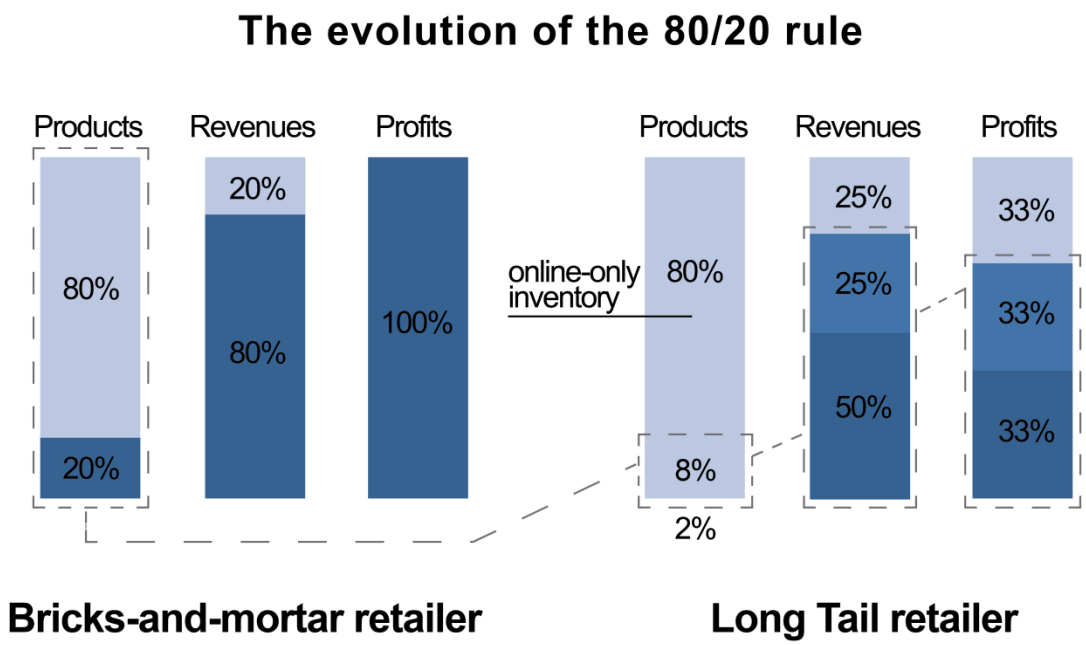

Fig. 3: Evolution of the 80/20 rule, source: Anderson (2008), p. 131. (modified)

2.5.2 E-commerce marketplaces and platforms

Platforms and marketplaces are important factors in E-commerce. While the term platform and marketplace are often used interchangeably, according to VanHoose there is a difference. Markets are described as arrangements where people can exchange goods, services or assets with one another.[23] VanHoose describes this the following way:

Historically buyers and sellers would meet in a city square or other agreed upon place that was defined as the market place. This marketplace was often owned by a third party, which collected some sort of fee from the seller or the buyer. The seller would display the goods and the potential buyer could evaluate the goods and then both parties would try to agree on a price. These marketplaces in the traditional sense still exist to some degree in many cities for agricultural products or antiquities.[24]

VanHoose also notes that since the development of mass transportation buyers tended to shop for goods, services or assets by traveling around and visiting fixed retailer locations. He has the opinion that with the invention of telecommunication the buyers have been able to save the traveling time by “phoning around” for products and price information and sellers could use radio or television to market their products. Another observation is that Electronic Networks were the next step that allowed people to create a “virtual” marketplace. This “virtual” marketplace allows the seller to post information and detailed description of a product on a website and it allows the potential buyer to evaluate and buy the item for the given price or in some cases place a bid or negotiate a lower price. VanHoose postulates that the owner

[23] Cf. VanHoose (2011), p. 8.

[24] VanHoose (2011), p. 8.

of the virtual marketplace either gets a fraction of the value of the transaction or captures the value in another way.[25]

The term platform can have different meanings in E-commerce. DeMatas notes that as a software product an E-commerce platform is the offering of a company. This offering allows a seller/merchant to easily create an own online store/web presence based on an existing software platform that only needs to be customized by filling in the sellers product information and store design. The merchant can either buy a one-time license to use the E-commerce platform or rent the platform, similar to a brick and mortar store. Typical E-commerce platforms providers are Shopify, Prestashop, Magento.[27]

According to Hagiu a platform in business terms or also described as multi-sided platform (MSPs) or platform business are technologies, products or services that create value primarily by enabling direct interactions between two or more customer or participant groups. This two-sided platform or also exchange platform or marketplace focuses on the exchange between buyer and seller. There are two kinds of relationships between buyer and seller. Typical examples of platforms with an 1:1 relationship are Ebay, Amazon, Airbnb and Uber. Typical examples of 1:n relationship platforms are Facebook, Youtube, IOS-Store, Play- Store, Linkedin. These types of Multi sided platforms or maker platforms focus on bringing (digital) content created by producers to an audience. This is possible due to product only consisting of digital information that can be reproduced at little to no cost.[28]

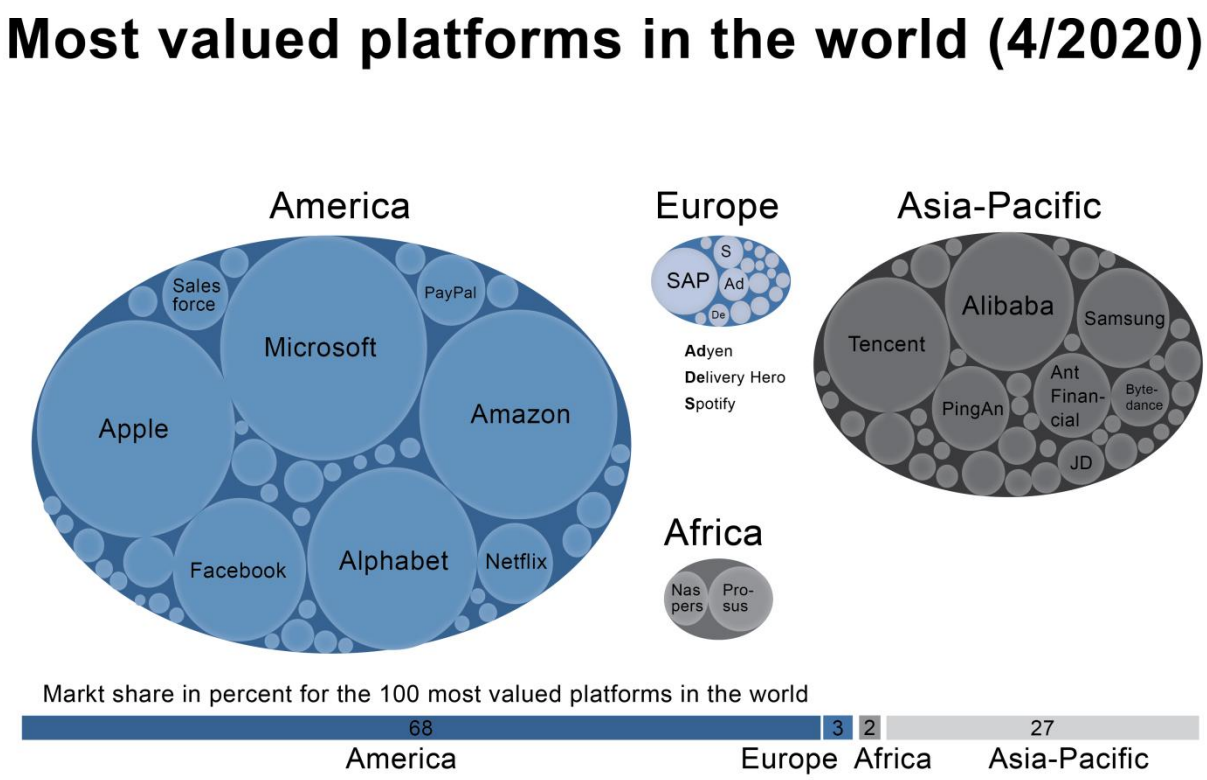

Fig. 4: 100 biggest platforms, source: Schmidt (2020), online source [30.06.2020]. (modified)

[25] Cf. VanHoose (2011), p. 8.

[27] Cf. DeMatas (2019), online source [02.06.2019].

[28] Cf. Hagiu (2013), online source [02.06.2019].

As analysed by Schmidt, some of biggest E-commerce companies were built by using multi-sided platforms. This includes Amazon, Alibaba, Ebay, Tencent, JD and many more. Schmidt also notes that it is rather noteworthy that the biggest companies by market value using multi sided platforms are located in the USA or in Asia. As shown in Fig. 4 of 100 most valued platforms America currently has 68% of the market share, followed by Asia with 27% market share. It is expected that the balance is shifting towards Asia in the future. This is a very concerning development as many Europeans are using these platforms but the value created is going abroad. Schmidt is also concerned that Europe is falling further behind in investment for “Deep Tech” and no one seems to care.[29]

2.6 Competition in E-commerce

Laudon and Traver explored competition in E-commerce. They described it as a perfect market during the invention phase (1995 to 2000), meaning that there were many small sellers selling homogenous goods to many buyers, the situation has changed a lot since then. They state that during the consolidation phase (2001-2006) that followed the burst of the dotcom bubble, the imperfections of the market continued to grow. They think that large traditional brands started to use the internet to strengthen their position online and besides retail products, also more complex products like travel or financial services entered the online market. In the reinvention phase (2007-now), Laudon and Traver stated that the imperfections of the online market continued to grow. The reason for this was found in large players like Amazon and Alibaba now dominating the E-commerce sector and the reinvention of personal service businesses like Uber and Airbnb adding a new dimension to the online market. However, they also observed that in selected markets a competition of commodities can be observed. Amazon is given as an example that allows other merchants to enlist products on their platform and has over a million registered merchants that sell their products via their platform creating a lot of competition where many merchants sell the same product.[30]

Importance of Marketing

Laudon and Traver found that online marketing and advertising spending continues to increase (by over 20% in 2016), compared to only about 1% for traditional media marketing and advertising. It was found that a significant portion of this increase in spending is shifted towards advertising on mobile devices which already have 60% of total digital advertising spending.[31]

2.7 Niche markets

Kotler and Armstrong state that firms competing in a given target market at any point in time differ in their objectives and resources. The firms are described to have different attributes with some large firms, some small firms, some firms having many resources while other are strapped for funds and so on. They argue that these firms each occupy different competitive positions in the target market with different competitive

[29] Cf. Schmidt (2018), online source [02.06.2019].

[30] Cf. Laudon/Traver (2017), p. 33.

[31] Cf. Laudon/Traver (2017), p. 339.

strategies based on the roles firms play in the target market. These roles are defined as market leader, challenger, follower and nicher. As can be seen in Fig. 5 each of these roles is defined or characterized by having a certain share of the market. While the market leader may have a 40% share of the total market, the nicher may only have 10% market share.[32]

Market leader	Market challengers	Market followers	Market nichers
40%	30%	20%	10%

Fig. 5: Competitive market position and roles, source: Kotler/Armstrong (2018), p. 558.

Kotler and Armstrong state that almost every industry includes firms that specialize in serving market niches that instead of pursuing the whole market are only targeting subsegments. Nichers are described often as smaller firms with limited resources or smaller divisions of larger firms that are pursue niching strategies. It is noted that firms with low shares of the total market can be highly successful and profitable through smart niching. According to Kotler and Armstrong the main reason niching profitable is that the market nicher ends up knowing the target customer group so well that it meets their needs better than other firms that casually sell to that niche. This allows the nicher to charge a substantial markup over costs because of the added value. It is claimed that whereas the mass marketer achieves high volume, the nicher achieves high margins with Nichers trying to find one or more market niches that are safe and profitable.[33] Kotler and Armstrong describe the ideal market niche in the following way:

An ideal market niche is big enough to be profitable and has growth potential. It is one that the firm can serve effectively. Perhaps most important, the niche is of little interest to major competitors. And the firm can build the skills and customer goodwill to defend itself against a major competitor as the niche grows and becomes more attractive. The key idea in niching is specialization. Nichers thrive by meeting in depth the special needs of well-targeted customer groups.[34]

Another comparison given by Katz is that mass marketers thrive on “must-have” items — huge volumes of single styles, sold across many market segments to an audience of consumers eager to have the item they saw advertised in mass media, and which, in turn are produced in great scale and efficiency. Nichers in contrast should satisfy customers by delivering products that will be uniquely relevant to consumer’s distinct desires, interests and needs. Katz states that it will provide greater value, deliver greater satisfaction, earn consumer loyalty, and recognize a greater profit.[35]

[32] Cf. Kotler/Armstrong (2018), p. 554.

[33] Cf. Kotler/Armstrong (2018), p. 558.

[34] Kotler/Armstrong (2018), p. 558.

[35] Cf. Katz (2017), online source [04.06.2019].

2.8 Measuring performance in E-commerce

Key performance indicators (KPI)

Hayes describes the performance indicator as a quantifiable measurement of the performance relative to a goal. As there can be many performance indicators for a goal he notes that it is important to find the most impactful indicators related to that goal. The most impactful performance indicators are called key performance indicators. They show whether a business is progressing towards its goal. According to Hayes selecting the KPIs begins with clearly stating the goals and understanding which areas of business impact those goals. In E-commerce, as outlined by Hayes, the KPIs fall generally into one of the following five categories:[36]

- Sales: Turnover, Average order size, gross profit, average margin, conversion rate, …
- Marketing: Site traffic, Time on site, Traffic source, Page views per visit, Average CTR, …
- Customer Service: Hit rate, First response time, Active issues, Service escalation rate, …
- Manufacturing: Cycle time, Yield, Number of non-compliance events or incidents, …
- Project management: Budget, hours worked, Return on investment, Cost variance, …

Große-Holtforth showed that it is possible to use KPIs to actively control and optimize the profit margin. This can be done by applying their model, the “E-commerce Code” which is an equation used for calculating the profit margin when using paid per click traffic from advertising services like Google AdWords.[37]

Methods for gathering customer data

The data for many of the above mentioned KPIs need to be gathered through monitoring tools and Web Analytics. The data is used as customer feedback and is essential to improve the E-commerce experience for the user as direct observation or communication like in a brick and mortar store is not possible. Many off the shelf E-commerce solutions already come with their own basic analytics software that allows the user to get some basic metrics see how well a website is doing. There are also 3rd party tools that can be integrated into an E-commerce website that allow more detailed information collection and analysis. The most popular tool for website and traffic analysis is Google Analytics with a market shat of more the 85 % in June 2019.[38]

[36] Cf. Hayes (2018), online source [04.06.2019].

[37] Cf. Große-Holtforth (2015), online source [04.06.2019].

[38] Cf. No author, w3techs.com (n.d.), online source [04.06.2019].

2.9 Trends in E-commerce

This chapter deals with the trends that are present in the E-commerce industry today as well as with prediction on how the industry will be influenced by emerging technology. At the end a critical review on the importance of trends is done.

2.9.1 Market size and growth

The massive growth of E-commerce has a significant impact on traditional retailing. According to Thomas large traditional brick and mortar stores, especially department stores, are piling up losses. It has been observed that outdated stores and merchandise isn't resonating with millennials but growth on Amazon.com is filling the hole for brands.[39] The E-commerce industry is currently growing at a rapid pace. It has been growing for the last 25 year and will also continue to grow in the years to come. The share of E-commerce of total global retail sales are predicted to rise from currently 15.5% (2020) to 17.5% in 2021 as can be seen in Fig. 6. [40]

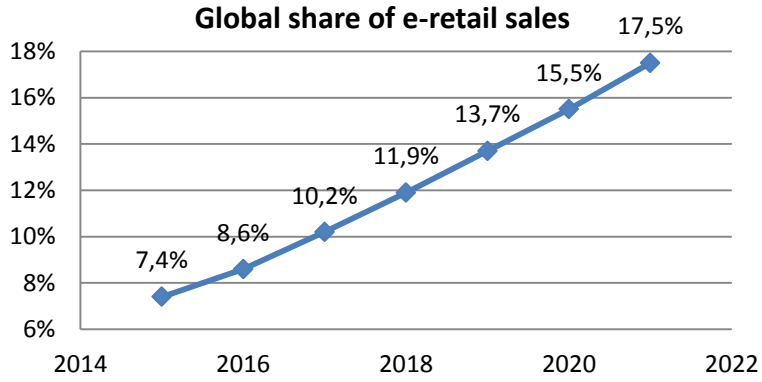

Fig. 6: E-commerce share of total global retail sales from 2015 to 2021, source: Statista (n.d.), online source [13.06.2019].

Relative growth rate

Although the relative growth rate of E-commerce in retail has already reached its peak and is declining for several years now which is shown in Fig. 7. While it was in 2016 still over 25 %, the predicted growth rate with almost 20% for 2020 is still quite high compared to other industries.[41]

[39] Cf. Thomas (2019), online source [13.06.2019].

[40] Cf. Statista (n.d.), online source [13.06.2019].

[41] Cf. Orendorff (2019), online source [13.06.2019].

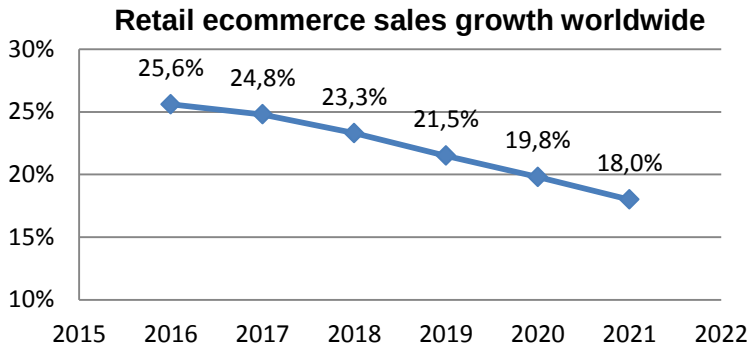

Fig. 7: Retail E-commerce Sales Growth worldwide, source: Orendorff (2019), online source [13.06.2019].

2.9.2 Market shift in E-commerce

While the E-commerce industry is growing in general (see chapter 2.9.1) the growth is not equally distributed among all participants. The market is shifting in some areas towards B2B E-commerce and larger companies as described below.

Rise of B2B E-commerce

According to Davis, B2B E-commerce sites, log-in portals and online marketplaces last year accounted for 14.3% of electronic sales and 7.2% of total B2B sales. Recent research by B2BecNews indicates those shares will rise sharply over the next few years with many companies planning to launch B2B E-commerce sites. In surveys conducted by B2BecNews in 2018 of 276 manufacturers, wholesalers and distributors, 60.7% of manufacturers and 38.1% of wholesalers and distributors do not yet have an E-commerce site. However the vast majority of those without an E-commerce site, or 75%, said they planned to launch one within two years.[42]

Negative growth rate of small E-commerce stores

While bigger E-commerce companies increased their revenue in 2018, the smaller companies lost significantly in Austria. Fig. 8 shows that the revenue growth for the top 50 companies was 46.6% on average while ranks 51 to 100 only had 12.2% growth. Companies in rank 150 to 250 had shrinking revenue.[43]

[42] Cf. Davis (2019), online source [13.06.2019].

[43] Cf. EHI/Statista (2018), online source [13.06.2019].

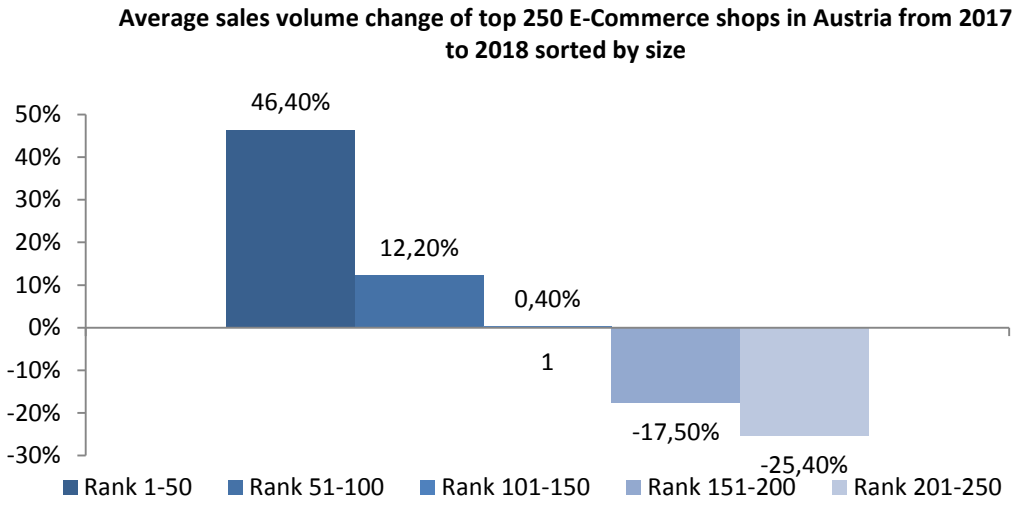

Fig. 8: Growth rate in Austria vs company size, source: EHI/Statista (2018), online source [13.06.2019].

2.9.3 Trends in emerging technology

The Gartner Hype Cycle focuses on technologies that will deliver a high degree of competitive advantage over the next decade. Fig. 9 shows the maturity of each of the 29 emerging technologies identified by Gartner in 2019. If a technology is positioned on the left side it means that it less mature than a technology further to the right. Some technologies are also expected to mature faster than others. The emerging technologies can also be organized into five major trend categories that are listed below:[44]

- Sensing and Mobility
- Augmented Human
- Postclassical Compute and Comms
- Digital Ecosystems
- Advanced Artificial Intelligence and Analytics

[44] Cf. Panetta (2019), online source [10.06.2019].

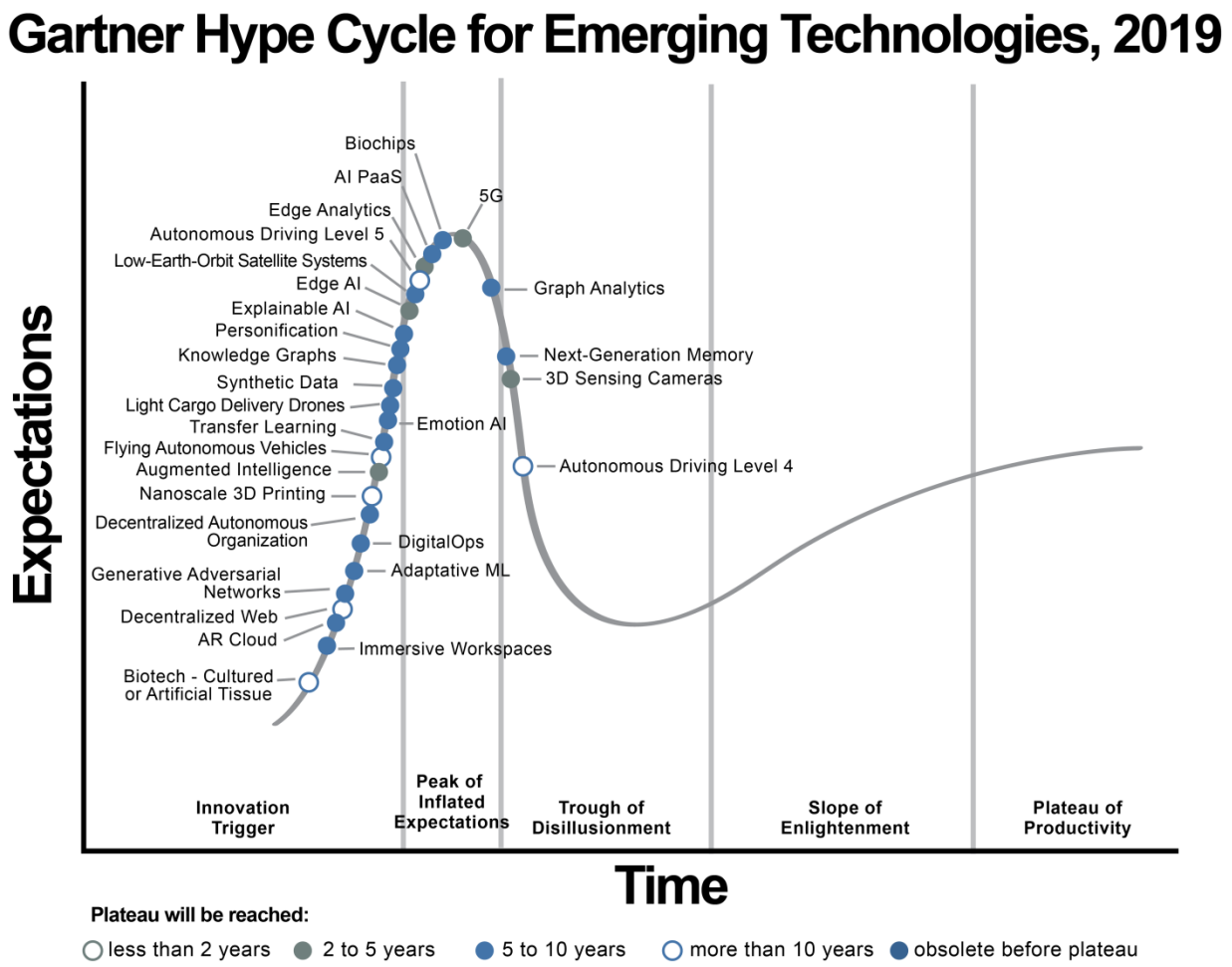

Fig. 9: Gartner Hype Cycle 2019: source: Gartner (2019), online source [10.06.2019].

Probably the biggest influence on E-commerce will be the widespread use and maturation of Advanced Analytics and Artificial Intelligence (AI) to fully utilize big data.

Advanced analytics - data driven decision making

Data driven decision making (DDDM) has been practiced in the industry for quite some time and has helped companies like Zara[45], Airbnb[46], Netflix and others gain significant advantages over their competition. While DDDM has been the domain of large firms in the past due to the complexity and effort needed to collect and process the data, the advancements in technology and increasing range of software tools have made it possible also for small companies to use advanced analytics tools. Tools like Microsoft power BI can analyse big datasets easily and provides many functions even free of charge.

There are three key analytics types:

- Descriptive, which uses business intelligence and data mining to ask:

  "What has happened?"

- Predictive, which uses statistical models and forecasts to ask:

[45] Cf. Varma (2017), online source [09.09.2019].

[46] Cf. Shunyuan (2018), online source [09.09.2019].

"What could happen?"

- Prescriptive, which uses optimization and simulation to ask:

  "What should we do?"

The three types build on one another, with descriptive analytics being the most common and prescriptive analytics the most advanced.[47]

One big issue that remains: When a HiPPO (highest paid person's opinion) is in play, the organization is most likely not relying on data to inform decision-making. According to Marr the HiPPO effect is one of the biggest barriers to more evidence-based and data-driven decision-making. With the quantity and quality of data available today, it is just poor business for organizations to ignore data in favour of making decisions solely based on what the HiPPO wants done.[48]

Other important E-commerce technologies

According to a survey of 150 E-commerce managers the following trends have the biggest potential on return of investment in 2019: Big Data, Business Intelligence (BI), Customer-Relationship-Management (CRM) and Content Marketing. Fig. 10 shows an overview of trends according to their maturity or return of investment (ROI) and the potential impact on the market.[49]

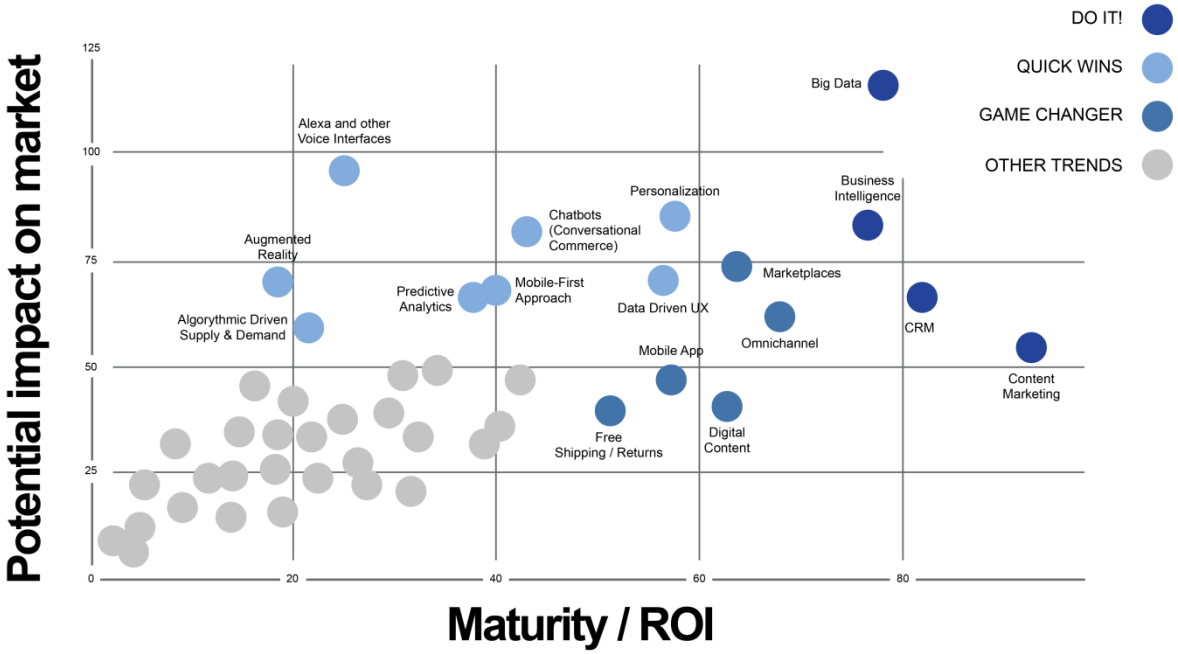

Fig. 10: Trends in E-commerce, source: Karwatka (2018), online source [10.06.2019]. (modified)

[47] Cf. IBM (2017), p. 3.

[48] Cf. Marr (2017), online source [09.09.2019].

[49] Cf. Karwatka (2018), online source [10.06.2019].

2.9.4 Opinions on the importance of trends

There are different opinions on the importance of trends. The opinions range from trends being indispensable where following trends is viewed as a necessity, to a somewhat more laid back approach of being not the first and not the last to adopt a new trend to trends being just a tool to see customers wishes. Exemplary quotes of the different opinions are listed below:

If you are able to understand the current trends and predict the future ones surrounding your business, forecasting the future of your business will be a lot easier for you. It will enable you to make better strategic decisions, capitalize on good business opportunities, and overcome the fierce competition that your business might face. It helps in determining the required changes for improvement. If you know all about the current and future business trends, you can compare with them your current strategies.[50]

New trends are always coming and going. Some last years and some only days. But the ability to catch E-commerce product trends, can change your business and life forever. … When it comes to selling things online, you never want to be the first to sell something and you never want to be the last. … The best time entry point into a trend is the point in the curve called the “The Chasm”.[51]

Trends are mere tools, but not the key to success. The secret for business success never lies with trends, following trends or even maybe creating trends. Trends are mere tools to be used, but they have never or will never lead op to real sales and client loyalty. Trends are just a way to find out what functionalities, colours, sounds, gadgets, innovations, etc. people want nowadays....[52]

[50] No author, cleverism.com (n.d.), online source [12.06.2019].

[51] Chibane (2018), online source [12.06.2019].

[52] Wolves (n.d.), online source [12.06.2019].

2.10 Findings for the thesis

The most common definition of E-commerce is the sale of products and services over the Internet, which will be also adopted for this thesis. E-commerce can be divided in different types, depending on the role the buyer and seller have with the most relevant being the B2C, B2B and C2C market. Though the difference might not be obvious from the outside, each market has its own set of rules and expected behaviour that needs to be respected. The adoption rate of E-commerce also varies between the markets and currently all segments are growing at a rapid pace that is expected to continue also in the years to come. The rise of platforms like Ebay or Amazon has it made possible for merchants and also private sellers with no prior knowledge in E-commerce to sell their products online on their platforms in exchange for a fee that is typically between 5% and 15% from the sales price. As E-commerce technology also progresses, it gets easier to participate in E-commerce as it is now possible to rent a basic E-commerce store for less than 10 USD per month, however large companies invest heavily into the latest E-commerce technology to gain an advantage. While the E-commerce market is growing in general, there are concentration effects which let the biggest E-commerce companies growing the revenues above average at the expense of smaller companies. This increasing competition in the E-commerce market, where the large players with heavy investments will eventually dominate the biggest markets, underlines the need for small companies to specialize and mainly serve market segments that are not directly targeted by large E-commerce companies. The performance in E-commerce can be analysed by defining KPIs and should be monitored constantly to detect shifts in the market and optimize the profits. The maturation of new digital technologies may also have a profound impact on E-commerce as we know it and may even make smaller market segments profitable for large companies and therefore closing niches.

3 ELECTRONICS SECTOR

Electrical and electronic engineering industries (EEI) include electrical devices, radio equipment and telecommunications industries. Examples are mobile phones, the mobile network infrastructure, TV sets, power supply units, wireless routers, maritime radars, sensors, and much more.[53]

3.1 The role of the electronics industry

Boudre et al. argues that micro- and nanoelectronics was never and will never be an end in itself. Electronics is rather viewed as a true key enabling technology providing users along value chains with relevant solutions that have great leverage across all industries and sectors. Semiconductors and electronic components are used in almost any industry and enable value creation on a massive scale. Fig. 11 shows the value chains of electronics and Boudre argues that large parts of Europe's GDP are enabled by the semiconductor supply chain.[54]

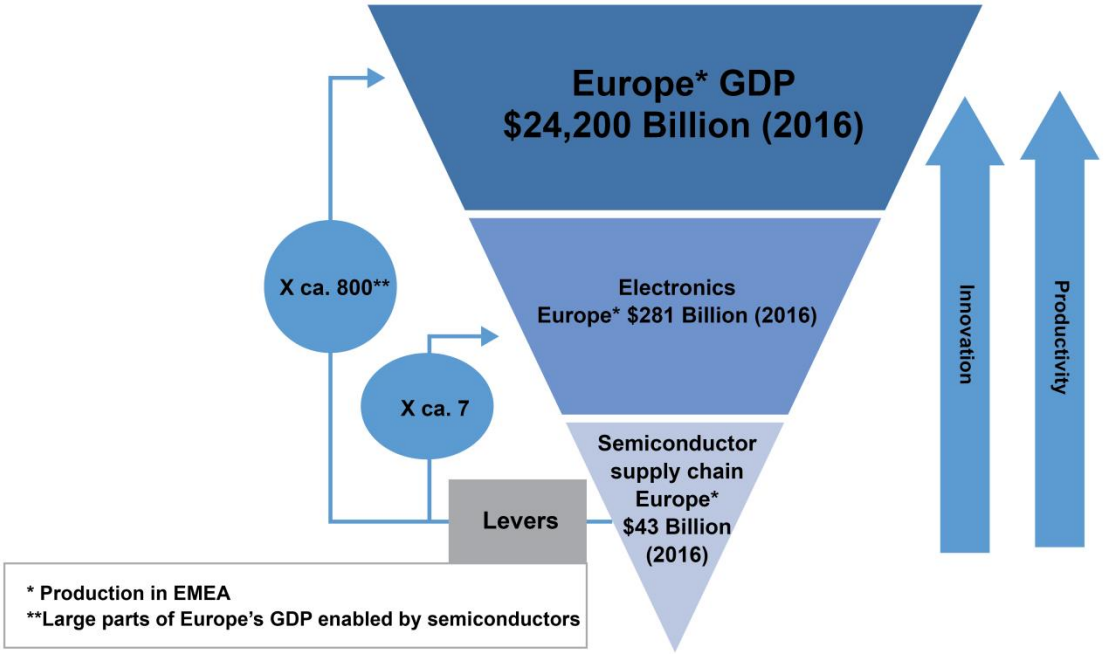

Fig. 11: Value Chain in Electronics, source: Boudre et al. (2018), online source [05.06.2019]. (modified)

In Germany for example, the electronic industry delivers intermediate goods with the value of more than 25 billion Euros (2015) to other branches and is the most cross-linked industry that other branches depend on. Also from a worldwide perspective there is no other industry branch more interconnected with outer areas of technology than the electronic industry. The competitiveness of many industries is directly linked to the electronics industry.[55]

[53] Cf. EEI (no date), online source [05.06.2019].

[54] Cf. Boudre et al. (2018), p. 4.

[55] Cf. ZVEI (2016), p. 5.

3.1.1 Electronics industry in Austria

According to the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMVIT) there are 188 Electronic Based Systems (EBS) relevant companies that are active at 198 locations in Austria and employ 62,905 people. The total turnover amounts to 76,764 million euros, of which 17,257 million euros (2016) are earned inside Austria. The spatial distribution of the segments displays a heterogeneous picture for the individual locations with three major clusters. Whereas Vienna is clearly dominated by equipment manufacturers, Linz has more component producers and in Graz, almost half of the companies can be assigned to the equipment segment. Tab. 7 shows how much share of turnover each category has.[56]

Category	Turnover (in %) of total EBS-industry turnover
Research and development	13 %
Software and Services	37 %
Manufacturing and Production	50 %

Tab. 7: EBS Industry value creation, source: BMVIT (2016), p. 7.

3.1.2 Electronics industry worldwide

The global electronics market in 2016 had a volume of 3.990 billion Euros when the production is viewed or even 5.844 billion Euros if also the trade with electronic products is included. Since the gross domestic product (GDP) of the world in 2016 was 76.146 Billion USD (68.531 billion Euros) it means that about 5.8% (or 8.5% if electronic trade is also included) of the total value was created in the electronics industry. The workforce in the electronics industry is estimated to be 27 million employees strong. Tab. 8 shows the distribution of the production capacity and market size. It is noteworthy that China produces over half of all electronic products in the world and biggest European economy, Germany, only produces and consumes about 3%.[57]

Biggest Producers	**Total (Billion €)**	**Share (%)**	**Largest Markets**	**Total (Billion €)**	**Share (%)**
China	2.031	51%	China	1.552	39%
USA	365	9%	USA	575	14%
Japan	292	7%	Japan	286	7%
South Korea	238	6%	South Korea	177	4%
Germany	136	3%	Germany	120	3%
Taiwan	102	2%	Great Britain	77	2%
Malaysia	54	1%	France	70	2%

Tab. 8: Electronic producers and markets, source: Gontermann/Polzin (2018), p. 1. (modified)

[56] Cf. BMVIT (2016), p. 7.

[57] Cf. Gontermann/Polzin (2018), p. 1.

Applying the definition of niche markets from chapter 2.7 it could be argued, that the electronics industry in Europe is a niche market as is has less than 10% market share (see also chapter 1.1.1).

3.2 Trends in the electronics industry

The semiconductors industry is the key driver for the electronics industry. It has been growing since 2000 with ups and downs as can be seen Fig. 12 with an average growth rate of 4,5% per year. In 2017 the growth rate was 9.9% and in 2018 7.8 %. This upward trend with short down periods is likely to continue as semiconductors and electronic circuits form the bases for many other technology advancements.[59]

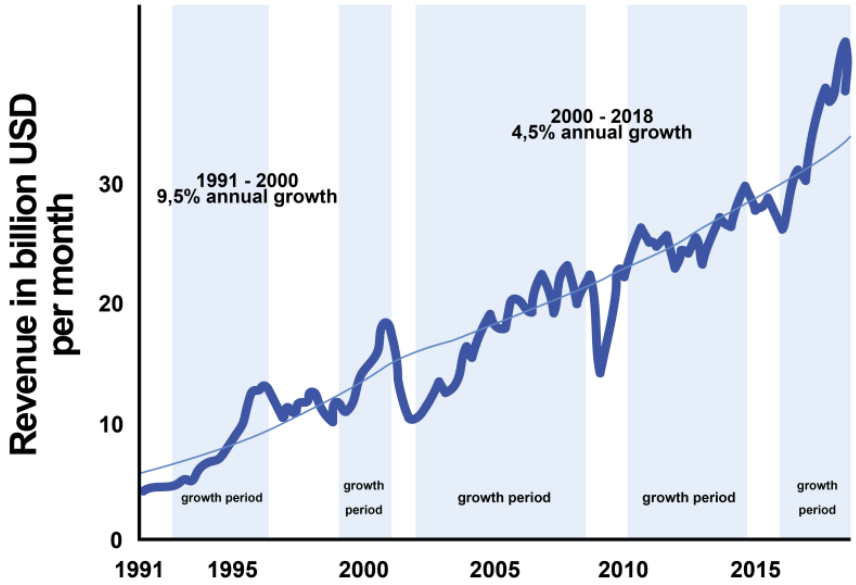

Fig. 12: Semiconductors worldwide turnover on a monthly base, source: Schäfer (2019), p. 6. (modified)

3.2.1 Digitalisation in the electronics industry

The digital transformation is an ongoing change that is currently happening in the electronics industry. The typical value chains transform into value networks which is changing the very basic form of industrial sectors. Each existing process may be enhanced by data or managed from data and automated. According to Ziesemer it is not clear what players at what locations will unlock the potentials of value added that come with digitization. Also, when it comes to new business models, the potentials in gaining the added value often remain unused. Fig. 13 shows on how the physical production will be enhanced and how the virtual production is a key factor. Aside from the physical production there is also a production of virtual goods. Both production methods will experience change on process level and on production level leading to a matrix of possible business model variants for each field of application.[61]

[59] Cf. Schaefer (2019), p. 6.

[61] Cf. Ziesemer et al. (2016), pp. 3-5.

Smart Markets / Digital Business Models				
Networked Suppliers Production Level		Physical Production	Virtual Production	Networked Customers
	Process level	**Smart Integration Networked Production** (Factory/Plant, Power Supply Systems, Infrastructure Machines and Technical Facilities, Cyber- physical Systems)	**Smart Operations Virtual Processes and Controlling** (Software and Data Management)	
	Production level	**Smart Products Networked Products on Producer-Customer Level** (Components and Devices)	**Smart Services Data-based and Networked Services** (Apps and Analyses)	

Fig. 13: Dimension of digitalization, source: Frietsch et al. (2016), p.12. (modified)

3.2.2 Shift to Asia

shows the distribution of wafer-fab for semiconductor production according to region. It can be seen that currently about 80 % of the worldwide semiconductor production is done in Asia, with China gaining on market share. This means that although the market is growing in size, Europe and America will lose further market share in production capacity. [62]

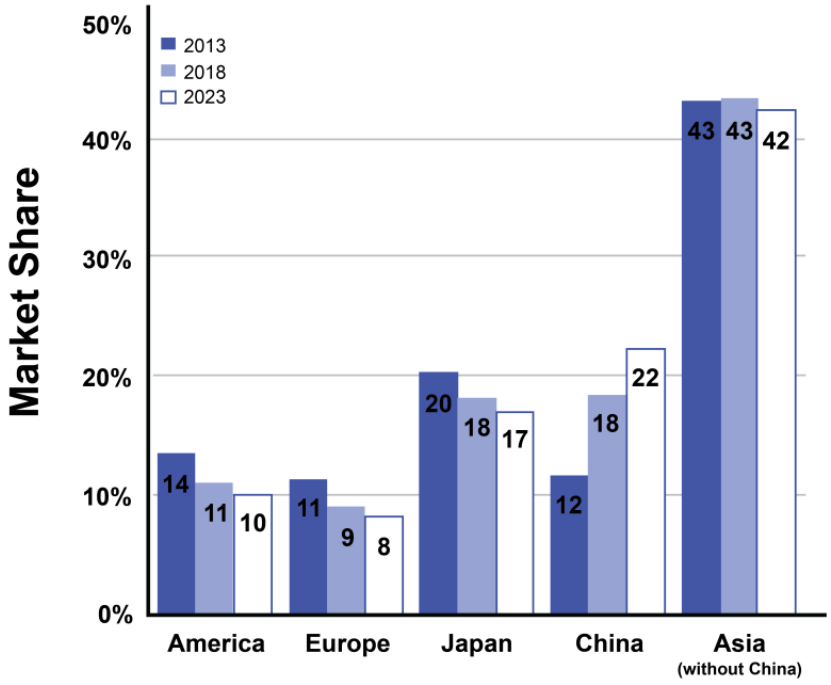

Fig. 14: Regional distribution of wafer-fab for semiconductor production, source: Schäfer (2019), p. 31. (modified)

[62] Cf. Schaefer (2019), p. 31.

3.2.3 Increased innovation speed

The speed of technology innovation has increased in the last years and new technology is adapted much faster. Fig. 15 shows the technology adoption over time and it can be seen that the cycles are getting shorter. In an Accenture survey in, almost a third (29 percent) of high tech C-suite executives believe their organization will cease to exist in 3 years if it fails to transform and become adept at innovating with intelligent technologies. Key technologies with biggest growth opportunities in 2019 are Web 2.0 (cloud and mobile), Big data analytics and internet of things (IoT) devices. Technologies like artificial intelligence and quantum computing are expected to be the drivers for the next decade.[63]

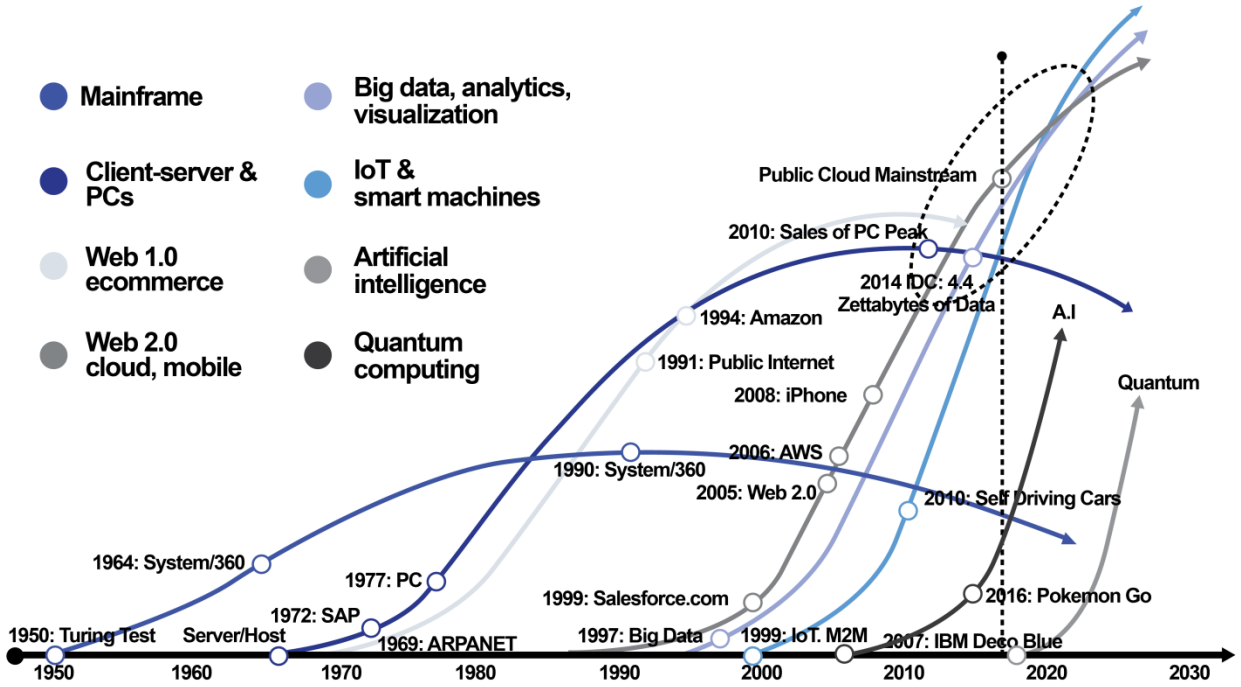

Fig. 15: Development in digital technology, source: Viniak (2018), online source [10.06.2019]. (modified)

3.3 Findings for the thesis

One very important finding for the thesis is the understanding of the importance of the electronics industry as enabler for other industries (see chapter 3.1). While the influence of the electronics industry is already very large, the ongoing digitization in this sector will have an even greater influence on other industries that are not that far with digitization yet.

Another important finding is that the electronics industry in Austria and Europe are rather small (see chapter 3.1.1 and chapter 3.1.2). It can be seen that the market shift in the electronic industry towards Asia, especially China is expected to continue in the coming years (see chapter 1.1.1). How this shift impacts the electronics industry in Europe remains to be seen, however as explored in chapter 3.2.3. innovation and new technologies are expected to determine the shape of the industry in the next decade.

[63] Cf. Viniak (2018), online source [10.06.2019].

4 BUSINESS MODEL

Nielsen states that business models (BM) have been intimately connected with e-business since the rise of the Internet during the late 1990's. He gives as example that Kodama (1999) and Hedman & Kalling 2003 provide early reviews of the business model concept as seen around the dot.com era and that the rise of the e-business model, while a more recent account of events and developments can be found in Fielt's 2014 review.[64]

Wirtz describes a business model as a simplified and aggregated representation of the relevant activities of a company. He notes that it describes how marketable information, products and/or services are generated by means of a company's value-added component. Furthermore he claims that in addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage. Wirtz also thinks that to fulfil this latter purpose, a current business model should always be critically regarded from a dynamic perspective, thus within the consciousness that there may be the need for business model evolution or business model innovation, due to internal or external changes over time.[65]

4.1 Purpose and importance of business models

According to Osterwalder the starting point for any good discussion, meeting, or workshop on business model innovation should be a shared understanding of what a business model actually is. He goes on to describe the need for a business model concept that everybody understands: one that facilitates description and discussion. It is needed to start from the same point and talk about the same thing. The described challenge is that the concept must be simple, relevant, and intuitively understandable, while not oversimplifying the complexities of how enterprises function.[66] Osterwalder describes the addressee's of a business model with the following statement:

The motivation behind the business plan may be to "sell" a project, either to potential investors or internal organizational stakeholders. A business plan may also serve as an implementation guide.[67]

Teece thinks that designing a new business model requires creativity, insight, and a good deal of customer, competitor and supplier information and intelligence. He estimates that there may be a significant tacit component. While an entrepreneur may be able to intuit a new model but he might not be not be able to rationalize and articulate it fully which leads to experimentation and learning likely to be required. Teece also notes that the evolving reality impacting customers, society, and the cost structure of the business must be understood. He argues that it is often the case that the right business model may

[64] Cf. Nielsen (2014), p. 21.

[65] Cf. Wirtz (2016), p. 41.

[66] Cf. Osterwalder (2010), p.15.

[67] Osterwalder (2010) p. 268.

not be apparent up front, and learning and adjustments will be necessary with new business models representing provisional solutions. Teece also agrees with Shirky that a business model is provisional in the sense that it is likely over time to be replaced by an improved model that takes advantage of further technological or organizational innovations. It is assumed that the right business model is rarely apparent early on in emerging industries. It is believed that entrepreneurs/managers who are well positioned, who have a good but not perfect business model template but who can learn and adjust, are those more likely to succeed.[68]

Regarding the topic of business model innovation Gassmann quotes that it is often said that existing business models 'don't work anymore'. However Gassmann notes that, the typical answers provided by R&D engineers are new products based on new technologies and more functionality. He states that, the underlying business logic is rarely addressed despite the fact that business model innovators have been found to be more profitable by an average of 6 % compared to pure product or process innovators (BCG 2008).[69]

Teece claims that neither business strategies, business structures nor business models can be properly calibrated absent assessment of the business environment; and of course the business environment it-self is, in part, a choice variable; i.e. firms can both select a business environment, and be selected by it: and they can also shape their environment.[70]

4.2 Key elements of a business model

Many different researchers and authors have developed their own business model over time. There are some communalities between the proposed business models which have been analysed by Wirtz. These are called the general building blocks all the analysed business model theories are comprised which are shown in Fig. 16. This figure gives an overview of the available business model concepts and what key elements are considered in the business model.[71]

[68] Cf. Teece (2010), p. 187.

[69] Cf. Gassmann (2017), p. 2.

[70] Cf. Teece (2010), p. 191.

[71] Cf. Wirtz (2016), pp. 36-54.

Component / Author	Strategy	Resources	Network	Customers	Market offering (value proposition)	Revenues	Service provision	Procurement	Finances	Spectrum of the Components
Hamel (2000)	Core Strategy, strategic Resources		Value Network	Customer Interface						**Low**
Mahadevan (2000)			Logistic stream		Value Stream	Revenue Stream				**Low**
Wirtz (2000)	Combination of production factors for strategy implementation	Core competencies & core assets		Market & Customer Segmentation	Service offer & Value proposition	Systematization of revenue forms	Combination & transformation of goods & services	Production Factors & Suppliers	Financing & Refinancing	**High**
Hedman/ Killing (2002)	Managerial and organizational, longitudinal process component	Resources		Customers	Competitors, Offering		Activities & Organization	Factor & Production input Suppliers		**High**
Bouwman (2003)		Technical architecture		Customer Value of service					Financial arrangements	**Low**
Afuah (2004)	Positions	Resources			Industry factors		Activities		Costs	**Moderate**
Mahadevan (2004)				Target Customers	Value Proposition	Revenue Model	Value Delivery			**Low**
Voelpel/Lelbold Takie (2004)		Leadership capabilities	Value Network (re) configuration for the Value Creation		Customer Value Proposition					**Low**
Yip (2004)	Scope Differentiation	Organization		Nature of Customers, channels	Value proposition nature of outputs		How to transform inputs (including technology)	Nature of inputs		**High**
Lehmann Ortega/8choitil (2005)					Value proposition, value architecture	Revenue Model				**Low**
Osterwalder Pigneur Tucci (2005)		Core Competency	Partner Network	Target Customer, distribution channel, Relationship	Value proposition	Revenue Model	Value Configuration		Cost Structure	**High**
Tikkanen et al (2005)	Strategy & Structure		Network				Operations		Finance & accounting	**Moderate**
Al- Debel /El-Haddadeh /Avison (2008a)			Value Network		Value Proposition Value Architecture				Value Finance	**Low**
Demil/Lecocq (2010)		Resources & Competences, Organization			Value Proposition	Volume & Structure of Revenue streams			Volume & Structure of Revenue costs	**Moderate**
Johnson (2010)		Key Resources			Customer Value Proposition	Profit Formula	Key Activities			**Moderate**
Osterwalder Pigneur (2010)		Key Resources	Key Partners	Customer Relationships, Channels, Customers segments	Value Proposition	Revenue Streams	Key Activities		Cost Structure	**High**
Intensity of use	**Moderate**	**High**	**Moderate**	**Moderate**	**High**	**Moderate**	**Moderate**	**Low**	**Moderate**	

Fig. 16: Overview of business model elements, Wirtz (2016), pp. 36-54.

The business models with the largest spectrum of components are considered for a review in detail as addressing many elements is favourable. The business models authors that fit the criteria are listed in Tab. 9. It is also checked whether there is a later version of the originally published business model available. Wirtz et al. stated in the paper Business Models: Origin, Development and Future Research Perspectives that the modern business model phase start 2003 with the differentiation phase.[72] Fritscher and Pigneur think that in the period from 2008-2012 the business model as we know it today was formed.[73] In his book on digital business models published in 2019 Wirtz also draws the line for the latest business model management approach to 2008 and describing older models as rudimentary, fragmented and with heterogeneous understanding of the concept.[74] For this reasons business models created from authors before 2008 are excluded from review in detail.

Business model author(s) and date	Latest version/adaptation published	Reviewed in detail
Wirtz (2000)	Wirtz (2016)	Yes, 2016 version
Hedman/Kalling (2000)	Hedman/Kalling (2003)	No, too old
Yip (2004)	No later version available	No, too old
Osterwalder/Pigneur/Tucci (2005)	Osterwalder/Pigneur (2010)	Yes, 2010 version

Tab. 9: Business model selection table, source: own illustration

4.2.1 Osterwalders business model

The Business Model Canvas is a tool that can be used to visualize a business idea for a start-up and develop and test business models. It was first described by Alexander Osterwalder in his book “Business Model Generation” and describes how a business works with 9 building blocks and on one page.The business model canvas is shown in Fig. 17. [76]

[72] Cf. Wirtz et al. (2016), p. 38.

[73] Cf. Fritscher/Pigneur (2015), p. 88.

[74] Cf. Wirtz (2016), pp. 23-25.

[76] Cf. Osterwalder (2010), p. 44.

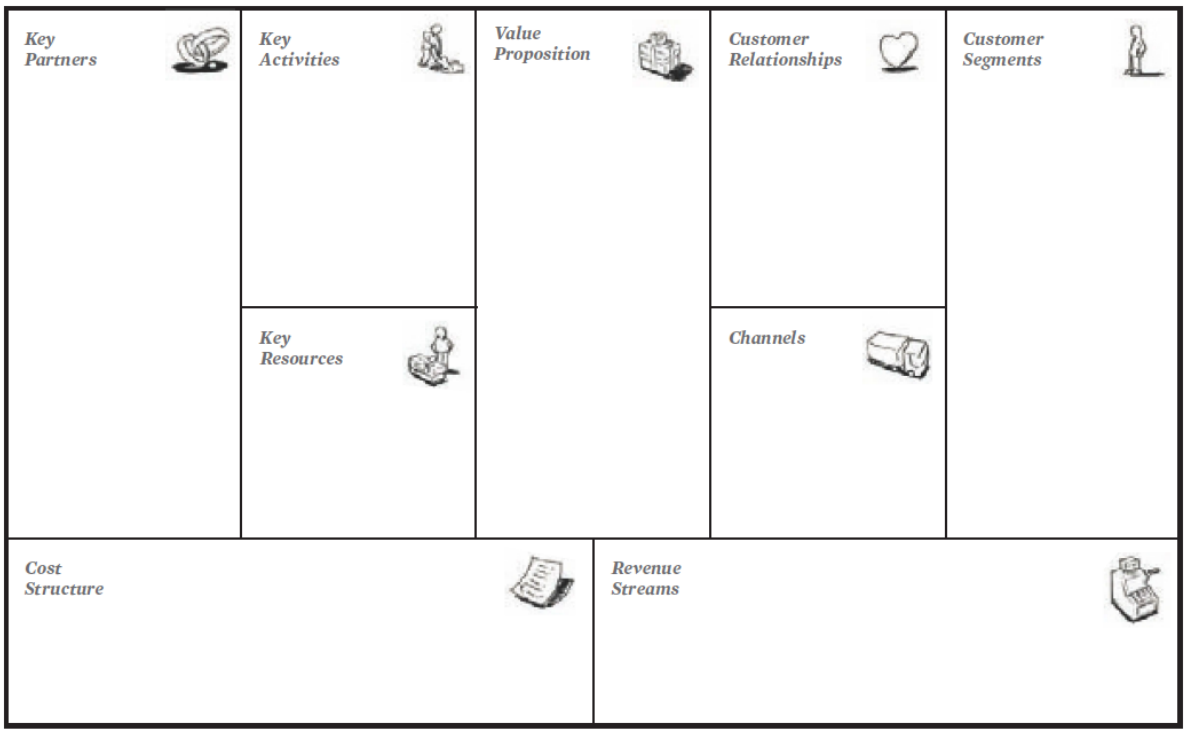

Fig. 17: The Business Model Canvas, source: Osterwalder (2010), p. 44.

Elements of the business model canvas: Osterwalder describes the essential 9 building blocks for the business model canvas the following way: [77]

Element	Description
Customer segments	An organization serves one or several customer segments
Value propositions	It seeks to solve customer problems and satisfy customer need with value propositions
Channels	Value propositions are delivered to customers through communication, distribution and sales channels.
Customer relationships	Customer relationships are established and maintained with each customer segment.
Revenue streams	Revenue Streams result from value propositions successfully offered to customers
Key resources	Key resources are the assets required to offer and deliver the previously described elements…
Key activities	… by performing a number of key activities.
Key partnerships	Some activities are outsources and some resources are acquired outside the enterprise.
Cost structure	The business model elements result in the cost structure

Tab. 10: The 9 Building blocks, source: Osterwalder (2010), pp.17-18.

[77] Osterwalder (2010), pp.17-18.

Customer segments

This building block defines the different groups of people or organizations an enterprise aims to reach. Customers are seen as the heart of any business model. It is stated that without (profitable) customers, no company can survive for long. To better satisfy customers, a company may group them into distinct segments. These segments may combine customers with common needs, common behaviours, or other attributes with the aim that a business model may address one or several large or small customer segments. It is noted that an organization must make a conscious decision about which segments to serve and which segments to ignore and once this decision is made, a business model can be carefully designed around a strong understanding of specific customer needs.[78]

Value proposition

This building block describes the bundle of products and services that create value for a specific customer segment. The value proposition is described as the main reason why customers turn to one company over another as it solves a customer problem or satisfies a customer need. It is stated that each value proposition consists of a selected bundle of products and/or services that caters to the requirements of a specific customer segment. The value proposition can be viewed as an aggregation, or bundle, of benefits that a company offers customers. It is stated that while some value propositions may be innovative and represent a new or disruptive offer, others may be similar to existing market offers, but with added features and attributes.[79]

Channels

This building block describes how a company communicates with and reaches its customer segments. The goal is to deliver the value proposition. Communication, distribution, and sales channels are seen as the company's interface with customers. Channels are viewed as customer touch points that play an important role in the customer experience. Channels serve several functions, including:[80]

- Raising awareness among customers about a company’s products and services
- Helping customers evaluate a company’s value proposition
- Allowing customers to purchase specific products and services
- Delivering a value proposition to customers
- Providing post-purchase customer support

[78] Cf. Osterwalder, 2010), pp. 20-21.

[79] Cf. Osterwalder (2010), pp. 22-23.

[80] Cf. Osterwalder (2010), p. 26.

Customer relationships

This building block describes the relationships a company establishes with specific customer segments. It is stated that a company should clarify the type of relationship it wants to establish with each customer segment. These relationships can range from personal to automated. It is described that customer relationships may be driven by the following motivations:

- Customer acquisition
- Customer retention
- Boosting sales (upselling)

As an example, the customer relationships of mobile network operators in the early days were driven by aggressive acquisition strategies involving free mobile phones. This strategy changed when the market became saturated with operators switching to focusing on customer retention and increasing average revenue per customer. The customer relationships required by company's business model is said to have deep influence the overall customer experience.[81]

Revenue stream

This building block describes the revenue a company generates. It is argued that if customers comprise the heart of a business model, revenue streams are its arteries. The central question the company must address in this block is for what value is each customer segment truly willing to pay. It is described that by successfully answering that question will allow the firm to generate one or more revenue streams from each customer segment. It is explored that each revenue stream may have different pricing mechanisms, such as fixed list prices, bargaining, auctioning, market dependent, volume dependent, or yield management.[82]

Key resources

This building block describes the most important assets required to make a business model work. It is believed that every business model requires key resources which allow an enterprise to create and offer a value proposition, reach markets, maintain relationships with customer segments, and earn revenues. It is stated that different key resources are needed depending on the type of business model. Key resources can be physical, financial, intellectual or human and can be owned or leased by the company or acquired from key partners.[83]

[81] Cf. Osterwalder (2010), pp. 28-29

[82] Cf. Osterwalder (2010), pp. 30-31.

[83] Cf. Osterwalder (2010), pp. 34-35.

Key activities

This building block addresses the most important things a company must do to make its business model work. It is stated that every business model calls for a number of key activities. These activities are important actions a company must take to operate successfully. It must acknowledge that key activities differ depending on business model type. For example for software maker Microsoft, key activities include software development while for PC manufacturer Dell, key activities include supply chain management and for consultancy McKinsey, key activities include problem solving.[84]

Key partnerships

This building block describes the network of suppliers and partners that make the business model work. It is stated that companies forge partnerships for many reasons, and partnerships are becoming a cornerstone of many business models. Reason for companies to create alliances may include the optimization of their business models, to reduce risk, or to acquire resources. Four different types of partnerships can be distinguished:[85]

- Strategic alliances between non-competitors
- Coopetition: strategic partnerships between competitors
- Joint ventures to develop new businesses
- Buyer-supplier relationships to assure reliable supplies

Cost structure

This building block describes all costs required to operate a business model. It is stated that creating and delivering value, maintaining customer relationships, and generating revenue all incur costs. The costs can be calculated after defining key resources, key activities, and key partnerships. For some business models costs are more important than other factors with example given of so-called “no frills” airlines which have built business models entirely around low cost structures.[86]

[84] Cf. Osterwalder (2010), pp. 36-37.

[85] Cf. Osterwalder (2010), pp. 38-39.

[86] Cf. Osterwalder (2010), pp. 40-41.

4.2.2 Business model according to Wirtz

Wirtz states that the performance and business-specific orientation of business models not only takes place on the overall model level of the business model, but also concerns the configuration of the partial models of an integrated business model. This leads to the conclusion that each integrated business model consists of several partial models.[87]

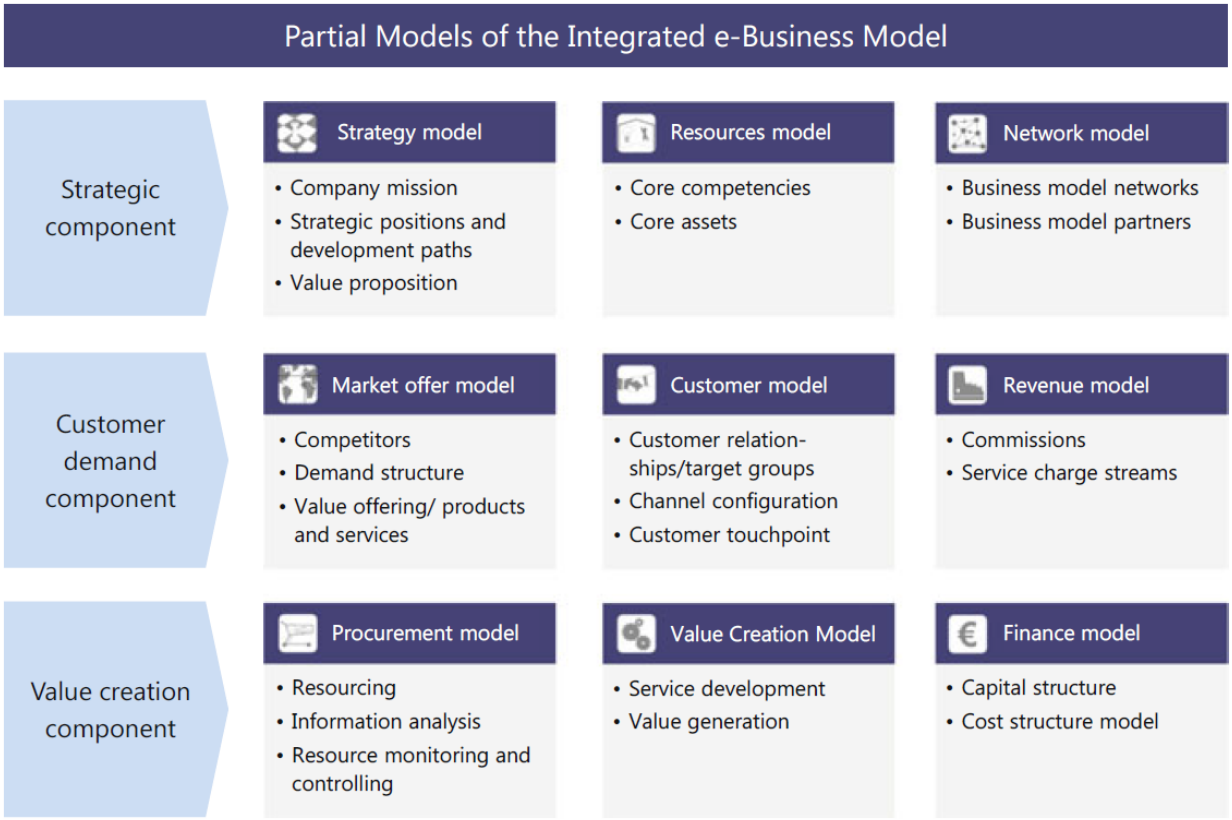

Fig. 18: Partial Models of Integrated e-Business, source: Wirtz (2019), p. 34.

The latest business model of Wirtz as shown in Fig. 18 is especially adapted for e-business takes the approach of partial models that can be optimized individually to describe the overall integrated model. The partial model is divided in to three big categories, the strategic component, the customer demand component and the value creation component. There are nine partial models listed by Wirtz which are similar to the nine building blocks of the business model from Osterwalder described in chapter 4.2.1. The main difference is the strategy model by Wirtz compared to the building block key activities by Osterwalder. Wirtz explicitly describes a formal strategy based on company mission, strategic positioning and development path which includes an outlook into the future while the key activities of Osterwalder's business model only describe the present state (or present strategy) of the company.

[87] Cf. Wirtz (2019), p. 34.

4.3 Business model popularity

While Osterwalder's business model canvas is the defacto standard and reached more than 5 Mio. users, there are also other canvases that may be better suited for special applications.[88] Some selected canvases are listed in Tab. 11 – Popularity counts the number of Google search results (with " ").

Canvas name	Creator	Short description/ Usage	Popularity
Business model Canvas	Alexander Osterwalder	The business model canvas creates value for your business.[89]	2.940.00
Lean Canvas	Ash Maurya	The lean canvas uses product-centric terms so innovators can more easily describe their business model using familiar language.[90]	316.000
Value Proposition Canvas	Alexander Osterwalder	The Value Proposition Canvas helps you to create value for your customer.	273.000
Platform Business Model Canvas	Matthias Walter	Canvas for scalable platform business.	7.840
Destroy Your Business Canvas	Go Weekly	The Destroy Your Business Canvas shows how to destroy your own business model before someone else does it for you. [91]	604

Tab. 11: Canvas Overview, source: own source (Google search accessed on 31.05.2019)

4.4 Business model environment

To get a better grasp on your business model "design space," Osterwalder suggests roughly mapping four main areas of the environment. These areas are the market forces, industry forces, key trends, and macroeconomic forces which are shown in Tab. 12. If deepening of the analysis of the landscape beyond the simple mapping is required, Osterwalder notes that each of these four areas is backed by a large body of literature and specific analytical tools.[92]

Market forces	**Industry forces**	**Key Trends**	**Macroeconomic forces**
Market Segments	Competitors	Technology trends	Global market conditions
Market issues	New Entrants	Regulators trends	Capital markets
Needs and demands	Substitute Products and Services	Societal and Cultural Trends	Commodities and other resources

[88] Cf. no author, Strategyzer.com (2019), online source [31.05.2019].

[89] Cf. Osterwalder Alexander (2014), p. XV.

[90] Cf. no author, Leanstack.com (2012), online source [31.05.2019].

[91] Cf. no author, Destroyyourbusiness.goweekly.co (2015), online source [31.05.2019].

[92] Cf. Osterwalder (2010), p. 200.

Switching costs	Suppliers and other Value Chain Actors	Socioeconomic trends	Economic Infrastructure
Revenue Attractiveness	Stakeholders		

Tab. 12: Business Model Environment, source: Osterwalder (2010), p. 200.

4.4.1 Trends

One way to categorize trends in literature analysis was given by Steininger et.al.: Five idealized course patterns are illustrating the different developmental patterns of topics (trends, negative trends, fads, recurring fads, and oscillating topics). The analysis is based on the assumption that the frequency of mentioning a term in scientific publications allows for inferring its importance in scientific research at a certain time. If, for example, the term outsourcing is mentioned many times within one year, it is assumed that the issue of outsourcing is of high importance in research. When plotting the frequency of this term over time it is possible to assign a developmental pattern.[93] According to Feigenbaum's view from a technical perspective, trends involve looking at the statistical analysis of historical data over a selected time frame and charting the progression. If there are consistent increases, decreases or even constancy or flatness in the data, a trend may be derived. Businesses of all sizes use trends to predict the future or help shape strategic decisions.[94]

4.4.2 Megatrends

Megatrends transform and shape societies over a long term period and may force entire industries to reorganize their structures and business models. Aligning the business model with megatrends is an indispensable tool for management and strategic planning. The following megatrends have been identified by the Zukunftsinstitut:[95]

- Knowledge Culture
- Urbanization
- Connectivity
- Personalization
- Neo-Ecology
- Globalization
- Gender shift
- Health
- New Work
- Mobility
- Silver Society
- Security

[93] Cf. Steininger et al. (2009), p. 411.

[94] Cf. Feigenbaum (n.d.), online source [12.06.2019].

[95] Cf. Gatterer (2018), online source [10.06.2019].

4.4.3 Finding industry trends

The trends for the e-commerce industry and the electronics industry are described in chapter 2.9 and chapter 0. Checking if something is a trend can also be done by using Google Trends which displays the interest for a given search term over time for a specific location. It's also possible to compare different keywords to each other to make comparisons. In the case of the keyword "E-commerce" reviewed for the last 5 years it can be seen that the interest in the search term was only 57 % in June 2014 of the peak in July 2018 which served as a reference (100%). To get from 57 to 100 is an increase of 75% in a time span of 4 about years which is an increase of about 15% per year. The growth rate in sales revenue for the same time period according to Statista was about 20% per year. Sales rose from 1336 billion USD in 2014 to 2842 billion USD in 2018 which is a 112% total increase.[96]

4.5 Business model test and adaptation

This chapter explores different ways business models can be tested and adapted. Tools, which can be used for better understanding or improving the business model, are described.

4.5.1 Robustness of business models / risk

The research from Casadesus-Masanell shows that when enterprises compete using business models that differ from one another, the outcomes are difficult to predict. One business model may appear superior to others when analysed in isolation but create less value than the others when interactions with the market are considered. Rivals may end up becoming partners in value creation. Reviewing models in a stand-alone fashion leads to faulty assessments of their strengths and weaknesses and bad decision making. Casadesus-Masanell outlines this as a big reason why so many new business models fail.[97]

4.5.2 Difficulties with business models and lean start-up process as a solution

The question, what type of business model should be pursued is most relevant for before the start-up phase of a new company or if a new opportunity is identified within an existing company. This decision is one of most important and at the same time most difficult decision to make as the following statements show:

Korobov states that the choice of business model is one of the key factors that determine the future success of every start-up. He thinks that if the model is not profitable, scalable and sustainable, the business is bound to fail.[98]

Altman says that with so many choices, deciding on the best business model for your business comes down to what's best for your customer.[99]

[96] Cf. Statista (n.d.), online source [02.06.2019].

[97] Cf. Casadesus-Masanell (2011), n.p.

[98] Cf. Korobov (2018), online source [31.05.2019].

[99] Cf. Altman (2017), online source [31.05.2019].

Blank has the opinion that for many entrepreneurs “raising money” has replaced “building a sustainable business” as their goal. He thinks that’s a big mistake and when you take money from investors their business model becomes yours.[100]

Teece has the position that the right business model is rarely apparent early on with Entrepreneurs/ managers who are well positioned and can learn and adjust are more likely to succeed.[101]

One way to minimize the impact of selecting the wrong or inefficient business model in the beginning is the lean startup process from Eric Ries which is pictured in Fig. 19. This process is originally designed for developing software and is focused on learning as quickly as possible. At the core of this method is a build-measure-learn loop with feedback, also called the continuous innovation loop. The described methods and techniques for the measure phase and learn phase can also be applied for developing and E-commerce business model. The described techniques for the build phase are partly very specific for software development and would need to be adapted depending on which E-commerce business model is actually developed. If the E-commerce business model uses existing E-commerce software only techniques like usability tests, incremental deployment and cloud computing may be suitable.[102]

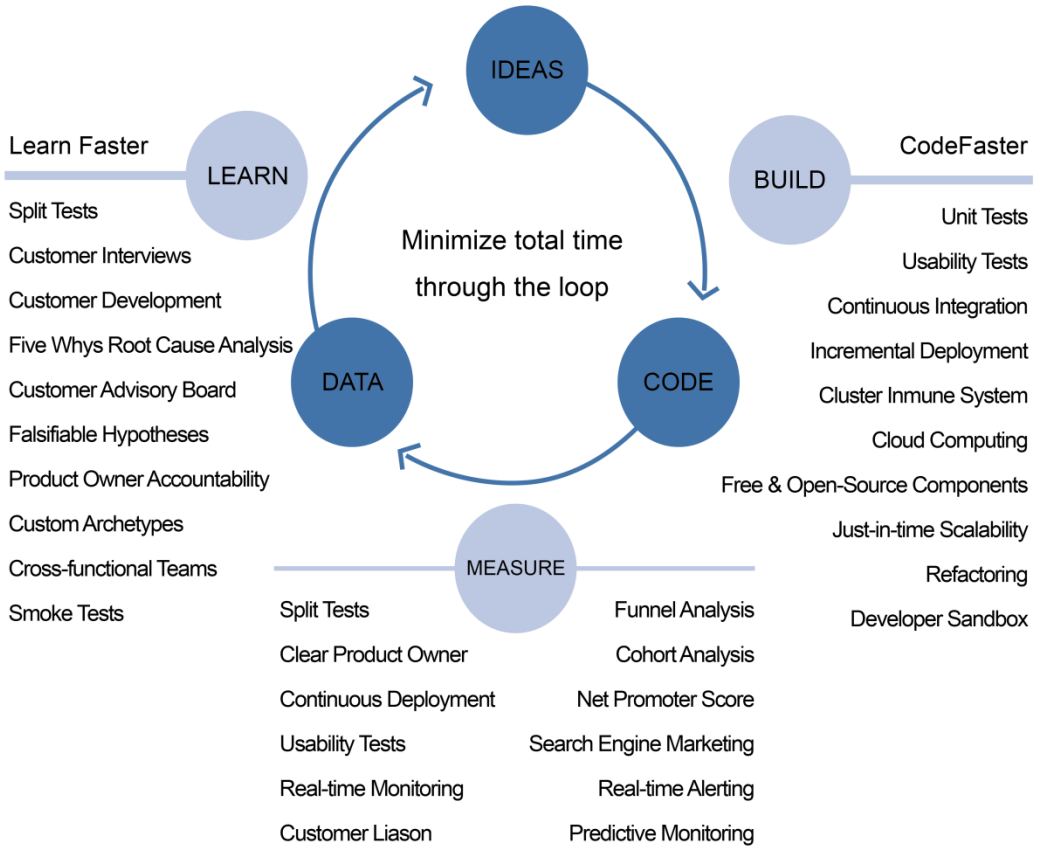

Fig. 19: Continuous Innovation Loop, source: Eric Ries (n.d.), online source [31.05.2019]. (modified)

[100] Cf. Blank (2017), online source [31.05.2019].

[101] Cf. Teece (2010), p. 187.

[102] Cf. Ries (2011), pp. 8-9.

4.5.3 Test the business model with system dynamic modelling

A way to compare different business models to each other is to use the Dynamic Business Model Canvas (DBMC) which combines the Business Model Canvas (BMC) with system dynamics (SD) modelling. According to Cosenz, the DBMC analysis provides an insightful method to assess business venture management dynamics and deep understanding of systematic interdependencies. Each element of the business model canvas gets modelling parameters assigned and influencing factors on other elements are defined. Fig. 20 shows the general structure of how such a model could look like. Without going into too much detail of how the model works, it shows the dependencies between the elements (lines with arrows) and also shows loops (like the loop: Profit → Company value and reputation → Key partner 2→Change in St_2 → Total cost). Changing a specific model parameter lets you see the effects on the other elements.[103]

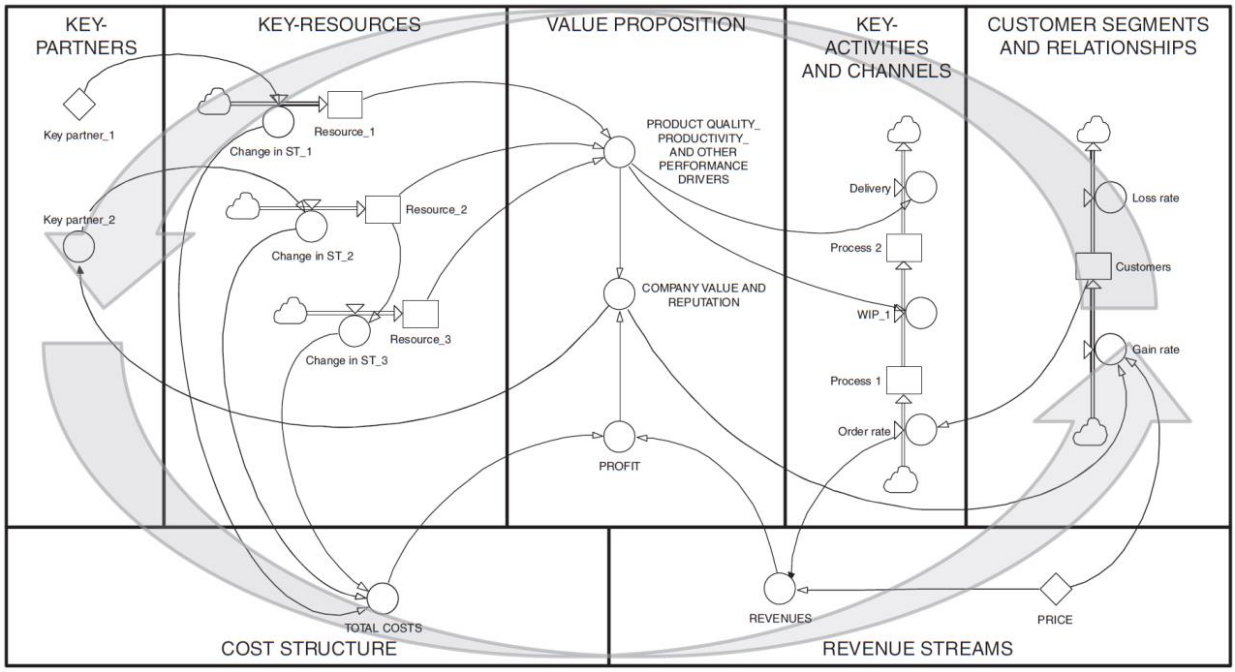

Fig. 20: DBMC Structure, source: Cosenz (2016), p. 58.

[103] Cf. Cosenz (2016), p. 58.

4.6 A critical view on business model innovation

The theories for business model innovation (BMI) are highly fragmented, and empirical studies are very limited. Moreover, these empirical studies are mostly based on case studies. The most commonly cited cases are large technology-oriented firms, which are well known for both their innovation and revenue models. Studies also do not consider the dynamics of the BMI process, such as how firms' performances are affected by structural change during the BMI process. BMI differs from product and service innovations in that engagement from top management is essential.[104]

The 55 patterns identified by Gassmann et al. (2014) cover a broad range of business issues. The authors use a "who-what-how-why" framework to describe these patterns. Although their approach is not based on sustainability considerations, some patterns are also presented as potential solutions to ecological and social problems (e.g., "no frills"). However, this classification lacks a meta-structure that brings order to the 55 patterns. Remane et al. (2017) published an extensive systematic database of 182 patterns by using the Business Model Canvas dimensions to describe specific pattern characteristics.[105]

[104] Hossain (2017), p. 352.

[105] Lüdeke-Freund et al. (2018), p. 9.

5 BUSINESS MODEL INNOVATION PROCESS

For the development of new business models it is advantageous to follow a detailed business model innovation process step by step. The process for creating the business model varies in the literature. To get a better understanding what and how many phases process models typically include, the process models are reviewed and evaluated.

5.1 Business model innovation process overview

As outlined by Wirtz and Daiser, developing a process of BMI has been an important element of BMI research. In total, Wirtz and Daiser could identify 20 distinctive approaches that differ in content, procedure, and scope, showing that there are various ways how people have handled BMI so far.[106]

Authors	Initial phase → →	Intermediate phases	→ →	Final phase
Osterwalder et al, (2010)	Assembling all elements for new business model design	Research and analyse elements for business model design effort	Generate and test business model options and select the best	Implement the business model prototype	Adapt and modify the business modes in response to market reaction
Sosna et al. (2010)	Initial business model design and testing	Business model development	Scaling up the refined business model	Sustaining growth through organization-wide learning
Teece (2010)	Segmenting the market	Create a value proposition for each segment	Design and implement mechanism to capture value from each segment	Implement isolating mechanisms	Deconstruction and evaluation
Wirtz (2012)	Idea generation	Feasibility analysis	Prototyping	Decision-making	Change management	Implementation	Monitoring & Controlling
Amit/Zott (2012)	Analyse customer needs	Business model content innovation	Business model structure/ government innovation	Checking value creation through novel business	Defining Revenue models	Launching model
Pyonnen et al. (2012)	Analyse customer value preferences of current business model	Innovate the business model according to customer needs	Implement a customer survey to test the business models	Adjust and implement the business model according to customer value
Enkel/ Mezger (2013)	Abstraction	Analogy identification	Adaptation
Franken-berger et al. (2013)	Initiation (analysing the ecosystem)	Ideation (generating new ideas)	Integration (building a new business model)	Implementation (Realization)
Gassmann et al. (2014)	Initiation (analysing the ecosystem)	Ideation (adapting patterns)	Integration (shaping your business model)	Implementation (realizing your plan)
Yang et al. (2014)	Definition	Analysis	Innovation feedback	Evaluation	Optimization	Verification	Risk management	Execution

Fig. 21: Business model innovation process, source: Wirtz/Daiser (2018), p. 44. (modified)

The 10 most recent BMI processes are shown in Fig. 21. What is obvious is the big difference in number of phases with the simplest process having only three phases and the longest process having nine phases. Also the content of the phases is very different. For example Osterwalder et. al. (2010) process starts with a “Mobilization Phase”, that is similar to a project kick-off, Teece (2010) starts by segmenting

[106] Cf. Wirtz/Daiser (2018), p. 42.

the market, Wirtz (2011) starts by idea generation, Enkel/ Mezger (2013) starts by abstracting the problem.[108]

5.1.1 Business model design process according to Osterwalder and Pigneur

Osterwalder argues that business model innovation rarely happens by coincidence but neither is it the exclusive domain of the creative business genius. He thinks that it is something that can be managed, structured into processes, and used to leverage the creative potential of an entire organization. He warns that the challenge, though, is that business model innovation remains messy and unpredictable, despite attempts to implement a process. He believes that it requires the ability to deal with ambiguity and uncertainty until a good solution emerges.[109] Osterwalder proposes a 5 stage concept for developing new business models as shown in Tab. 13 which describe the general process for finding, developing and integration of new business model ideas into existing organizations.

Phase	Description
Mobilize	Assemble all the elements for successful business model design. Create awareness of the need for a new business model, describe the motivation behind the project, and establish a common language to describe, design and analyse and discuss business models.
Understand	You and the business model design team immerse yourselves in relevant knowledge: customers, technology, and environment. You collect information, interview experts, study potential customers, and identify needs and problems
Design	Transform the information and ideas from the previous phase into business model prototypes that can be explored and tested. After an intensive business model inquiry, select the most satisfactory business model design.
Implement	Implement the selected business model design.
Manage	Set up the management structures to continuously monitor, evaluate, and adapt or transform your business model.

Tab. 13: Business Model Design Process, source: Osterwalder (2010), p. 249.

5.1.2 Business pattern application according to Gassmann et al.

Gassmann, Frankenberger and Csik who are the authors of “The Business Model Navigator” state that 90 percent of business model innovation are a recombination of 55 business model patterns that are described in their book. The business model innovation map shows the evolution of the business models over time and also marks revolution in an industry with well-known companies as examples. In this business model innovation map it can be well seen, that business models were rather statistic up to the

[108] Cf. Wirtz/Daiser (2018), p. 44.

[109] Cf. Osterwalder (2010), p. 246.

mid-90s and then exploded with the starting adoption of the internet. The phases for their business model development are the following: Initiation, Ideation, Integration and Implementation. [112]

5.1.3 Business model design process and pattern application according to Remane et al.

In business model innovation endeavours, the simultaneous application of all 182 identified patterns would be rather overwhelming. Even lists from single authors such as Gassmann et al. (2014) with 55 patterns, Rappa (2001) with 50 patterns, or Linder and Cantrell (2000) with 34 patterns can lead to a quite complex and unfocused process. The business model pattern database from Remane et al. reduces this complexity significantly, as it helps to identify the relevant set of patterns for a specific purpose depending on the specific situation of the innovating firm. The business model patterns in the database are organized into dimensions with each dimension having two or more characteristics as shown in Fig. 22.[113]

	Dimension (D)	Characteristics per dimension (number of patterns per characteristic)					
Overarching	D1: Hierarchical impact	Prototypical pattern (87)			Solution pattern (95)		
	D2: Degree of digitization	Purely digital (55)		Digitally enabled (35)		Not necessarily digital (92)	
Value proposition	D3: Product type	Physical (12)	Financial (7)	Human (5)	Intellectual Property (36)	Hybrid (10)	Product type not specified (12)
	D4: Strategy for differentiation	Quality (9)	Customi-zation (8)	Combination (13)	Access/con-Venice (6)	Price (22)	Network Effects (11)	No impact No differentiation (113)
Value delivery	D5: Target customers	Specific new customer Segment (10)		Lock-in existing customers (9)	Other companies(B2B) (7)		No impact on target customers (156)
	D6: Value-delivery process	Brand and marketing (7)	Sales channel (20)	Sales model (9)	Customer relationship management (3)		No impact on delivery process (143)
	D7: Sourcing	Make (17)		Bay (11)	No impact on sourcing (154)		
Value creation	D8: Third parties involved	Suppliers (9)	Customers (12)	Competitors (3)	Multiple parties (18)		No impact on third parties involved (140)
	D9: Value creation process	Research and Design (7)	Supply (5)	Production (8)	Multiple steps (11)		No impact creation process (151)
Value capture	D10: Revenue model	Sell (15)	Send (20)	Intermediate (18)	Advertising (12)		No impact on revenue model (117)
	D11: Pricing strategy	Premium (11)	Cheap (9)	Dynamic (12)	Non-transparent (8)		No impact on pricing strategy (142)
	D12: Direct profit effect	Increase revenue (42)	Reduce cost (15)	Multiple effects (11)	No direct profit impact (114)		

Fig. 22: Structure patterns by impact on business model elements, source: Remane et al. (2016), p. 22.

[112] Cf. Gassmann (2017), p. 4.

[113] Remane et al. (2016), p. 22.

5.2 Implementing a new business model in an existing company

Juntunen states that the business model represents the business architecture, and environmental changes have major consequences to the business model of the company. He argues that the company is expected to react quickly to these upcoming challenges and opportunities caused by the environmental change, or else the companies will fail in the long run against their competitors.[114]

Exemplary Situations when it's time to change the business model and value proposition

1. Not enough traction generated from the customer you targeted
2. The value proposition doesn't resonate with customers
3. The acquisition & retention strategy doesn't generate the growth hoped for
4. Customers are not willing to pay the price
5. Can't build the product and/or your costs are too high
6. External forces are threatening your business model (laws, political forces, ..)

Amarsy notes that while iterations of the core idea are fairly easy, pivoting to a radically new business model and value proposition is a tougher challenge.[115] According to Sarson changes happening behind the scenes are equally important with organizations currently being reshaped to fit changing families, longer lifespans and how people plan their careers. He also explains that supply chains are being redrawn by changes in macro factors, such as oil prices, economics and geopolitics, and in micro factors, such as changing technology and local tax changes. Another issue found was that shortages of highly qualified staff are forcing companies to hire and locate senior staff wherever they can find them, and technology is being used to connect them as organizations become more virtual.[116] According to Osterwalder there are 3 ways on how to implement a new business model in an existing company based the categories shown in Tab. 14. The similarity of the nine building blocks, potential for synergies and the potential for conflict are the deciding factor on how to implement a new business model.

Similarity of the nine Building block	Potential for Synergies	Potential for conflict	Recommendation
High	High	Low	Integration of new business model into exiting business model
High	Average	Low	Autonomy needed - Create a new business unit and use synergies where possible
Low	Average	High	Separate new business model from existing business model by creating a spin-off company.

Tab. 14: Managing multiple business models, source: Osterwalder (2010), p. 232. (modified)

[114] Cf. Juntunen (2017), p. 191.

[115] Cf. Amarsy (2015), online source [31.05.2019].

[116] Cf. Sarson (2019), online source [31.05.2019].

5.3 Analysing business model innovation processes

The last chapters explored the possibilities of available business models and business model innovation processes. As for selecting the form in which the business model is visualized, the Business Model canvas from Osterwalder as described in chapter 4.2.1 seems best suited. The BM canvas with its 9 building blocks is the most widely used form to represent a business model (see chapter 4.3) with just the right amount of details and not adding too much unnecessary complexity. The BM canvas is used extensively in the start-up scene and by business consultants to convey business ideas.

For the business model innovation process, the decision which process to use for finding and creating the business model is more difficult. As described in chapter 5.1 there are more than 20 different processes suggested by researchers within the last and 10 years that approach the subject from very different angles.There doesn't seem to be a consensus among the researchers which way works best. The problem, as stated by Berend Alberts in his work on Comparing business modelling methods is the following:

Over the past few years, several authors have created different meta-business models, methods for business modelling. However, the authors rarely use existing literature for their conceptual design. Because of this, there are no clear semantics in the field of business model research. The elements used in meta-business models are not clearly defined, or differ wildly from one model to the next.[117]

Since the authors of these business model processes are not disproving each other, but merely pointing out their view of how business models can be developed in a new way, it is reasonable to assume that any of the proposed processes for developing a business model will work.

For developing new business models in E-commerce, the model of Davis J. Teece (2010) seems well suited, since it focuses on market segmentation, value creation in that segment and also on developing isolation mechanisms to avoid copycats from entering the market.[118] However Teece does not describe the importance analysing the environment which is done by Gassmann et. al. in the initialization stage (see chapter 5.1.2). Osterwalder et. al. provides a detailed description of how business models can be generated and implemented (see chapter 5.1.1), but the process is mainly tailored for large organizations and also very generic. For the Implementation phase the importance of fast learning and making adjustments is present in most of the analysed business model innovation processes, which can be done by incorporating the Lean Startup approach of Eric Ries (see chapter 4.5.2). Also mentioned by Teece, Osterwalder, Gassman and others is the systematic deconstruction of existing business models and evaluation of each element, for which the pattern database of Remane (see chapter5.1.3) seems as an ideal starting point. To get most suitable business model innovation process for developing a business model for E-commerce with niche products in the electronics sector these described elements should be combined into a new business model innovation process.

[117] Alberts (2011) p.1.

[118] Cf. Teece (2010), p. 188.

5.4 Creation of business model innovation process model for E-commerce with niche products in the electronics sector

Although the creation of a new process is not mandatory, it seems necessary to do so as the application of existing only partly suitable BMI processes will also yield only partial results. The basis for the new BMI process is the reviewed literature on business model innovation processes (see chapter 5.1) and especially the papers and books published by authors Osterwalder, Gassmann, Teece, Remane, Wirtz and Ries. The goal is to create a BMI process that incorporates the specific needs for E-commerce with niche products in the electronics sector.

The requirements for this new BMI process are the following:

The process should be simple to execute and not require massive amount of resources and working hours to generate results as this limits the size of the niche that can be explored economically. For larger niches a large effort may be acceptable, but business models for small niches may not even be considered worth investigating if the process costs are too high. Another reason that process should be simple and fast to execute is to make use of temporary occurring niches. Parts of the electronic sector are relatively fast paced with short product life cycles and increasing product functionality. While not every new product generation released to the market requires an adaption of the business model, it should be possible to execute the BMI process on a regular basis to incorporate industry trends and changing environments to adapt and improve the current business model if necessary. The process should also make use good of available data and suggest which data should be collected in the future to assist in business model adaptation.

Based on the requirements described above a new BMI process model was developed. The model is shown in Fig. 23. It is using the building blocks from literature described in detail in chapters 5.4.1 to 5.4.6. It consists of six stages with the last step starting the implementation phase and being executed multiple times (build-measure-learn loop of the lean cycle).

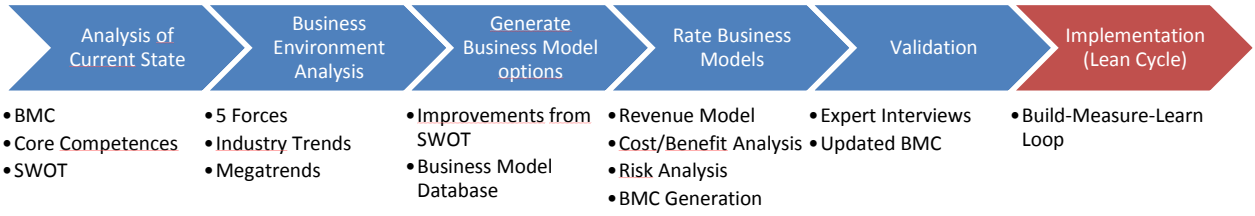

Fig. 23: Business model innovation process, source: own illustration

5.4.1 Analysis of current state

The first step in the process concerns the analysis of the current state of the company. It should show how business is conducted on a top level view and also in detail. The analysis should be starting point to better understand how the business works and cover every important aspect of the business. For this task the Business Model Canvas from Osterwalder and Pigneur as described in chapter 4.2.1 is best suited since it provides a graphical representation of the business model and also covers the major areas of importance in business. To get a good picture of the strength and weaknesses as well as the currently

perceived opportunities and threads a SWOT analysis is performed, which is recommended by Osterwalder and Pigneur. The focus of the SWOT analysis in the first step should be on the SW part. This should also include the analysis of the core competences.

5.4.2 Business environment analysis

In E-commerce the business environment plays a major role as it can change very fast (see chapter 2.9.3). For the analysis of the business environment, the Five Forces Analysis from Porter is chosen which helps to increase the robustness of the business model as outlined in chapter 4.5.1. The current competitors and bargaining power of suppliers and customers are factors that can be answered by looking at existing data either available in the company or through data that is available online. To determine the threat of new entry and thread of substitution deeper analysis of the market is required (see also chapter 5.3, protection from copycats). Whether the Five Forces analysis is conducted for a specific segment of the market or the company as a whole, is open to the user.

Industry trends and technology trends (see chapter 2.9.3) also play a major factor in changing the business environment. Megatrends should also be considered – particularly for business model adaptions with long term consequences. The current trends in the electronics industry (see chapter 0) and in E-commerce (see chapter 2.9) as well as the megatrends (see chapter 4.4.2) are described in the previous chapters. For finding temporary trends ore niche specific trends online tools such as Google Trends are an easy way to check the assumptions (see chapter 5.1.1). After the trends are identified these trends should be rated according to the estimated strength of impact on the individual business model elements. The SWOT analysis from the first stage should then be updated with the new data

5.4.3 Generate business model options

There are two ways in which business model options are generated, that are well suited for E-commerce with niche products in the electronics industry:

The first way is by using the SWOT analysis from the first stage to make improvements to the existing business model to better address the threats and capture the opportunities. This is also proposed by Osterwalder and Pigneur and is part of their process described in chapter 5.1.1.

The second way is to use the business model pattern database from Remane (see chapter 5.1.3) to sort out relevant patterns that are used in the industry and are within or close to the current core competences. The selected patterns are then formulated into possible business model options for the company

5.4.4 Rate business models

The business model options are then rated according to certain criteria that are defined by the company.

This can include the following, but may also include other elements:

- Business Model evaluation questions according to Osterwalder and Pigneur
- Rating the revenue model

- Making a cost/ benefit analysis
- Risk Perspective (see chapter 4.5.1)
- Portfolio considerations
- DBMC Analysis (see chapter 4.5.3)
- Effectuation (see chapter 6.5)

For the best options business model canvases are generated and reviewed in detail. The number of canvases generated at this point should only include the 3 and 5 most promising options to avoid unnecessary effort.

5.4.5 Validation of generated business models

To validate the previously generated business models and made assumptions about the market situation there are multiple options with each option having advantages and disadvantages.

- Expert interview with E-commerce traders, electronics industry professionals and entrepreneurs
    - Advantage: get multiple viewpoints, insights and also possible feedback for improvement
    - Disadvantage: experts may be biased or not fully understand the whole concept
- Customer survey:
    - Advantage: Get first hand feedback if the product or service meets the customer needs.
    - Disadvantage: Some elements of the business model can’t be validated with this method.
- Implementation: Start the first implementation cycle and analyse the data
    - Advantage: actual data is the most reliable way to verify or disprove a business model
    - Disadvantage: costs many resources to test multiple options

For the purpose of this thesis the expert interview will be used as it provides the most comprehensive view of the situation. The response from the experts is then used to update the business models.

5.4.6 Implementation of selected business models (Lean Cycle)

For the implementation phase the Lean Start-up approach or Lean Cycle from Eric Ries (see chapter 4.5.2) should be used. Although the process was created for software engineering, the Built-Measure-Learn loop is also well suited for E-commerce. The goal is to get the new business model prototype running as fast as possible, then measure the performance and learn what works and what doesn’t to improve on the original concept. This stage is no longer part of this thesis.

6 APPLICATION OF BUSINESS MODEL INNOVATION PROCESS ON COMPANY

The developed business model innovation process provides the basic procedure for developing the business model. To apply this process with a specific company, it needs to be refined and broken down into actionable tasks that can be executed. For this purpose a detailed task overview is created where the task, used methods and outcome is described in detail. This task overview is shown in Tab. 15.

Stage 1 : Analysis of Current state		
Task	Format	Expected Outcome
BMC Analysis	Workshop	Current business model of company is explored and put onto paper
Core Competences		Core competences are identified
SWOT Analysis		Strength and weaknesses are identified
Stage 2 : Business Environment Analysis		
Task	Format	Expected Outcome
5 Forces	Workshop	5 Forces documented
Industry Trends	Data gathering from online sources	Qualitative impact of general industry trends on specific niche
Megatrends		Qualitative impact of megatrends trends on specific niche
Stage 3 : Generate Business Model variants		
Task	Format	Expected Outcome
Generate business model variants from SWOT analysis	Synthesis of previously collected data	multiple business model variants
Generate business model variants from pattern database		multiple business model variants
Stage 4 : Rate business models		
Task	Format	Expected Outcome
Rating process	Work	Defined rating process and rating criteria for business model
Rate business models		3-5 business models
Stage 5 : Validation		
Task	Format	Expected Outcome
Expert interview	Interview	Expert opinion
Update BMC	Work	Final Business Models

Tab. 15: Task List for BMI Process, source: own illustration

6.1 Company description

The company, where the business model innovation process is applied on, is named Voltagezone Electronics e.U. It is under sole proprietorship and was founded in 2010 as a secondary activity and has, beside the owner, one employee. The main focus of the company is trading and development of products for high-voltage generation in the low-energy sector and trading in thermal imaging cameras. The products are sold over the own web shops and online platforms like eBay as main sales channels.

6.2 Analysis of current state

The first stage, the analysis of the current state, provides information about the situation in the company and serves as a reference point for future improvements. This was done as part of a workshop that was held in Graz on 05.03.2020 with following participants: CEO, Co-worker, Tax consultant. Materials used were a flip-chart, laptop and projector and normal pen and paper to write notes. While for the business model canvas, the laptop and projector were used, the other parts were mainly done with normal pen and paper and the flip-chart.

6.2.1 Business model canvas

The first step in the process is the formalization of the business model the company currently uses. This is done by creating a business model canvas. The process of creating the canvas within the workshop was done in similar manner as described by Osterwalder (see chapter 4.2.1). However instead of plotting the BMC, putting it on a wall and then adding paper notes, the BMC was viewed on a screen and notes added directly on the computer. The current business model canvas of Voltagezone Electronics e.U. as shown in Fig. 24 is that of a product oriented second generation E-commerce company that trades with electronic products.

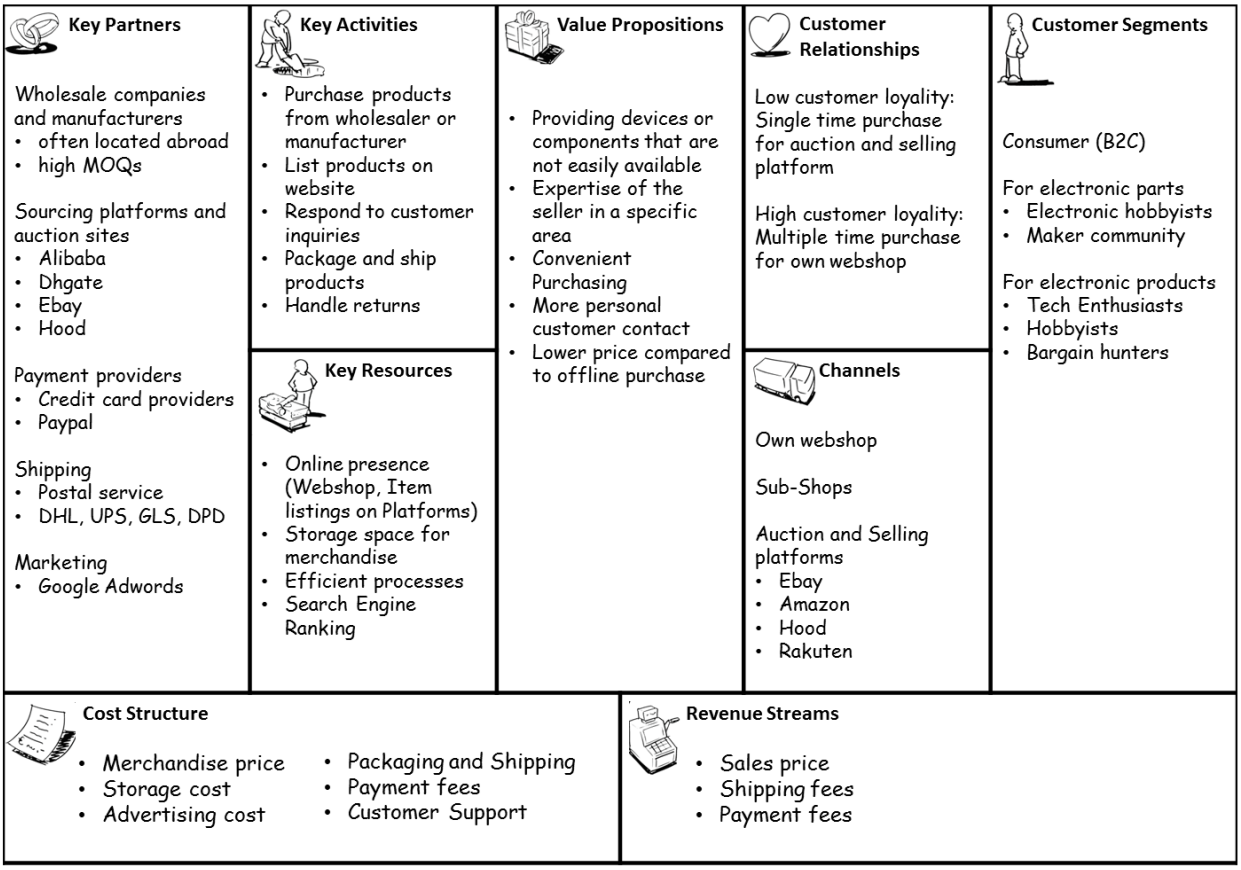

Fig. 24: BMC for Voltagezone Electronics e.U., source: based on Osterwalder (2010), p. 44.

The business model of the company is focussed on a very narrow niche within the electronics industry. High voltage modules and components like coils, transformers or cables are offered to customers over different sales channels on the internet which include sales over platforms like eBay or the own web shop. The value for the customer is that components and parts that cannot be easily found elsewhere can be purchased.

6.2.2 Core competence analysis

The core competence analysis is based on the works of Prahalad and Hamel who published the article "The Core Competence of the Corporation" in the HBR Journal in 1990. The idea is to identify, develop and leverage unique competences to gain or maintain an advantage over competitors in the marketplace. There are three tests proposed to identify if a competence is a core competence:

- The competence provides potential access to a wide variety of markets
- The competence makes a significant contribution to the value perceived by the customer or the end product
- The competence should be difficult to imitate by competitors

Developing the strategic architecture that allows the monitoring and improvement of core competences is seen by Prahalad and Hamel as key for long term success in increasingly faster changing markets.[119]

For the practical process of performing the core competence analysis in a workshop the method from mindtools.com was chosen which consists of the following step:[120]

- Brainstorm factors that are important to your customers
- Brainstorm your existing competencies and the things you do well
- Test the listed own competencies against the three test criteria that determine if a competence is a core competence
- Test the list of factors that are important to your customers against the three test criteria
- Review the lists and see which core competences already exist and which need to be developed
- Identify most time consuming and costly things that are not a core competence to check if they can be outsourced

The factors that could be of importance for the customer were brainstormed. The identified factors are listed below in order they came up in the workshop.

- Can the product be used for my application?
- Reliable function of the product
- Is the quality good
- Low Price
- Shipping costs
- Does the manual explain everything
- Tracking of shipment
- Is the item the same as pictured online
- Fast shipping time
- Nice packaging
- Invoice available
- Secure payment methods
- No risk when buying
- Fast support when problems arise
- Detailed datasheets available
- Which product to use
- Help with integration
- Customizing options
- No import fees or hidden fees
- Deliver larger quantity at lower cost
- Get accessories in same shop
- Trust in the company
- References from trustworthy sources
- Get special products that can't be found anywhere else
- Hassle-free return
- Easy to use web interface for placing an order
- Long term availability
- Payment after receipt of goods

[119] Cf. Hamel et al. (1990), pp. 79-90.

[120] Emerald Works Ltd. (n.d.), online source [25.04.2020].

The existing competencies and the things done well were brainstormed and are listed below in order they came up in the workshop.

- Run an E-commerce store
- List items on different selling platforms
- Design of high voltage power supplies
- Storage of goods and parts
- Packaging and shipping
- Procurement of goods and parts
- Online advertising (Google)
- Customer support
- Selling and buying goods international
- Handle Asian, American and European suppliers
- Optimized supply chain
- Outsourced volume production
- Prototyping in house
- Innovative product designs
- Customer oriented
- Selection of profitable customers
- Knowledge of market requirements
- Experience in the industry
- Creating product descriptions
- Customizing high voltage products

In the next step the listed own competencies were tested against the three test criteria proposed by Prahalad and Hamel (see beginning of chapter 6.2.2) to see which of the competences fulfils the formal requirement for a core competence. This was done by going through each identified competence one by one in the workshop and noting the opinion (Yes/No) on the test criteria). If there was a disagreement on one of the test criteria the majority opinion (2/3) was considered. This reduces the found competence list to the following competences shown in Tab. 16 where all three criteria could be answered positively:

Competence	**Significant value for customer**	**Potential market access**	**Difficult to copy**
Design of high voltage power supplies	yes	yes	yes
Selling and buying goods international	yes	yes	yes
Handle Asian, American and European suppliers	yes	yes	yes
Knowledge of market requirements of high voltage parts	yes	yes	yes
Experience in the high voltage industry	yes	yes	yes
Customizing high voltage products	yes	yes	yes

Tab. 16: List of possible core competences, source: own illustration

The same procedure as applied for the competences before was also applied on the list of factors important for the customer and yielded the results as shown in Tab. 17.

Factors important to the customers	**Significant value for customer**	**Potential market access**	**Difficult to copy**	**Competence existing in the company**
Can the product be used for my application	yes	yes	yes	partly
Fast support when problems arise	yes	yes	yes	no
Help with integration	yes	yes	yes	partly
Customizing options	yes	yes	yes	yes
References from trustworthy sources	yes	yes	yes	partly
Get special products that can't be found anywhere else	yes	yes	yes	yes
Long term availability	yes	yes	yes	partly

Tab. 17: Factors important to the customers, source: own illustration

The question whether the competence to satisfy the factors deemed important for the customer already exists in the company was checked in the next step and also added to the table. This shows there is room for improvement in certain areas. Furthermore it was also determined that before doing any improvements, the customers should be divided into customer categories as not every factor has the same level of importance to each group. For example, the factor "long term availability" is usually very important for business customers, but only plays a minor role for other customers. Another example is the factor "References from trustworthy sources" which is mostly relevant to convince new customers to buy, but not so relevant for existing customers. The factor "Help with integration" may only be applicable for customers who have limited experience. Defining these groups of customers and addressing their needs is something that would need to be done in a separate step.

The last step of the process, the identification of most time consuming and costly things that are not a core competence to check if they can be outsourced, was only briefly discussed in the workshop as many parts are already outsourced. Further potential candidates for outsourcing were found to be online advertising, customer support and packaging and shipping. This has to be reviewed in closer detail as there may also be negative effects or additional risk associated with the outsourcing.

6.2.3 SWOT analysis

The SWOT analysis is a tool to determine the position of a company relative to the market and is used for strategic development and decision-making. SWOT stands for S (Strength), W (Weaknesses), O (Opportunities) and T (Threats). The method combines the internals factors (strength and weaknesses) with the external factors (opportunities and threads) in a 4-quadrant matrix with the aim to develop strategies for each quadrant. It can be used to show in which areas the company should put their focus and develop new products or services. According to the innovation handbook the following step should be done for performing the SWOT analysis in a workshop:[121]

1. Define a goal / area of application
2. Collect internal factors about the company (strength and weaknesses)
3. Collect external factors that influence the company (opportunity and threats)
4. Reflect on the results and see how to gain the biggest benefit or avoid catastrophic losses by combination of internal and external factors which includes the following
    a. Strength-Opportunities
    b. Strength-Threats
    c. Weaknesses-Opportunities
    d. Weaknesses-Threats
5. Develop strategies based on the results

For step 5 - Strategy development only ideas were collected as more details on external influencing factors, particularly the influence of industry trends and megatrends will be explored in more detail in the next chapter. The additional data will be added to the SWOT analysis and the impact on the strategy explored in more detail.

The strengths and weaknesses found in the workshop are listed in Tab. 18 – a prioritization according to importance was not done at this stage – the strength and weaknesses are listed in order they came up in the workshop.

Strength	**Weaknesses**
S1. Experience with specialized high voltage products	W1. Knowledge concentrated on CEO and knowledge transfer to other persons might not be easily done
S2. Purchasing experience	W2. No replacement in case of sickness
S3. Creativity to develop solutions	W3. Limited redundancies in organization
S4. Flexible product portfolio	W4. Company growth limited by workload on CEO
S5. Low capital invested	W5. Already outsourced areas have an increased communication effort
S6. Healthy margins with specialized products	
S7. Flexible work hours for employees	W6. Parts of the product portfolio are subject to strong

[121] Cf. Benno van Aerssen (2018), p. 427.

S8. Result oriented workflow S9. Standardized order handling S10. Good position in the market S11. Customizing possibilities of products S12. Low fixed costs S13. Little dependence on a particular customer S14. Long term cooperation partners S15. Low storage costs S16. Basic demand available, not very cyclical S17. Technology orientation S18. Company name is known in the market S19. Short product development time S20. Short way of decision making	competition W7. Due two small size large development projects can't be done W8. No dedicated marketing or direct sales W9. Systematic strategy for growth is missing W10. No centralized inventory management system W11. Segmented storage locations W12. Use case for sold products is partly unknown which makes targeted marketing difficult

Tab. 18: List of strength and weaknesses, source: own illustration

The opinions on opportunities and threats were also collected in the workshop and are shown in Tab. 19. Further opportunities and threats will be derived from analysis of trends and market expectations to complete the SWOT analysis.

Opportunities	**Threats**
O1. Technology has a much bigger market potential than currently addressed O2. Gaining customers in different geographical areas may be possible O3. New technologies bring new chances to develop/ sell additional products O4. Revenue can be increased many times within the niche without hitting the boundaries O5. Offering accessories to products to increase revenue	T1. Focus is only on two technologically based niches which could disappear T2. New trends might influence customer decision to buy T3. Some sold products are designed by other companies and features as well as flaws can't be controlled T4. Manufacturers might sell to customers directly T5. Shipping costs rise / trade restrictions T6. New EU value added tax (VAT) regulation planned to be implemented in 2021 will require very costly changes to existing online shop and enterprise resource planning (ERP) system and make selling into certain EU countries unprofitable at low annual volume if implemented as described in current draft.

Tab. 19: List of opportunities and threats, source: own illustration

To find possible strategies the results of the internal and external factors were reflected upon. The goal was to find the best combination of the factors to gain the biggest benefit or avoid catastrophic losses. For each strategy category only the three most promising strategies were put on record. The specific factor combination that leads to the particular strategy is put in brackets. For example (S1, O1) means that the strength factor S1 from Tab. 18 and opportunity factor O1 from Tab. 19 were combined. The following strategies as visualized in Fig. 25 were derived:

	Strength	**Weaknesses**
Opportunities	SO strategy: • Sell more products in niche (S1, O1),(S18, O4) • Make online shop multilingual (S10, O2) • Focus on new technology areas that need special expertise (S17, O3)	WO strategy • Develop more complex products together with partners (W7, O4) • Hire additional employees to reduce workload on CEO and address new opportunities (W1, O1) • Create a strategy or systematic development (W9, O3)
Threats	ST strategy • Monitor changes of environment (S3, T1) • Find new suppliers in the EU (S2, T5) • Implement methods to get customer feedback on products (S11, T2)	WT strategy • Monitor for additional niches or shift in niches (W6, T1) • Find ways to decrease dependence on a particular supplier (W8, T3) • Prepare for changes of new EU VAT law (W4, T6)

Fig. 25: SWOT strategy matrix, source: own illustration

The listed strategies were discussed in the workshop only on a macro scale to convey the general idea of the strategy without going into detail. Adaptions to the business model were not discussed at this stage. More details on the business models derived from the SWOT strategies can be found in chapter 6.4.1.

6.3 Business environment analysis

This chapter takes a closer view on the business environment the company is embedded in. This is done by using Porter's 5 forces analysis and analysing the impact of industry trends and megatrends on the business.

6.3.1 5 forces

The 5 forces model developed by Michael E. Porter is a tool that is used for strategy development. It allows dissecting the forces within an industry from a macroscopic point of view. The 5 forces that shape industry competition are the threat of new entrants, threat of substitute products or services, bargaining power of suppliers, bargaining power of buyers and rivalry among existing competitors. In Tab. 20 the forces are shown with detailed questions that need to be answered when applying the model to an industry.[122]

[122] Cf. Porter (2008), pp. 79-80.

Threat of entry	**Power of suppliers**	**Power of buyers**	**Threat of substitutes**	**Rivalry of existing competitors**
Supply side economy of scale Demand side benefits of scale Customer switching costs Capital requirements Incumbency advantages independent of size Unequal access to distribution channels Restrictive Government policy Expected retaliation Incumbents are likely to cut prices Slow industry growth	Supplier industry is concentrated Supplier does not depend on a particular industry Changing supplier has high switching costs Supplier offer differentiated products No substitute Supplier can credibly threaten to integrate forward	Few buyers or large order size compared to size of vendor Products are standardized Low switching costs when changing vendor Buyers can credibly threaten to integrate backward	Attractive price/ performance trade-off to industry's products Buyers cost of switching is low Improvements in other industries	Competitor are numerous and roughly equal in size Industry growth is slow Exit barriers are high Rivals are highly committed Rivalry is solely based on price

Tab. 20: 5 forces, source: Porter (2008), pp. 79-80.[123]

For the practical application of the industry analysis Porter recommends the following steps:[124]

1. Define the relevant industry that should be analysed and specified boundaries and scope
2. Identify the participants and segment them into groups
3. Assess the underlying drivers of each competitive force to determine which forces are strong and which are weak
4. Determine overall industry structure and test the analysis for consistency
5. Analyse recent and likely future changes in each force, both positive and negative
6. Identify aspects of industry structure that might be influenced by competitors, by new entrants or your company

For the workshop the practical guidelines of how to apply Porter's 5 forces from Business-to-you is used.[125]

[123] Porter (2008), pp. 79-80.

[124] Porter (2008), pp. 79-80.

[125] no author, Business-to-you.com (2016), online source [01.03.2020].

Definition of the industry

Since the company develops and sells high voltage products as well as thermal imagers online it is part of the electronics industry and also the E-commerce industry. However this definition alone still seems too generic for the 5 forces analysis as Porter acknowledges that the industry definition shouldn't be too broadly or too narrow. One way to narrow the focus is to make an individual analysis for the sub segments of the industry. In this case the high voltage industry and the thermal imaging industry which are part of the electronics industry. Both of these sub segments of the electronics industry should be analysed in the context of E-commerce as shown in Fig. 26 as part of the business is conducted online.

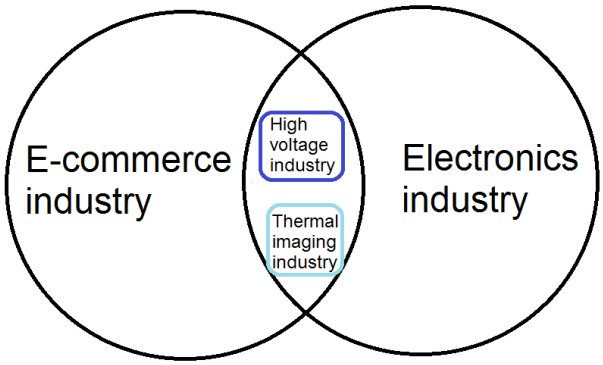

Fig. 26: Definition of industry, source: own illustration

For the 5 forces analysis Porter's full list of influencing factor were considered which amounts to a total of 51 factors. The influence of each factor was considered either low (weak influence), high (strong influence) or average (no particular influence). A weak influence factor in each dimension is generally favourable for the business while a strong influence factor is seen as unfavourable. Comments of underlying assumptions were also added to each force category. After rating the influence factors, numbers were assigned to each factor: -1 (strong influence), -1 (weak influence) and 0 (no particular influence). The number were then summed up for each force category and divided by the number of factors for each force category. When putting the numbers into a spider web diagram it visualizes the 5 forces of the two analysed sub segments of the industries and also makes a comparison easily possible. As for interpretation of the diagram in Fig. 27, the lower the value the favourable the competitive situation in the industry is. If all factors are in the centre at -100% it would be the ideal industry with high profits and low risk where the influence of the 5 forces is very weak. The further away from the center the stronger the influence factors of the 5 forces get. At 0% the influence factors are at an average level and when rising to +100% the influence factors are strong, which means that this industry is very unattractive as it has low profits and high risk.

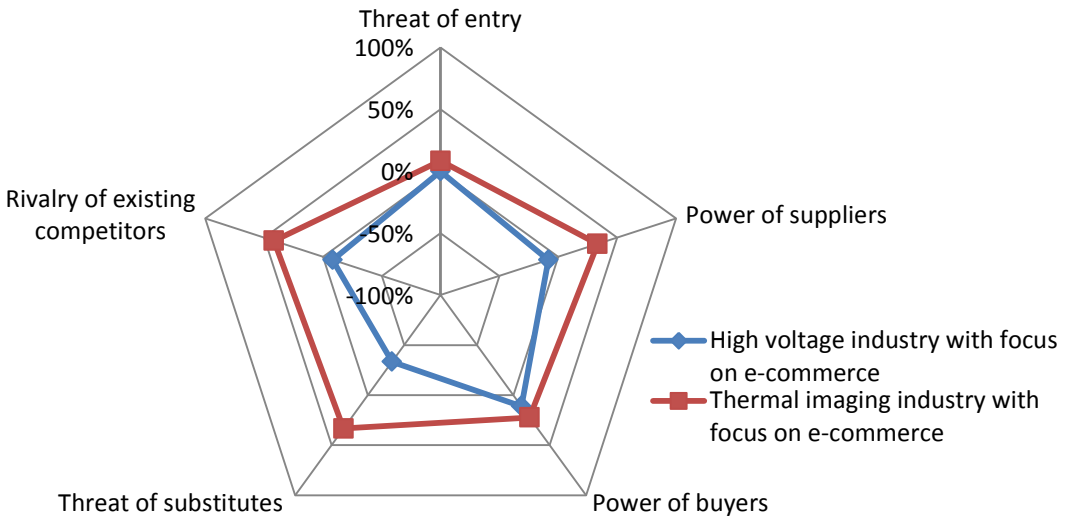

Fig. 27: 5 forces industry comparison, source: own illustration

The 5 forces analysis shows that the high voltage industry with focus on E-commerce is generally better positioned on average than the thermal imaging industry with focus on E-commerce (see Fig. 27.).

The high voltage industry with focus on E-commerce is a rather slow moving industry with 10+ years product life cycle, with a very segmented market that consists of few sellers and few buyers. Many suppliers have little interest to expand their competences. Since the products are not particularly often used by consumers there are few product reviews online. The prices stay roughly the same for quite some time. Some applications come and go but the general demand doesn't change much. It is a rather mature market where the cost for the end user is usually low, but engineering costs and costs for product adaptations can be very high. The number of companies stayed roughly the same over years, with many very small companies, but also bigger distributors, that carry high voltage parts in their E-commerce portfolio.

The thermal imaging industry with focus on E-commerce is a rather fast moving industry with 3-5 years product life cycle that took off with the manufacturer Seek Thermal developing an affordable thermal imaging camera as an accessories for the smartphone in 2015. As virtually all kind of semiconductors, the image sensors of thermal cameras get cheaper if produced in high volume which catapulted thermal imaging cameras into the consumer price range. However there is a distinction between thermal imaging cameras for consumers and professional use as cameras beyond a certain price rarely get purchased by consumers even if they are superior. There are some lower cost alternatives, like infrared thermometers, but usually they are used in a different purpose, but the threat of substitution by another technology is present. Thermal imagers can be bought at electronics stores, supermarkets as well as specialized distributors. Buying parts from another company as a consumer is easy.

It is also important to note that this industry analysis display the estimated current state of the industry and the profile may change over time. For this reason the analysis of industry trends and megatrends can be used.

6.3.2 Industry trends

In the theoretical part of the thesis the industry trends for the electronics sector (see chapter 2.9) and E-commerce industry (see chapter 0) were already explored. For the business environment analysis it will be checked how these general industry trends influence a business in the thermal imaging industry (TII) with focus on E-commerce and a business in high voltage industry (HVI) with focus on E-commerce. The data for the impact analysis was gathered from online sources by reviewing manufacturer websites and from sales material and product roadmaps provided from manufacturers that is not publicly available. In Tab. 21 and Tab. 22 the impact of the general industry trends on a particular industry is either classified as high, low or possible. If the impact is rated as possible, it is not clear if the general industry trend will have an impact. In the comment field the explanation for the decision on how to classify the impact can be found.

General Industry Trend	Impact on TII	Comment
Market size growth in E-commerce	high	Increasing number of online shoppers also means more potential customers
Market shift towards bigger firms	possible	Big firms are already dominating the industry, but many smaller companies offer differentiated products. Since the market is expanding for bigger and smaller firms it is currently unclear in which direction the trend goes or if it is relevant.
Emerging technology:		
Sensing and mobility	high	Thermal imaging is highly relevant for getting temperature data from objects, usage for medical purpose or distinguish a person from an object in self-driving cars or drones
Augmented Human	high	Thermal imagers capture the infrared spectrum which is invisible to the human eye
Postclassical compute and comms	possible	Increased computing power many shrink size and cost of thermal imagers. Current price mainly depends on the thermal imaging sensor, but new applications may be possible with significantly increased computing power.
Digital Ecosystem	low	There are some applications that use thermal imaging, but impact is still minor
Advanced AI and Analytics	high	Machine vision libraries like OPENCV are already used for object identification and tracking in thermal imagers.
Shift to Asia	high	Thermal imagers are produced and also used in significant quantity in Asia. High resolution thermal imagers are also produced in Europe and the US, but almost all low resolution thermal imagers are made in Asia
Digitalization in the electronics industry	possible	many processes are already done automated or with aid of digital equipment - it is hard to say how fast additional digitalization will progress

Increased innovation speed	high	In the last 5 years, there have been a multiude of new applications for thermal imagers due to significantly lower cost of production from new production processes and breaking of existing monopoly

Tab. 21: Trends that impact the thermal imaging industry, source: own illustration

General Industry Trend	**Impact on HVI**	**Comment**
Market size growth in E-commerce	high	Increasing number of online shoppers also means more potential customers
Market shift towards bigger firms	low	Companies stay the same size for quite some time - company size is more dependent on specific sub segment of the market and the growth thereof rather than the generic trend towards bigger firms
Emerging technology:		
Sensing and mobility	high	The automotive industry invests vast amounts for development of electric cars. There are many improvements in high voltage semiconductors and other electronic parts can be used for other applications in the high voltage industry
Augmented Human	low	No direct impact
Postclassical compute and comms	low	No direct impact
Digital Ecosystem	possible	There have been communities of hobbyists around on the internet since the start which share building plans and experience on how to build certain types of high voltage devices.
Advanced AI and Analytics	low	No direct impact
Shift to Asia	high	Many high voltage parts are produced in Asia - some parts that require rare earth minerals like capacitors are only produced in Asia
Digitalization in the electronics industry	possible	many processes are already done automated or with aid of digital equipment - it is hard to say how fast additional digitalization will progress
Increased innovation speed	possible	Better high voltage parts and semiconductors from e-car industry may lead to increased innovation speed and generate additional use cases.

Tab. 22: Trends that impact the high voltage industry, source: own illustration

6.3.3 Megatrends

The megatrends that will have significant impacts on the industry are listed in Tab. 23. The megatrends were explored in detail in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Megatrends with significant impact on thermal imaging industry with focus on E-commerce	Megatrends with significant impact on high voltage industry with focus on E-commerce
Personalization	Personalization
Globalization	Globalization
Health	Mobility
Mobility	
Security	

Tab. 23: Impact of megatrends on the TII and HVI with focus on E-commerce, source: own illustration

The megatrend personalization already has as significant impact on both industries which can be seen in various customizing options that the products have and that E-commerce sellers offer. A good example are thermal imagers: While the configuration options were rather limited for stand-alone thermal imagers, with the introduction of thermal cameras that could be attached to mobile phones, the number of configuration options increased rapidly. The reason for this is that customers wanted to have settings that would fit for their specific use case and the low cost of just adapting the mobile phone app made it possible to address many more use cases than before. So while the hardware mostly stays the same or only has minor differences (like other lenses and housing variants), the thermal imagers connected to the smartphone got more versatile.[126] Every specific group of users gets can use their own settings and customize their device. As for E-commerce sellers of thermal imaging equipment or high voltage parts, the level of personalization is directly linked to the increasing level of personalization in the E-commerce industry. This starts with targeted advertising, giving the customer a choice to configure the products online in product configurators and offering a multitude of shipping and payment options to fit the individual needs. Offering all these options also increase the complexity and cost that the customers has to pay in the end.

Globalization also has a very significant impact on both industries as both industries are having global supply chains and the suppliers are distributed all over the world with major concentration on Asia, Europe and North America. Increased globalization would also make it easier to source parts and equipment, but will also increase competition, possible only benefitting the customer with lower prices and a bigger variety of goods to choose from. Currently ordering a thermal imager or high voltage components through platforms like Ebay, Alibaba or Amazon from somewhere around the world is already made very easy for consumers.[127] So while there is the benefit of selling products internationally with increasing number of potential buyers it also puts the business in direct competition with many others sellers.

[126] Cf. Mitroff (2015), online source [01.07.2020].

[127] Cf. Wirjo (2018), online source [01.07.2020].

The impact of the megatrend mobility on both industries is due to the automotive industry. The increased development of electric cars had a significant impact on the semiconductor industry. Most cars have a high voltage battery and in order to get the right amount of power from the battery to the electric motor high voltage semiconductors are needed. This has led to large improvements in semiconductors and has lowered the cost significantly. Many of these parts designed for the automotive industry can also be used for building specialized high voltage equipment. The goal for autonomous driving has increased the need for sensors. Thermal imagers have been used in some cars to differentiate living beings from inanimate objects due to their thermal signature or as a camera to see the environment even with bad environmental conditions. If the demand for thermal imagers in the automotive industry increases, it is expected that the price of thermal imagers will go down due to mass production.[128]

The megatrends health and security will only have a significant impact on the thermal imaging industry. Thermal imagers are used in security system as cameras to easily detect people even in complete darkness. In healthcare thermal imagers are used to detect thermal imbalances or to detect people with elevated body temperature, which may also be linked to security. Thermal imagers are currently used at airports and other places to screen people for elevated body temperature which might indicate an infection with the Coronavirus.[129]

The other megatrends like knowledge culture, urbanization, connectivity, neo-ecology, gender shift, new work and silver society do not seem to have any obvious significant impacts on these industries.

6.4 Generate business model variants

With the collected data about the current business model and the business environment it is possible to create new business model variants. For the creation of the business model variants there are two different approaches pursued. The first option is the creation of business model variants based on the SWOT analysis and consideration of the internal strength and weaknesses as well as the external factors (see chapter 5.1.1). This approach is used to find improvements and logical adaptations to the current business model. The second way to generate business model variants is by using the pattern database (see chapter 5.1.3). This way is used to systematically screen all possible business model patterns and also reveal not so obvious business model variants that could be of interest.

6.4.1 Generate business model variants from SWOT analysis

To generate the business model variants the strategies found in the SWOT analysis and the nine building blocks of the business model are put into a matrix in an excel sheet. Then for each strategy the impact on each of the nine building blocks is determined and if a change to the current business model is likely, the change is put in the matrix. The results are business model variation or business model improvements. The distinction whether to count a change as a new business model or just as an improvement depends

[128] Cf. Howard (2016), online source [01.07.2020].

[129] Cf. FDA (2020), online source [01.07.2020].

on how many building blocks are impacted. If there are more than three building blocks different than in the original business model, it is considered a business model variation.

This was applied to the 12 strategies found in the SWOT analysis (see chapter 6.2.3). Five of those strategies had more than three changes in the building blocks and will be considered as business model variants. The other seven strategies yielded fewer changes but these changes may still be used to enrich the existing business model or any new business model variant. Tab. 24 shows an overview of the strategies and the number of changes to building blocks it had.

Category	Strategy	Changes to building blocks	Business model variant
SO strategy	Sell more products in niche	8	Yes
SO strategy	Focus on new technology areas that need special expertise	7	Yes
SO strategy	Make online shop multilingual	5	Yes
WO strategy	Develop more complex products together with partners	5	Yes
ST strategy	Implement methods to get customer feedback on products	4	Yes
ST strategy	Monitor changes of environment	3	No
ST strategy	Find new suppliers in the EU	2	No
WT strategy	Prepare for changes of new EU VAT law	2	No
WO strategy	Hire additional employees to reduce workload on CEO and address new opportunities	1	No
WO strategy	Create a strategy or systematic development	1	No
WT strategy	Monitor for additional niches or shift in niches	1	No
WT strategy	Find ways to decrease dependence on a particular supplier	1	No

Tab. 24: Business model variants created from SWOT analysis, source: own illustration

Also interesting to observe was that the number of changes to the building block was highest in key activities followed by key partners and lowest in revenues streams followed by cost structure and value proposition as can be seen in Tab. 25. This indicates that some areas have more potential for change or at least more options to choose from than other areas like revenue streams for example. The full table of details on changes to the building blocks can be found in Appendix 1.

Building block	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationships	Chan-nels	Customer Segments	Cost structure	Revenue Streams
Number of changes	6	10	5	3	5	4	4	3	2

Tab. 25: Number of changes to building blocks, source: based on Osterwalder (2010), p. 44.

6.4.2 Generate business model variants from pattern database

The pattern database holds 182 business model patterns that are divided in 12 different dimensions with each having sub-sets of patterns (see chapter 5.1.3). For the application of the pattern database in the business model innovation process, the researchers show the usage of the pattern database within the business model innovation process according to Frankenberger et al. (see chapter 5.1.2).

For the practical application the following use of the pattern database is recommended:[130]

- Initiation: Identification of currently implemented patterns in the focal firm's ecosystem – most useful questions are:
    - What is the current strategy for differentiation (D4)?
    - Which third parties are directly involved in value creation (D8)?
    - How are revenues generated (D10)?

- Ideation: Iterative cycle of structure (select dimension for innovation) and creativity (transfer patterns to own business model) – most useful questions are:
    - Do the technological, social, environmental, or organizational trends have a particularly strong impact on any business model component?
    - Which dimension of the firm's own business model has been identified as the weakest?
    - On which dimensions have competitors innovated their business models?
    - Is a new strategy for differentiation required (D4)?
    - Does the current business model generate sufficient profits (D12)?

- Integration: Systematic generation of opportunities to specify the missing business model dimensions through additional patterns)
    - The dimensions (D3–D12) of the database taxonomy serve as a checklist to assure that value proposition, value delivery, value creation, and value capture were sufficiently specified.

- Implementation: Glossary for relevant background information and cases for implementation of involved patterns – most useful questions are:
    - How are the patterns typically implemented?
    - Which steps have other companies taken to implement them?
    - What were the critical factors for their successful implementation?

The pattern database is available in an excel format which allows for convenient filtering of the dimensions and instantly displays all business model patterns in a certain sub category.

[130] Remane et al. (2016), p. 25.

Identification of currently implemented pattern with database for initiation phase:

What is the current strategy for differentiation (D4)? Details are listed in Tab. 26.

D4: Strategy for differentiation	Relevance for current business model	Comment
Quality	Yes	The product quality perceived by the customer is very important
Customization	No	while some parts are being customized, customization currently doesn't play a major role
Combination	Yes	Price and quality play major roles
Access/convenience	No	while it may be convenient to order online, it isn't used to for differentiation
Price	Yes	Price is one of the most important factors
Network effects	No	
No impact on differentiation	Yes	Selling specialized products in the niche do not need any kind of the above described differentiation strategies, as niche focus is enough differentiation on its own.

Tab. 26: Current strategy for differentiation, source: based on Remane et al. (2016), p. 22.

Which third parties are directly involved in value creation (D8)? Details are listed in Tab. 27.

D8: Third parties involved in value creation process	Relevance for current business model	Comment
Suppliers	No	While products are purchased from the suppliers, they do not actively contribute to value creation.
Customers	No	
Competitors	No	
Multiple Parties	No	
No impact on third parties involved	Yes	The value creation is produced inside the company, by delivering products to the customer.

Tab. 27: Directly involved parties in value creation, source: based on Remane et al. (2016), p. 22.

How are revenues generated (D10)? Details are listed in Tab. 28.

D10: Revenue model in value capture process	Relevance for current business model	Comment
Sell	Yes	This is currently the major revenue stream
Lend	No	
Intermediate	No	
Advertising	No	
No impact on revenue model	No	

Tab. 28: Revenues generated, source: based on Remane et al. (2016), p. 22.

When using the filter function of the business structure database and filter according to parameter D4, D8 and D10 like described before, the business patterns shown in Tab. 29 remain. To use the excel filter function correctly, the not applicable characteristics were filtered out which left the desired structure patterns. The identified patterns were then checked if any of the patterns described the current business model well.

Source	Pattern	Does pattern describe current business model?
Weill et al. (2005)	[Physical] manufacturer	No
Weill et al. (2005)	Entrepreneur	No
Weill et al. (2005)	Financial trader	No
Weill et al. (2005)	Inventor	No
Weill et al. (2005)	IP trader	No
Weill et al. (2005)	[Physical] wholesaler	Partly - the pattern is about selling physical goods not taking into account the sales channels
Linder and Cantrell (2000)	Value-added reseller	No
Gassmann et al. (2014)	White label	No
Hanson (2000)	Product sales	Partly – the pattern is about selling products at a fixed price
Applegate (2001)	[Digital] infrastructure retailers	No
Applegate (2001)	E-retailer	Yes – this pattern describes the selling of physical products at a non-negotiable price online
Bienstock et al. (2002)	Merchant model	No
Clemons (2009)	Selling virtual accessories	No
Fleisch et al. (2014)	Sensor as a service	No

Tab. 29: Filtered business model database, source: based on Remane et al. (2016), pp. 55-57.

For the ideation phase the following questions are of importance:

Do the technological, social, environmental, or organizational trends have a particularly strong impact on any business model component?

- The influence of trends and their impact on the current business model has already been investigated in chapter 6.3
- The identified trends are used to filter the pattern database.

Which dimension of the firm's own business model has been identified as the weakest?

- The weaknesses of the current business model have been analysed in chapter 6.2.3

On which dimensions have competitors innovated their business models?

To answer this question a total of eight competitor websites were screened for recent changes. To have a balanced result, four E-commerce shops in the high voltage industry and fours E-commerce shops in thermal imaging industry we chosen. These shops have already been identified and classified as potential competitors to the business several years ago and changes and adaptations to these websites have been followed regularly. The results of the innovation dimension of the business model of the competitors are shown in Tab. 30. Most frequent changes were in dimension Strategy for differentiation (Price and Customization) as well as Target customers (Specific new customer segment) and Value creation process (Research and Design). The dimension Sourcing and Direct profit effect had the least changes, which may be attributed to the difficulty of assessing these changes just by viewing the web-page of the company and doesn't necessarily mean that there was no progress in these areas.

Dimension	Number of changes	Details on subcategory
D1: Hierachical Impact	0	
D2: Degree of digitization	0	
D3: Product type	0	
D4: Strategy for differentiation	5	2 Price, 2 Customization, 1 Combination
D5: Target customers	2	2 Specific new customer segment
D6: Value delivery process	2	1 Sales Channel, 1 Brand and Marketing
D7: Sourcing	0	
D8: Third parties involved	1	1 Multiple parties
D9: Value creation process	2	2 Research and Design
D10: Revenue model	2	1 Intermediate, 1 Lend
D11: Pricing strategy	1	1 Premium
D12: Direct profit effect	0	

Tab. 30: Changes to characteristic of business model structure pattern, source: based on Remane et al. (2016), p. 22.

Is a new strategy for differentiation required (D4)?

Based on the analysis from the competitors, a business model adaptation that includes further customization and focuses at price may also be advisable.

Does the current business model generate sufficient profits (D12)?

While the business model is currently sustainable, there are indications from the business environment analysis and that this may not hold true for the future. So business model adaptations that can increase the revenue or reduce the costs should definitely be investigated.

Integration: Systematic generation of opportunities to specify the missing business model dimensions through additional patterns

The business model database is reconfigured to expand the search parameter and also take into account the all the characteristics that competitors innovated their business model. This expanded list is then filtered to get only the business model patterns on which the Megatrends (see chapter 6.3.3) and Industry Trends (see chapter 6.3.2) are expected to have an impact. This leaves the list shown in Tab. 31.

Source	Pattern	Does the business model pattern resolve weaknesses / or leverage strength?
Weill et al. (2005)	[Physical] wholesaler	Pattern describes current business model
Chatterjee (2013)	Perceived value-based	Strength: Creativity to develop solutions, Technology orientation
Osterwalder and Pigneur (2010)	The long tail	Weakness: No centralized inventory management system
Linder and Cantrell (2000)	Channel maximization	Weakness: No dedicated marketing or direct sales
Linder and Cantrell (2000)	Cool brands	Strength: Company name is known in the market
Linder and Cantrell (2000)	Incomparable products	Strength: Creativity to develop solutions, Technology orientation
Linder and Cantrell (2000)	Mass customization	Strength: Customizing possibilities of products Weakness: Already outsourced areas have an increased communication effort
Johnson (2009)	Rent instead of buy	Strength: Company name is known in the market Weakness: Parts of the product portfolio are subject to strong competition
Gassmann et al. (2014)	E-shop	Pattern describes current business model
Gassmann et al. (2014)	Ultimate luxury	
Hanson (2000)	Product sales	Describes current business model pattern
Strauss and Frost (2014)	E-mail	Weakness: No dedicated marketing or direct sales
Strauss and Frost (2014)	Online advertising and public relations	
Strauss and Frost (2014)	Online sales promotions	Strength: Company name is known in the

		(niche) market
Applegate (2001)	[IT] equipment/component manufacturers	Strength: Creativity to develop solutions, Customizing possibilities of products
Applegate (2001)	Advisors	Strength: Experience with specialized high voltage products
Applegate (2001)	E-retailer	Describes current business model pattern
Clemons (2009)	Selling online services	Strength: Healthy margins with specialized products
Clemons (2009)	Selling virtual accessories	
Fleisch et al. (2014)	Sensor as a service	Strength: Technology orientation

Tab. 31: Filtered business model patterns, source: based on Remane et al. (2016), pp. 55-57.

The patterns that coincide with strengths of the company are chosen for detailed examination. Therefore for each pattern a business model variant needs to be created with filling the building blocks of the business model canvas for each variant. This is done by searching the internet for an example company (or multiple example companies) that already is in the same industry or closer related to the business of trading with niche electronic product compared to the example company given in literature. The business model of that company is then inspected closer and used to fill the building blocks of the business model variant generated. If no other example is found, then the original example given in the literature is used.

6.5 Rate business models

The rating process is divided in two stages.

In the first stage it is checked how to manage the newly developed business model variants in regards to the existing business model. For this purpose Osterwalder's approach of classifying similarities, synergies and conflicts is used (see chapter 5.2).

In the second stage the business model variants are rated with the Effectuation method based on the works of Saras D. Sarasvathy which is based on the logic of control and not on the logic of prediction. This method seems especially suitable in the current situation the outbreak of the Coronavirus makes long term predictions rather difficult because the situation is very dynamic. Making business model decisions on the factors that the entrepreneur can control seem to be the best choice. The four principles that describe the theory of effectuation are the following: [131]

1. Affordable loss rather than expected returns
2. Strategic alliances rather than competitive analysis
3. Exploitation of contingencies rather than exploitation of pre-existing knowledge
4. Controlling an unpredictable future rather than predicting an uncertain one

[131] Cf. Sarasvath (2001), pp. 243-263.

Tab. 32 shows the difference between causation and effectuation.

Categories of Differentiation	**Causation Processes**	**Effectuation Processes**
Givens	Effect is given	Only some means or tools are given
Decision-making selection criteria	Help choose between means to achieve the given effect	Help choose between possible effects that can be created with given means
	Selection criteria based on expected return	Selection criteria based on affordable loss or acceptable risk
	Effect dependent: Choice of means is driven by characteristics of the effect the decision maker wants to create and his or her knowledge of possible means	Actor dependent: Given specific means, choice of effect is driven by characteristics of the actor and his or her ability to discover and use contingencies
Competencies employed	Excellent at exploiting knowledge	Excellent at exploiting contingencies
Context of relevance	More ubiquitous in nature	More ubiquitous in human action
	More useful in static, linear, and independent environments	Explicit assumption of dynamic, nonlinear, and ecological environments
Nature of unknowns	Focus on the predictable aspects of an uncertain future	Focus on the controllable aspects of an unpredictable future
Underlying logic	To the extent we can predict future, we can control it	To the extent we can control future, we do not need to predict it
Outcomes	Market share in existent markets through competitive strategies	New markets created through alliances and other cooperative strategies

Tab. 32: Contrasting causation and effectuation, source: Sarasvath (2001), pp. 243-263.

Effectuation begins with a set of means which consists of the statements “Who I am” (traits, tastes and abilities), “What I know” (knowledge corridor) and “Whom I know” (Social network). The acceptable risk, affordable loss and strategic partnerships should also be taken into account.[132] For the rating of the business model variants the following rating questions are chosen:

1. Business model variant realization possible with existing competence? (Yes/No)
2. Business model variant within knowledge corridor? (Yes/No)
3. Business model variant realization possible with help of existing contacts? (Yes/No)
4. Business model variant realization requires strategic partnership? (Yes/No)
5. Estimated risk of failure of business model variant implementation? (Low / medium / high)
6. Estimated loss if business model variant implementation is unsuccessful? (Low / medium / high)

[132] Cf. Sarasvath (2001), pp. 243-263.

To compare the results and get an order of relevance for the business model variant, the answers to the question received point which were then summed up to get the overall rating. Questions 1-3 received 1 point each if the answer was “yes”. Question 4 does not receive any points. For questions 5 and 6, the answer “low” received 2 points and the answer “medium” received 1 point each. A higher number at the overall rating signifies a better fit according to the effectuation model. The aim of this rating was to select the top 5 business model variants for the expert interview as shown in Tab. 33. However since two variants shared the fifth place in the rating, the number was expanded to 6 business model variants for the expert interview.

BM Variant Name	Realization possible with existing competence	Within knowledge corridor	Realization possible with help of existing contacts	Realization requires strategic partnership	Estimated risk of failure	Estimated loss if unsuccessful	Overall Rating
Customer feedback created products	Yes	Yes	Yes	No	medium	low	6
Open source brand enhancement	Yes	Yes	Yes	No	medium	medium	5
Niche B2B Equipment Webshop	Yes	Yes	Yes	No	high	low	5
Multilingual offerings	No	Yes	Yes	No	low	medium	5
Technical equipment lending	No	Yes	Yes	No	high	low	4
Fever Screening Thermal Solution	No	Yes	Yes	Yes	medium	medium	4

Tab. 33: Business model rating overview, source: own illustration

The selected business models variants are described below in detail.

6.5.1 Business model variant: Customer feedback created products

This business model variant is based on a ST strategy from the SWOT analysis addresses the strength of the company when it comes to customizing products and creativity do develop solutions and the threats that niches could disappear or other factors that influence the customers’ decision to buy. In the past customers feedback was not actively collected and feedback given by customers was only considered to a minor extent for the product portfolio and product features. In hindsight this ignorance led to missed

opportunities where sub-niches were created and exploited by other companies due to tailoring their products and offerings for a specific use case.

This business model adaptation (see Fig. 28) tries to address that issue by actively incorporating customer feedback as a major factor for sourcing products and/or develop and improve products. The ways and methods of how this customer feedback is best gathered and acted upon are still not fully explored. Feedback comes in many forms and the typical processes that work well in large established organizations may have too much overhead for small niches. Gathering data from online product configurators, online simulation tools or other means where the characteristics of the needed product and the demand situation can be assessed might be a viable option. The costs of customization of a product towards a specific target group also have to be considered for this business model adaption to work. If the sub-niche is to narrow then the costs for this process may be too high, so a process would need to be developed to find a good balance. While the practice of offering customized products is already well established in some E-commerce industries like 3D printing for example where the customer can just upload the data, then get an instant quote and order the product online, in other industries where the manufacturing chain is longer, this is not yet the case.

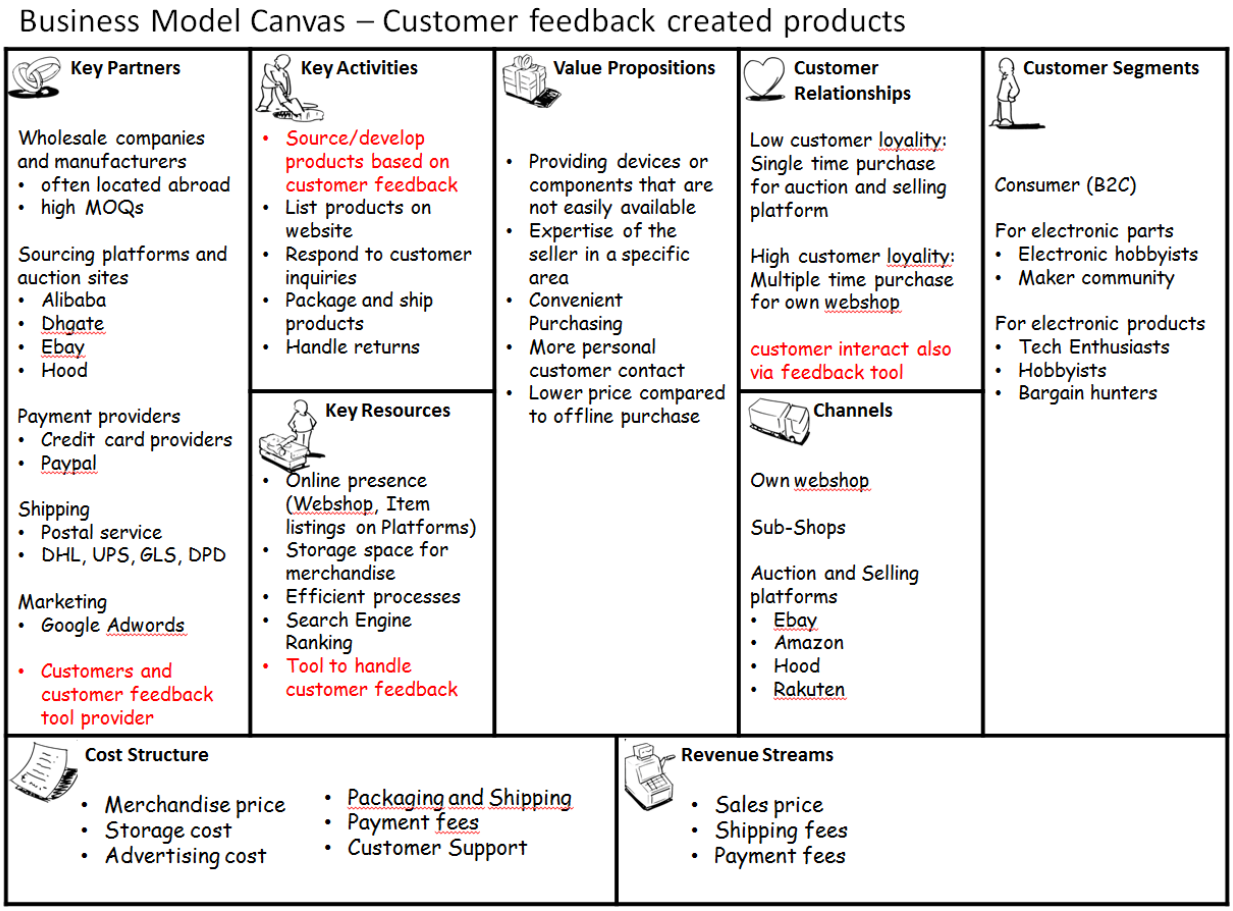

Fig. 28: BMC variant customer feedback created products, source: based on Osterwalder (2010), p. 44.

6.5.2 Business model variant: Open source brand enhancement

This business model variant is based on the application of the pattern database of the business model pattern “Cool brands” combined with the pattern “Open Source”. There are many open source projects in the electronics industry that have a good brand image and the companies behind these projects can also be considered successful in commercial terms. This business model variant explores the possibility to use this concept also for E-commerce companies in a particular niche. The business models value proposition is focused on providing well designed open source product designs for a particular niche that can be used either for professional or educational purposes and is focused on building a community that is also actively engaged in providing concepts and ideas for improving the products further and helping in supporting customers that may have trouble to use the products. Parts of the development cost for the products may be collected from donations and fundraisers. While the business model is based on the open source idea, it does not necessarily mean that having the design files for the products in the public domain makes it easy to copy the business model for a competitor. The business model as shown in Fig. 29 has worked well for companies in the electronics industry that deal with relatively widespread electronics like microcontroller boards and sensors, however the question is if this business model would also work in the niche where there is less demand and not so many sellers.

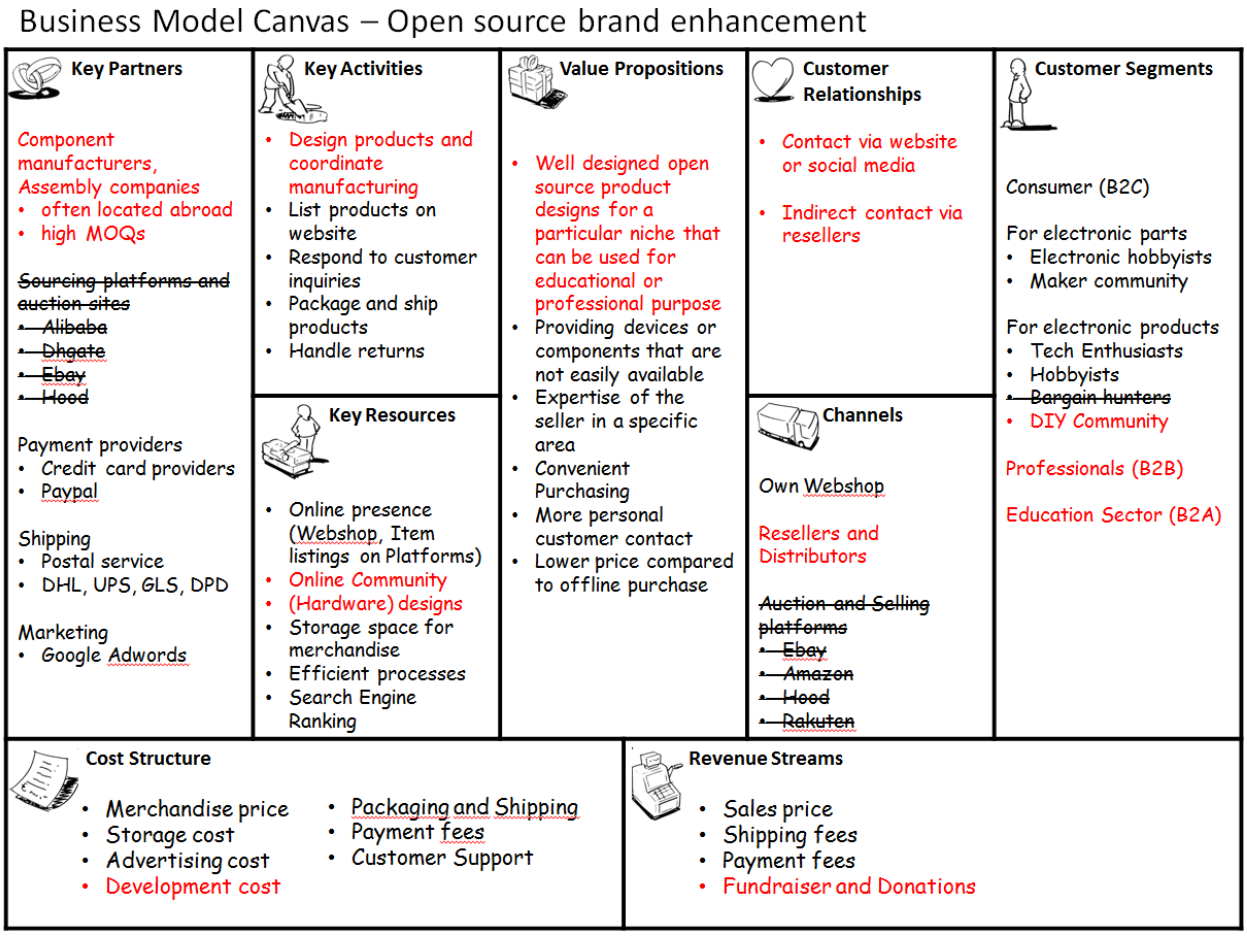

Fig. 29: BMC variant open source brand enhancement, source: based on Osterwalder (2010), p. 44.

6.5.3 Business model variant: Niche B2B equipment webshop

This business model variant is based on the pattern “Incomparable products” of the business model database and is shown in Fig. 30. While for consumer products and often used business products the internet can be used to easily compare prices and product features, this is currently not possible for specialized B2B equipment. For many industry supplies that are not in high demand it is still customary (at least in Europe) to have only partial data of what the product can do and a pricelist available online. Often it is also needed to contact the manufacturer or a designated distributor to get information on current prices, lead time or shipping costs. This is typically a very time consuming process and purchasers in businesses may choose to buy the needed parts from a web shop if possible to save time. Large electronics component distributors have steadily increased their online market share in the last years, however there might be still enough room left to target niches that cannot be easily addressed by these large companies.

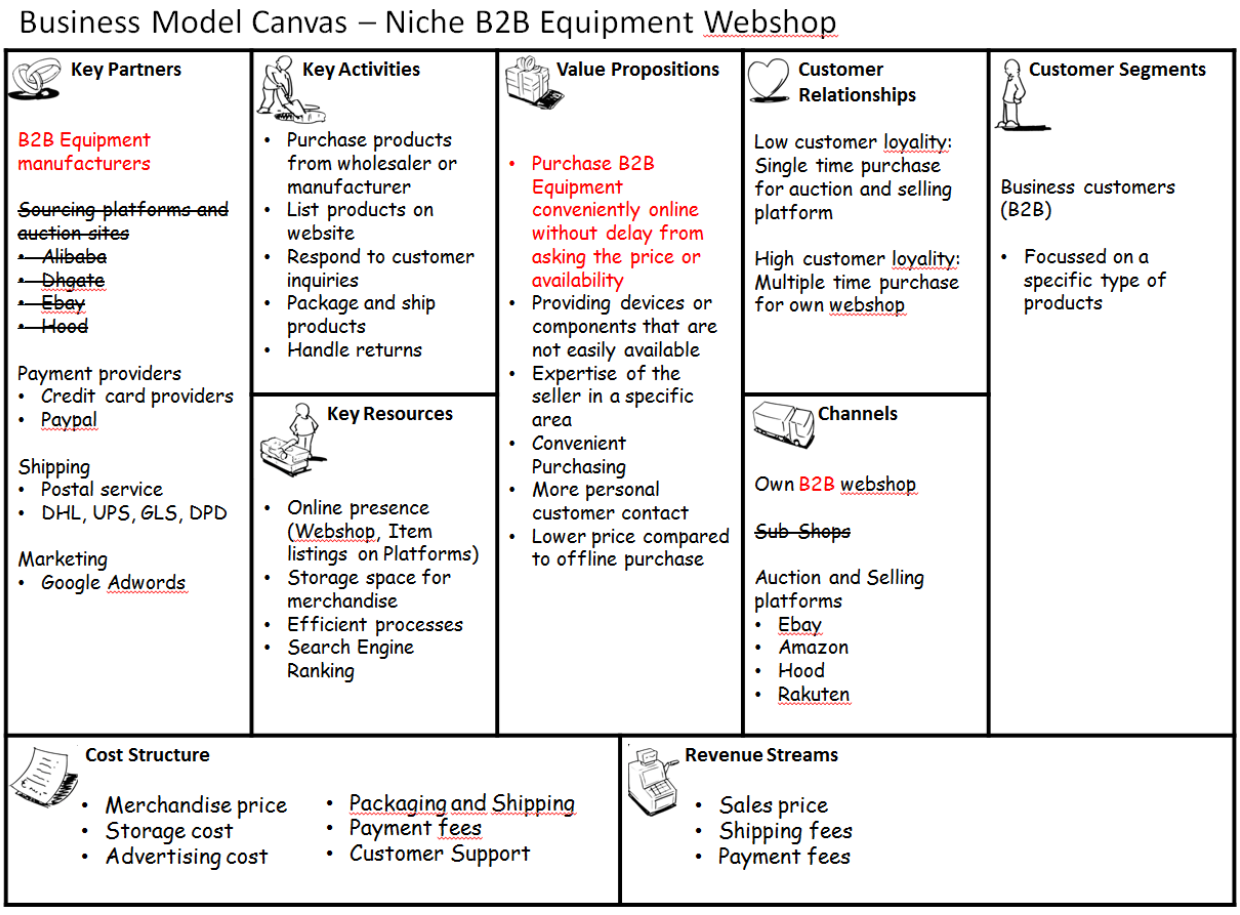

Fig. 30: BMC variant niche B2B equipment webshop, source: based on Osterwalder (2010), p. 44.

6.5.4 Business model variant: Multilingual offerings

This business model variant (see Fig. 31) is based on a SO strategy from the SWOT analysis addresses the strength of the recognition of the company within the niche market in the German speaking area and the opportunity of gaining additional customers from geographically different areas that do not speak German. Although most of the online offerings and product descriptions are only available in German language, there already is a substantial amount of customers that do not speak German and use online translations tools to translate from German into their native tongue. However this still presents a barrier for customers that prefer to shop in their own language. Also from the point of search engine optimization, websites in the local language of the country are better listed and the products can be found by a larger number of potential customers. It also has to be considered which languages to choose and on how to address customer support in multiple languages. Possibly translation into English language is sufficient as a first step.

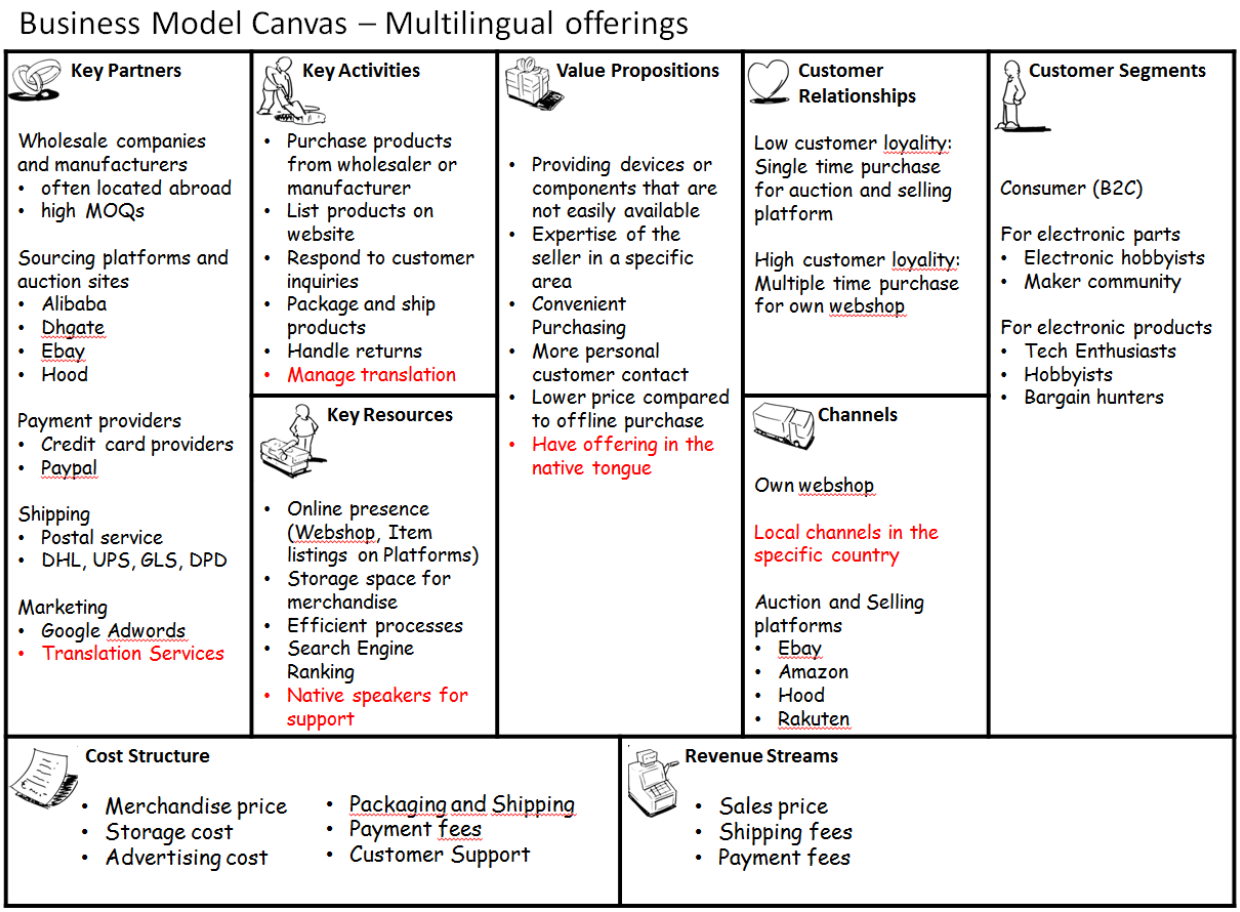

Fig. 31: BMC variant multilingual offerings, source: based on Osterwalder (2010), p. 44.

6.5.5 Business model variant: Technical equipment lending

This business model variant (see Fig. 32) is based on the pattern “Rent instead of buy” of the business model database. The idea is to lend technical equipment to customers instead of selling it to them. This has the benefit for the customer (renter) not to spend money on goods that are rarely used and expensive but rather pay a much lower rent. On the business side of the company that is lending the equipment there are some changes compared to selling as each product is returned and may need to be inspected after return.

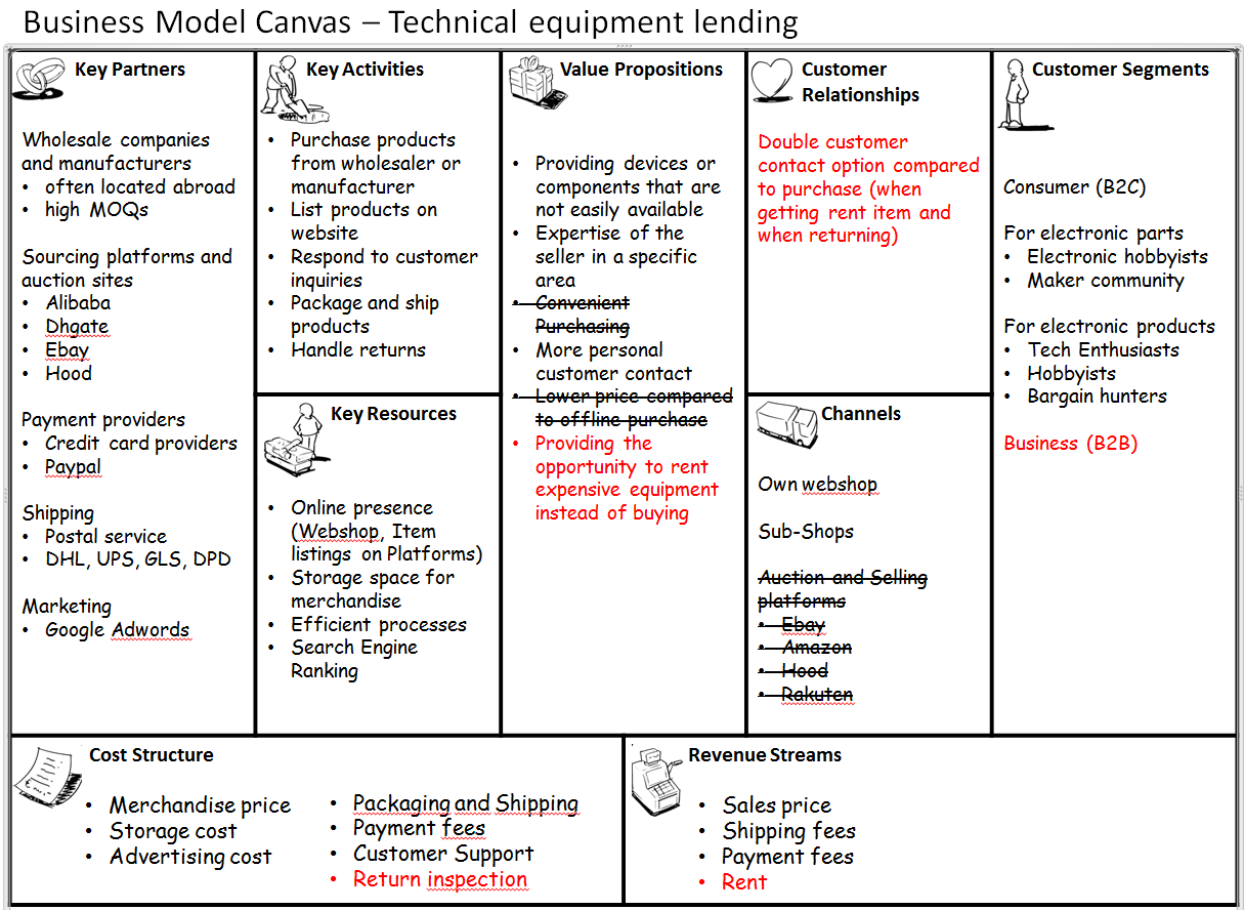

Fig. 32: BMC variant technical equipment lending, source: based on Osterwalder (2010), p. 44.

6.5.6 Business model variant: Fever screening thermal solution

This business model variant is based on the pattern “Perceived value-based” of the business model database and is shown in Fig. 33. With the outbreak of the Coronavirus the need to detect people who may be infected with the virus has emerged. For this purpose thermal imaging cameras can be used for screening people from a distance without contact at a suitable place (entrance, gate, corridor, etc.) to detect people that have elevated skin temperature. When a person with elevated skin temperature is detected they can be checked by a doctor for typical symptoms of COVID-19. Since the company has been trading with thermal imagers for many years and the thermal imager products have been used for medical purpose before, developing an own fever screening system could be possible with the help of partners in very short time. The business model would be mainly focused on creating the software and setup that is needed to get the system running and address the shortcomings of other systems that are already available on the market today. In contrast to the other business model variants, this business model variant may only be applicable during a very narrow time period.

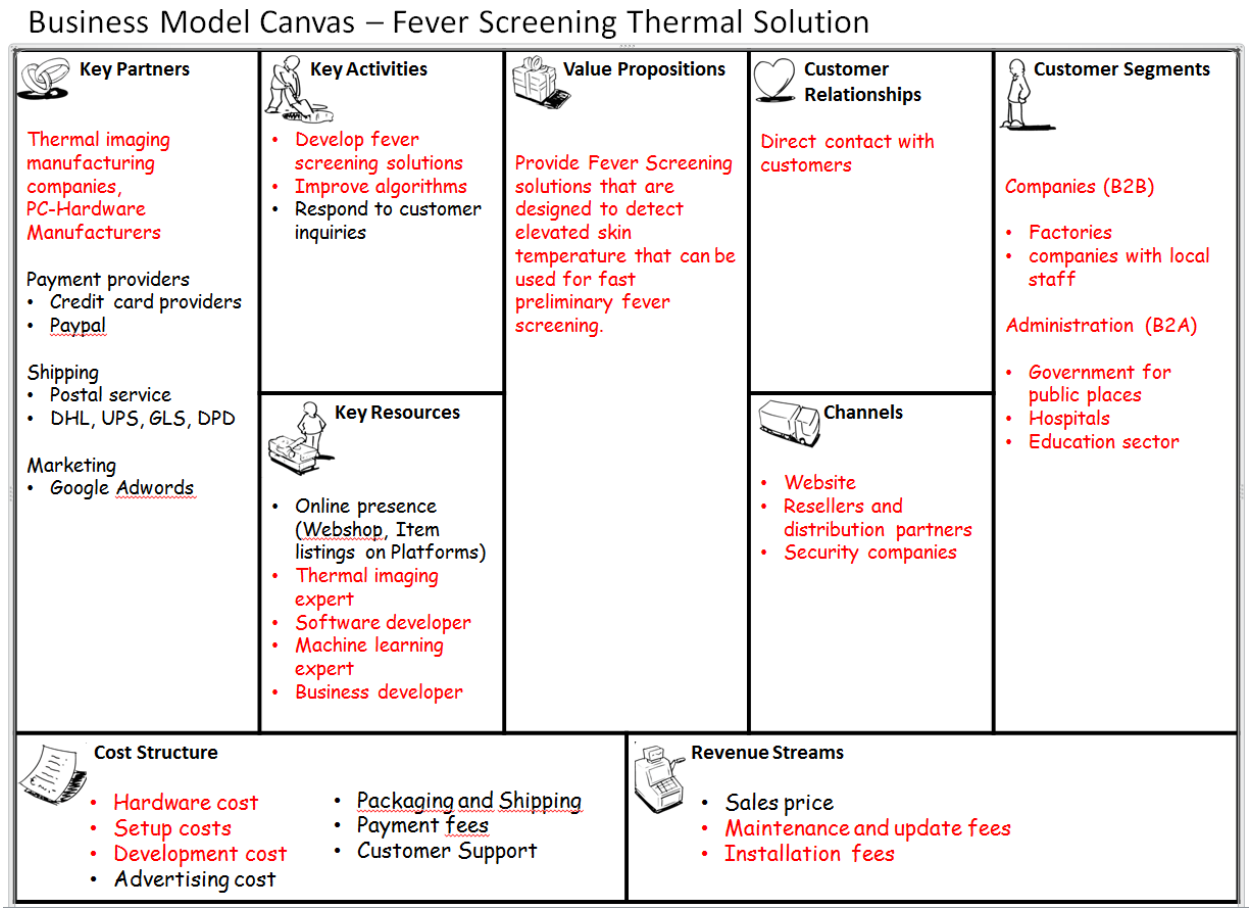

Fig. 33: BMC variant fever screening thermal solutions, source: based on Osterwalder (2010), p. 44.

6.6 Validation with expert interviews

For the expert interview the recommendation from the publication “Interviewing Experts” are applied. The book summarizes the works of several researchers and provides practical examples. The interview process can be divided in 3 steps:[133]

- Preparing the interviews
- Conducting the interviews
- Analysing the results and feedback

6.6.1 Preparing expert interviews

Interviews are conducted with experts to get expert opinions on the generated business models variants. The expert interviews have three purposes: The first purpose is to validate whether the underlying assumptions that lead to the creation of the particular business model variant are seen the same way. The second purpose is to validate if a sustainable and profitable business can be created from a particular business model variant and to get an opinion on the best choice. The third purpose is to fill in the gaps for details that may have been overlooked and refine the business models variants. Answering these questions require multiple areas of expertise. The experts are selected from three main areas the business model variants are based upon. These experts are E-commerce traders, electronic industry professionals and entrepreneurs. Each of these expert groups are asked for their opinion in a guideline-based interview with question addressed specifically to their area of expertise. The question catalogue consists of open ended questions that allow the experts to express their opinion freely, but within a set narrative. Due to the restrictions put in place to combat the spread of the Coronavirus it is not possible to conduct the expert interviews in person as originally planned. The interviews are conducted via video conference call or phone depending on the expert’s choice. For this purpose the best practices mentioned in the chapter “Expert Interviews on the Telephone: A Difficult Undertaking” were studied to avoid possible pitfalls. One major limitation for an interview with voice only is that due to the lack of non-verbal elements, the interaction process may be disturbed much more than with face-to-face interviews. Furthermore, potential external disturbances (such as the entering of third parties) are usually not recognized. This means that interviewers are not able to know if the interview partner’s attention is exclusively directed at the interview. Also with telephone interviews the interviewer typically produces reception signals in the form of “yes” and “uhm” more frequently than was the case with direct interviews. On the one hand this was the only way to indicate attention, on the other hand these signals served also for communicating to the opposite that the telephone-technical contact was still intact. The recommendation for interview length is recommended to be less than 45 minutes with the author choosing 20 to 30 minutes for practical reasons. Also it was found that the participants are more responsive to setting up interview appointments when contacted via the phone directly, compared to first contact via email and that offering a shorter interview duration does not automatically work as a factor motivating for agreeing to an interview as one might assume. While conducting interviews via the phone reduces travel time to the expert, the flexibility expected from the interviewer in this context may pose a

[133] Cf. Bogner (2009), pp. 243-245.

challenge as planned interview dates are rescheduled or postponed more often than in person meetings.[134]

6.6.2 Conducting expert interviews

The chapter "The Theory-Generating Expert Interview: Epistemological Interest, Forms of Knowledge, Interaction" provides a useful table with typologies of interaction and interview strategies which is shown in shortened form in Tab. 34 below:[135]

Interviewer role	**Indication of communication situation**	**Pre-conditions on the interviewer side**	**Interview and question style**	**Main area of application**
Co-expert or expert from different field	Symmetrical interaction	Mastery of specialist vocabulary	oriented towards dialogue, repeated supplementary questions, rapid exchange of questions and answers, "trading information"	Exploratory or systematizing expert interviews
Lay person	Asymmetrical interaction in favour of interviewee	Interviewer has no knowledge in the particular field	primarily a receiver of knowledge, questions generate narrative, committed but naïve supplementary questions	Theory generating expert interview
Authority	Asymmetrical interaction in favour of interviewer	Institutional background, position of political power	authoritarian style of questioning, critical supplementary questions, interviewer interrupts interviewee	Not recommended for interview situation
Accomplice	Secret knowledge is revealed	Personal acquaintance, common background	interview is conducted in a "personal" style and everyday language is used; repeated confirmation of common ground; range of different kinds of question possible	Exploratory, systematizing and theory generating expert interview
Potential critic	Rejection of interviewer	Interviewer is publicly known as "critic"	critical or tendentious interview questions; no verbal or non-verbal confirmation of the interviewee's status	Not recommended for interview situation

[134] Cf. Bogner (2009), pp. 167-178.

[135] Cf. Bogner (2009), pp. 68-69.

Tab. 34: Typology of interaction situations and interview strategies, source: Bogner (2009), pp. 68-69. (modified)

Bogner and Menz argue that the result of the expert interview depends on the role of the interviewer which may also change during the course of the interview. While the interaction cannot be put into a single category, it is recommended that the role of “lay person” or “accomplice” should be used for theory generating expert interviews. Posing as a “co-expert” from a different knowledge culture usually yields the most information as the interviewed expert is normally treating the interviewer as a colleague with equal status and exchanges more details. Assuming the role as interviewer as an expert in the same field may make the interviewed expert feel threatened in his competence or seeing the interviewer as competition which may lead to holding back critical information. However depending on one’s own epistemological interest, other roles may also be assumed for different interviews.[136]

6.6.3 Analysing the results and feedback

For analysing the feedback from the experts a qualitative content analysis is performed to filter the gathered data and get the information relevant to the research question. For this purpose the qualitative content analysis of Mayringer was used in a modified way. Fig. 34 shows the quantitative volume of the base material content that is reduced step by step in the original process proposed by Mayringer.[137]

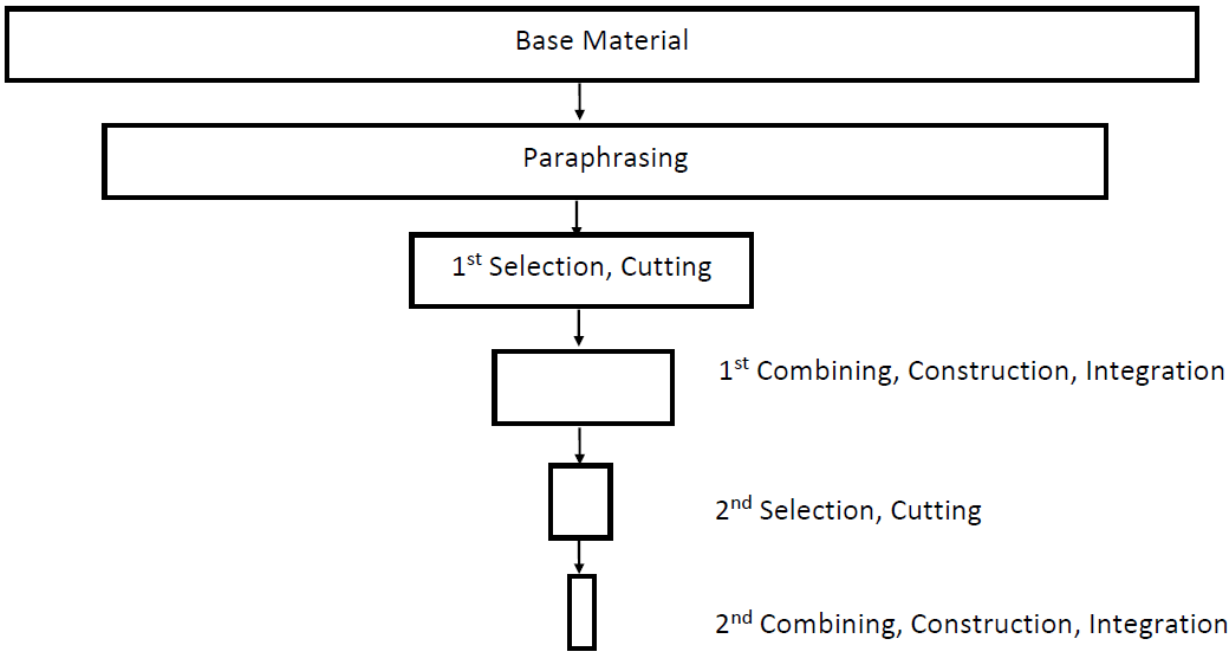

Fig. 34: Base material data reduction, source: Mayringer (2014), p. 78.

As the interview questions for the experts are already very specific and the goal is to reduce the experts’ response into categories for classification, there is no need to run a two stage selection and combing process. This reduces the number processing step to the following:

[136] Cf. Bogner (2009), pp. 65-72.

[137] Cf. Mayringer (2014), p. 78.

1. Base material (data from interview)
2. Paraphrasing (extract meaning)
3. Generalization
4. Reduction (Classification)

The list of interviewed experts shows the details like background, work experience and age of the interviewed experts. The list in Tab. 35 is provided in an anonymized format as the majority of the experts preferred not to be named. The main reason was privacy concerns.

Expert Number	**Current Job Position**	**Background**	**Age**	**Category**	**Years of experience in industry**	**Interview duration (min)**
Expert 1	Senior Staff System Engineer	Electronic hardware designer	30-40	Electronics industry	14	40:16
Expert 2	CEO	E-commerce and manufacturing with multiple companies	30-40	E-commerce	12	38:49
Expert 3	CEO	Electronic hardware designer, recently founded a startup	20-30	Entrepreneur	5	28:59
Expert 4	CEO	Electronic product development and manufacturing	30-40	Entrepreneur	12	28:48
Expert 5	retired	Electronic hardware developer	60-70	Electronics industry	23	31:34
Expert 6	Senior Software Application Engineer	Embedded systems development, also runs own company	30-40	Electronics industry	10	36:07
Expert 7	CEO	Founded several companies in electronics industry	60-70	Entrepreneur	40	65:56

Tab. 35: List of interviewed experts, source: own illustration

The complete qualitative content analysis of the interviews can be found in the appendix. The summary of the experts' opinions on the business models is listed below.

Business model: Customer feedback created products

None of the experts saw any real potential in this business model. Acting on customer feedback was seen as a necessity, for example to provide support to customers or to produce an electronic part according to specification. The potential for economic gain was seen as rather low to even negative when using this

business model. Expert number 7 pointed out that while it may be good for the customer if every feedback from the customer is considered, it may not be the optimum for the company from revenue point of view. Other experts from the electronics industry also shared the opinion that prioritization of customer requests (feedback) is important as resources are limited. Customer feedback is already considered to extend as is it profitable for the existing business. An improvement to the way business is currently done in the industry by considering customer feedback to a much greater extend was not seen.

Business model variant: Open source brand enhancement

The opinions on the usability of open source projects are quite diverse. Two experts believed that small open source projects can be useful. Other opinions are that the lack of standardization, the questionable quality and trust issue or that license problems would be an issue. The main revenue models for open source were considered to be support and adaptation fees for companies, advertising revenue or selling physical accessories for large open source project. Interestingly although entrepreneurs consider that running a business model based on open source is difficult and needs to be managed professionally, they think that adding open source to the business model is a good idea or have plans to do so.

Business model variant: Niche B2B equipment web shop

The validation of this business model variant was done in two steps. The first the purchasing behaviour of the target group for the web shop, the experts in the electronics industry who need special equipment, was investigated. This showed that specialized web shops are only the last resort when ordering electronic equipment and are only used when other purchasing sources like catalogue distributors, pre-approved suppliers or Amazon do not carry the item in their inventory. At smaller price items which only cost a couple hundred Euros, the electronics experts could partly place the order on their own, while at larger order sizes, purchasing was always involved, which may indicate, that the focus shifts from best convenience of ordering the item to lowest price as primary selection criteria. The second step in the validation process was the consideration of the opinion of the entrepreneurs and E-commerce trader which was rather pessimistic. The main concerns were that this business model is already state of the art and everything that can be sold online is already being sold online, to the main issue with electronics being the integration which cannot be done online. Finding the right niche is seen as necessity for this business model to work.

Business model variant: Multilingual offerings

The opinions of the experts were quite similar on this business model adaptation. All experts confirmed that the websites and webshops of their companies used English. Four out of seven also had offerings in German and three had offerings in more than these two languages. The opinions of offering support in language other than English and German differed with the main concern being cost for having native speakers on payroll for customer support for languages you infrequently need. Another opinion was that 90% of the market in the B2B electronics industry can be addressed in English. Having an English language website can be considered a standard in the electronics industry.

Business model variant: Technical equipment lending

Lending out technical equipment as a business model was seen very critical by the majority of experts. From all experts only Expert 4 was renting technical equipment for his company. The main objections to lending are that rental just is not that interesting for objects you can easily buy. The technical equipment lending business model is seen to have a no market on low price equipment and to be be very capital intensive for high price equipment where there is a market. According to one expert, coupling equipment lending with some kind of service customer need, is the only way to make the lending business model work.

Business model variant: Fever screening thermal solution

The experts' opinions on this business model were generally positive. Only Expert 4 thought that fever screening was no viable solution to address the issue of spreading the Coronavirus. Five experts had experts had the opinion that fever screening works and should be used. As for the business case all entrepreneurs thought that there will be demand for the solution. Even Expert 4 who thinks the system is useless has the opinion that the state and companies are using these systems to show the public that they are taking measures for the safety of the people. Major concerns are that the current situation is used to install more surveillance and intrude into the privacy of the individual. Concern was also voiced about the high cost of thermal imagers and that the business model was only working temporary.

Tab. 36 shows a summary of the overall rating of the business model variants

Business Model variant	Customer feedback created products	Open source brand enhancement	Niche B2B Equipment Webshop	Multilingual offerings	Technical equipment lending	Fever Screening Thermal Solution
Overall Expert rating	negative, no potential	Mixed, possible potential	Negative, many concerns	Positive, already state of art	negative, very limited potential	Positive, good potential

Tab. 36: Summary of rating of business model variants, source: own illustration

Opinion on trends

The experts' opinions on relevance of trends in the electronics/E-commerce industry were also investigated in the interviews as shown in Tab. 37. A rating scale with four categories was used to classify the opinion of the importance of the trend for the industry. These categories were: not relevant, low relevance, relevant and very relevant. Also the experts were asked to argue on why they classify a particular trend the way they do, which is not used for the analysis in the table below, but just to get a better understanding of the reasoning behind the classification. To get comparable percentage numbers for the relevance of the trends, the categories were assigned percentage values from 0% to 100% with not relevant getting 0%, low relevance getting 33,3%, relevant getting 66,6% and very relevant getting 100%. These numbers were then multiplied by the number of experts' answers for each category, added up for each trend and scaled to get the average value. The close the value is to 100% the higher the

trend is estimated to influence the industry. The variance was also calculated to show how much experts' opinions differ – A lower percentage value shows that the opinions are the same, a high value shows that opinions differ.

Trend	Trend score	Variance in %
Security	81%	16%
Health	76%	15%
Digital Ecosystem	71%	12%
Globalization	67%	0%
Digitalization in the electronics industry	67%	18%
Mobility	62%	21%
Sensing and mobility	57%	29%
Increased innovation speed	57%	29%
Advanced AI and Analytics	57%	39%
Market shift towards bigger firms	52%	35%
Shift to Asia	43%	29%
Market size growth in E-commerce	29%	33%
Augmented Human	24%	29%
Personalization	24%	29%
Postclassical compute and comms	10%	23%

Tab. 37: Experts opinion on relevance of trends on the electronics/E-commerce industry, source: own illustration

When comparing the experts opinions on the trends with the own opinions of the trends 10 out of 15 trends were within limits when considering a 10% lower and upper limit on the variance per trend compared to the average value. The importance/relevance of the following trends was underestimated:

- Digital Ecosystem
- Digitalization in the electronics industry
- Security
- Health

The importance/relevance of the following trend was overestimated:

- Personalization

When looking at the most relevant trends according to the experts' opinions, which are security, health and digital ecosystems, it leads to the assumption that companies whose business models are positively impacted by these trends will be better off in terms of growth on average. However one expert also noted that while trends are good to predict markets in general, it really depends on the detailed implementation of the business model and the management of the business: It is better to have a well-managed business in a stagnating or even declining market than having a poorly managed business in a growing market.

6.6.4 Updated business model canvases

Only the business model variants “Fever Screening Thermal Solution” and “Multilingual offerings” were viewed favourably by the experts. These business models are improved by the experts’ recommendations which are added in green colour to the business model canvas.

The improvements of the business model “Fever Screening Thermal Solution” as can be seen in Fig. 35 marked in green was mainly in the value proposition. While originally the thought was only to detect sick people as main value proposition other reason for using such a system were identified. The fever screening could be used by companies to demonstrate that something is done for the health of the employees or if such screening systems are used nationwide it may give healthy people back their freedom of movement. It was also noted that this kind of business model was likely to be only temporary in nature and that there would be no long term customer relationships or demand.

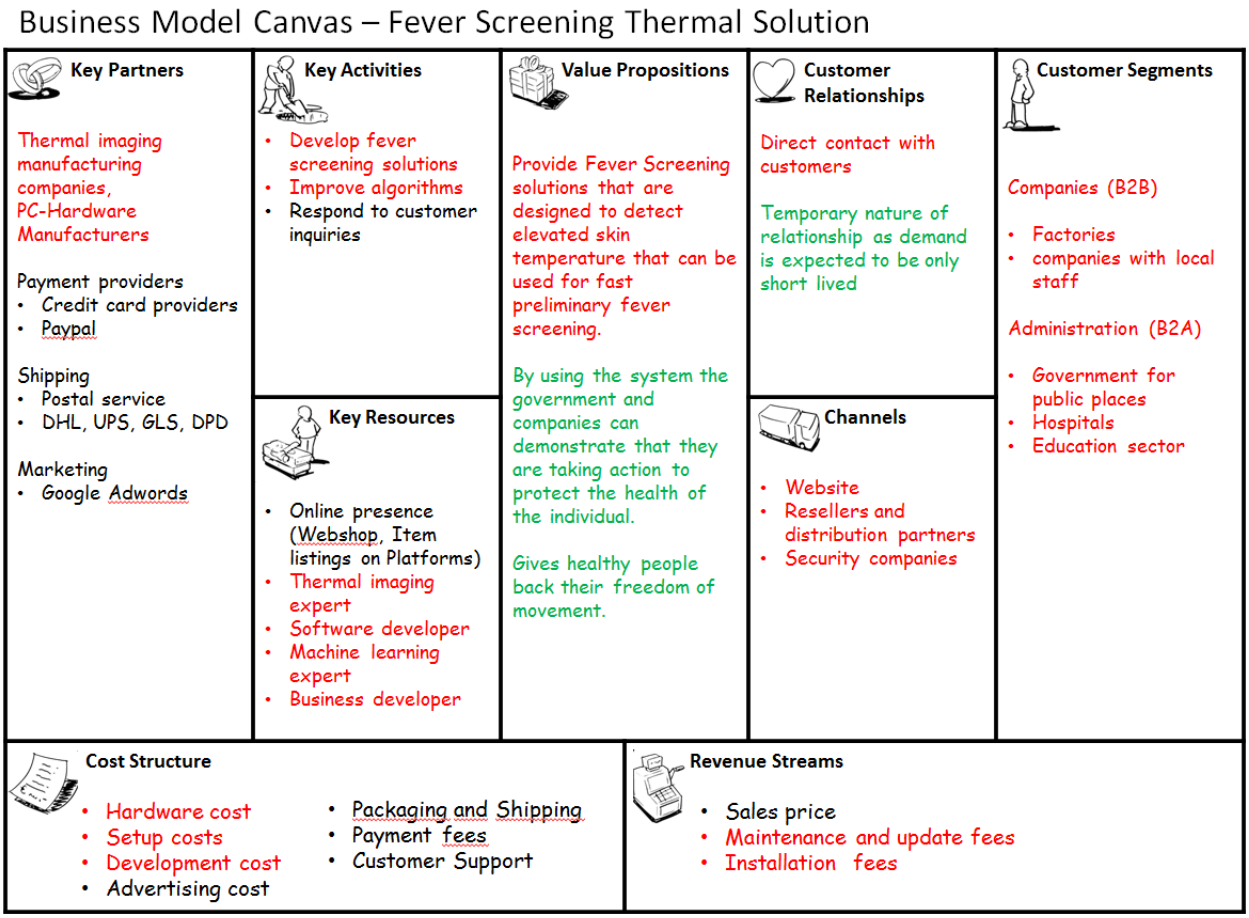

Fig. 35: Fever Screening Thermal Solutions - improved BMC, source: based on Osterwalder (2010), p. 44.

The improvements of the business model “Multilingual offerings” (see Fig. 36) after considering the feedback from the experts are that the company website should first have support in English language as this is most important, before adding any other language. To address about 90% of the B2B market, English language support is sufficient. The cost for multilingual support should not be underestimated as it requires a certain selling volume to break even.

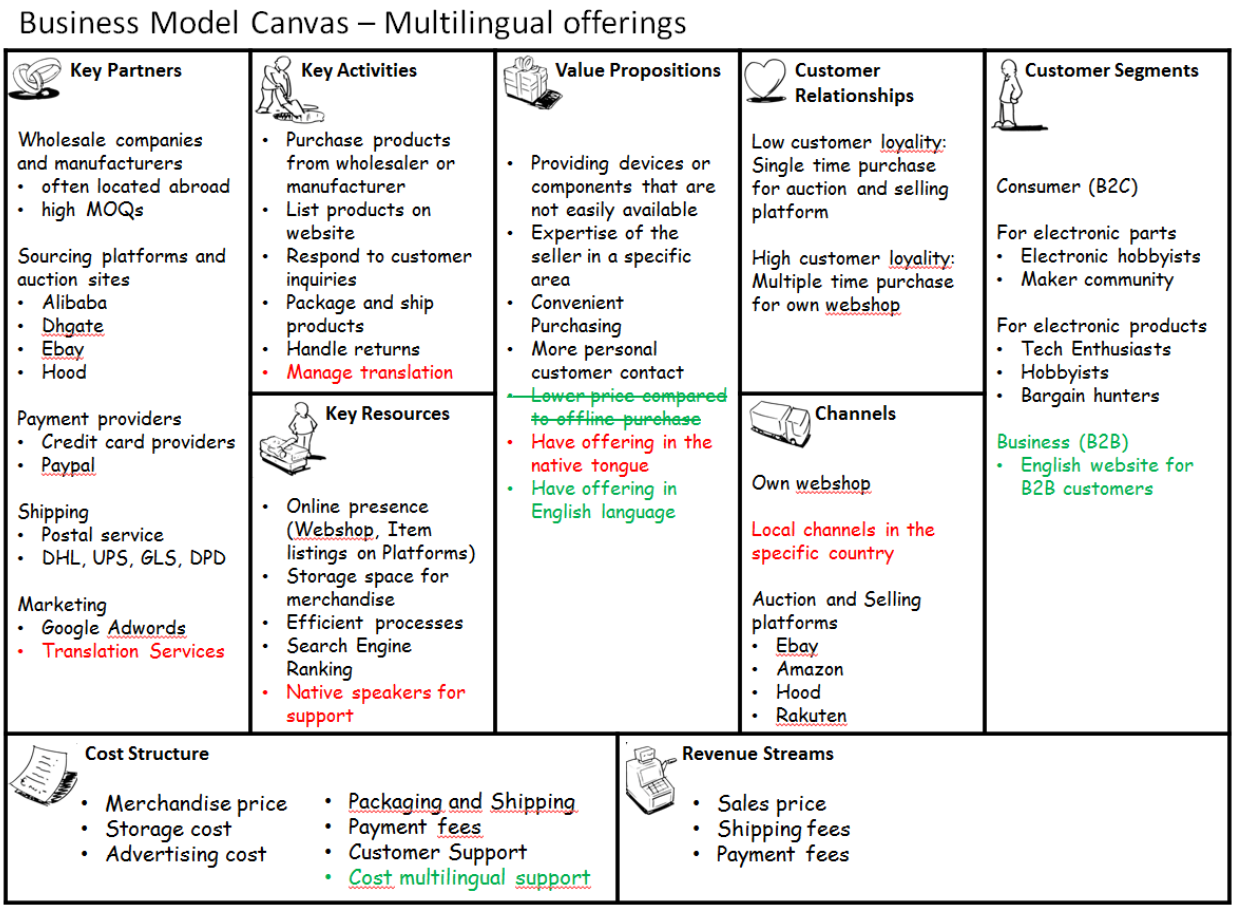

Fig. 36: Multilingual offerings - improved BMC, source: based on Osterwalder (2010), p. 44.

7 CONCLUSION AND RECOMMENDATIONS

Developing and improving the business models of companies that are part of electronics industry is critical to the continued success of the company. The focus on product niches in E-commerce allows exploring many possible business model options as E-commerce is gaining in popularity. The recent developments with the outbreak of the Coronavirus have also demonstrated the need for companies to re-evaluate their business model, be flexible and adapt to the new situation if necessary.

In the theoretical part of the master thesis the structure, value chain and typical business models of E-commerce were analysed first. The major trends of this industry were identified which include the strong expected growth rate for the years to come, the growing importance of B2B E-commerce and also a strong benefit from emerging technologies. In the next step the electronics sector was investigated. The major trends of this industry were identified as the shift to Asia, digital transformation and increased innovation speed. In the following chapter business model literature was reviewed which led to the finding, that although there were many different approaches described in literature, the business model canvas of Osterwalder was most often used in practice. This graphical representation of the business model was also adopted for this work. As for the business model innovation process, there was no procedure in literature especially suitable for small scale E-commerce businesses so an own six stage process was created. This process includes the following stages: Analysis of the current state, business environment analysis, generating business model options, validation and implementation. The first five stages are linear stages that build on each other sequentially and the last stage is a cycle.

In the practical part the business model innovation process was applied on the company Voltagezone Electronics e.U. to explore new possible business model options and find ways to improve the existing business model. For this purpose a workshop was held where the current business model of the company was explored and put onto paper, the core competences were identified, SWOT analysis was performed to finish the first stage of the process. This stage yielded good results and lead to the creation of nine strategies that could already be acted upon. In the second stage the business environment was analysed by applying the 5 forces model from Porter and identifying relevant industry trends and megatrends. As the company focuses on two different industry niches, the high voltage industry and the thermal imaging industry, the influences of trends on these niches were analysed separately. In the following stage the business model variants were generated based on two different methods. The first method used the strategies from the SWOT analysis and the second method the business model pattern database and analysis of competitor web-pages. Both methods yielded a total of twelve possible business model variants. For each of the twelve variants the impact to the nine building blocks of the existing business model canvas was checked and put on record if there was any obvious impact. To rate the order of relevance of these variants for the business, the effectuations model from Sarasvathy was chosen as it appeared most suitable for the circumstances. The top six business model variants were chosen and full business model canvases were developed that showed the necessary adaptations to the existing business model. In the validation stage, expert interviews were conducted to validate the underlying assumptions and get their opinions about the business models variants. This showed that from the six developed business model variants only two business model variants were viewed in a positive way. These positively viewed business model variants were “Multilingual offerings” and “Fever Screening

Thermal Solution". The business model "Open source brand enhancement" received mixed opinions and would need to be investigated further as it may have some potential.

The recommendations for the company are to use at this stage only the two business model variants that were positively viewed by the experts. The application of the business model "Multilingual offerings" would bring an immediate growth in number of potential customers as the web shop of the company is currently only offering German language. It is recommended to translate the Website into English language and reserve for the possibility to add further languages at a later date. Having the offerings in English language is likely to increase the amount of B2B customers more than the amount of B2C customers. It is recommended to start with a few products or a limited product portfolio that is offered in English language to check the market response.

As for the business model "Fever Screening Thermal Solution" the recommendation for the company is to offer some of their existing thermal imagers that would fit the required specifications for the fever screening purpose to get in contact with potential customers and see how big the demand really is. This can be seen as start of a Build-Measure-Learn loop. After some customer interactions the next steps should be taken to decide whether to pursue this business model further and develop a full fever screening solution or take a different path.

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LIST OF ILLUSTRATIONS

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
B2B	Business-to-Business
B2C	Business-to-Consumer
BI	Business Intelligence
BM	Business Model
BMC	Business Model Canvas
BMI	Business Model Innovation
C2C	Consumer-to-Consumer
CRM	Customer-Relationship-Management
DBMC	Dynamic Business Model Canvas
DDDM	Data Driven Decision Making
EBS	Electronic Based Systems
EEI	Electrical and Electronic engineering Industries
ERP	Enterprise-Resource-Planning
GDP	Gross Domestic Product
HiPPO	Highest Paid Person’s Opinion
HVI	High Voltage Industry
IOT	Internet of Things
KPI	Key Performance Indicator
MSP	Multi-Sided Platform
ROI	Return on Investment
SD	System Dynamics
SME	Small and Medium Enterprise
TII	Thermal Imaging Industry
VAT	Value Added Tax

APPENDIX

APPENDIX 1: DOCUMENT USED FOR SWOT ANALYSIS

Business model variants based on SWOT (Excel sheet) – used in chapter 6.2.3

Category	Strategy	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationships	Channels	Customer Segments	Cost structure	Revenue Streams	Changes to building blocks
SO strategy:	Sell more products in niche	Reselling partners that offer our products in geographically different areas	Focus on Marketing to target each sub segment of the niche	Reselling partners	Value proposition to reselling partners: Resell in demand products for healthy margins	Resellers have to be prioritized as customers. Indirect relationship with customers that buy from resellers have to be managed	Focus on most relevant channels and leave other channels to resellers	Focus on B2B and Resellers	Reseller will need margin so cost structure needs to be revised		8
SO strategy:	Focus on new technology areas that need special expertise	manufacturers, technical universities, start-ups	systematically search for areas of interest			Frequent and targeted relationships with customers	Own technology related website and social media presence	Focus on B2B	marketing cost	Sales com-missions	7
SO strategy:	Make online shop multilingual	Translation Services and Native speakers for support	Coordinate translation into multiple languages	Native speakers for support		indirect customer relationships for customers directly supported by native speakers	Local channels in the specific country				5
WO strategy	Develop more complex products together with partners	other engineering companies	Development coordination	Development team				Customers looking for customized products	development costs	NRE fees	5
ST strategy	Implement methods to get customer feedback on products	customer feedback tool provider	source/develop products based on customer feedback	change management to implement useful customer feedback		customer interact also via feedback tool					4
ST strategy	Monitor changes of environment		regularly check for changes that can affect business		fast adoption of new factors that offer value for the customer	inform customers regularly about changes					3
ST strategy	Find new suppliers in the EU		continuous supplier monitoring		great variety of suppliers and supply chain redundancy						2
WT strategy	Prepare for changes of new EU VAT						Stop selling on platforms, that are not	Remove buyers from EU countries			2

	law						profitable due to increased effort	are not profitable due to increased effort			
WO strategy	Hire additional employees to reduce workload on CEO and address new opportunities			Employees/Freelancers							1
WO strategy	Create a strategy or systematic development		actively work on strategy development								1
WT strategy	Monitor for additional niches or shift in niches		regularly check if underlying assumptions are still true								1
WT strategy	Find ways to decrease dependence on a particular supplier	Other suppliers	Look for alternative suppliers								1
Changes per element		6	10	5	3	5	4	4	3	2	

APPENDIX 2: DOCUMENTS USED FOR GENERATING BUSINESS MODEL VARIANTS FROM PATTERN DATABASE

Business models pattern database initiation phase (Excel sheet) – chapter 6.4.2

Source	Pattern	Dimensions																																																			
Source	Pattern	D1: Hier. Impact			D2: Degree of digitization		D3: Product type						D4: Strategy for differentiation							D5: Target customers				D6: Value delivery process					D7: Sourcing			D8: Third parties involved					D9: Value creation process					D10: Revenue model					D11: Pricing strategy					D12: Direct profit effect			
Source	Pattern	Prototypical pattern	Solution pattern	Purely digital	Digitally enabled	Not necessarily digital	Physical	Financial	Human	Intellectual property	Hybrid	Product type not specified	Quality	Customization	Combination	Access/convenience	Price	Network effects	No impact on differentiation	Specific new customer segment	Lock-in existing customers	Other companies (B2B)	No impact on target customers	Brand and marketing	Sales channel	Sales model	Customer relationship management	No impact on delivery process	Make	Buy	No impact on sourcing	Suppliers	Customers	Competitors	Multiple parties	No impact on third parties involved	Innovation	Supply	Production	Multiple steps	No impact on creation process	Sell	Lend	Intermediate	Advertising	No impact on revenue model	Premium	Cheap	Dynamic	Non-transparent	No impact on pricing strategy	Increase revenue	Reduce cost	Multiple effects	No direct profit impact
Weill et al. (2005)	[Physical] manufacturer	X				X	X												X				X					X	X							X					X	X									X				X
Weill et al. (2005)	Entrepreneur	X				X		X											X				X					X	X							X					X	X									X				X
Weill et al. (2005)	Financial trader	X				X		X											X				X					X		X						X					X	X									X				X
Weill et al. (2005)	Inventor	X			X					X									X				X					X	X							X					X	X									X				X
Weill et al. (2005)	IP trader	X		X						X									X				X					X		X						X					X	X									X				X
Weill et al. (2005)	[Physical] wholesaler	X				X	X												X				X					X		X						X					X	X									X				X
Linder and Cantrell	Value-added reseller	X				X					X				X								X					X		X						X					X	X									X				X

(2000)																																																							
Gassmann et al. (2014)	White label	X				X						X							X				X			X			X							X			X			X									X				X
Hanson (2000)	Product sales	X				X	X												X				X					X			X					X					X	X									X				X
Applegate (2001)	[Digital] infrastructur e retailers	X			X		X												X				X					X		X						X					X	X									X				X
Applegate (2001)	E-retailer	X			X		X												X				X		X					X						X					X	X									X				X
Bienstock et al. (2002)	Merchant model	X				X						X							X				X					X		X						X					X	X									X				X
Clemons (2009)	Selling virtual accessories	X		X						X									X				X		X						X					X					X	X									X				X
Fleisch et al. (2014)	Sensor as a service		X		X					X									X				X					X			X					X					X	X									X				X

Innovation dimensions of competitors (excel sheet) – used in chapter 6.4.2

Competitor Website	https://www.rmcybernetics.com/	http://www.lessinger.net/	https://www.hvproducts.de/	https://www.amazing1.com/	https://www.danholt.de/	www.batterfly.com	https://www.amazon.de	https://www.flir-infrarotkameras.de/			
Dimension	Competitor A, HVI	Competitor B, HVI	Competitor C, HVI	Competitor D, HVI	Competitor E, TII	Competitor F, TII	Competitor G, TII	Competitor H, TII	Dimension	Total number	Sub segment in Dimension
D1: Hierarchical Impact									D1: Hierarchical Impact		
D2: Degree of digitization									D2: Degree of digitization		
D3: Product type									D3: Product type		
D4: Strategy for differentiation	Added volume pricing: 10% off when buying 10 pcs of same item. The level of customization has also increased: Previously only offered products, but is now also offering customized development and adaptation services		The level of customization has also increased: Previously only offered products, but is now also offering custom solutions			Combination: Now offer different types of thermal cameras (SWIR) as well as different manufactures	Many merchants on sales platforms compete on price - this is not really a new innovation as it has been the primary purpose of the platforms to connect the merchant with the best offer to the buyer.		D4: Strategy for differentiation	5	2 Price, 2 Customization, 1 Combination
D5: Target customers	Targets new customer segment: DIY Science Projects				Focus on different Customer segment: Smart Life Technology - no longer carries latest thermal imager models in inventory				D5: Target customers	2	2 Specific new customer segment
D6: Value delivery process			Sales Channels: Increased advertising on google AdWords	Brand and Marketing: Increased number of products with own brand					D6: Value delivery process	2	1 Sales Channel, 1 Brand and Marketing

D7: Sourcing									D7: Sourcing		
D8: Third parties involved							Multiple Parties: Besides letting sellers uses their platform for selling, they are now buying directly from the manufacturer and sell themselves		D8: Third parties involved	1	1 Multiple Parties
D9: Value creation process		Research and design: Now offers many fully assembled devices, not only self-build kits		Research and design: Increased number of products that even fit very specialized niches					D9: Value creation process	2	2 Research and Design
D10: Revenue model						Intermediate: Some thermal imagers are sold by 3rd party sellers via Affiliate link		Lend: Offers lending for high price thermal cameras	D10: Revenue model	2	1 Intermediate, 1 Lend
D11: Pricing strategy		Premium: Fully assembled devices are addressed at premium market							D11: Pricing strategy	1	1 Premium
D12: Direct profit effect									D12: Direct profit effect		

Business models pattern database integration phase (excel sheet) – used in chapter 6.4.2

Source	Pattern	Megatrend						Industry trend TTI &HVI						
Source	Pattern	Personalization	Globalization	Health	Mobility	Security	No direct influence to megatrend	Market size growth in E-commerce	Sensing and mobility	Augmented Human	Advanced AI and Analytics	Shift to Asia	Increased innovation speed	No direct Influence on trend
Weill et al. (2005)	[Physical] wholesaler		X					X						
Chatterjee (2013)	Perceived value-based	X								X				
Osterwalder and Pigneur (2010)	The long tail		X					X						
Linder and Cantrell (2000)	Channel maximization		X					X						
Linder and Cantrell (2000)	Cool brands	X						X						
Linder and Cantrell (2000)	Incomparable products	X						X						
Linder and Cantrell (2000)	Mass customization	X						X						
Johnson (2009)	Rent instead of buy					X		X						
Gassmann et al. (2014)	E-shop		X					X						
Gassmann et al. (2014)	Ultimate luxury	X								X				
Hanson (2000)	Product sales		X					X						
Strauss and Frost (2014)	E-mail		X					X						
Strauss and Frost (2014)	Online advertising and public relations		X						X					
Strauss and Frost (2014)	Online sales promotions		X						X					
Applegate (2001)	[IT] equipment/component manufacturers		X								X			
Applegate (2001)	Advisors					X							X	
Applegate (2001)	E-retailer		X					X						
Clemons (2009)	Selling online services	X						X						
Clemons (2009)	Selling virtual accessories	X						X						
Fleisch et al. (2014)	Sensor as a service			X					X					

Selected business models based on patter database (excel sheet) – used in chapter 6.4.2

Pattern	Short description	Example companies from literature	Does the business model pattern resolve weaknesses / or leverage strength?	Pattern used for generating business model variant	Example company closer related to current business
[Physical] wholesaler	Buy and sell physical assets	Wal*Mart, Amazon	Pattern describes current business model	no	
Perceived value-based	Position company's output as a "want" item and command a price premium —invest in knowledge professionals such as scientists, engineers, programmers, or data experts	Semiconductors, software firms, pharma	Strength: Creativity to develop solutions, Technology orientation	yes	https://www.hikvision.com/en/products/Thermal-Products/Thermography-thermal-cameras/fever-screening-series/
The long tail	Focus on selling a large number of niche products, each of which sells relatively infrequently	Netflix, eBay, YouTube	Weakness: No centralized inventory management system	no	
Channel maximization	Leverage as many channels as possible to maximize revenues	AOL, Time Warner	Weakness: No dedicated marketing or direct sales	no	
Cool brands	Earn premium prices with competitive products through expert brand marketing	Goodyear, Nike	Strength: Company name is known in the market	yes	https://www.sparkfun.com/ https://www.adafruit.com/
Incomparable products	Use deep R&D skills to develop and exploit proprietary technology to offer unique products that command high margins	Polaroid, DuPont	Strength: Creativity to develop solutions, Technology orientation	yes	https://www.workswellwaermebildkamera.de https://iseg-hv.com/de
Mass customization	Customize a commodity product to the customers' specific preferences	Dell, mymuesli	Strength: Customizing possibilities of products Weakness: Already outsourced areas have an increased communication effort	yes	https://de.beta-layout.com
Rent instead of buy	Temporarily lend a product to the customer and charge a rent	Xerox, fashionette, United Rentals	Strength: Company name is known in the market Weakness: Parts of the product portfolio are subject to strong competition	yes	https://equipment.cafe/shop/
E-shop	Build a web shop to sell products or services online	Fleurop, Travelocity, Flyeralarm	Pattern describes current business model	no	
Ultimate luxury	Focus on selling to the top-tier customers of the income pyramid	Lamborghini, Abbot Downing		no	
Product sales	Sell a product for a fixed price	Dell	Pattern describes current business model	no	
E-mail	Communicate with stakeholders via e-mails rather than print and mail	Online mailings of companies, digital annual reports	Weakness: No dedicated marketing or direct sales	no	
Online advertising and public relations	Buy advertising on products or services of another companies	Product advertising in radio, TV, or Internet		no	
Online sales promotions	Use the internet to send free product samples or discount coupons to customers	Companies selling via Groupon	Strength: Company name is known in the (niche) market	yes	www.pearl.at

[IT] equipment/component manufacturers	Produce IT equipment and components	IBM, Compaq, Cisco	Strength: Creativity to develop solutions, Customizing possibilities of products	yes	www.kronegger.com
Advisors	Provide consulting and advice	Accenture, IBM	Strength: Experience with specialized high voltage products	yes	www.enersynt.com https://www.thermalimagingconsultant.com/
E-retailer	Assume control of inventory, set a non-negotiable price, and sell physical products online	Amazon.com, LandsEnd.com, Walmart.com	Describes current business model pattern	no	
Selling online services	Offer to use software services online	E*Trade, Survey Monkey	Strength: Healthy margins with specialized products	yes	https://www.remove.bg
Selling virtual accessories	Sell accessories that would be difficult to earn in online games	World of Warcraft, Second life		no	
Sensor as a service	Collect, process, and sell sensor data for a fee	Streetline.com, Google Maps	Strength: Technology orientation	yes	https://data.iota.org/#/ https://www.redliondata.com/

Business model variants based on patter database (Excel sheet) – used in chapter 6.4.2

Category	Pattern / Strategy	BM Variant Name	Key Partners	Key Activities	Key Resources	Value Proposition	Customer Relationships	Channels	Customer Segments	Cost structure	Revenue Streams
ST strategy	Implement methods to get customer feedback on products	Customer feedback products	customer feedback tool provider	source/develop products based on customer feedback	change management to implement useful customer feedback		customer interact also via feedback tool				
Pattern database	Cool brands	Open source brand enhancement	Component manufacturers, Assembly companies, Shipping companies, Payment providers	Design and manufacture	online presence, online community, designs	Well-designed open source product designs for a particular niche that can be used for educational or professional purpose	Contact via website or social media, indirect contact via resellers	Website, Resellers and distribution partners	Education Sector, Professionals, DIY Community	Development cost, Hardware cost, Fulfilment cost, Support	Sales Price, Fundraisers and donations
Pattern database	Incomparable products	Niche B2B Equipment Web shop	B2B Equipment manufacturers			Purchase B2B Equipment conveniently online without delay from asking the price or availability		B2B Web shop	B2B customers		
SO strategy:	Make online shop multilingual	Multilingual offerings	Translation Services and Native speakers for support	Coordinate translation into multiple languages	Native speakers for support		indirect customer relationships for customers directly supported by native speakers	Local channels in the specific country			
Pattern database	Rent instead of buy	Technical equipment lending				Providing the opportunity to rent expensive equipment instead of buying	Double customer contact			Return inspection fee	Rent
Pattern database	Perceived value-based	Fever Screening Thermal Solution	Thermal imaging manufacturing companies, PC-Hardware Manufacturers	Develop Fever Screening solutions, improve algorithms	Thermal imaging expert, software developer, Machine learning expert, Business developer	Provide Fever Screening solutions that are designed to detect elevated skin temperature that can be used for fast preliminary fever	Direct contact with customers	Website, Resellers and distribution partners, Security companies	Factories, companies with local staff, government for public places	Development cost, Hardware cost, Installation cost, Support cost,	System sales price, maintenance and update fees

						screening.					
Pattern database	Advisors	Selling as consultant	Thermal imaging manufacturing companies	Consulting on project for customers		Resolving a specific problem the customer has		Professional networks like LinkedIn			Consulting fees
SO strategy:	Sell more products in niche	E-commerce reselling partners	Reselling partners that offer our products in geographically different areas	Focus on Marketing to target each sub segment of the niche	Reselling partners	Value proposition to reselling partners: Resell in demand products for healthy margins	Resellers have to be prioritized as customers. Indirect relationship with customers that buy from resellers have to be managed	Focus on most relevant channels and leave other channels to resellers	Focus on B2B and Resellers	Reseller will need margin so cost structure needs to be revised	
SO strategy:	Focus on new technology areas that need special expertise	Emerging technology focus	manufacturers, technical universities, start-ups	systematically search for areas of interest			Frequent and targeted relationships with customers	Own technology related website and social media presence	Focus on B2B	marketing cost	Sales commissions
Pattern database	[IT] equipment/component manufacturers	Localized production	Pre-Assembly companies	Specification/Test of products	R&D Team	Optimized products for target user group				R&D Cost	
WO strategy	Develop more complex products together with partners	E-commerce joint venture	other engineering companies	Development coordination	Development team				Customers looking for customized products	development costs	NRE fees
Pattern database	Online sales promotions	Coupon based campaigning	Coupon portal like Groupon	Running coupon campaigns		Don't pay full price if you have a coupon	Interaction via coupon	Coupon Portals, Newsletters with Coupons		Coupon costs	

APPENDIX 3: DOCUMENTS USED FOR RATING THE BUSINESS MODELS

Business Model rating (Excel sheet) – used in chapter 6.5

BM Variant Name	Changes to building blocks	Similarity of nine building blocks	Potential for Synergies	Potential for conflicts	BM managing Approach	Realization possible with existing competence?	Within knowledge corridor?	Realization possible with help of existing contacts?	Realization requires strategic partnership?	Estimated risk of failure	Estimated loss if unsuccessful	Overall Rating
Customer feedback products	4	++	++	--	Integration	Yes	Yes	Yes	No	medium	low	6
Open source brand enhancement	9	+-	+-	+-	Autonomy	Yes	Yes	Yes	No	medium	medium	5
Niche B2B Equipment Webshop	4	++	+-	--	Autonomy	Yes	Yes	Yes	No	high	low	5
Multilingual offerings	6	++	++	--	Integration	No	Yes	Yes	No	low	medium	5
Technical equipment lending	4	++	+-	++	Seperation	No	Yes	Yes	No	high	low	4
Fever Screening Thermal Solution	9	--	++	++	Seperation	No	Yes	Yes	Yes	medium	medium	4
Selling as consultant	5	++	++	+-	Autonomy	No	No	Yes	No	medium	medium	3
E-commerce reselling partners	8	+-	+-	+-	Autonomy	No	Yes	Yes	Yes	medium	high	3
Emerging technology focus	8	+-	+-	--	Autonomy	No	Yes	Yes	Yes	high	medium	3
Localized production	5	--	+-	+-	Seperation	No	No	Yes	Yes	medium	high	2
E-commerce joint venture	6	--	+-	--	Seperation	No	No	Yes	Yes	medium	high	2
Coupon based campaining	6	++	++	--	Integration	No	No	No	Yes	high	medium	1

APPENDIX 4: QUESTION LIST EXPERT INTERVIEW

Topic / Business Model	Question number	Question English	Question German	Expert in Electronics Industry	Expert in E-Commerce	Entrepreneur / Investor
General questions	Q1	What impact does the Coronavirus already have on your business?	Welche Auswirkungen hat das Coronavirus bereits auf Ihr Unternehmen?	x	x	x
General questions	Q2	How do you see the impact of the Coronavirus on your industry branch?	Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	x	x	x
General questions	Q3	What positive or negative effects do you think are still to come?	Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	x	x	x
Fever Screening Thermal Solution	Q4	What do you think about mass people screening like measuring their skin temperature automatically or tracking their phone movement history?	Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	x		x
Fever Screening Thermal Solution	Q5	What do you think of developing or offering fever screening solutions as a business model?	Was halten Sie von der Entwicklung oder dem Angebot von Fieber-Screening-Lösungen als Geschäftsmodell?		x	x
Trends	Q6	Besides the Coronavirus, what trends do you think currently have the biggest impact on your industry?	Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	x	x	x
Trends	Q7	Which trends that were very prominent last year are no longer relevant this year?	Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	x	x	x
Customer feedback created products	Q8	How do you collect customer feedback in your company?	Wie wird Kundenfeedback in Ihrem Unternehmen gesammelt?		x	
Customer feedback created products	Q9	In which areas do you see potential for improvement through customer feedback?	In welchen Bereichen sehen Sie Verbesserungspotenzial durch Kundenfeedback?		x	x
Customer feedback created products	Q10	How do balance between what the customer wants and your own available resources?	Wie balancieren Sie zwischen den Wünschen des Kunden und Ihren eigenen verfügbaren Ressourcen?	x	x	
Customer feedback created products	Q11	What do you think about making customer feedback the main source for the products you are selling or developing?	Was halten Sie davon, Kundenfeedback zur Hauptquelle für die Produkte zu machen, die Sie verkaufen oder entwickeln?		x	
Open source brand enhancement	Q12	Do you think that only large open source projects can be successful/usable?	Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	x		x
Open source brand enhancement	Q13	Would you contribute to an open source project?	Würden Sie zu einem Open Source-Projekt beitragen?	x		
Open source brand enhancement	Q14	How do you think companies that support open source projects make their money?	Wie verdienen Ihrer Meinung nach Unternehmen, die Open Source-Projekte unterstützen, ihr Geld?		x	x
Open source brand enhancement	Q15	What do you think about using open source as part of your business model to make a product available to a bigger user group.	Was halten Sie von der Verwendung von Open Source als Teil Ihres Geschäftsmodells, um ein Produkt einer größeren Benutzergruppe zur Verfügung zu stellen?		x	x
Niche B2B Equipment Webshop	Q16	Can you describe the order procedure in your company if you need a part or equipment?	Können Sie den Bestellvorgang in Ihrem Unternehmen beschreiben, wenn Sie ein Teil oder eine Ausrüstung benötigen?	x		

Niche B2B Equipment Webshop	Q17	What steps will you when you need to order a part for your company (or recommend for oder) that cost below 500 Euro? *) Just send the part number/specs to purchasing and let them figure it out *) Order from one predefined supplier *) Go to Amazon and purchase it *) Check with a search engine and purchase best offer *) Use a price search engine and select the best offer *) Contact suppliers that list the part but do not provide online pricing *) Contact suppliers that might have the part	Welche Schritte werden Sie unternehmen, wenn Sie ein Teil für Ihr Unternehmen bestellen (oder für oder empfehlen) müssen, das unter 500 Euro kostet? *) Senden Sie einfach die Teilenummer / Spezifikationen an den Einkauf und lassen Sie sie es herausfinden *) Bestellung bei einem vordefinierten Lieferanten *) Gehen Sie zu Amazon und kaufen Sie es *) Fragen Sie bei einer Suchmaschine nach und kaufen Sie das beste Angebot *) Verwenden Sie eine Preissuchmaschine und wählen Sie das beste Angebot aus *) Wenden Sie sich an Lieferanten, die das Teil auflisten, aber keine Online-Preise anbieten *) Kontaktieren Sie Lieferanten, die das Teil haben könnten	x		
Niche B2B Equipment Webshop	Q18	Does that change when the price of the part is higher?	Ändert sich das, wenn der Preis des Teils höher ist?	x		
Niche B2B Equipment Webshop	Q19	Does that change when you need the part urgent?	Ändert sich das, wenn Sie das Teil dringend benötigen?	x		
Niche B2B Equipment Webshop	Q20	How do you see the development in B2B E-commerce?	Wie sehen Sie die Entwicklung im B2B E-Commerce?		x	
Niche B2B Equipment Webshop	Q21	Do you think that large companies like Amazon, Digikey, Farnell and so on will manage do dominate every niche?	Glauben Sie, dass große Unternehmen wie Amazon, Digikey, Farnell usw. jede Nische verwalten werden?		x	
Niche B2B Equipment Webshop	Q22	What do you think about selling B2B equipment in a niche via the internet?	Was halten Sie vom Verkauf von B2B-Geräten in einer Nische über das Internet?		x	x
Multilingual offerings	Q23	What is the primary used language in your company? How many languages do you usually translate your sales brochures/ Marketing material/ technical documentations to?	Was ist die primär verwendete Sprache in Ihrem Unternehmen? In wie viele Sprachen übersetzen Sie normalerweise Ihre Verkaufsbroschüren / Marketingmaterialien / technischen Dokumentationen?	x	x	
Multilingual offerings	Q24	What do you think of automatic translation tools?	Was halten Sie von automatischen Übersetzungstools?		x	
Multilingual offerings	Q25	How important do you think is the support of customers in the native tongue via Email? Does it make any difference for phone support?	Wie wichtig ist Ihrer Meinung nach die Unterstützung von Kunden in der Muttersprache via email? Macht es einen Unterschied für den telefonischen Support?		x	
Multilingual offerings	Q26	What are your thoughts on the importance of supporting multiple languages on a business website?	Was halten Sie von der Unterstützung mehrerer Sprachen auf einer Unternehmenswebsite?		x	x
Technical equipment lending	Q27	Have you or your company currently rented someting instead of buying it? If yes what?	Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	x	x	x
Technical equipment lending	Q28	Do you think that offering lending options if a good idea if you also want to sell the equipment?	Denken Sie, dass das Anbieten von Kreditoptionen eine gute Idee ist, wenn Sie die Ausrüstung auch verkaufen möchten?		x	
Technical equipment lending	Q29	Do you think that the current trend is going towards buying equipment or renting equipment?	Denken Sie, dass der aktuelle Trend zum Kauf von Geräten oder zum Mieten von Geräten geht?	x		
Technical equipment lending	Q30	What do you think of renting out technical equipment as a business model?	Was halten Sie von der Vermietung technischer Geräte als Geschäftsmodell?		x	x
Trends		Market size growth in E-commerce	Marktwachstum im E-Commerce	x	x	x
Trends		Market shift towards bigger firms	Marktverschiebung hin zu größeren Unternehmen	x	x	x
Trends		Sensing and mobility	Sensoren und Mobilität	x	x	x

Trends		Augmented Human	Augmented Human	x	x	x
Trends		Postclassical compute and comms	Postklassisches Rechnen und Kommunikation	x	x	x
Trends		Digital Ecosystem	Digitales Ökosystem	x	x	x
Trends		Advanced AI and Analytics	Künstliche Intelligenz und Analytik	x	x	x
Trends		Shift to Asia	Verschiebung nach Asien	x	x	x
Trends		Digitalization in the electronics industry	Digitalisierung in der Elektronikindustrie	x	x	x
Trends		Increased innovation speed	Erhöhte Innovationsgeschwindigkeit	x	x	x
Trends		Personalization	Personalisierung	x	x	x
Trends		Globalization	Globalisierung	x	x	x
Trends		Health	Gesundheit	x	x	x
Trends		Mobility	Mobilität	x	x	x
Trends		Security	Sicherheit	x	x	x

APPENDIX 5: TRANSCRIPT EXPERT INTERVIEWS

Expert 1

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Die Auswirkungen auf mein Unternehmen sind unterschiedlich. Ich kann es jetzt noch nicht sagen, ich kann nur die aktuellen Veränderungen sagen. Alle anders ist eine Prognose. Aktuell ist es so, dass wir auf Homeoffice geschickt worden sind […] Man muss zu zweit im Büro sein, da einmal einer umgeflogen ist. Weiter Auswirkung sind, dass die Zulieferer nicht liefern können
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Du muss schauen, bei den Aktien, es sofort alle Halbleiter Aktien extremst gefallen, manche performen ein bisschen besser, manche ein bisschen schlechter. Automotivie ist man etwas sensitiv, weil die Automobilproduktionen runtergefahren sind. Consumer Business kann ich nicht sagen, da bin ich nicht drinnen. Aber das eine ist, dass die Zulieferer bei fab-less firmen sehr betroffen sind - wennst eine eigene fab und assembly linie hast dann kommt es drauf an wenn gewisse Länder einen Showdown haben, dann ist das Thema erledigt.
Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	An sich gibt es keine positiven Auswirkungen. Wenn du sagt auf das ganze Unternehmen bezogen, weil natürlich weniger produziert wird es wird einen Moment geben wo weniger laufen wird. Es werden wahrscheinlich sich die Timelines mit Kurzarbeit verschieben, es wird Verzögerungen geben. Das ist hauptsächlich negativ zu bewerten. In meinem Bereich, wir sind da im Marketing Bereich, Technisches Marketing und Applikation Support, auch wenn das die Kollegen machen, da ist es schon so, dass viel von unseren Kunden auf Home-Office geschickt worden sind, jetzt natürlich diese schon etwas mehr Zeit haben für vorausschauende Aktivitäten, die mit den Lieferanten Kontakt aufnehmen und sich neue Sachen anschauen. Ich muss sagen in meinem persönlichen Bereich ist die Arbeit auf keinem Fall weniger geworden. Wir haben da ehern im Vergleich zu vor Weihnachten leicht mehr Anfragen - alle wollen in Q1 Gas geben und jetzt kommt halt der positive Effekt dazu. Dass jetzt alle mehr nach Sensoren nachfragen, ist aber etwas illusorisch, weil sich dir Produktionen trotzdem verschieben werden. [..] Auf der andern Seite hören wir, dass China wieder hochfährt.

Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Die Sache ist, die, wenn man einen Ausgangssperre verhängt und die überprüfen will, dann ist das ein Mittel zur Kontrolle - ich stehen dem eher gelassen gegenüber […] Ob das verwendet werden kann hat jetzt mit der Firma nichts zu tun. Ich denke unser Büro könnte ganz normal weiterlaufen. An sich ist das ja eine Regierungsmaßnahmen und das suchen sich die Firmen nicht aus. Ich glaube nicht, dass die großen Firmen, wie zB Automobilfirmen da Ihre eigenen Regeln verhängen, sondern das machen weil es staatliche Regeln gibt. [...] Wenn das nicht von der Politik vorgegeben würde, dann wäre das ggf. ein Mittel aber ich würde es wahrscheinlich nicht anwenden. In den Firmen arbeiten ja großteils nicht Risikogruppen und die Manager haben ja nur die Finanzen im Blick - da muss es ja politisch gelöst werden.
Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Ich denke derzeit ist der größte Einfluss sicher durch Corona. Dadurch, dass viele Firmen die Mitarbeiter auf Home-Office schicken, die Produktionen heruntergefahren werden, sieht man da natürlich ein große Verunsicherung. Andere Themen sind natürlich was in der Automobilindustrie generell passiert - das wissen wir nicht. Wird alles Elektrifiziert, werden die HEVs (Wasserstoffautos) kommen, werden die Hybrid Autos kommen, wir wissen es nicht. Aber ganz konkret für meine Branche ist es eigentlich egal was kommt - in jedem von den drei Szenarien braucht man einen Elektromotor drinnen, der kommutiert werden muss mit einem induktiven Sensor, also haben wir da keine Probleme [...]
Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	Keine Ahnung - Mir fällt nichts ein.
Wie balancieren Sie zwischen den Wünschen des Kunden und Ihren eigenen verfügbaren Ressourcen?	Wir sind jetzt im Home-Office und ich bin vielleicht alle 2 Wochen im Büro wenn ich was messen muss […] Wir haben keine Einschränkungen und betreuen die Kunde wie vorher. […] Es wird sowieso immer darauf geschaut was für ein Business dahinter ist und ob das rentabel ist. Es ist nicht so, dass alles was reinkommt bearbeitet werden kann [...] Wir müssen da schon selektieren und wenn jetzt dann Kurzarbeit kommt müssen wir schauen ob wir Support einschränken oder was man sonst macht.
Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Nein

Würden Sie (Ihre Firma) zu einem Open Source-Projekt beitragen?	[…] Wir stellen natürlich gewisse Supportsachen zur Verfügung, zum Beispiel unser GUI kann man runterladen, aber welche Lizenzen da dahinerstehen kann ich nicht sagen. Das machen andere Leute. Dass wir das jetzt irgendwo, auf Github, etwas hochladen das machen wir nicht - Es kann aber jederzeit passieren, wenn wir ein Standardboard einbinden, aber wegen der niedrigen Priorität ist das nicht nicht gemacht worden [...] Unser Kunden können das auch so frei verwendet - was das genau für eine Lizenz ist, kein Ahnung. [...] Frei verfügbar wäre aber sicher eine gute Idee -bei uns ist das Prozedere zum runterladen nicht immer ganz so einfach. Das muss aber mit dem legal department abgeklärt werden.
Können Sie den Bestellvorgang in Ihrem Unternehmen beschreiben, wenn Sie ein Teil oder eine Ausrüstung benötigen?	Das typische Prozedere ist einfach - ich rede mit meinem Chef du sage ich brauch das - er sagt ja - dann schreibe ich der Sekretärin und es wird bestellt.
Welche Schritte werden Sie unternehmen, wenn Sie ein Teil für Ihr Unternehmen bestellen (oder für oder empfehlen) müssen, das unter 500 Euro kostet? *) Senden Sie einfach die Teilenummer / Spezifikationen an den Einkauf und lassen Sie sie es herausfinden *) Bestellung bei einem vordefinierten Lieferanten *) Gehen Sie zu Amazon und kaufen Sie es *) Fragen Sie bei einer Suchmaschine nach und kaufen Sie das beste Angebot *) Verwenden Sie eine Preissuchmaschine und wählen Sie das beste Angebot aus *) Wenden Sie sich an Lieferanten, die das Teil auflisten, aber keine Online-Preise anbieten *) Kontaktieren Sie Lieferanten, die das Teil haben könnten	Das ist ganz unterschiedlich und hängt von dem Teil ab das ich brauche - Dort wo ich es am schnellest bekomme. Wenn es um Sachen geht, die ich eventuell auf Amazon bekommen kann , dann verwende ich Amazon weil es bequem ist. Sonst Distributoren und bei Messgeräten muss man eh direkt anfragen - es hängt sehr davon ab was man braucht [...]
Ändert sich das, wenn der Preis des Teils höher ist?	Wenn irgendwas einen größeren Warenwert hat, wird man das nicht bei Amazon kaufen. Wenn es kleiner Sachen sind, dann ist das bei Amazon oder irgendwelchen Anderen Distributoren viel einfachen zu bekommen.[…]
Ändert sich das, wenn Sie das Teil dringend benötigen?	[...] Ich suche mir nur aus wo könnte man das bekommen - der Rest muss über den Einkauf abgewickelt werden […] Bei mir geht es rein darum wo bekommt man das Teil einmal und es dann Sinn macht, dann schalten sich die ein. Dann geht es natürlich in den Bestellprozess, der ist immer da [...]

Was ist die primär verwendete Sprache in Ihrem Unternehmen? In wie viele Sprachen übersetzen Sie normalerweise Ihre Verkaufsbroschüren / Marketingmaterialien / technischen Dokumentationen?	Englisch, alles English. In der Kommunikation mit deutschen Kollegen verwenden wir Deutsch auch, aber sonst hauptsächlich Englisch. Das ist eh bei den meisten Halbleiterfirmen so, im Gegensatz zu den Automobilfirmen. [...]
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	In meinem direkten Umfeld kaufen wir, weil die Beträgen nicht so hoch sind. Wir haben da jetzt kein 100 k Beträgen die wir anschaffen. Es kann aber schon sein, dass Abteilugen in anderen Bereichen Geräte mieten - da habe ich aber kein Informationen dazu
Denken Sie, dass der aktuelle Trend zum Kauf von Geräten oder zum Mieten von Geräten geht?	Das ist eine Frage der Verfügbarkeit. Das ist ziemlich branchenspezifisch. Da wo ich bin wird das sicher so bleichen, dass man die Sachen einkauft. […]
Marktwachstum im E-commerce	not relevant
Marktverschiebung hin zu größeren Unternehmen	very relevant
Sensoren und Mobilität	very relevant
Augmented Human	not relevant
Postklassisches Rechnen und Kommunikation	not relevant
Digitales Ökosystem	relevant
Künstliche Intelligenz und Analytik	not relevant
Verschiebung nach Asien	relevant
Digitalisierung in der Elektronikindustrie	relevant
Erhöhte Innovationsgeschwindigkeit	less relevant
Personalisierung	not relevant
Globalisierung	relevant
Gesundheit	relevant
Mobilität	very relevant
Sicherheit	relevant

Expert 2

Frage	Antwort
What impact does the Coronvirus already have on your business?	At this point we already notice very limited inquiries from western Europe. It's maybe because most of the companies have closed, I am talking mainly for French companies, Spanish companies - German companies seems still working, but they work with limited capacity and limited staff, so a this point they seem to be some state of holding because nobody knowns what will happen and nobody is ready to invest in new productions. So I expect slower sales.

How do you see the impact of the Coronavirus on your industry branch?	I think the impact will be the same in the whole industry. We work with companies in different areas of business, some of them are making access control, or devices for general appliance, home appliance but for all of them there is some problem and they have expecting news in order to take the decisions how to process their business plans.
What positive or negative effects do you think are still to come?	As the beginning when the coronavirus was in China, it was very good effect for our business because most of the companies directed their enquiring from China to us, because they need European service where the expected more reliable delivery time - shorter delivery time. It was time when we had so much work with new customers that never worked with us before and then when the problem came in Europe, everything changed, because the Chinese companies started work and the deliveries from china at the moment are more reliable than deliveries from Europe. it is interesting because the problem here is getting worse and worse every day. You know Italy is big in industry - it's in top three in industries in Europe and many of the companies, including local companies have a mother company in Italy. So you understand the connection when the mother company is not working properly, all the companies underneath cannot work normally. I think it will be at least 6 month effect, because companies with Italian connections have work for month or little bit more maybe. After this period they will be working with very reduced staff. They don't have prepared enough work - other problem is biggest companies like VW and automotive business is also very important for our industry because there is bigger branches here that also stopped working and have work for maybe 2 weeks, 3 weeks and then will be closed for uncertain period of time. I think this is a problem for bigger companies - the smaller like ours still keep some production without problem with a little bit bigger lead time, because we don't have free capacity, but still working without problem.
What do you think of developing or offering fever screening solutions as a business model?	Yes, it's in connection with the limitation of movement after positive test for the virus or after coming from abroad from a destination where the coronavirus is in high levels at the moment. We have a lot of restriction here and we are quite surprised that our government take quite strong measurements for that. They have all the information who is coming from abroad and there was even a change of the law and now many people will now be charged because they don't keep this law, but the police has all the e information who has to be at home and have everyday check at unspecified time - it can be at eight o clock in the morning, it can be in the afternoon, everyday a different time, and if you are not on address, you can go to prison for 5 years at the moment - it's a new law. It's the reason that people pay more attention, now discipline is better. I think putting a camera who measures temperature is certainly better, but it is impossible right now - you know it is a lot of money to be invested in that. I think that is one of the things that still stops our authorities and we still don't have such cameras, maybe on public places where there is a lot of people. It is maybe a good idea, but I don't know if it is worth to investment so much - you know how many towns there are and how many streets and areas to cover - it would be a huge amount i think. The tracking of

	the mobile phone I think is also coming into the personal space of the people - so I think it is a little bit tricky and that is why the government is not so sure how to act, because it may lead to problems after that.
Besides the Coronavirus, what trends do you think currently have the biggest impact on your industry?	I don't know any other things - maybe there is some speculation with the prices of electronic components - I think China will also raise the prices of the electronic components, because this is their moment, you know when Europe is weak, China will try to reduce their losses that they already had - but the effect is still from the Coronavirus, an indirect effect.
Which trends that were very prominent last year are no longer relevant this year?	Many people will lose their work and it may be easier for companies to find new people, because up to coronavirus there was problem of finding new people. We were in lack of specialists, so we started hiring people from abroad (...) This will definitely change now, because the number of workless people changed a lot - like same as in 2008/2009 crisis.
How do you collect customer feedback in your company?	We have customers who give very very detailed report for every part that has to be repaired from them, with very exact description for every one single problem. I understand that is a lot of time, because you need some monitoring firstly, you have to make list of the problem, then you have to write them down, you have to make some pictures - its time consuming.
In which areas do you see potential for improvement through customer feedback?	Customer feedback is always very important for improving quality, for improving service, but what exactly can be done better - I don't know - maybe we have to remind our customer to give some feedback, because most of them forgot to do it or just don't find it important to spend several more minutes to do that.
How do balance between what the customer wants and your own available ressources?	The day is only so long (…) we try to finish every day what we can do, but it is not always possible. We lose some customers if responses are too slow when we have too much work with a big urgent order
What do you think about making customer feedback the main source for the products you are selling or developing?	We do that - we produce what data we get from the customer and customer gives us feedback on how to test the products, pack and so on.
How do you think companies that support open source projects make their money?	Open Source? Like open office - currently we are using Microsoft products, but they are quite expensive - the license is getting more and more expensive. (…) We have a customer that has sells open source hardware - describes their device on the internet, at their website and ... I don't know the detail how this works - I don't want to give you any wrong information - maybe Hristo knows more
What do you think about using open source as part of your business model to make a product available to a bigger usergroup.	We don't do that. Many of our customer use Arduino for example. They use some Arduino modules for controlling their devices, but they do it by theirselves. We just help them by producing the peripheral hardware
How do you see the development in B2B E-commerce?	Yes, it is an important point of business. Actually we planned to expand our offerings, but we still need more staff - you know its additional resources you have to provide, but in my opinion it is very important to have some ready products and more B2B

	accessories online.
Do you think that large companies like Amazon, Digikey, Farnell and so on will manage do domiante every niche?	For electronic components it will be much difficult for Amazon, because you have think about quality assurance that is not easy job. Data code, there are important things, the way the components were saved during storage, many many problems and I think it is not easy job, because you have to be sure in quality and the way the components were stored because when somebody has a problem you can do nothing. He will just say I have losses and you have to find a way to cover my losses. It's too late to do anything after the components are soldered. You need big capital in order to buy more components in bigger quantity for better price, otherwise you don't have chance to be competitive in the market. Small companies will also be there but maybe make little profit.
What do you think about selling B2B equipment in a niche via the internet?	We do that, but not in niche -the majority of revenue is from B2B customers we do assembly jobs for - we may do additional niche for tools, instruments, something like this - but not sure yet.
What is the primary used language in your company? How many languages do you usually translate your sales brochures/ Marketing material/ technical documentations to?	We use English and German - German because most of the companies are German speaking. English for internal.
What do you think of automatic translation tools?	We use for translating customer documents from German to English, as only few of our workers speak German.
How important do you think is the support of customers in the native tongue via Email? Does it make any difference for phone support?	it is still to keep so many people with these languages, because they need to be ready to take an order and to make communication if you don't have work for them it's still problem. On the other side you can also only make the website in different languages, but the people usually expect to have also communication in this language.
What are your thoughts on the importance of supporting multiple languages on a business website?	We also have idea for Spanish, because Spain is big market, also for us we have clear signs, that it would be a good market for us. Besides of the fact that most young people talk English, but there are still more people that would be very happy to have communication on their native language. So I think it is very very useful to have it to reach many customers. for us these would be four languages, English, Spanish, German and Russian. Russian since many people in eastern Europe speak Russian and maybe this is the way to them.
Have you or your company currently rented someting instead of buying it? If yes what?	At the moment we don't have rented equipment- it's not so popular here. Most of our equipment was already used, so the price was not so high and we were able to pay at once.
Do you think that offering lending options if a good idea if you also want to sell the equipment?	We have some machines that we could do that, but they are very specific ones and I don't know who may need them on rent. It's not so popular to rent here

What do you think of renting out technical equipment as a business model?	we don't do that, but it would be good. We need to think about that
Market size growth in E-commerce	relevant
Market shift towards bigger firms	relevant
Sensing and mobility	less relevant
Augmented Human	not relevant
Postclassical compute and comms	not relevant
Digital Ecosystem	relevant
Advanced AI and Analytics	not relevant
Shift to Asia	not relevant
Digitalization in the electronics industry	relevant
Increased innovation speed	relevant
Personalization	relevant
Globalization	relevant
Health	relevant
Mobility	less relevant
Security	relevant

Expert 3

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Noch keine
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Mittelfristig hat es sicher Auswirkungen - Grundsätzlich Umsatzrückgang
Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	Positive Auswirkungen ist die leichtere Verfügbarkeit von Fremdkapital [für uns] - im besten Fall vielleicht auch eine Marktbereinigung - aber da gehe ich nicht unbedingt davon aus. Negativ glaube ich, dass die wirtschaftlichen Auswirkungen noch kommen werden - die schweren. Auf mich direkt, also die Firma, jetzt nicht direkt, aber allgemein wirtschaftlich werden [negative] Auswirkungen da sein.
Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Davon halte ich nichts, weil ich nicht glaub, dass das was bringt - das Tracking im allgemeinen. Zum jetzigen Zeitpunkt macht das Tracking keinen Sinn mehr - die Einschränkungen, der Shutdown ist meiner Meinung nach sinnvoll. Tracking ist meiner Meinung nach nur sinnvoll, wenn es früh genug begonnen wird, also wenn die Anzahl der Infizierten in einem niedrigen Bereich ist (...)
Was halten Sie von der Entwicklung oder dem Angebot von Fieber-Screening-Lösungen als Geschäftsmodell?	Ja, ich glaube das das Sinn macht - auch wenn es nur Sinn macht, wenn die Anzahl der Infizierten gering ist -zur reinen Verzögerung ist es meiner Meinung nach nicht geeignet

Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Derzeit - neben Korona - ist es schwierig. Es bewegt sich Richtung Rezession, aber das ist wieder von Korona ausgehend (…)
Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	Könnte ich jetzt direkt nicht sagen, vielleicht der Trend zur Globalisierung, aber das auch nur bedingt.
In welchen Bereichen sehen Sie Verbesserungspotenzial durch Kundenfeedback?	Auf die Entwicklung und Vertrieb - vieles wird mündlich mitgeteilt - ist nicht gar so optimal.
Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Nein - Grundsätzlich weil schon eine Person ein Open source Projekt betreiben kann. Die zugehörigen Wartungsverträge und Supportverträge sind jetzt nicht davon abhängig [wie groß die Firma ist].
Wie verdienen Ihrer Meinung nach Unternehmen, die Open Source-Projekte unterstützen, ihr Geld?	Durch Supportverträge und Anpassungen - Wir setzten open source ein, das ist eine sehr lange Liste, Linux, Ubuntu, Debian, Gitlab, Redmine, Nextcould, (…) und haben teilweise Supportverträge
Was halten Sie von der Verwendung von Open Source als Teil Ihres Geschäftsmodells, um ein Produkt einer größeren Benutzergruppe zur Verfügung zu stellen?	Ist sinnvoll, wir planen das auch.
Was halten Sie vom Verkauf von B2B-Geräten in einer Nische über das Internet?	Grundsätzlich finde ich das gut und/oder sinnvoll - das ist Stand der Technik (…) Es wird aber noch mehr kommen.
Was halten Sie von der Unterstützung mehrerer Sprachen auf einer Unternehmenswebsite?	Ist sinnvoll. Mindestens Englisch und die Sprache des Hauptwirtschaftsraumes bzw. die Sprachen, wenn möglich alle auf der Webseite - Support nur Englisch ist Ok.
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	Nur die Geschäftsräume, sonst nichts. Zum Teil wegen fehlender Angebote und weil vieles nicht relevant ist - kostet nicht viel.
Was halten Sie von der Vermietung technischer Geräte als Geschäftsmodell?	eher weniger - grundsätzlich bei Immobilien ist das sicher sinnvoll. Bei Geräten eher nicht.
Marktwachstum im E-commerce	relevant
Marktverschiebung hin zu größeren Unternehmen	relevant
Sensoren und Mobilität	relevant
Augmented Human	nicht relevant
Postklassisches Rechnen und Kommunikation	relevant
Digitales Ökosystem	relevant
Künstliche Intelligenz und Analytik	very relevant
Verschiebung nach Asien	relevant
Digitalisierung in der Elektronikindustrie	less relevant
Erhöhte Innovationsgeschwindigkeit	relevant
Personalisierung	nicht relevant
Globalisierung	relevant

Gesundheit	relevant
Mobilität	relevant
Sicherheit	relevant

Expert 4

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Aktuell merke ich der Materialfluss, der stagniert, d.h. ich kann nicht in üblicher Performance produzieren. Infolgedessen verschieben sich ein bisschen meine Lieferlose - datiert unter dem Namen höhere Gewalt und in Kombination dessen, meine Kunden sind jetzt so darauf eingestellt, dass Sie sagen, Hannes, wir haben bei dir aufrechte Rahmenverträge, wir werden voraussichtlich in 3 Wochen in Kurzarbeit gehen - bitte liefere jetzt alles was du kannst, das heißt unterm Strich zusammengefasst, ich sollte schneller liefern und bekomme langsamer Waren.
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Der Angebotsprozess ist etwas mühsamer, da die Lieferanten und Distributoren und co. halt Homeoffice und die können da halt auch nicht in voller Power auf deren Infrastruktur zugreifen. Es geht langsamer. Es wird mehr abgerufen und es kommt langsamer rein (...)
Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	Die positiven Auswirkungen, die ich bis jetzt beobachtet haben ist, dass die Entwicklungsabteilungen von unseren Kunden mehr Zeit und Fokus für Ihre Entwicklungen haben, dadurch ist es bei uns vermehrt zu Anfragen gekommen. So viele Anfragen wie ich jetzt haben für neue Produkte in der Ramp-Up Phase hatte ich in meiner Firmengeschichte noch nie - das kann jetzt ein Zufall sein, oder dass sich die Leute jetzt mehr auf Entwicklung fokussieren können (...) Ich leide derzeit noch nicht an Korona.
Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Davon halt ich garnichts. Zur ersten Frage Wärmebildkameras - es ist zwar schön wenn ich weiß der hat Korona, aber wie bekannt ist, das Korona ist ja höchst ansteckend schon bevor du Symptome zeigst. D.h. die Wärmebildkamera ist dann nur mehr zum Feststellen, der hat Fieber, bzw. erhöht Temperatur aber da ist es dann eigentlich schon zu spät. Wenn es dem dann so geht, dass die Wärmebildkamera das detektiert, dann wird er eh bald selber sagen, ich muss mich ins Bett legen - d.h. meines Erachtens bringt sich das garnichts. Die letzten Tage und Wochen je nachdem wie lange es bei der Person dauert bis die Symptomes ausbrechen, hat er ja schon unzählige andere Leute angesteckt. das mit den Bewegungsdaten ist für mich ein Für und wieder. Das Für ist das kontrolliert wird ob sich die Leute daran halten dass Sie nur in äußersten Notfallen rausgehen (...) Kehrseite ist,

	dass das Ganze in die Privatsphäre geht - ich persönlich würde von niemandem präventiv Daten abziehen und wenn dann Fälle bekannt sind von Leuten die sich nicht daran halten (...) werden dann Personalien aufgenommen und die Daten dieser Leute dann für Tracking verwendet.
Was halten Sie von der Entwicklung oder dem Angebot von Fieber-Screening-Lösungen als Geschäftsmodell?	Für mich ist das nur medial, dass Regierungen und co. ein Statement abgeben können wir tun was, aber das ist gänzlich verpuffte Kapazität in meinen Augen.
Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Längerfristig gesehen haben, nach Korona, habe ich zwei Theorien, wie kann es danach weitergehen - das ist jetzt wie gesagt ein Zukunftsthema. Möglichkeit A ist, dass wir Wirtschaftlich ein großes Thema auf uns zukommen sehen werden. Ich betitle das unten dem Titel Deflation. d.h. dass die Kunden sagen durch die Krise und co müssen die Sachen günstiger werden (...) Theorie B ist komplett entgegengesetzt: Das ist die, dass ich sage die Leute sind jetzt daheim eingesperrt worden, die haben nicht aussi dürfen. was glaubst du was mit den Leuten los ist wenn die wieder aussi dürfen, die fangen einkaufen an wie die bösen. (...) Das wäre so die einmalige Starthilfe für die Wirtschaft, ein Kickstart, bis sich der Motor wieder dreht und das steht halt genau gegen die Deflation. Ich sehe die Wahrscheinlichkeit eher auf zweiteres (...) Aufteilen würde ich das so 70 zu 30.
Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	Keine Ahnung, kann da nichts sagen.
In welchen Bereichen sehen Sie Verbesserungspotenzial durch Kundenfeedback?	Tu ich mir jetzt ganz schwer diese Frage zu beantworten, weil auf dem ich habe ich mir noch keine Gedanken gemacht, da muss ich leider passen - da kann ich die keine Antwort geben.
Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Großer Vorteil von Open source ist ja, du hast ein eine quick and dirty Lösung mit der du recht schnell zum Fliegen kommst, der große Nachteil bei open source ist ja jener, das ich sag es gibt da kein Gremium oder keine Firma dahinter, die versucht irgendwelche Standard voranzutreiben. d.h. es kann heute, morgen und übermorgen blau sein, dh. alles was heut so ist, muss morgen nicht mehr so sein- das ist bedenklich aus unternehmerische Sicht und das nächste was ich sehen ist, dass einfach, das man mit open source vernünftig zum Fliegen kommt, du hast den Vorteil bei open source, dass du eigentlich alles auf Wünsche hin einstellen und umstellen kannst, das ist für mich aber auch gleichzeitig der Nachteil, das raubt irrsinnig viel Ressourcen. und genau auf Basis diese zwei fakten, dass ich sagen ich habe da keine Firma dahinter, die irgendwo einen Standard verfolgt (...) und es frisst unheimlich viel Ressourcen, ist open source für mich nicht die erste Wahl.

Wie verdienen Ihrer Meinung nach Unternehmen, die Open Source-Projekte unterstützen, ihr Geld?	Ich meine open source muss schon alles gut für dich passen, ansonsten wird die ROI Rechnung keine vernünftigen Zahlen ergeben. Es ist schwierig.
Was halten Sie von der Verwendung von Open Source als Teil Ihres Geschäftsmodells, um ein Produkt einer größeren Benutzergruppe zur Verfügung zu stellen?	das steht immer wieder mal auf der Liste. Gerade im speziellen - ich habe ja mein ERP System selbst programmiert und bevor es zu dieser Entscheidung kam, habe ich mir natürlich Open source ERP System angeschaut. Im Prinzip hätte ich kein Problem mein ERP open source zu stellen, aber das Thema ist, das ERP habe ich genau auf meine Infrastruktur hin geschneidert. Dh. wenn einer wirklich bei Sinnen ist, der würde sich mein ERP System nie irgendwo anlächeln, weil er sagt, das ist zu viel Arbeit, dass das vernünftig funktioniert.
Was halten Sie vom Verkauf von B2B-Geräten in einer Nische über das Internet?	Wir machen da gar nichts - kann da nicht dazu sagen
Was halten Sie von der Unterstützung mehrerer Sprachen auf einer Unternehmenswebsite?	Im Prinzip ist es so, wir sind derzeit tatsächlich im Umbruch unserer Webseite, die entsteht in dieser Sekunde neu und ändert sich tag täglich. Ganz klar unsere Muttersprache Deutsch und gerade im Elektronikmarkt, du kennst es eh , da ist unsere Standardsprache Englisch. Unsere Webseite wird dann zweisprachig sein, Deutsch und Englisch. Weiter Sprachen sind nicht geplant.
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	Ja, wir haben 100% unserer Equipment, die wertiger sind gemietet. Es ist eine Leasing Form und zwar wir machen es aus dem Grund, prinzipiell kaufe ich nur Maschinen, die ich mir prinzipiell auch ohne Miete leisten kann (…) Wenn dem so ist, dann lease ich aber die Maschinen einfach um den cash Flow aufrecht zu erhalten. das spielt mir in der Koronakriese massiv in die Karten (...) habe mir durchgerechnet was ist, wenn alle Unternehmen zusperren müssen, sprich ich kann nicht mehr liefern und keine Ausgangsrechnungen mehr schreiben, hätten wir ein Sitzfleisch in der Form an Mitarbeitern und Gehältern ohne Rettungsschirme ohne Kurzarbeit und co. mit diesen Verbindlichkeiten hätten wir ein Sitzfleisch bis September und Oktober (...) Prinzipiell wird alles gemietet und geleast um den den Cashflow und die Liquidität aufrecht zu erhalten.
Was halten Sie von der Vermietung technischer Geräte als Geschäftsmodell?	Da braucht man viel Kapital damit das funktioniert
Marktwachstum im E-commerce	not relevant
Marktverschiebung hin zu größeren Unternehmen	not relevant
Sensoren und Mobilität	relevant

Augmented Human	relevant
Postklassisches Rechnen und Kommunikation	not relevant
Digitales Ökosystem	relevant
Künstliche Intelligenz und Analytik	relevant
Verschiebung nach Asien	less relevant
Digitalisierung in der Elektronikindustrie	relevant
Erhöhte Innovationsgeschwindigkeit	relevant
Personalisierung	less relevant
Globalisierung	relevant
Gesundheit	relevant
Mobilität	relevant
Sicherheit	very relevant

Expert 5

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Die ganzen Auswirkung kann man jetzt noch schlecht abschätzen. Es wird auf jeden Fall Einbußen geben und da muss die Industrie zurückschalten (…) dass dann nächstes Jahr wieder ein Aufschwung kommt.
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Ich hoffe dass es mich nicht betrifft, nicht dass sie die Pensionen kürzen. Der Staat muss ja sparen - Ausgaben sparen (...) heute ca. 30 Mrd. Euro - ob es dabei bleibt ist eine andere Frage. Ob da nicht die Summe revidiert werden muss - nach oben. Da ist der Staat schon gefordert, dass da Einsparungen gemacht werden müssen, das betrifft alle - Entweder Steuern erhöhen oder Ausgaben kürzen.
Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	Über positive Auswirkungen habe ich mir noch keine Gedanken gemacht - Ich sehe hauptsächlich nur die negativen Sachen - aber positiv, hmm… Das Einzige positive ist, dass man sich wieder mehr auf sich selbst besinnt. (...) Die ganzen Organisationen ändern sich.

Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Das ist ein zweischneidiges Schwert - einerseits in die Privatsphäre des Einzelnen einzudringen, was ja eigentlich nicht sein sollte aber auf der anderen Seite als Präventivmaßnahme ist das schon von Wichtigkeit. (…) Lassen wir es wie es jetzt ist - Ausgangsbeschränkungen und Abstand halten. Die Beschränkungen lockern [und dafür mehr Überwachung] würde ich jetzt noch nicht machen.
Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Ich kann nicht in die Zukunft schauen (…) aber ich würde sagen, dass gerade in der Elektronik immer kleinere Teile gefragt sind. (…) Großcomputer werden immer kleiner, die Bildschirme immer größer - das ist meines Erachtens ein Trend der sich schon längere Zeit abgezeichnet hat.
Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	Ich bin jetzt schon seit einem Jahr zu Hause und habe jetzt nicht mehr so viel Einblick was gemacht wird
Wie balancieren Sie zwischen den Wünschen des Kunden und Ihren eigenen verfügbaren Ressourcen?	Wir haben geschaut was der Kunde haben wollte - ob wir das realisieren konnten - auch im Hinblick auf eventuelle unerwartete Zwischenaufgaben - ganz ausschließen konnte man das ja nie (...) Du gibst dem Kunden den kleinen Finger, will er die ganze Hand. Nach dem Motto wenn du schaust was der Kunde haben will und du immer sagst, ja das geht, das geht, dann will er immer mehr - das ist klar. Das ist der Drang eines jeden Menschen, dass er immer mehr haben will (...) da man dann auch noch mehr machen und irgendwann stößt du dann an die eigenen Grenzen.
Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Jein, im Normalfall nicht. Unix bzw. Linux hat sich bewährt aber das kann man nicht verallgemeinern (…) ich würde sagen, dass geistige Eigentum sollten auch respektiert werden. Die kleineren Programme sind eingebettet in größere Umgebungen - das sind mehrere kleine Programme die zusammenarbeiten die man dann im Gespann für eine Anwendung Nutzen kann.
Würden Sie (Ihre Firma) zu einem Open Source-Projekt beitragen?	Wieso nicht - man sollte die geistige Aktivität nicht verkümmern lassen - gerade in der Pension ist das schon wichtig, dass man da immer vorn am Ball bleibt. (…) Wenn man was tut will man auch was dafür haben - nicht, dass man alles umsonst macht. [Zum Beispiel] Open Source Projekte wo man als Nutzer nichts zahlen muss (...) irgendwie aber doch etwas [für den Entwickler] reinkommt. Niemand will etwas gratis machen - einfach so - da hat man keine Befriedigung nachher.

Können Sie den Bestellvorgang in Ihrem Unternehmen beschreiben, wenn Sie ein Teil oder eine Ausrüstung benötigen?	Im Internet die verschiedenen Anbieter, die Händler, Großhändler abgeklappert und geschaut wo es am günstigsten ist bzw. ob es überhaupt beziehbar war und dann bestellt.
Welche Schritte werden Sie unternehmen, wenn Sie ein Teil für Ihr Unternehmen bestellen (oder für oder empfehlen) müssen, das unter 500 Euro kostet? *) Senden Sie einfach die Teilenummer / Spezifikationen an den Einkauf und lassen Sie sie es herausfinden *) Bestellung bei einem vordefinierten Lieferanten *) Gehen Sie zu Amazon und kaufen Sie es *) Fragen Sie bei einer Suchmaschine nach und kaufen Sie das beste Angebot *) Verwenden Sie eine Preissuchmaschine und wählen Sie das beste Angebot aus *) Wenden Sie sich an Lieferanten, die das Teil auflisten, aber keine Online-Preise anbieten *) Kontaktieren Sie Lieferanten, die das Teil haben könnten	Bei uns gab es da hauptsächlich Farnell und RS. Mouser und Digikey wäre auch eine Option gewesen aber da gab es eine Mindestbestellmenge oder man musste Versandkosten bezahlen. Das war dann schon ein Kriterium, dass wenn man keine so große Summe zusammen bekommen hat, das auf Farnell und RS bestellt.
Ändert sich das, wenn der Preis des Teils höher ist?	ja, das schon- da wurde schon genau geschafft was kann das Gerät, entspricht das meinen Anforderungen und was kostet das bei dem einen und dem anderen - meistens waren die Preisunterschiede gering. Ganz spezifische Sachen, das ist schon eher wo keine so große Spanne - also die Spanne ist schon drinnen, aber für den Endanwender, also mich, ist da wenig Spielraum
Ändert sich das, wenn Sie das Teil dringend benötigen?	Da schaue ich eher weniger auf den Preis, eher wo das lagernd ist und wo ich das schnell bekomme - das sind die wesentlichen Kriterien. Preis ist da nicht das Primärzetesio.
Was ist die primär verwendete Sprache in Ihrem Unternehmen? In wie viele Sprachen übersetzen Sie normalerweise Ihre Verkaufsbroschüren / Marketingmaterialien / technischen Dokumentationen?	Deutsch und Englisch, technisch nur Deutsch und Englisch - bei Marketing weiß ich es nicht, ich kann das da nicht 100%ig sagen
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	Nicht dass ich wüsste. Ich halte wenig davon. Meistens beim Mieten heißt es das Gerät ist in Ordnung und man muss dann schauen ob etwas nicht in Ordnung ist. Dann ist das Gerät , das ich brauche überhaupt verfügbar? (…) ich bin da eher der wenn ich was brauche dann wird das gleich beschafft.

Denken Sie, dass der aktuelle Trend zum Kauf von Geräten oder zum Mieten von Geräten geht?	Bis jetzt war es so, das alles gekauft wurde und selber anschafft wurde - mit mieten habe ich keine guten Erfahrungen - ich halte davon nichts. Ich kann mir nicht vorstellen, dass das groß in Mode kommen wird.
Marktwachstum im E-commerce	relevant
Marktverschiebung hin zu größeren Unternehmen	relevant
Sensoren und Mobilität	relevant
Augmented Human	less relevant
Postklassisches Rechnen und Kommunikation	not relevant
Digitales Ökosystem	relevant
Künstliche Intelligenz und Analytik	relevant
Verschiebung nach Asien	relevant
Digitalisierung in der Elektronikindustrie	relevant
Erhöhte Innovationsgeschwindigkeit	very relevant
Personalisierung	not relevant
Globalisierung	relevant
Gesundheit	very relevant
Mobilität	relevant
Sicherheit	relevant

Expert 6

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Ein geringes. Business impact ist, dass viel Projekte nach hinten verschoben werden, dass alles entschleunigt wird, dass alles etwas langsamer geht, weil sehr viele und auch Kunden im HomeOffice sind. Es ist noch kein Projekt gestorben, es ist noch kein Kunde weggebrochen - alles hält sich innerhalb der Erwartungen.
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Ich glaube das ist ziemlich das gleiche - die Projekt werden deswegen nicht sterben, sondern es wird alles nach hinten verlagert, was durch Home-Office nicht möglich ist. zB Hardwareentwicklung zu betreiben oder proof of concept zu machen oder solche Sachen. Es wird jetzt nicht nur [für unsere Firma] exklusiv sein, sondern es wird unsere Mitbewerber und Konkurrenten ähnlich treffen.

Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	Positive [Auswirkungen] nicht wirklich welche, weil danach wird es ja nur noch stressiger, weil dementsprechend jeder alles sofort haben möchte - also noch sofortiger als sonst, nachdem man ja Zeit verschlendert hat (…) Negativ ist es so, dass man unter Druck gerät, wenn man sich den Aktienmarkt anschaut, dann ist der Stock preis [der Firma] auch wieder runtergerasselt. Die Quartalszahlen werden dementsprechend nicht erreicht werden, weil die Projektabschlüsse in den Quartalen nach hinten verschoben werden, die Quartalszahlen werden schlechter werden, die Erwartungen werden wir nicht erfüllen (...)
Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Ich halte nichts davon, wenn es nicht auf freiwilliger Basis ist. Dass da über den Kopf des Bürgers bestimmt wird, halte ich nicht für gut. Auf freiwilliger Basis stelle ich meine Daten zur Verfügung, wie diese Corona Apps, die in vielen Ländern jetzt entstehen, die genau das machen, halte ich für eine wesentlich bessere Lösung. Dieser Trend zu Totalüberwachung mit der Ausrede eine Pandemie - ist eine sehr gute Ausrede - finde ich trotzdem nicht korrekt. Wenn man in die Firma geht, gibt es beim Eingang ein Fieber messen. Wenn man in die Firma kommt muss man sich anmelden, das betrifft jetzt die ganzen Home-Office Leute, damit man nachher einen sauberen Track Rekord hat, falls wer krank wird (...) aber ansonsten gibt es kein Monitoring in dem Sinn. Erkrankungen sind zu melden.
Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Wireless charging - Wir sehen gerade im Consumer Bereich einen riesigen kommenden Markt, der auch sehr stark logiert wird - da braucht man sich nur anschauen die Webseiten - es zielt momentan alles auf wireless ab - das ist "the next big thing" und UWB mit Standorttracking (...) Apple ist auch auf den Zug aufgesprungen und hat das im nächsten iPhone - da kommt auch Fahrt auf.
Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	eigentlich keine (…)
Wie balancieren Sie zwischen den Wünschen des Kunden und Ihren eigenen verfügbaren Ressourcen?	Das hängt vom Kunden ab. Der Forecast bzw. das Projektvolumen - ist das ein Tier 1 customer oder ein customer mit dem wir ein proof of concept machen wollen - da werden die Ressourcen entschieden. Jemand, der jetzt 50k Projekt Volumen hat bekommt wesentlich weniger als mit 50 Mio. Volumen ist das Hauptkriterium (...) Es wird mit dem Kunden offen kommuniziert. Wenn ich die Ressourcen nicht habe wird das nach oben eskaliert- d.h. mein Chef entscheidet nachher - ok kommunizieren wir zu dem Kunden dass wir im Moment die Ressourcen nicht haben um an dem Problem zu arbeiten oder haben wir nicht irgendwo in

	einem anderen Land jemanden wo sitzen, der das bearbeiten kann. Es wird schon geschaut, dass jeder [vorher qualifizierte] Kunde zufrieden gestellt wird.
Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Hängt dafür ab für was - Jein - Eigentlich weniger, weil man sehr schnell Lizenzprobleme bekommt, weil viele Open-Source Sachen sind für Kommerzielles nicht verwendbar.
Würden Sie (Ihre Firma) zu einem Open Source-Projekt beitragen?	Nicht dass ich wüsste - keinen Ahnung. Ich hätte jetzt noch nicht gesehen, dass wir an open source Projekten aktiv beteiligt werden. Vieler Source code [der Firma] ist öffentlich zugänglich, aber ich weiß nicht ob da jetzt eine tatsächliche GPL oder was für eine Lizenz da dahintersteht.
Können Sie den Bestellvorgang in Ihrem Unternehmen beschreiben, wenn Sie ein Teil oder eine Ausrüstung benötigen?	Wird mit Teamleiter besprochen, weil er hat die Budgetfreigabe - aber gerade bei Kleinkram, wie bei Logic Analyser ist das normal überhaupt kein Thema. Wenn die Freigabe erfolgt ist, schickt man einfach unserer Abteilungssekretärin was man haben will und die bestellt es dann. Das gilt jetzt für uns, im Labor gibt es einen anderen Vorgang. Im Labor gibt es einen Einkäufer, dem man eine Liste schickt , da gibt es eine vordefiniert Liste, die man ausfüllen muss (...) die dann eingekauft wird.
Welche Schritte werden Sie unternehmen, wenn Sie ein Teil für Ihr Unternehmen bestellen (oder für oder empfehlen) müssen, das unter 500 Euro kostet? *) Senden Sie einfach die Teilenummer / Spezifikationen an den Einkauf und lassen Sie sie es herausfinden *) Bestellung bei einem vordefinierten Lieferanten *) Gehen Sie zu Amazon und kaufen Sie es *) Fragen Sie bei einer Suchmaschine nach und kaufen Sie das beste Angebot *) Verwenden Sie eine Preissuchmaschine und wählen Sie das beste Angebot aus *) Wenden Sie sich an Lieferanten, die das Teil auflisten, aber keine Online-Preise anbieten *) Kontaktieren Sie Lieferanten, die das Teil haben könnten	Bevorzugt bei Farnell oder RS, weil es da am schnellsten und einfachsten geht, aber auch Amazon und andere Shops - ist überhaupt kein Thema. Hängt natürlich immer ab von was für Budget Preis. Ein paar 100 Euro kann ich noch selbst entscheiden - natürlich immer mit dem Gedanken, dass es Sinn macht. Wenn ich etwas bestelle und gefragt werde warum brauchst du das und ich kanns es nicht erklären, kann es sein dass es irgendwann soweit kommt das ich nicht mehr bestellen darf ohne Rücksprache zu halten.
Ändert sich das, wenn der Preis des Teils höher ist?	Wenn ich jetzt ein Ultra Oszi um 80k benötige ist das ein Budget, dass einmal im Jahr freigegeben wird - wenn wir solch Materialien brauchen - und das obliegt meinem Chef.
Ändert sich das, wenn Sie das Teil dringend benötigen?	Das ist nicht ganz so strikt - das ist sehr viel mit Eigenverantwortung. Wenn es 4 stellig wird sollte man schon man Rücksprache halten.
Was ist die primär verwendete Sprache in	Englisch, Soweit ich weiß haben wir alles nur auf

Ihrem Unternehmen? In wie viele Sprachen übersetzen Sie normalerweise Ihre Verkaufsbroschüren / Marketingmaterialien / technischen Dokumentationen?	Englisch. Mir wäre noch nie etwas untergekommen außer in englisch - nicht in Deutsch, nicht in Chinesisch oder sonst was. Ich weiß allerdings nicht wie da das offizielle Statement ist - ob es da vielleicht lokal - gerade für den asiatischen Raum gerade Marketing Sachen schon übersetzt werden (...)
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	Ich glaube wir haben nichts gemietet aber wir lagern Sachen, die wir nicht machen können, weil wir die Gerätschaften nicht haben, lagern wir an Dritte aus. Ich wüsste nicht, dass wir je etwas gemietet hätten. Gerade für Funkmessungen haben wir nur ganz kleine Sachen im Haus für Vormessungen und der Rest wird outgesourced. Aber ansonsten wird bevor wir Gerätschaften anmieten wird eigentlich immer Budgetär geplant, dass es auch gekauft wird, weil was ich da gesehen habe ist, wenn man so ein Gerät braucht ist es meistens für, betrifft es nicht ein Projekt, sondern eine Produktlinie und somit ist es immer gut es schon zu haben.
Denken Sie, dass der aktuelle Trend zum Kauf von Geräten oder zum Mieten von Geräten geht?	Ich glaube das sich das ändern wird. Die Technik wird immer komplexer, es gibt immer mehr Geräte und die Geräte braucht man nicht ständig und ich glaube dass hier mieten durchaus Sinn macht (…) Wir haben da sehr viele Testbenches durchprobiert und da kann ich mir schon vorstellen, dass man sagt, man mietet es für 2 Jahre (...) und holt sich dann eine neue, wenn es eine bessere gibt. Weil wir sind da nicht immer Glücklich mit dem was wir gerade haben, weil die was net kann und andere des können - und die Preise sind ja utopisch, da kann man ein Haus bauen dafür was da kostet - da kann ich mir vorstellen, dass mieten attraktiv wird.
Marktwachstum im E-commerce	nicht relevant
Marktverschiebung hin zu größeren Unternehmen	relevant
Sensoren und Mobilität	relevant
Augmented Human	relevant
Postklassisches Rechnen und Kommunikation	not relevant
Digitales Ökosystem	relevant
Künstliche Intelligenz und Analytik	very relevant
Verschiebung nach Asien	relevant
Digitalisierung in der Elektronikindustrie	very relevant
Erhöhte Innovationsgeschwindigkeit	relevant
Personalisierung	relevant
Globalisierung	relevant
Gesundheit	very relevant
Mobilität	relevant
Sicherheit	very relevant

Expert 7

Frage	Antwort
Welche Auswirkungen hat das Coronvirus bereits auf Ihr Unternehmen?	Wenig, da die Puffer in den Lieferketten noch ausreichend sind, würde ich sagen.
Wie sehen Sie die Auswirkungen des Coronavirus auf Ihre Branche?	Auch noch nicht, zumal die Kunden noch ihre bestehenden Aufträge abwickeln. D.h. die Auswirkung wird erst ab Jahresmitte spürbar sein, weil dann die Aufträge abgewickelt werden, die jetzt momentan mit größter Wahrscheinlichkeit - Also Auftragseingang rückläufig - der verringerte Auftragseingang wird sich erst Umsatzmäßig in der Jahresmitte auswirken.
Welche positiven oder negativen Auswirkungen stehen Ihrer Meinung nach noch bevor?	Die Ausfälle werden sicher auch zu Unternehmensausfällen führen - es wird eine Bereinigung geben am Markt - was negativ zu beurteilen ist (…) Diese Bereinigung hat langfristig sicher auch positive Effekte.
Was halten Sie von Massen-Screening-Tests wie der automatischen Messung ihrer Hauttemperatur oder der Verfolgung des Bewegungsverlaufs ihres Telefons?	Sind dann hervorragend wenn es dazu dient Kranke zu identifizieren und den Gesunden die Bewegungsfreiheit wieder zu geben. Besser wäre die Lösung mit Fußfessel. D.h. wenn einer erkrankt ist und unter Quarantäne steht, dann geht es eh nicht um Freiheitsrechte. Weil in dem Moment wo einer krank ist und andere ansteckt unterliegt er dem Quarantänegesetz und damit sind seine Freiheitsrechte automatisch eingeengt - das geht gar nicht anders - und dass man den identifizieren muss in einer Quarantäne ist auch klar - d.h. das ist kein Datenschutzproblem, sondern das geht gar nicht anders. Wenn ich die Leute nicht identifiziere, kann ich sie nicht zur Verantwortung ziehen und daher ist es absolut notwendig, vor allem die Kranken zu isolieren - das sollte aber nicht dazu führen die Gesunden einzuengen - das ist der Fehler.
Was halten Sie von der Entwicklung oder dem Angebot von Fieber-Screening-Lösungen als Geschäftsmodell?	Das ist ein vorübergehendes Geschäft, das so schnell wie es kommen wird auch wieder verschwinden wird. Wenn man es schafft opportunistisch hier ein bisschen mitzuschneiden dann ja, aber das wird kein Nachhaltiges Geschäftsmodell sein. D.h. das geht vielleicht heuer bis Herbst und dann ist es genau so schnell wie es da war ist es wieder weg.
Welche Trends haben Ihrer Meinung nach neben dem Coronavirus derzeit den größten Einfluss auf Ihre Branche?	Neben Coronavirus - ich glaube der Haupttrend der sich fortsetzt ist, dass man Elektronik zum Überwachen und verfolgen von Prozessen in immer kleineren und verteilteren Bereichen einsetzen wird. Der Trend ist ungebrochen - was Elektronik immer schon war, nämlich Sensorik bzw. einfach auch Automatisierte Datenerfassung die dann die Steuerung von Prozessen, sowohl Geschäfts Prozesse als auch Logistikprozesse - das war es schon eigentlich von der Urzeit der Elektronik - und der Trend setzt sich ungebrochen fort.

Welche Trends, die im letzten Jahr aktuell waren, sind in diesem Jahr nicht mehr relevant?	Da kann ich nichts dazu sagen - so kurzfristig denke ich nicht.
In welchen Bereichen sehen Sie Verbesserungspotenzial durch Kundenfeedback?	In gar keinem - das ist eh eine Selbstverständlichkeit, dass man schaut was die Kunden brauchen (…) Die Frage bei Verbesserungen ist immer das Kosten-Nutzen Verhältnis. Verbessern kann ich immer, nur Verbessern heißt nicht, dass es dann wirtschaftlicher wird. Ja - verbessern kann man immer, aber das Problem ist, wenn Sie immer verbessern, dann werden Sie wirtschaftlich immer schlechter, weil das betriebswirtschaftliche Optimum und das Kundenoptimum decken sich nicht. da gibt es zwei Antworten - Betriebswirtschaftlich nicht und Kunden Optimierungen können Sie immer machen - die optimale Kundeverbesserung wäre wenn Sie dem Kunden alles schenken - dann wird der Kunden überglücklich (...) ich glaube es gibt in der Volkswirtschafts- Betriebswirtschaftslehre die große Illusion dass das deckungsgleich ist. das stammt irgendwann aus den 60er Jahren, wo man erkannt hat, dass sich die Märkte jetzt von Produzentenmärkten zu Kundenmärkten wandeln (...) wurde dann darauf geschlossen, dass man einfach das tun muss was deren Kunde will und dann läuft das Geschäft. Ich glaube das das Paradigma auch überholt ist, aber das ist jetzt ein anderes Thema - Beispiel ist Microsoft, die alles andere als Kundenzufriedenheit produzieren aber höchst erfolgreich sind mit Kundenbindungsmodellen, etc. das ist für mich ein Extrem Beispiel für eine außerordentlich erfolgreiche Firma, die eigentlich nicht wirklich was gescheites produziert.

Denken Sie, dass nur große Open Source-Projekte erfolgreich / nutzbar sein können?	Ja, und zwar das hängt damit zusammen, dass in Software relativ hohe Fixkosten sind, die auch in Open Source anfallen für Freiwillige und weil ohne die Kritische Masse die Qualität nicht entsteht. D.h man braucht eine Menge - ich habe mir viele OpenSource Projekte in der letzten Zeit angeschaut, in den letzten Jahren - wenn die nicht eine entsprechend breite Unterstützung haben, Ökosystem etc. Leute die Beitragen zur Weiterentwicklung, dann wird das stagnieren oder absterben und davon gibt es Myriaden Beispiele, die diese kritische Masse nicht erreicht haben und die dann halt irgendwo so dahinvegetieren auf so einem Github Account aber wo nie etwas gescheites daraus wird - und umgekehrt gibt es Lösungen, ich denke an das nextcloud, wenn man sich den source code anschaut ist er nicht gut, aber die haben so eine Masse an Unterstützern, dass das einfach ein defakto Standard ist bei der Synchronisierung. heisst mit andern Worten die Menge an Unterstützern und die Größe des Projekts ist viel entscheidender als die Qualität die dann dahintersteht. Ich glaube das gilt generell für Software und das habe ich sehr stark bei open source beobachtet. d.h kleine Opensource Lösungen sind ganz nett, das ist aber ungefähr gleich wie wenn jemand seine geistige Überreste, der er vom Programmieren zusammengeschrieben hat veröffentlich - das war es dann schon - davon gibt es wirklich Myriaden - wenn Sie da irgendwas im Spezial Bereich suchen nach open source, da gibt es Lösungen ohne Ende. das Problem ist, wenn Sie das dann einsetzten haben Sie ein Vertrauens Problem, weil wenn Sie dieser Lösung dann irgendwelche kritischen Daten anvertrauen und die sind dann hin oder was auch immer, haben Sie ein riesen Problem. und aufgrund dieses Vertrauensproblems setzten sich dann eigentlich nur die ganz ganz großen Lösungen durch. Nextcloud ist für mich ein gutes Beispiel.

Wie verdienen Ihrer Meinung nach Unternehmen, die Open Source-Projekte unterstützen, ihr Geld?	Was ich beobachten in den allermeisten Fällen, indem sie zum einen das open source kostenlos zur Verfügung stellen aber dann drum herum Dienstleistungen anbieten. Also beispielsweise, ich glaube das tut auch nextcloud, um das Beispiel nochmals zu verwenden, man kann diese Software völlig kostenlost herunterladen, wenn man aber spezielle Anpassungen, zum Beispiel für einen Unternehmensbereich (...) also Schutzmaßnahmen oder Administrations Unterstützung sodass das der Administrator leichter verteilen oder verwalten kann, für solche Erweiterungen wird das dann kommerziell abgewickelt. Das heißt mit anderen Worten, die Leute lernen das Basisprodukt über das open source kennen und das ist zugleich Werbung für die firm die dann den Support dazu macht und für die Erweiterungen. es gibt bei fast allen open source Sachen die größer sind ein kostenlosen community paket und wenn man dann die wesentlichen Erweiterungen braucht, das ist auch bei Compilern ich denke da an pycharm und wie sie alle heißen, da ist das community Paket kostenlos und wenn man das kommerzielle Paket haben will, wo dann irgendwelche speziellen profiler etc. haben wollen, ist das dann kostenpflichtig. Das heißt mit anderen Worten, das open source ist immer eine Werbeplattform, die dann letzten Endes Kunden bringt im Premium Segment. das funktioniert aber nur ab einer gewissen Grundgröße, da gibt es aus meiner Sicht eine kritische Größe. ich glaube, dass es in einem kleine Ansatz, das ist mein Bauch Gefühl, da funktioniert es nicht, aber ich habe es mir noch nicht genau durchgedacht.
Was halten Sie von der Verwendung von Open Source als Teil Ihres Geschäftsmodells, um ein Produkt einer größeren Benutzergruppe zur Verfügung zu stellen?	Ich glaube dass das ein ganz hervorragender Ansatz ist. Ich denke an [das Produkt X] , das wurde unglaublich stark von der Hacker community, also die Leute die dann herumgehackt haben, also CCC etc. wurde der Leser unglaublich stark verwendet. Das war einer der Kanäle der rein zufällig, die die Verbreitung stark verbreitet hat. Also auf jeden Fall. das muss aber komplementär - Da muss eine professionelle Firme dann komplementär dabei sein, damit der ganze Support, Marketing, Produkt Abrundung - also das ganz Umfeld muss dann auch noch stimmen, dass die Skalierbarkeit funktioniert. ich glaube nicht, dass es im kleinen funktionieren wird - es gibt sicher ausnahmen aber mir ist keine bekannt derzeit.

Was halten Sie vom Verkauf von B2B-Geräten in einer Nische über das Internet?	das Hauptproblem dabei ist ein ganz eine anderes - ich denke da an Zutrittskontrollleser um ein einfaches Elektronik Beispiel zu nennen. (…) Das Problem ist bei diesen Teilen ja die Integration- heißt mit andern Worten ,wenn sie jetzt was verkaufen mit Standard Schnittstellen, dann sind sie bei einem Preis, wo nur mehr die Chinesen mithalten können und wenn Sie eine spezialschnittstelle haben, weil das einfach nicht in einen Standard reinpasst, dann wird das keinen nehmen, weil die Integrationskosten ja wesentlich höher sind. das Modell wird aus meiner Sicht wahrscheinlich nicht fliegen. das heißt mit anderen Worten, der kauft das nicht über das Internet, der braucht eigentlich ein System und das besondere bei Elektronik ist, das das in der Regel eigentlich immer ein System ist. es gibt ein paar Ausnahmen aus dem Massenmarkt, die scheinbar Einzelkomponenten sind, also ein Handy ist scheinbar eine Einzelkomponente, genauer betrachtet ist es eingebettet in Verträgen mit den Providern usw. mit den Mobillieferanten - ohne das geht ein Handy gar net. d.h wenn sie jetzt zb ein Handy verkaufen würden und sie hätten jetzt nicht die ganze Abstimmung , dass das mit A1 und wie sie alle heißen zusammen funktioniert und freigegeben ist und zugelassen ist, dann können Sie das Handy auch vergessen. das ist das Problem wenn sie das Handy in Japan einkaufen, dann haben sie die Möglichkeit, dass es unter Umständen bei uns gar nicht gescheit funktioniert, weil das alles nicht zusammenpasst, weil das Ganze ein System ist (...) Sie sehen schon sie haben bei Elektronik immer eine Einbettung und diese Integration ist eigentlich ein Widerspruch, dass man das b2b über das Internet einfach verklickert. es wird Ausnahmen geben, aber die Sachen, die sie über das Internet kriegen sind meistens Massenprodukte, vielleicht gibt es Nischen, aber das das funktioniert ist die Ausnahme, nicht die Regel. es mag durchaus so sein, dass es manchmal geht, aber das ist aus meine Sicht die reine Ausnahme.
Was halten Sie von der Unterstützung mehrerer Sprachen auf einer Unternehmenswebsite?	das hängt ganz vom Produkt ab. Wenn das Consumers also Privatkunden sind, dass ist es absolut notwendig und unverzichtbar. Im B2B Geschäft - es gibt deutsche Firmen, die gerne deutsche Beschreibungen Lesen, die sind aber sehr abnehmend. Typischerweise im internationalen Bereich haben sie Englisch. Im Japanischen Bereich wird es sicher viele Firmen geben, die gerne Japanisch hätten, auch im chinesischen wird es sicher viele Firmen geben, die im chinesischen sind. Also es hängt ganz davon ab in welchem markt sie verkaufen. würden wir in China verkaufen, würden wir die Webseite auch auf Chinesisch anbieten, in Japan auf japanisch - und dann gibt es wiederum viele Märkte für die ist es völlig ausreichend, wenn es nur englisch ist - da gibt es regional riesige Unterschiede. Ich würde sagen für 90%

	der Welt reicht Englisch aus.
Haben Sie oder Ihr Unternehmen derzeit etwas gemietet, anstatt es zu kaufen? Wenn ja was?	Die Räume, die Immobilien, sonst nichts. Das ist jetzt eher bei kapitalintensiven Branchen (…) oder wenn Sie fluktuieren Bedarf haben - das ist bei uns nicht der Fall.
Was halten Sie von der Vermietung technischer Geräte als Geschäftsmodell?	Das ist immer mit einer Dienstleistung verbunden, also Service, Wartung und solche Sachen. Wenn dann müssen Sie das als Komplettpaket aufziehen mit Wartung usw. sonst wird das nicht funktionieren. Weil die Voraussetzung ist, sie müssen funktionsfähige Sachen ausliefen an ihre Kunden und wenn sie es zurück bekommen müssen sie sicherstellen dass es wieder funktioniert bevor sie es dem nächste Kunden geben und den Prozess müssen sie organisieren, sonst fliegt das nicht.
Marktwachstum im E-commerce	not relevant
Marktverschiebung hin zu größeren Unternehmen	not relevant
Sensoren und Mobilität	not relevant
Augmented Human	not relevant
Postklassisches Rechnen und Kommunikation	not relevant
Digitales Ökosystem	very relevant
Künstliche Intelligenz und Analytik	relevant
Verschiebung nach Asien	not relevant
Digitalisierung in der Elektronikindustrie	relevant
Erhöhte Innovationsgeschwindigkeit	not relevant
Personalisierung	not relevant
Globalisierung	relevant
Gesundheit	relevant
Mobilität	less relevant
Sicherheit	very relevant

APPENDIX 6: QUALITATIVE CONTENT ANALYSIS OF EXPERT INTERVIEWS

Qualitative content analysis of business model: Fever Screening Thermal Solution

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q4	recognises a form of surveillance but in a neutral way Companies can't decide for themselves what to do, but rely on politics, Thinks that it is good that way because managers are only concerned with profit	Decision is made by politicians	C1: Opinions on fever screening as measure to detect people infected with Coronavirus: * positive that it works (5 out of 7) * think it's useless (1 out of 7) * other opinion (1 out of 7) C2: Opinion of Entrepreneurs of demand * demand under certain conditions * Will be useful only for show *System should be used C3: Major concerns about privacy and data (2 out of 7) C4: Concern about cost C5: Temporary business model
2	Q4	Using a camera to screen people is a good idea, but it will cost a lot of money - the question is if this is a good investment.	Thinks it is a good idea, but concerned about cost	
3	Q4	Does think that tracking is only useful if there is a very low number of infected people, for high number shutdown is better suited	thinks is useful	
3	Q5	thinks that it is useful for low number of infected	demand under certain conditions	
4	Q4	Thermal imaging cameras are useless as preventive measure as only people are detected who already have symptoms and know they are sick. Tracking mobile phone date could be beneficial but should not be used for all people, only for those who violate the restrictions	Thermal screening is useless, concerned about privacy	
4	Q5	Thinks that thermal screening is only good to show the public that something is done by the government or the company	Will be useful only for show	
5	Q4	is concerned about privacy, but sees benefits of preventive measures. Sees future application of screening	Concerned about privacy but sees benefit	
6	Q4	Will provide data if participation is voluntary, Concerns about data misuse by government, fever screening already used in company	Thinks it's good, but wants control over own data	
7	Q4	Solutions that identify the sick to give the healthy back the freedom of movement are ideal. Sick people should be identified because the can infect others.	system should be used	

7	Q5	This is a temporary business model and will vanish soon but opportunistic behaviour may turn some profit	temporary demand	

Qualitative content analysis of business model: Customer feedback created products

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q10	tasks are prioritized according to customer importance when short-time work will come, support will be decreased	Prioritization is important	C1: Low benefit of business model * Limited potential * no idea how to apply *no economic improvement C2: Customer feedback needs to be prioritized according to importance when acted upon C3: Customer selection is prior to support C4: Process improvements on how customer feedback is handled may be considered
2	Q8	customer give detailed reports if something is not working	only active feedback is considered	
2	Q9	no clear opinion, maybe remind customer to give feedback	sees limited potential	
2	Q10	Works certain amount of hours and prioritizes by order size and urgency	prioritization according to urgency and order size	
2	Q11	customer data is used to produce	custom manufacturing	
3	Q9	In R&D and in Sales many things are only communicated verbally which is not ideal	Process improvement	
4	Q9	no idea how to apply	no idea how to apply	
5	Q10	check what can be realized - customer always wants more if you offer it and own resources are limited	Prioritize according to own resources	
6	Q10	support is prioritized by customer importance based on purchase volume. If resources are not available customer will be informed or task delegated	Customer Selection prior to support	
7	Q9	the costs and benefit have to be considered - every optimization that is good for the customer may be bad for costs of the company - making the customer happy is a no longer valid paradigm	no economic improvement	

Qualitative content analysis of business model: Open source brand enhancement

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q12	no opinion	no opinion	C1: Positive and negative aspects of small open source projects * can be useful (2 out of 6) * lack of standardization * mixed feelings * quality and trust issues * no opinion C2: Revenue models in open source projects * Sell accessories for big open source projects * support and adaptations * Services, adaptations and advertising C3: Open Source business Model is not easy to run * difficult to have good ROI * needs to be managed professionally *contributors expect payment C4: All entrepreneurs think that adding open source to the business model is a good idea or have plans to do so
1	Q13	Doesn't use open source, but thinks it could be useful	Not fully convinced of open source	
2	Q14	no clear opinion	no opinion	
2	Q15	many customers develop and sell products for well-known open source projects like Arduino	sell accessories for big open source projects	
3	Q12	One person can run an open source project and do maintenance and support contracts	Small open source can work	
3	Q14	support and adaptions are sources of revenue	Support and adaptations	
3	Q15	yes, we plan to do this	Plans to make use of open source	
4	Q12	the benefit of open source is to have a quick and dirty solution, the downside is that there is no standardization and continuity and configuration is very time consuming. Open source is not my first choice	lack of standardization	
4	Q14	to have good ROI with open source projects many things must go well	difficult to have good ROI	
4	Q15	Plans to do some open source projects in the future like his programmed ERP but is worried that nobody will use it if it is to specialized	Plans to make use of open source	
5	Q12	small open source project may be useful as part of an own bigger application	small open source projects can be useful	
5	Q13	Would contribute to open source project. Would need some form of payment to be satisfied	contribution for payment	
6	Q12	licence problems are the main issue	Mixed feelings about open source	
6	Q13	does not participate in an open source project source code is made available, but with license	no active contribution	

7	Q12	Open source projects need a critical mass of supporters to ensure the quality of the product and provide a level of trust give critical data into the application. There are a myriad of small one man projects that stagnate	Quality an trust issues	
7	Q14	Services are offered around the open source product or there is a basic version that is open source and some extensions with special functions for premium segment that make it more useful that cost money	Services, extensions, advertising	
7	Q15	This is a good idea, but it needs to be managed by a professional company in the background to improve and direct the product	good idea, needs to be managed professionally	

Qualitative content analysis of business model: Niche B2B Equipment Webshop

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q16	Asks boss and orders	Cannot decide on his own	C1: Order Process in company: * Cannot decide on his own * has limited control over purchase * Can order by himself C2: Convenience is relevant for low price items. * Amazon for cheap items * Approved websites by company C3: Business model may be problematic: * smaller companies may have lower margins * Issues with integration C4: High formal order channels are used for higher price items C5: Price not so relevant for urgent demand C6: Details are more important for higher price items C7: Business model is state of the art C8: Business model can work if right niche is found C9: no opinion
1	Q17	Looks online for equipment and forward to purchasing For special equipment ask company direct	Convenience is relevant for low price items	
1	Q18	Uses Amazon only buy cheap items	Amazon for cheap items	
1	Q19	Purchasing department is always in the loop	No procedural change for urgent items	
2	Q20	Expansion of B2B offerings on the website is planned, but postponed due to lack of staff	sees potential, but it's not a top priority	
2	Q21	Handling all kinds of electronic parts is not an easy job and needs massive amount of capital. Low profit for small sellers.	smaller companies can exist if they can work with lower margins	
2	Q22	Can think of adding B2B products for a special niche to their offerings, but is not sure yet	Thinks it can work, but niche needs to be found	
3	Q20	it is state of the art to sell online, but it will increase	state of the art	
4	Q20	no idea	none	
5	Q16	Searched on the internet for best price and then ordered	Can order by himself	
5	Q17	Used mainly catalogues distributors and considered item price and shipping cost.	uses internet and approved websites	
5	Q18	for higher price items specification was checked in detail - observed that price difference between sellers for higher price items is minimal	Details are more important for higher price	
5	Q19	price is not that relevant when item is needed fast	price not so relevant for urgent demand	
6	Q16	Asks team leader and forwards to assistant	Has limited control over purchase	
6	Q17	looks on the internet, mainly on known distributor websites amazon and other websites are	uses Internet, first approved websites, then	

		second choice	other websites	
6	Q18	Bigger purchases require budgetary approval	Formal channels for higher price	
6	Q19	based on own decision for up to 1000 Euro	own decision what to buy	
7	Q20	The problem is that special devices need to be integrated as all electronic devices are part of a system. The integration is the hard part which cannot be done online and if it is standardized then the competition is high. For some niches this might work, but it is the exception	integration is the issue	

Qualitative content analysis of business model: Multilingual offerings

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q23	English is the main language	English	C1: Following languages are used for offerings on Website: * English (7 out of 7) * German (4 out of 7) * more (3 out of 7) C2: Language offering is * market depended, 90% can be addressed in English * related to main economic area C3: Support in native language comes at a price C4: Translation tools are used
2	Q23	English is used as main internal language, German also	English and German	
2	Q24	Translation tools are used for document translation.	translation tools are used	
2	Q25	Thinks that support in native language is important but cost to employ so many people is downside	support in native language is important, but comes at a price	
2	Q26	Spanish support would be good because it is a big market, German and English are already used - Russian maybe to address eastern Europe	German, English, Spanish and Russian	
3	Q26	English and the languages of the main economic area should be used on the website	English and main economic area	
4	Q26	German and English will be supported on the website - no other	German and English should be supported	
5	Q23	German and English language is used	German, English	
6	Q23	English is used	English	
7	Q26	It depends on the market - 90% of the B2B world market may be addressed in English language	market dependent, 90% English	

Qualitative content analysis of business model: Technical equipment lending

Expert	Question	Paraphrasing (extract meaning)	Generalisation	Reduction (Classification)
1	Q27	No rented equipment, because value is not high	No added value	C1: Technical Equipment rented: * No (6 out of 7) * Yes (1 out of 7) C2: Technical equipment lending not relevant because: * No added value * Buying is preferred * rental is not interesting * rental is currently not interesting C3: Technical equipment lending business model not viable because: * doesn't see a market * doesn't make sense * too capital intensive C4: Technical equipment lending business model may be viable because: * Expensive Equipment is rented * Rental may become interesting C5: Rental should be couple to services
1	Q29	no change in his department	Buying is preferred	
2	Q27	No rented Equipment because price was low	no rented equipment	
2	Q28	Renting is not so popular	Doesn't see a market	
2	Q30	It needs to be considered	No immediately visible potential	
3	Q27	no technical equipment rented, not relevant or no offers	no rented equipment	
3	Q30	business model doesn't make sense for technical devices	doesn't make sense	
4	Q27	All more expensive machines are rented to have more liquidity within the company to have a buffer for unforeseen events	expensive equipment is rented	
4	Q30	Thinks that you need too much capital	too capital intensive	
5	Q27	no equipment rented, if something is needed it is purchased	No equipment rented	
5	Q29	no good experiences with renting and has the expectation that renting will not become a new trend	rental is not interesting	
6	Q27	No rented equipment in company Whole task is outsourced if equipment is not available	Rental currently not interesting	
6	Q29	Electronics are getting more complex and number of test equipment gets larger requirements change and older test equipment may not be ideal Thinks that renting may be a viable option for more expensive equipment	Rental may become interesting	
7	Q27	no rented technical equipment, it only makes sense in capital intensive industry	no rented equipment	
7	Q30	renting out equipment is always coupled to a service, maintenance and so on. This process has to be managed well in order for the business model to work	coupled to service	