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Article

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Abstract

Smart Home (SH), essentially meaning efficient housekeeping with the help of digital devices that are able to learn, is on its way into Germany's households. As one of the world's markets with the biggest economic potential for SH, this research outlines that consumers as well as companies are ready to engage.

Analysing various aspects of SH, from obstacles to overcome in the consumers' minds to potential business models for companies engaging in SH, a future scenario has been created by using the Delphi method: Upper management experts from marketing, telecommunications, retail management, logistics and supply chain management plus the automotive industry in Germany have contributed to creating the scenario and agreed to the final version. The scenario shows that in the long run, perceived obstacles like data privacy or interconnectivity will probably be solved and successfully overcome. It also outlines the prerequisites for a success of SH.

Furthermore this research identifies two core roles that can be occupied by companies: the one of owning the platforms and networks and the one of participating by connecting products and services to these platforms and networks. In the end, it will be the software companies and owners of the platforms and networks generating the most sustainable profits while manufacturers of hardware will face eroding margins and interchangeability because of high competition. SH will also spawn positive spillover effects on many other industries: they will be the biggest accumulated group of beneficiaries. Those very often traditional industries will engage in SH once it proves to be an efficient business case for them.

Key words: Smart Home; platforms; strategy; telecommunication; cross-industries; business opportunity; German market; IoT; Smart; interconnectivity; marketing; positioning

1 Introduction

In today's global world, technological changes are becoming more and more rapid (Jeong et al. 2010). Digitalization leads to shorter product life cycles and an increased amount of innovation. Especially during the last decade, the "Internet of Things" (IoT) has emerged and significantly changed people's resource perspective. As a result, the way in which resources are being managed becomes more and more "smarter" (Kirkham et al. 2014) nowadays.

With companies and businesses slowly benefitting from the IoT, computer technology also spreads in the home environment. The use of this ubiquitous computer technology has manifested in a development around the term "Smart Home" (SH). Essentially "economising the running of a house" (Jeong et al. 2010), Smart Home is a space in which digital devices are connected in an intelligent and self-learning way (Balta-Ozkan et al. 2013). As humans interact with their surroundings and adopt accordingly, research has proven that a vice versa interaction is also beneficial. As Jacobson et al. (2015) argue, using Smart Home technology can reduce the energy consumption (heating, water and electricity) by up to 20%. Moreover, it is safe to state that with over 90 million people using Smart Home concepts in the near future, the growth potential for this market is enormous (Jacobsson et al. 2015).

Being the world's third biggest Smart Home market with an estimated mUSD 925.6 in 2016 (Statista 2015), Germany provides a lucrative market for potential players. Nevertheless, research lacks a clear view of which industries should engage in the smart home environment and how these players should behave. It is therefore the aim of this research to discuss and explore possible future scenarios for a successful implementation of Smart Home across industries. In a first step, existing research related to Smart Home will be analysed with regards to potential use cases. Secondly, the Delphi method will be used to collect qualitative data. Following Bernardo and Freitas (2015), this is the most sophisticated method creating future scenarios. For the use case of Smart Home, business experts, ranging from eCommerce and telecommunication to automotive and digital consultants, will be asked in a 3-step process how they see the future development of Smart Home in Germany.

With the help of the method created by the RAND Corporation in 1963, the different opinions will be narrowed down to one future scenario. This scenario will then be the subject of discussion and further implications. In the end, the findings will be summed up combined with limitations and potential need for further research.

2 Research Questions and Objectives

As already explained the aim of this research is to explore the market opportunities emerging with SH in Germany. Experts will be interviewed to identify various aspects for a successful implementation of SH use cases. The research angle will include SH hardware and software, looking at possible providers for the technical platforms and digital infrastructure needed. However, the indirect beneficiaries – the ones who can benefit from the SH products once the infrastructure is implemented – will also be a target of the qualitative research.

To answer those questions and to establish a possible future scenario for the development of the German SH market, the following research questions need to be processed:

- 1) Is the German market ready for Smart Home products and their evolvement?
- 2) Which industries can benefit from Smart Home, and how do they need to tackle possible use cases?
- 3) Who needs to invest in the necessary hardware and software?
- 4) Are future profits on the side of providers or of businesses using existing SM infrastructures?

With the help of the research approach those questions will be answered and analysed to derive practical implications.

3 Smart Home

Smart Home should be understood as a bundle based on the IoT infrastructure but limited to a single household and its technical infrastructure. Simplifying the concept, it can be said that anything that features tiny computers that are able to learn over time from a certain behaviour can be called “smart” (ITU 2005; Fleisch 2010).

Within the last decade, smart homes and closely related topics have increasingly become the focus of researchers (Balta-Ozkan et al. 2014b; Luor et al. 2015). This trend in research mainly emerged from an energy-saving angle, pointing out the sustainability benefits society could achieve if the resources at home are managed more “smart” (Jacobsson et al. 2015). This use of “intelligent technology” has dominated the scientific definition of smart homes as a communication network linking various devices with one another using an ubiquitous computer system technology (Kirkham et al. 2014; Parra et al. 2009; Balta-Ozkan et al. 2014a).

As the home develops into an environment that is no longer enclosed (Kirkham et al. 2014), a challenge researchers as well as companies have to face is how to develop a concrete product

proposition (use case) that is flexible enough to adopt to various different homes and needs (Luor et al. 2015). This connection between Smart Home and positioning strategies for potential businesses has been neglected in research papers so far and legitimises the need for this research. As previous studies have pointed out, especially the cultural context and market conditions have been neglected yet. The impact of cultural acceptability towards Smart Home perceptions has been noticed (GhaffarianHoseini et al. 2013) but not embedded into a strategic approach for the end consumer. Underlining the cultural aspect, a recent study proves sophisticated differences between perceptions of product features when comparing the western culture with Asia, for example. Westerners are way more energy-conscious and like to be in total control of their homes (Jeong et al. 2010).

Seminal work regarding consumer behaviour and Smart Homes was done by Bonino and Corno (2005) or Balta-Ozkan et. al (2015). Although their research findings are a decade apart from each other, their results evoke similar implications. In 2005, Bonino and Corno claimed that the technical gap between what customers would expect and what is technologically feasible could already be bridged and was narrower than perceived. During their studies, they analysed three major trends that are still valid in 2015: First, people want to be in control, so whatever possibilities smart homes bring with them, it is essential that the user has total access to everything. Secondly, people are becoming more and more interested in the benefits of Smart Home, but not necessarily in the technology behind it. The third and last trend they identified is that with all future Smart Home developments the core values attached to a home (feeling “at home”, feeling good, being able to do what you want, etc.) must be left untouched. Thus, two main needs emerge, one dealing with COMFORT (e.g. lighting, windows, and temperature), and the other with HOUSEHOLD (e.g. cleaning, washing, gardening).

The study conducted by Balta-Ozkan in 2015 agrees with the last trend as they found out that a smart home solution needs a strategic “fit” into today’s perception and general sense of a home. Similar to Bonino and Corno, he also examined a perceived technical gap in expectations. In addition to that Balta-Ozkan analysed some deeper concerns regarding trust and morality issues when it comes to SH. These reservations potential customers might have, have to be alienated as early as possible when introducing a SH product.

Having analysed the existing research in terms of Smart Home (SH), one can say that the approach taken in this study has not been taken before. In most cases, research focuses on one single industry and its Smart Home applications, often with the focus on consumer behaviour. Conducting a potential analysis of use cases across industries while focussing on one specific market is a new

approach in SH research. To further specify the German market, the next chapter will outline the existing Smart Home market as well as analyse economic growth and potential.

Being the world's third biggest Smart Home market with an estimated revenue of mUSD 925.6 in 2016 (Statista 2015), Germany provides a lucrative market for potential players. With a projected annual growth rate of 36% until 2020, the SH market in Germany will then amount to mUSD 3,261.5. Within the next four years, all four sectors that will be discussed in this paper are expected to grow significantly (Statista 2015). Those sectors are: Home Automation, Security, Energy Management & Home Entertainment. "Home Automation" can be defined as all services SH provides for technologies in the household, for example a fridge that orders milk once it runs out. "Security" is the field of SH which relates to the safety of homes, e.g. your camera connects with a Smartphone as soon as someone approaches your house. "Energy Management" with SH means managing energy resources more sustainably, e.g. coordinating the times of heating and switching on lights with the point of time when you come home from work. The last sector "Home Entertainment" includes all aspects ranging from TV over music to streaming providers. These numbers highlight the economic importance that SH will get during the next years. However, penetration rates are still very low. Only 1,2% of German households are considered "smart", roughly 6% to be in 2020.

It is this gap between enormous potential but very low penetration rates what this research tries to investigate further. With both internet and smartphone penetration being on a high level, the future perspective for SH in Germany is promising in all aspects. After having discussed recent literature and the market development, the next step will combine the collected knowledge in a theoretical framework on which the expert interviews will be designed.

4 Theoretical Framework

The framework of choice for this research is the Diffusion Theory of Innovation. As SH is an innovative and new field, the theory provides the needed depth to specify the current state of SH in the German market.

4.1 Diffusion Theory of Innovation

The Diffusion Theory of Innovation (DOI), as developed by Everett Rogers in 1962, is one of the oldest and most used social science theories. The aim of the DOI is to map how a new idea or change spreads (diffuses) over time through a specific market or society. It elaborates different

phases an innovation goes through and tries to explain how characteristics can influence adoption. Additionally, Rogers also divided potential users into groups regarding their usage of new and innovative ideas: “diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers 1995). Over the years, the diffusion theory has become a leading hypothesis dealing with acceptance recognition (Aizstrauta et al. 2015).

One of the reasons for the success of the theory is Rogers’ approach, unlike other researches, stating that “[I]t should not be assumed, as it has sometimes in the past, that all innovations are equivalent units of analysis.” (Rogers 1995). Thus, he splits up different aspects related to innovation that have to be specified regarding each innovative idea: Innovation, Communication Channels, Time, and the social context. Innovation, dealing with the speed at which an innovation can spread and five different attributes that define this speed; Communication Channels, essentially meaning which mode of communication is used on the one hand are the mass media channels and on the other hand the interpersonal channels and Time, describing the process how an innovation develops (Knowledge to Persuasion to Decision to Implementation to Confirmation).

4.2 Smart Home – Innovation Angle

Combining scientific results from further research with the diffusion of innovation will allow an in-depth analysis of the German SH market. The following analysis of the innovation angle of SH will precisely allocate what qualitative research has to explore.

In a first step, two of Rogers’ key aspects for the diffusion of innovation will be applied to the German SH market. For this research, the aspects of innovation and time are the most crucial ones when looking at this market. Therefore, the five aspects of innovation (Relative Advantage, Compatibility, Complexity, Trialability, and Observability) will be mirrored onto the SH development:

The five aspects of innovation indicate that SH Germany has a difficult way to through. Being a product bundle that combines technological devices within a household (low Relative Advantage), it is hard to grasp for potential customers (high Complexity). Due to the fact that it cannot be tried out easily, SH evokes high uncertainty (low Trialability). As it is very complex in its nature, SH is having a hard time being understood before it can even be tried and then potentially adopted.

In the next step, the important aspect of time will be applied to the German SH market, focussing on the current stage of development.

According to Rogers (1995), the diffusion of an innovation relates to consumers and their different levels of innovativeness. This innovativeness of a person or a decision-making unit is divided into five different categories, the Innovators, the Early Adopters, the Early Majority, the Late Majority, and the Laggards. Applying this concept to the SH market in Germany, the following picture can be drawn:

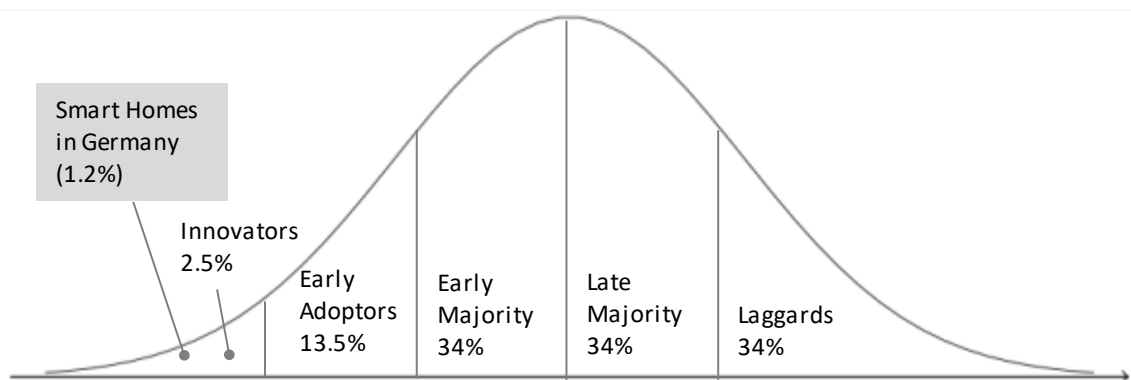


Figure 1: Innovativeness SH Germany (own adaption to Rogers, 1995)

With only 1.2% of German households being considered “smart”, SH is at the stage of the product life cycle at which only the innovators participate (Statista 2015). In order to successfully diffuse into the next stages, a strategic approach to SH as a whole is needed.

To provide research exploring how SH Germany can overcome the obstacles that have been identified via the literature review and the application of Rodgers DOI theory, a qualitative approach is needed. The collection of quantitative data has been sorted out due to the complexity of the product itself as well as due to the lack of market penetration. Without reaching a critical mass, quantitative data would not provide any results useful for a strategic approach of SH in Germany. Moreover, there is a clear lack of real life use cases in which SH is being used in natural surroundings (Lour et al. 2015).

5 Research Approach

Within this chapter, the chosen method for carrying out the qualitative research will be introduced. After explaining the strategy to collect data for creating a future SH scenario for the German market, the Delphi method will be applied. Following the research design, the sample size will be allocated, guaranteeing a sophisticated approach regarding the gathering of data.

5.1 The Delphi Method

The Delphi method originated in 1963. Since its development the Delphi method has been used across different industries to help and construct future scenarios. The ultimate aim of the Delphi method is not to create a consensus but rather a structured communication process among experts (Linstone & Turoff 2011). Furthermore, Keeney et al. (2006) argue that the Delphi method is used to reach at least a certain level of agreement among its participants. For this research, the view of Keeney et al. in terms of agreement is used, aiming at creating a future scenario for the German SH market that most of the experts will agree upon.

Research literature agrees that the structure of the Delphi method contains at least two rounds in which experts are anonymously asked questions (Bernardo & Freitas 2015; Keeney et al. 2006; Gary & Gracht 2015). Here, the first round consists of a questionnaire with 3-6 questions, which is distributed to all participants. When all answers are gathered, the results are anonymised. In a second step, all answers are distributed to all participants with the chance to comment, reflect or change their opinion.

This step can be repeated multiple times until a certain level of agreement is reached (Bernardo & Freitas 2015). In a possible last step, a future scenario can be created from the answers, comments, and remarks. This scenario will then be distributed to the experts for a final comment. Although there might not be “the” future scenario, the Delphi method is able to identify common lines of thoughts among experts. In the multiple rounds, the most important topics are emphasized.

5.2 Research (Delphi Application)

Applying the method to the aims of this research the following 3 step process, in accordance to Bernardo & Freitas (2015), Keeney et al. (2006), and Gary & Gracht (2015), has been designed:

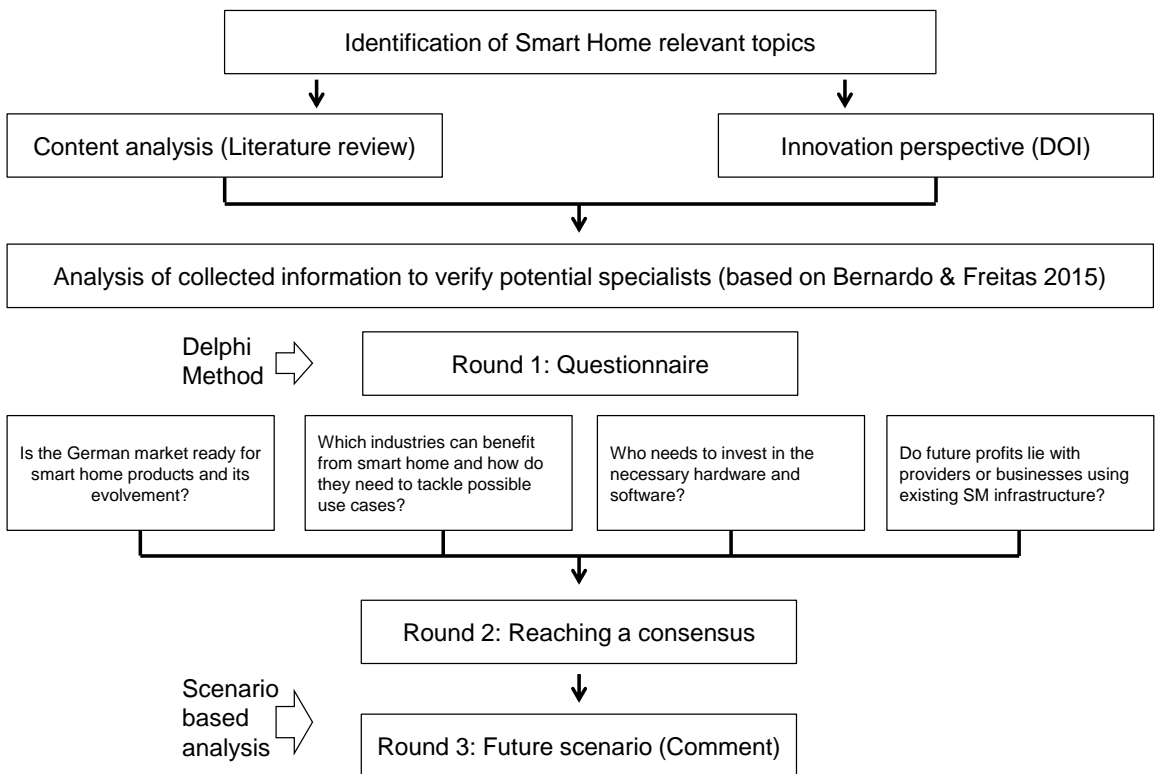


Figure 2: Research Process (Own adaption according to Lee et al. 2016)

As can be seen above (Fig. 2), the Delphi method is structured into three rounds. The starting point of the expert email interviews will be the distribution of the questionnaire. The four questions asked mirror the main research questions of this article. After all answers are collected, the results will be put together anonymously and sent out for the second round. This time, the participants can alter or comment on their own opinion or on the other answers. There is also a reminder included, specifying that the aim is to reach a certain level of agreement among the participants.

In the third and last step, all answers and comments are gathered and merged into one possible future scenario for the SH market in Germany. This scenario is then given to all participants with the invitation to comment on the scenario. Having collected those comments as well, the data collection is successful and the results will be analysed and discussed.

5.3 Sample Size

“The key to success resides in the participants” (Bernardo & Freitas 2015).

Hence, it is important to include people that can take part in a meaningful way. As the aim of this article to find use cases across industries, the experts represent different industries and their opinions and attitudes:

The first field relevant for SH Germany is marketing. As many research implications have shown, SH will rely heavily on the right marketing strategy in order to convince people of the technology and its unique selling proposition (USP). Therefore, it is extremely important to include a marketing perspective into the cross-industry analysis. The expert of choice is a marketing leader. He teaches digital marketing and social media marketing at a private university and gives frequent interviews on marketing and digital transformation.

The second field is the telecommunication industry. As of now, it is the third biggest sector for SH in Germany, and one of the first touch points for customers to experience “smart” services. Bearing that in mind, it is of essence to include managerial expertise from this industry into the circle of specialists. The expert chosen is head of brand strategy and insights for one of the biggest German telecommunication players.

The third field impacting the future of SH is eCommerce. Since the SH movement needs to be monetized at a certain stage, eCommerce is the industry to look for. Thus one of the chosen experts for this research is the chief operations officer of an online retail company.

The fourth field that should be taken into consideration when discussing the future of SH is logistics and supply chain management. As the infrastructure for an extensive SH network is not existent yet, logistics and supply chain management plays an important role in two ways: On the one hand, they are the unit needed to make SH easily accessible, on the other hand, they can eventually profit from SH themselves in the future. Sharing meaningful insights regarding both aspects, the expert from this field is head of logistics at an online fashion retailer.

The fifth and last field are the “old industries”. In this research, they are represented by the automotive industry. To represent a large share of brands in this industry, the person interviewed works within the Volkswagen group in the department of “Communication Platforms and Mobility Services”.

6 Data Collection & Results

Before any scientific collection of data, be it quantitative or qualitative, can take place, a sophisticated framework needs to be built. Following the literature review on recent SH trends and topics, a qualitative method was chosen. Having analysed the theoretical framework of the Delphi method enabled the finalization of the research approach, including the detailed choice of experts.

After the questionnaire was sent back by all participants, all answers were distributed among all experts to comment on the other opinions and – if needed – modify own answers. The results of these two rounds have been aggregated into one future scenario for SH in Germany:

“The German market, probably as a followers’ market, is perceived to be ready for SH and its evolvement. The consumer is ready for SH products and solutions, although he is not fully educated about the benefits and possible risks. Providers and companies are still in an early development phase. The market for SH is currently rearranging itself, but players will position themselves within the next years. For marketers, it will be essential to “brand” SH in the minds of potential consumers, especially in the early stages of development (high log-in effect). To address issues such as data privacy can be a challenge, but will not prevent SH from developing. Presently, it is hard to ultimately determine the industry that will profit the most from SH. What can be said, on the other hand, is that SH will be a cross-industry development, touching and changing various industries. In general, there will be two kinds of beneficiaries:

- 1) *The owners of the platforms or networks that enable interconnections and*
- 2) *Participants that will connect their services/products with those platforms.*

In order to ensure that both parties can succeed, unified standards have to be developed. The owners of the platform will mainly profit from the customer data they collect, either directly to use it for advertising purposes or indirectly by selling it to other companies. Participants that connect with the platform, like supermarkets, energy providers, or construction – just to name a few –, will benefit from a much higher customer contact. Meaning they are in constant and direct contact to help, offer services, improve business processes and gain insights. It has to be seen whether both beneficiaries can coexist or if one will push the other out of the market. If so, the main profits will either be made with data and its usage or with hardware. Except for start-ups evolving around data analysis, the SH market

will not be a market redefined by start-ups. It is much more likely that already existing companies will lead the way by alliances and partnerships. This is due to the fact that SH is a capital-intensive industry, especially in its early stages.

As SH is a big picture solution, it might be the case that after a rather simple standard is agreed upon, companies will work on single “smart” solutions for their product feature-by-feature. After that, individual products can be automatically integrated into a system.

When it comes to R&D, companies that want to participate in SH should invest themselves. There is a very low probability of SH becoming a government-financed project. To further develop this project, companies need applicable standards.

Without standardisation, only few companies will invest, as it will not be an efficient business case. These standards need to be defined by the economy on a global scale.

For the investment to be profitable in the long run, the way the costs are being shared with the consumer is also essential. According to the experts asked, three different payment models can be derived:

- 1) SH could be directly financed by the customer.*
- 2) Monthly subscriptions could be used in which companies have to pre-finance the needed equipment.*
- 3) A case in which users pay only with their data is also realistic.*

What can be said, regardless of whether you are a manufacturer or a network company, is that SH will revolve around convenience. It has to be hassle-free and easy to use in order to win over consumers and succeed as an upcoming development.

Future outlook 2020: The main beneficiaries will be software companies collecting data. As hardware margins will erode over time due to higher competition, companies providing network-related services will generate the most profit on a sustainable basis. Google was named several times as a company who can drive this market. It has to be said, however, that there are many other traditional companies that have aggregated “smart” knowledge, so market leadership is not a sure thing for the likes of Google and Amazon. Furthermore, positive spill-over effects on indirect beneficiaries should not be underestimated. This probably has the biggest potential in terms of benefits related to SH. But these are benefits for existing companies who will adopt SH developments once their business case proves it to be an efficient tool.”

After all experts commented on the final scenario, it can be said that a high level of agreement was reached: The future scenario was approved by the participating experts and mirrors a potential roadmap for SH in the German market towards 2020. As far as the Delphi method and its application are concerned, this research can be called a success. In the next step, the results will be analysed in depth, aiming at identifying both similarities and dissimilarities between the participating industries and SH. After that, the validity and reliability of this research will be put into a critical perspective.

6.1 Analysis

Following the final future scenario of the Delphi method, this chapter aims at analysing the results obtained from the second round. In the second round, the experts had the chance to comment on the opinions from the different industries. The aim of this chapter is to quantify the qualitative data for measuring the agreement between the different industries. Therefore the comments were divided into four groups: Agree (One expert completely agrees with another experts' statement), Partially Agree (One experts agrees to some aspects of another experts' opinion), Disagree (One expert disagrees with another) and No Comment (where no comment could be found). The following trends can be observed:

Table 1: Aggregated Responses of All Experts

	Q1-4 - awarded			
	Agree	Partially Agree	Disagree	No Comment
Marketing	4	1	0	11
Telecommunications	9	4	3	0
Retail Management	7	8	1	0
Logistics	6	8	2	0
Automotive	6	1	1	8
Total:	32	22	7	19

	Q1-4 - received			
	Agree	Partially Agree	Disagree	No Comment
Marketing	6	5	3	2
Telecommunications	6	2	2	6
Retail Management	6	5	0	5
Logistics	6	6	2	2
Automotive	8	4	0	4
Total:	32	22	7	19

Overall, it can be said that the average rate of comments and participation was relatively high with 73% (n=80). The only two industries that did not comment on all other opinions are the automotive industry (with a response rate of 50%) and the marketing industry (with a response rate of only 32%). As a result, these industries were not weighted as strongly, neither for the future scenario nor for the business and marketing implications that will be given at a later stage.

The expert that agreed the most with fellow industries is the representative of the telecommunication industry. He agreed with a rate of 56% (n=16). At the same time, the telecommunication industry is also leading the disagreements with an average rate of 19%. Both results show that the telecommunication industry has fostered a very intensive knowledge of SH and can therefore comment on many different aspects. At the same time, due to the fact that SH was a more direct factor, the telecommunication industry has already made up a clear opinion on SH. Retail and logistics both have similar levels of agreement and partial agreement.

The automotive industry is the one that received the most agreements. In contrast to awarding the fewest opinions, the automotive industry made more general comments on SH – often beliefs that were shared among experts, but at the same time they did not pass the surface of SH and its development. The other industries all received an average rate of agreement of 38%, identifying an intermediate level of consensus.

In a second step, a closer look at the comments between industries reveals the following results:

Table 2: *Level of Agreement between Industries*

Level of Agreement	Automotive	Logistics	Retail Management	Tele-communications	Marketing
Marketing	0% (0/4)	50% (2/4)	50% (2/4)	0% (0/4)	
Tele-communications	75% (3/4)	25% (1/4)	50% (2/4)		75% (3/4)
Retail Management	75% (3/4)	25% (1/4)		100% (4/4)	0% (0/4)
Logistics	50% (2/4)		25% (1/4)	50% (2/4)	25% (1/4)
Automotive		50% (2/4)	25% (1/4)	50% (2/4)	50% (2/4)

In general, it can be said the average rate of agreement between industries ranges around 50%. As already analysed earlier, the automotive industry yielded a high level of agreement among all experts. In terms of industry match, the highest match of industries with 75% (n=8) is between retail management and the telecommunication industry. During the course of the Delphi method, those two industries continuously agreed with and complemented each other. Especially from the retail management side (100%), the opinion of the telecommunication industry was right in all four remarks.

In contrast to the highest match of industries, the lowest match of industries is between retail management and the marketing industry. With a combined rate of only 25%, values and beliefs regarding SH and its development differed on a large scale. Disagreement took place especially concerning the question whether it is evident that Google, Amazon and the like will dominate SH. As a result, this aspect is not finalised in the future scenario as no consensus could be reached.

In summary, the analysis and quantification of the qualitative data collected could weigh in on all research questions. Furthermore, the future scenario created was further approved by various rates of agreement, disagreement, and matching industries.

6.2 Validity and Reliability

This research holds several limitations, which are explained in this chapter. First of all, SH is not fully mature at the point in time this research was conducted. As a result, only a limited number

of studies regarding this topic have been published and could be taken into account for this research. This decreases the generalizability of the literature review and the findings in the first part of this research.

Secondly, the future-oriented nature of this research comes along with a certain level of uncertainty. No researcher can predict the exact development of a new technical phenomenon, not even if it is only in one country. In addition to that, all results, implications and further statements only hold true for the German SH market and can be neither applied to another country nor to another digital phenomenon. As a result, there is no generalizability in terms of other countries that are on the edge of an SH development.

Thirdly, the experts interviewed only represent a small sample size. According to Bernardo & Freitas (2015), the recommended size for the Delphi method ranges between 15 and 30 participants. Due to the newness of SH and the limited scope of this research, only five experts were interviewed. This limits the reliability of the future scenario and at the same time, it diminished the generalizability for the whole German market. However, it serves as an initial trigger point for further research that will be discussed in the next chapter.

Finally, the industries participating are only represented by one expert each. As a result, it cannot be stated for sure that these experts represent the majority of thoughts when it comes to SH. This also limits the degree of generalizability of this research.

Due to time and resource constraints, other industries that might be touched by SH, such as healthcare, construction, or the food industry, could not be included. Many other variables regarding SH, such as the technical part, could impact the further development of SH in Germany.

7 Discussion

This chapter aims presenting final implications for businesses in general on how to engage in SH activities in the German market. In a second step, especially strategies for marketing-focusing companies will be presented.

7.1 Business Implications

Evaluating both, literature and expert input, this chapter develops implications that can be used as a guideline when thinking about whether to engage in SH in Germany. These useful SH tools for businesses can be formulated as follows:

Engagement

For businesses in Germany, it is not too late to engage in SH. Bearing in mind the economic potential of SH for the German market, this research proves that consumers are ready as well. Although they are not fully educated yet, the SH market is in a stage of rearrangement, a stage in which providers and companies figure out how they want to position themselves, what they want to offer and how they want to approach customers. Being a followers' market, businesses can learn from other early SH products and thus, lower their risks and enhance their opportunities. As a result, a company should take the time for an audit with regard to whether SH provides an efficient business case for the products or services one is offering.

Positioning

When it comes to SH, it is essential to know how to strategically position a firm. This research has identified two main beneficiaries, direct and indirect ones. The direct ones will be the owners of the platform or networks that enable interconnectivity, while the indirect beneficiaries are the ones that will connect their products and services with those platforms.

The first group will be industry-specific, as mostly data or network-driven companies will invest in implementing such networks and platforms. Possible frontrunners are Google, Amazon and the likes, but also network-related industries such as telecommunication have a sophisticated base in which SH networks could be built up on.

The second group is a larger one and represents the biggest accumulated potential in terms of growth. The participants can benefit across industries. Businesses like food producers, eCommerce companies, construction companies and many more can engage in SH. They all can benefit from higher customer contact and, as a result, can offer more tailored products or service solutions.

However, businesses need to be clear about the group they see themselves in. Whereas the first group will have to invest larger amounts, indirect beneficiaries can develop their products and services as stand-alone solutions and connect them once the platforms are enabled. As a result, the margins for participants as well as their market power will be lower. From a perspective of time, indirect beneficiaries will be the second ones actively participating in SH, while the first mover benefits will belong to the ones entering the platform and network market.

Unified Standards

Depending on which strategy is chosen, one has to wait for unified standards to be created or try to actively implement them. Either way, standards that are applicable industry-wide on a global scale need to be defined. Similar to the Android system that has intensified the smartphone market, a unified standard for SH-related products has to be created. Maybe a possible solution is to launch it as a freeware, just like Google did with Android. However, this time it will be more complex, due to different products from various industries that have to be somehow integrated into one interconnected system.

Once this standard is created, many more firms will engage and invest into R&D with regard to SH. This can be either done by companies developing stand-alone products and services that are later connected or through an industry conglomerate.

Financing

One of the crucial questions is how SH will pay off for participants in the end. With regard to this research, three different kinds of business models can be distinguished:

- 1) SH could be directly financed by the customer.
- 2) Monthly subscriptions could be used, in which companies have to pre-finance the needed equipment.
- 3) Users pay only with their data.

Which of the above will be the most successful cannot be said at this stage. However, they all have their right to exist at this time of market development. The first option needs to come with a strong USP for consumers, as the SH equipment is right now still comparatively expensive. The advantage of such a solution from the business point of view is that SH would be less investment-heavy while, at the same time, customers could only pay for what they need.

The second solution lowers the entry-barrier for potential customers: Similar to entertainment packages from SKY or telecommunication providers, monthly fees reduce the initial investment and pay for the hardware needed. From the business side, the hardware has to be pre-financed, leading to liabilities, especially in the early stages.

The last financing model would let customers use SH services for free in exchange for the use of their data. Similar to business models by Google, the data collected could be either analysed and used for further marketing and sales initiatives or be sold to other companies. For the German market, this model could be risky, as German consumers are very data-conscious.

Smart Home 2020

As far as this research is concerned, the long-term beneficiaries will be software companies. The ones who “own” the platforms will generate the most sustainable income. Hardware companies will at some point run out of business as margins will erode over time. This is due to the fact that more and more companies will offer similar products and, as a result, hardware will become more and more interchangeable.

Positive spill-over effects on diverse industries like wholefoods, construction or eCommerce will also generate various indirect beneficiaries, as mentioned before.

In summary, this research can provide the outlined five explicit business implications that should be considered when engaging in SH. These implications hold true for any industry considering to enter the SH market in Germany, regardless whether they engage as software providers, hardware producers or indirect beneficiaries.

In the next chapter, special implications with regards to marketing will be considered.

7.2 Marketing Implications

This chapter deals with the marketing aspect that SH in Germany brings with it. The implications given are relevant for all marketing departments in firms that decide to enter the SH market or at least adapt their products and services to it. The implications backed up by this research are the following:

First Marketer Advantage

In the minds of German consumers, SH is not branded yet. This yields a huge opportunity for marketing departments to strategically position their SH brand in the minds of potential customers. Especially in the early stages of market development, a competitive edge over other players with the help of a Unique Advertising Proposition (UAP) can be secured. Similar to Zalando’s strategy while entering the online retail market in Germany, a high level of expenses can pay off in the long run.

Reaching consumers with a good campaign as one of the first SH players will increase market reach and brand recognition. As the experts interviewed in this research agree that SH will have high log-in effects, following this first marketer advantage can become a decisive factor in answering the question of who will be leading the SH market in Germany.

Big Data

In recent years, “big data” has become one of the key words in business and marketing, thinking about possible ways to transform it into smart data. With the development of SH, a new tool that can collect huge amounts of private data enters the market. This development opens up new ways in which marketers can operate and target their customers. Being able to access these data streams can redefine Customer Relationship Management (CRM) and will enable companies to further specify tailored products and services. As of now the data that comes with SH usage is unlike any data companies have currently access to. While most of the data is collected to elaborate on various customer journeys and now they can be optimized to yield the most interactions/clicks/conversions and so on, SH is the customer journey in itself. Once a home is considered fully smart, every action can be traced back to its origins: If a person watches a movie and walks to the fridge during commercial break, one could analyse which movie triggers which kind of appetite in a specific target group. Companies who built up expertise around analysing those huge amounts of data will have access to new ways to engage with the consumers. Ways that are way beyond what current data analytics can deliver.

It is therefore a long-term investment to engage in the SH environment to ensure the possibility to gain access to the data of Smart Homes all over the country.

Business Opportunity

Especially in the field of online marketing, SH goes along with new business opportunities. If your company focuses on data and marketing data mining via SH could be a game changer. This holds true for SH providers (internal or as a service company) and external companies that acquire data and analyse it in a second step.

This is one of the few stepping-stones for potential start-ups in the SH environment. Being able to collect, analyse and then use data generated from smart households for omnichannel-marketing actions is a core competency that will be highly needed.

All in all, these implications can be used as a checklist for marketing companies and departments to further evaluate chances and potential risks that are associated with an engagement in SH. After the implications for businesses in general as well as for marketing in specific have been given, a final conclusion of all findings will be drawn in the next chapter.

8 Conclusion

Smart Home, essentially meaning the efficient run of a household with help of digital devices that are able to learn, is on its way into German households. As one of the world's markets with the biggest economic potential for SH, this research has outlined that consumers as well as companies are ready to engage.

With the help of the research questions, the Delphi method used for this data collection has closed the research gap identified in the literature review. Prior to this research, scientific literature mainly focused on quantitative research evolving around consumers and their perspective on SH. With the industries and their respective experts interviewed in this research, the missing perception of high profile experts across industries has now been surveyed. In combination with existing literature, a future scenario for the SH market in Germany could be developed.

This scenario certifies the German market is ready for SH. Although being a followers' market and still in an early stage of development, providers and companies are in a state of rearrangement. SH is perceived by all experts as a development that will influence various industries. As a result, there are not only one or two industries but rather different kinds of beneficiaries: on the one hand, the owners of the platforms or networks that enable interconnection and on the other hand, the participants that will connect their products and services to those platforms.

For all direct and indirect beneficiaries, unified standards are the key. Such standards need to be defined by the industry and have to be applicable on a global scale. Once these standards have been agreed upon, research and development will increase and more companies will start to participate when SH proves to be an efficient business case. Being a big picture solution, a way moving forward might be for companies to work on single "smart" solutions for their product on a feature-by-feature basis before integrating it into a system.

To make this an efficient business case, three key business models were distinguished: Firstly, SH could be directly financed by the customer; secondly, monthly subscriptions in which companies have to pre-finance the needed equipment could be used; and thirdly, a case in which users pay only with their data is also realistic. As to which one will succeed, no further comments can be made.

What can be said, however, regardless of whether you are a manufacturer or a network company, is that SH will be about convenience. The solutions offered will have to be integrated into existing homes (downward integration) as seamlessly as into newly built homes. In accordance with all experts, the following situation can be predicted for 2020:

“The main beneficiaries will be software companies collecting data. As hardware margins will erode over time due to higher competition, companies providing network-related services will generate the most profit on a sustainable basis. Google was named several times as one of the companies who could drive this market. It has to be said, however, that there are many other traditional companies that have aggregated “smart” knowledge, so this is not a sure thing for the likes of Google and Amazon. Furthermore, positive spill-over effects on indirect beneficiaries should not be underestimated. This level probably has the biggest potential in terms of benefits related to SH. But these are benefits for existing companies who will adopt SH developments once their business case proves it to be an efficient tool.”

Derived from the input of the experts as well as from seminal literature, implications for business in general and for marketing in particular were made. These implications may serve as a guideline when considering whether to engage in the field of SH and can be further developed by the companies themselves or can become a research topic of their own. As far as this research goes the implications may serve as a kick-off topic for management meetings, in which innovations and their impact on a firm and its stakeholders are discussed. Ones SH has been identified as a potential source of growth, innovation teams could be formed analysing specific implications in a more detailed and tailored manner.

In the end, it can be said that SH will evolve in Germany and that it will yield more chances across industries than one might think. However, this research has pointed out that the German economy is ready to cope with those chances on a large scale within the next years, foreseeable around 2020.

9 Directions for Future Research

Due to the explorative nature of this study, several recommendations for future research can be made. Being the first kind of a cross-industry study for SH, this research serves as a tipping point for further examination that could include the following areas:

First of all, the technical aspects need to be further researched: how a unified platform with industry-wide standards can be implemented and who is capable of delivering such a system is of high importance for the development of SH in Germany.

Secondly, a replication of this study with a larger number of experts from even more industries could prove or build up on the insights gathered by this research to finally determine which industries are in the lead and which ones are followers.

Thirdly, once the customer is fully educated, quantitative data from the consumer perspective could bring more information with regard to whom the customer side expects to be the frontrunner and which industries might therefore have an advantage they might not realise.

In the end, the B2B side of SH has been left untouched until now – future research could also investigate which possibilities might impact B2B services or alliances.

In conclusion, SH as a field of research is far from mature. This study offers many starting points from which new research can be done in a field that has the chance to be a groundbreaking factor over the next decade.

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