Niche strategy elucidation for hyperpersonalization in the online automotive sector

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Niche Strategy Elucidation for Hyperpersonalization in the Online Automotive Sector

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At the moment of writing this, I can say I am now a healthy and happy (and almost graduated!) person. I have learned a lot about myself in the process and am very grateful to be surrounded by such a great group of people! I can honestly say I look back at my time at the TU Delft in peace. Onwards & upwards it is!

Enjoy reading this thesis.

-Winnifred Noorlander

List of Acronyms

AI	Artificial Intelligence
BM	Business Model
BYD	Build Your Dreams
CC	Core competencies
CDO	Chief Digital Officer
CGI	Computer Generated Images
DAM	Digital Asset Management
DC	Dynamic Capabilities
DL	Deep Learning
FTE	Full Time Equivalent
GDPR	General Data Protection Regulation
IBM	International Business Machines Corporation
department Y	Innovation, Digital & Data
IT	Information Technology
KLG	Koninklijke Company X Group
KPI	Key Performance Indicator
LLM	Large Language Model
MIG	Mobility Investment Group
ML	Machine Learning
MOT	Management of Technology
NLP	Natural Language Processing
OEM	Original Equipment Manufacturer
SME	Small Medium Enterprise
SNM	Strategic Niche Management
TIS	Technology Innovation System
TLFS	Toyota Company X Financial Services
VRIN	Valuable, Rare, Inimitable, Non-substitutable

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1. Introduction

Imagine walking into a large bookstore. The minute you walk in, the bookcases, shelves and books begin to reorder themselves. One of the bookcases moves forward and, without you having said a word or having to have searched yourself, a book you have been thinking about and another book you didn't know you needed, present themselves to you (Linden et al., 2003). This story illustrates what the service of hyperpersonalization is about. The ease of instantaneous recommendations, feeling like they are coming from an old friend that seemingly knows you better than yourself. The service minimizes search and thinking time and reduces decision fatigue (Pereira et al., 2022).

While this may sound like a figment of imagination, the service of 'hyperpersonalization' has actually been on the mend in e-commerce for years. Despite the service not being fully developed yet, many large companies owe large shares of their profit to their (hyper)personalization efforts. Amazon reported to generate 30% of its revenue through its recommender systems, surpassed by a whopping 50% reported by Booking.com (Akter & Wamba, 2016). Also Netflix has been known as a big player in this field for years and awarded a 8.49 million dollar prize for an 8.49% improvement back in 2007 and a another 1 million dollar prize in 2009 for a 10% improvement to their recommender system (Technica, 2012).

1.1. Problem Statement

With developments leading to easy access to Artificial Intelligence (AI), the era of digital commerce is witnessing an evolutionary transition from traditional personalization techniques to hyperpersonalization. Whereas personalization focuses on group-level, leading to passive recommendations, hyperpersonalization can be conceptualized as the harnessing of artificial intelligence (AI) and real-time data. This allows the company to deliver more relevant and individualized user experiences to consumers at every interaction touchpoint (Li & Kannan, 2014). The online retail sector in particular stands to benefit immensely from this. The adoption of hyperpersonalization ensures a tailored shopping experience for consumers, which not only enhances user satisfaction by diminishing decision fatigue, but also leads to higher conversion rates and customer retention, making it an interesting business opportunity for all stakeholders involved (Shukla & Nigam, 2018; Jain & Paul, 2018). In fact, customers increasingly expect and demand such bespoke experiences, making it a requisite for competitive differentiation in today's saturated online retail landscape (Kumar et al., 2019).

An application within the online retail sector that has not been studied in depth yet because of the type of transaction, is the use of hyperpersonalization to transform the online car-buying journey (McKinsey & Company, 2019). By analyzing vast amounts of data on consumer behavior, preferences, and historical interactions, retailers can present car models, features, and financing options that align precisely with individual consumer needs. On top of that, the service presents the opportunity for cross-selling other mobility products, such as bicycles, mobility scooters, or public transportation cards, to fulfill a consumer's complete mobility journey. However, this sector faces unique challenges compared to the fast online retail segment. Buying a car is a high-involvement decision, meaning consumers require more detailed information and often seek physical instore validation before making a purchase (Verhoef et al., 2017). For instance, MCKinsey & Company (2019) shows that a consumer spends upwards of 14 hours on online search before

planning a first test drive at a dealership. Evenso, when approached correctly, results of hyperpersonalization in comparable sectors such as the bike and motor industry are simply impressive as can be seen in Example 1.

Example 1: *Hyperpersonalization benefits for online sales mobility products*

Cycle shop BikeBerry experienced a 133% increase in sales and a 200% in user-on-site engagement after hyperpersonalization implementation.

A Harley Davidson dealer experienced a 2960% increase in leads in the first weekend of using a commercial hyperpersonalization platform and a 400% increase in sales the first month.

(Aktar & Wamba, 2016; Brad, 2017)

Hyperpersonalization does potentially offer significant benefits for the bottom line. It promises up to a 20% reduction in churn rate, a 50% decrease in customer acquisition costs, an increase of more than 10% in sales, 20% more up- and cross selling, 8x return on investment and 82% higher opening rates, as seen in *Figure 1* (Deloitte, 2020). However, performance significantly depends on the level of execution and industry context. These numbers are an average from a variety of industries, ranging from fashion, governments, pharma, entertainment to even OEM's.

Figure 1: Illustration of hyperpersonalization numbers by Deloitte (2020)

Hyperpersonalization has been quite readily adopted in other industries, such as the fashion industry (Jain & Paul, 2021) or by companies such as Netflix, Amazon or Albert Heijn specifically in the Dutch landscape (Kumar, 2020). However, hyperpersonalization in the automotive industry is only just starting to diffuse. To identify the research objective and understand which theories are suitable for answering that objective, one must understand what the current status of the service of hyperpersonalization is. Defining the diffusion phase for a service is less straightforward than for technologies as there are no 'units sold' measured (Wittell et al., 2016.

The current phase of diffusion of the automotive industry in relation to hyperpersonalization can therefore be identified as follows. With only 15% of automotive companies relying on a form of hyperpersonalization in their Marketing and Sales (M&S) efforts, versus 52% of retail companies (McKinsey & Company, 2019). Mass-market adoption usually starts to occur from approximately >15% (Moore & McKeanna, 1999), from which you could argue that hyperpersonalization is nearly reaching large scale diffusion. However, for at least one of the automotive companies that has been experimenting with hyperpersonalization, it was reported that effective implementation is still limited. For Seat, the company in question, limitations were due to both technical and organizational aspects (Cucala,2021). Since then, advances have been made on the technical side, leading to hybrid (both content and item based) product recommender systems in the automotive sector. However, more work is necessary to finetune the systems to the needs of the market, for instance by surveying customer satisfaction (Liu et al, 2023). Since there are various companies that are experimenting with hyperpersonalization in the market, we conclude that hyperpersonalization as a service has left the innovation phase and is now in the adaptation phase. However, it has also not reached mass-market adaptation in the automotive industry. Therefore, we can conclude that the industry is currently in the adaptation phase. The adaptation phase contains the time between a technology's first market introduction and its large-scale diffusion.

1.2. Research Contributions

A contribution to the automotive field in the Netherlands would be to identify next steps on how to overcome the adaptation phase for hyperpersonalization for selling vehicles online. More specifically, a contribution for Company X would be to plot these steps to the context of the company.

To make a beginning in strategically overcoming the adaptation phase in the automotive market a proven strategy for technologies set out by Ortt & Kamp (2022) is used. The framework of (Ortt & Kamp, 2022) has proven to structurally identify barriers holding back large scale diffusion for emerging technologies. The authors identified a set of seven Technology Innovation System (TIS) building blocks. In case these blocks are missing or incomplete, the blocks hamper large scale diffusion. The core reasons that explain why the building blocks are missing or incomplete are called influencing conditions. There are seven influencing conditions. By combining influencing conditions and building blocks, the authors have elucidated for some industries which specific niche strategies may be applied to overcome and enable further diffusion. In the Ortt & Kamp (2022) publication the need for testing the framework on service innovation was mentioned. By applying the framework to the service of hyperpersonalization hence a gap in the literature is tentatively colored in.

Similarly, the publication of Ortt & Kamp (2022) indicates the application of the framework on a market level with a company perspective. This means the Technological Innovation System, the boundaries of the to be researched topic, lie on the market level. Companies are actors within this ecosystem and may influence the status of the TIS by their actions. By looking at the market level, company level intricacies are too fine a level to be studied. But, as organizational innovation literature has proven, a firm's unique capabilities can actually influence the execution of niche strategies as proposed by the Ort & Kamp (2022) framework. Hence, by taking Company X as the topic of research within this thesis, the framework is applied on a

company level with a market perspective as well. This gives insight into the effect of company level details influencing the effectiveness of niche strategies proposed by the market level framework.

In this thesis, three main contributions to literature have been explored:

1. **Application to services:** The framework has originally been developed for emerging technologies and not for emerging services. Therefore, a contribution to the scientific field of innovation management would be an evaluation of the framework for an emerging service such as hyperpersonalization.
2. **Application on company level:** the framework of Ortt & Kamp (2022) is designed to evaluate technologies on an industry as a whole. Therefore, by also considering the company perspective, another addition to the scientific literature is made.
3. **Extension of Ortt & Kamp (2022) framework with more niche strategies:** The last scientific addition lies in how to elucidate niche strategies fitting with the above findings.

1.3. Structure of this thesis

Chapter two describes the research design, including data collection and processing methods. The emphasis lies on qualitative approaches, since interviews and literature research have been chosen as the main data source in this thesis. The third chapter discusses the concepts of hyperpersonalization, Company X, diffusion theory, and the Ortt & Kamp (2022) framework, laying the theoretical foundation for the study. The fourth chapter presents the case study of Company X. The chapter is defined into the background information of the company and second, the findings from the interviews and literature review. This section focuses on identifying core factors, influencing conditions, and potential niche strategies. The last chapter presents the conclusions, discussion and recommendations and offers insights into the practical application of the findings, including the adaptability of the framework to a service and company context.

2. Research Scope and Methodology

Chapter two describes the scope of the thesis and the methodologies that are used. In Section 2.1 and 2.2 respectively, the main research question and sub-research questions are presented. In Section 2.3, the general scope of the thesis is outlined, followed by the proposed methodology in Section 2.4.

2.1 Main research question

The objectives presented in the introduction lead to the formulation of the following main research question:

What niche strategies may be adopted by large corporations through the Ortt & Kamp (2022) framework, for overcoming the adaptation phase of the service hyper-personalization in the Dutch automotive online retail sector?

The main research question is a general, relatively broad question. To find an answer to this research question, a case study is conducted. The case study is a company-level focused case study on the Dutch family-owned Company X Group (hereafter Company X). Company X has 3500 employees and is known for its activity within the automotive sector, where the organization serves the entire automotive chain. For more information on Company X, see Section 4.1.

The main research question is further specified into a research question regarding the case study:

What (subsequential) niche strategies may Company X adopt through the utilization of the Ortt & Kamp (2022) framework to facilitate overcoming the adaptation phase with regard to the service of hyperpersonalization in the online retail automotive sector?

2.2 Sub Research questions

The case study research question is systematically split up into sub-research questions. The three sub questions are described below. For each of the three main subquestions, the context of the research must be kept in mind. This is covered by incorporating two questions that require extra scrutiny regarding the application of the framework to the novel setting of a service diffusion and the company perspective over a market perspective.

Main sub questions:

1) What are the key building blocks as defined by Ortt & Kamp (2022) that could potentially hinder the effective implementation of hyperpersonalization in the Dutch online retail automotive market?

    1.1) How are the found building blocks in the framework applicable to an emerging service instead of to an emerging technology?

1.2) How do the found market core factors relate to Company X's emerging service?

2) What are the influencing conditions for hyperpersonalization in the Dutch automotive market outlined in Ortt & Kamp (2022) that explain the missing or incomplete building blocks?

2.1) How are the found influencing conditions in the framework applicable to an emerging service instead of an emerging technology?

2.2) How do the found influencing conditions relate to Company X's emerging service?

3) When combining these missing building blocks and influencing conditions, what niche strategies contribute to mitigating the identified core factors?

3.1) How are the found niche strategies in the framework applicable to an emerging service instead of an emerging technology?

3.2) Which of the found niche strategies are suitable for Company X?

Lastly, depending on the outcomes & direction of the study, a few generalization questions should be answered.

Generalization subquestions:

A) In what way is the adaptation of the framework in the case of hyperpersonalization as a service generalizable to other services?

B) In what way is the adaptation of the framework for the case of hyperpersonalization for Company X generalizable to other companies in- and outside of the automotive sector?

2.3 Scope of the Study

For the sake of brevity & clarity of the thesis, the service of hyperpersonalization is only applied to the context of the automotive sector in which Company X is found in the Netherlands. While Company X does successfully operate in the bicycle & healthcare e-commerce sector, these are beyond the scope of research, as seemingly different sectoral contexts apply. However, the work stemming from this research might form a good basis to extend hyperpersonalization services to the other domains in a relatively efficient way.

Furthermore, the scope is kept to digital touch points for hyperpersonalization only, even though it is clear that hyperpersonalization is also applicable to omni-channel or just physical retailing. This may be examined beyond the scope of this thesis.

While the research question of this thesis was based upon whether the Company X2035 vision is realizable , this thesis was conducted without the use of the strategy. This helped to keep an open mind. The vision and found outcomes of this research will be merged together outside the scope of this thesis.

2.4 Methodology

This section describes the overall approach of the research, including the type of design, the criteria for selection subjects and data collection methods. The research is described in four sections, as can be seen in Figure 2. Therefore, the section is divided into four corresponding subsections. **The outcomes of the described research methods are described in Chapters 3 and 4.**

- **2.4.1 Scoping**: In which the steps from literature review to case study design are discussed.
- **2.4.2 Data collection and processing**: The second subsection describes how the data collection and processing methods are combined, due to the iterative nature of the process.
- **2.4.3 Verification**: The third subsection is aimed at ensuring that the privacy of interviewees is respected and validity of the research is held high.
- **2.4.4 Round-up**: The final part of the research is about writing and sharing the results in order to fulfill the graduation process and serve Company X in the start of implementing hyperpersonalization as a service.

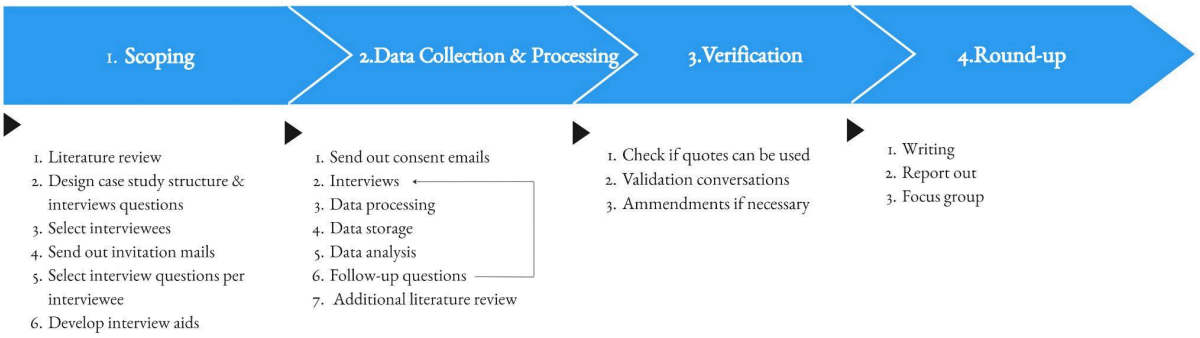


Figure 2: Methodology outline divided into four phases.

2.4.1 Scoping

In the beginning of this chapter, the research questions have been posed. From there on out, a path is developed to get the answers to the research questions. While the path to answer each research question was studied individually, it was found the paths overlap significantly. Hence, a single path is displayed here in which no distinction is made between the subquestions. Section 2.4.1.4 to 2.4.1.6 are placed in Appendix A.

2.4.1.1. Literature review

As for the data collection of the case study, the use of multiple sources is recommended to maintain high validity (Yin, 2003). Therefore, this includes interviews and internal and external reports.

Three literature review topics

For the literature review, the aim was to obtain a depth similar to the description in the TU Delft MOT2004 thesis proposal course, since a full blown systematic & traditional literature review would consume too much time (Jesson, 2011). Used sources were limited to Web of Science and Scopus for scientific publications. Furthermore, the scope of the study is set very broadly. The research focussed on combining the comprehensive topic of hyperpersonalization on both a market and company context and the suggestion of a large set of niche strategies. As a consequence, it was chosen to limit the depth of each topic to fit within the

limited time scope of this thesis. However, it is still believed focussing on broadness over depth is the best approach, as this could yield several academic contributions and moreover also providing a solid foundation for Company X to build on with regard to hyperpersonalization. There are three main topics that have been studied in the literature review:

1. First, hyperpersonalization must be understood. Both in e-commerce in general, the automotive market and for Company X as a company.
2. Secondly, relation of the Ortt & Kamp (2022) framework to diffusion theory. This helps in understanding the theory behind the use of the framework.
3. Lastly, a review and extension is done on niche strategies for the final step of the Ortt & Kamp (2022) framework. This is also done on a market level and a company level.

A combined approach of reviewing methods

As the focus of this thesis is not a traditional literature research, a networked graph approach was used with the help of AI tools such as Connected Papers and Scite.ai, in order to additionally deepen understanding of the literature field. By extending the conventional search through Scopus with a follow-up networked approach in Connected Papers, the most influential papers and relation between the papers were found as can be seen in Figure 3. In a traditional literature review, all papers would most likely primarily have been found through searching scientific libraries such as Scopus or Web of Science. An overview of the influential, frequently cited works is obtained much faster by putting interesting publications found through traditional methods into the web application. In Figure 3, Zahra (2006) was found on Scopus and put into ConnectedPapers. The image shows which works precede and follow the found paper, and the ratio of the number citations between the papers in the field. Papers with many citations are recognized of key papers, examples from Figure 3 include Teece (1997), Eisenhard (2000), (Teece, 2007), Winter (2003), Helfat (2003) and Ambrosini (2009) which have all been used in this thesis. Similarly recent papers with many citations Schilke (2014) may also spark interest. Furthermore, it is much less likely that a nearly isolated bubble of papers is missed, due to the visualization software.

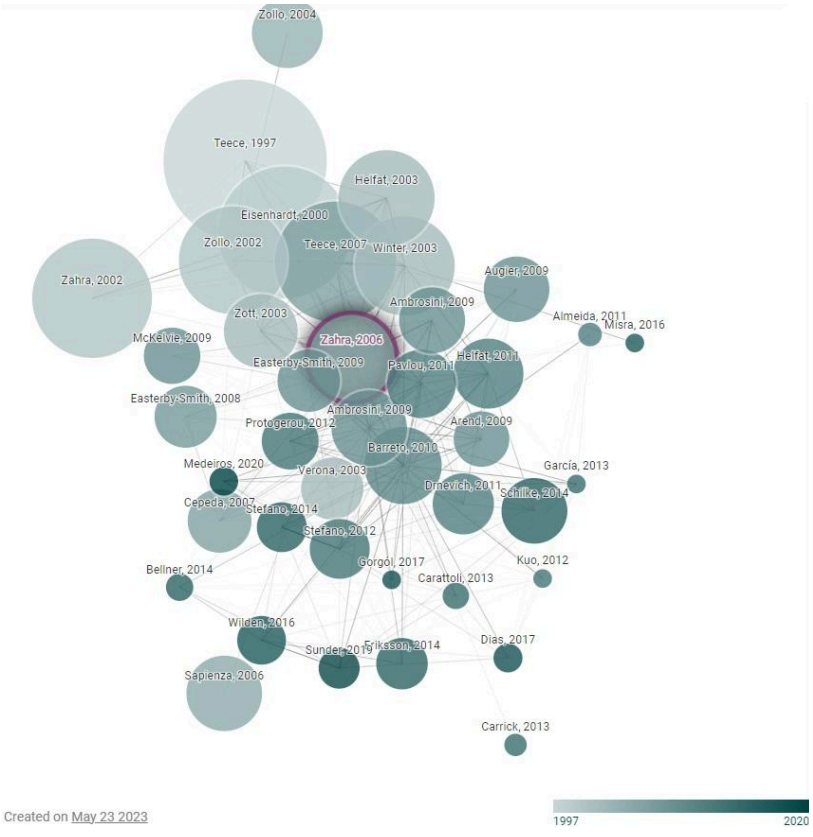


Figure 3: Example of expediting the literature review process by using Connected papers. The larger the bubble, the more citations a paper has. Colors indicate publication years.

A drawback of the method is that less cited or younger papers may be misjudged on importance. Therefore, to ensure proper selection of sources, additionally the Article Field Weighted Citation Index (FWCI) was used as a measure of importance. The index shows the relative importance of the publication with regards to the number of citations through time in the field. The higher the score, the more prominent the work. FWCI>1 are deemed to be acceptable according to Scopus. Combining traditional search methods, networked searching through ConnectedPapers and FWCI grading criteria gives sufficient coverage of literature works for this thesis.

Using the right search terms

Lastly, a small remark is made about the importance of using the right search terms. As the definition of hyperpersonalization has not yet been cast in stone in the literature, as a result of its emerging nature, search criteria should be thoughtfully extended beyond solely the term hyperpersonalization. This is done in the following manner:

- Overlapping definitions: ranging from 'individualization', 'mass personalization' and 'ultra personalization', 'micro-targeting' but also 'segment-of-one' and often even just ' personalization' due to the sliding scale of the concept definition (Seppala *et al.,* 2023).
- Descriptive works: include works where a proper definition of hyperpersonalization has been omitted. Combinations such as 'personalization + AI OR + real time' form a good starting point.
- Sub-technologies: standing for an important part of the service such as 'customer segmentation' or the opposite, terms that encompass the broader idea of personalization such as 'e(-)commerce' should also be included.
- Orthographies: such as 'hyperpersonalization', 'hyper-personalization' and variations using British spelling.

Although it is not possible to be completely sure, it is expected that a substantial part of the important terms are included, due to the application of the described networking tools, and because considerable effort was put into exploring various options.

2.4.1.2 Research Design: Case study

A clear research design helps the researcher in getting from point A, their research questions to point B, or the final conclusions. The research design must function as a blueprint to guide the researcher and avoid straying off topic (Yin, 2003). This section describes the blueprint for the case study of the Company X Group.

Qualitative approach for exploratory questions

To answer the main research questions posed in Paragraph 2.1, built up by the exploratory subquestions, a qualitative approach is taken in the form of a case study. The main research question may be categorized as explanatory due to its predictive component of to-be-used niche strategies, while the sub questions are judged to be exploratory because of the application of the framework in a novel type of setting.

Single case study design

As we are dealing with contemporary events, a single-case study is chosen to assess the current state of affairs and next steps regarding hyperpersonalization for Company X Group. These events cannot be manipulated in a real-life context, hence an experiment is of no use. The case of Company X Group is assumed to be a

typical case for the development of a high-tech digital service in a large firm, at least in the automotive industry as it shows resemblance with the case performed on Audi (Dremel et al., 2017). The case is hence expected to be able to expand the well-formulated theory of the Ortt & Kamp (2022) framework from emerging technologies to emerging services. The implications and advantages of the Ortt & Kamp (2022) framework are further described in Section 3.2.1. However, it must be noted that, while the case study is of single-case design, it may be extended into longitudinal case studies beyond the scope of the thesis, to validate the recommendations made for the niche strategies.

An embedded case
The single-case study is one of the embedded types, wherein not one, but two units of analysis are of importance. The overlaying unit of analysis is the e-commerce automotive industry in the Netherlands as a whole. The second, embedded, unit of analysis is the department Y department of Company X Group. While the case of hyperpersonalization reaches further than this single department within Company X, it is important to draw boundaries for the unit of analysis. Drawing a boundary is important because it limits the scope and creates concrete actions for the department in question. This however does not mean that no information may or should be collected from other divisions, it means that recommendations must be made from the viewpoint of this central department. The department that is chosen is department Y as they form the core of running the service of hyperpersonalization.

Answered by interviews and a literature review
The case study is unraveled through interviews and a literature review. Relatively young historical data for the explanation of the choice of niche strategies, is deemed as a contemporary event as well and therefore overlaps with the case study. While a survey could answer the research questions in a high-over fashion, the use of semi-structured interviews allows for deeper insights of the intricate details of a company in a digital transition, which may be left out of strict survey questions by the participants.

2.4.1.3 Design of the interviews & approach

To determine what data must be collected, the Ortt & Kamp (2022) framework is followed for establishing the correct operational measures. As the data is partly collected through semi-structured interviews, one must keep in mind the subjective nature of the data. To promote consistency throughout the separately held interviews, interviews are always structured in the same manner. The interviews were structured in five parts:

Recap email: this email contains a consent check, thesis purpose description, why the interviewee is important & interview structure. *(5 min)*

Introductions: introduction of the interviewer, interviewee, definition of hyperpersonalization by interviewee, definition hyperpersonalization by interviewer, followed by feedback of the interviewee on the provided definition. The open definition question was asked to gauge the thoughts on the subject of the participants before steering them in a certain direction, blocking out of the box ideas beforehand. Letting the interviewees establish their expertise on the topic might be helpful in a later phase to show the validity of the case study.
(10 min)

Open questions: questions regarding building blocks and influencing conditions where derived from the research questions. The questions were developed by breaking down the framework into subparts. Then, through a process of reflection and understanding of the framework, relying on the interviewer's intuition and experience, questions per sub part where derived. Followed by the 5 why principle to get to the bottom of the initial information given (Serrat &

Serrat, 2017). To ensure proper coverage of each building block and influencing condition, examples about other technologies were given so the interviewees really understand the question.*(20 min)*
Guided questions: questions regarding core factors and influencing conditions covering sufficient depth. *(20 min)*
Recap & follow-up: inconsistencies, questions from interviewee and explanation of next steps. *(5 min)*

Asking both open and guided questions on the core factors and influencing conditions is helpful because it helps the interviewee think outside of the box, but also sheds light on the interviewer's own point of view. Congruently, it may bring inconsistencies to light in the interviewees answers, when asking them about the same topic twice. This protocol is in accordance with Kamp *et al*. (2018), which has used the framework for elucidating niche strategies for the introduction of kite-based airborne wind energy.

During the interviews, it is of importance to ask follow-up questions to truly understand where answers are coming from. These have not been written out, but boil down to asking 'why' often, especially when explanations are missing. Similarly phrases such as 'Can you clarify?' or 'Where do you think this core factor/influencing condition results from?'. The interview questions can be found in Appendix A.

2.4.1.4 Selecting interviewees

Selection of the interviewees was based on answering the external market status around hyperpersonalization and the internal company climate of Company X.

Internal interviewees
For the internal company climate, Innovation Strategist Paula van den Boer and Mobility Innovation Team Manager Jan-Peter Legtenberg were asked to assemble a list of suitable interviewees. This boiled down to the list of names in Appendix B. Each of the interviewees was asked which people within Company X should also be interviewed on the topic. These names are displayed in gray. This method may also be referred to as 'snowball sampling' and ensures that the topic of hyperpersonalization is covered to the best of its extent within Company X. When no new names are mentioned, it may be concluded that the primarily engaged employees on the topic have been spoken too (Naderifar &Ghaljaie, 2017). To ensure construct validity is not compromised, which is often the case with case studies, alternate perspectives should be sought for, this was done by also interviewing some people who were not mentioned during the snowball sampling. For instance, people that were new to the company or were hired as external consultants.

External interviewees
Finding experts to interview around the external market situation proved to be less straightforward. Most of the information could be found through public sources, such as McKinsey reports and papers. Gathering more specific information through interviews from comparable or leading companies led to difficulties with consent policies. Ahold (Albert Heijn) and Bol.com are both interesting organizations to interview because of their Dutch nature, Ahold additionally for their family-company culture & history, and Bol.com due to her digital native heritage. While some general information was retrieved, no specifics were consented to. On a more positive note, a large, non-digital, native Dutch family retail company was interviewed, but wishes to remain anonymous. Furthermore, the gray boxes in Appendix A show informal encounters with the head of IKEA global, clothing brand Fabletics and Booking.com were included. The interesting parallel with IKEA is in the type of goods that are sold, and the time investment people make before choosing their kitchen versus their car. Furthermore, the site Booking.com shows us the state-of-the-art possibilities in the market.

2.4.2 Data collection & processing

The second part of the methodology forms the core of the research. Because data collection and processing is an iterative process, it was decided to keep the parts of data collecting, processing and analysis together, even though they could officially be separated as well. For brevity sake, 2.4.2.1 up to and including 2.4.2.4 and 2.4.2.6 can be found in Appendix A.

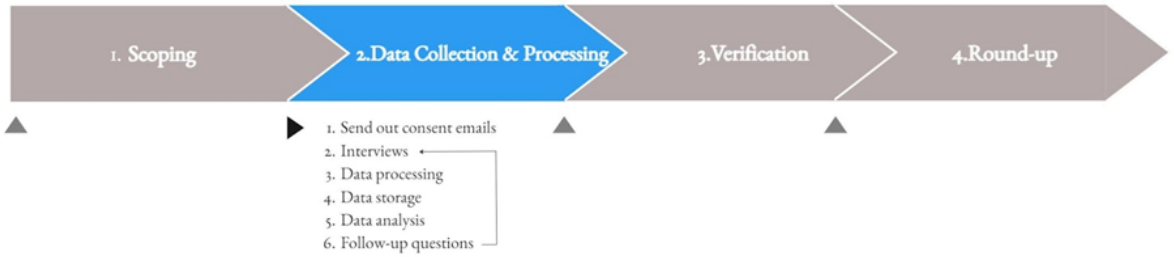


Figure 4: Step two of the methodology outline. This section is an iterative section to gain thorough insights.

2.4.2.5 Data Analysis

Data analysis methods consisted of the analysis of two topics. The first are the outcomes of the interviews regarding the TIS Building Blocks and influencing conditions. The consecutive step is about connecting those results to the findings around niche strategies, both from the literature and the interviews. The actual results of the methods are discussed in Chapter 4.

Data Analysis - Part 1: Analyzing TIS Building Blocks and Influencing Conditions

The strategy was to rely on theoretical propositions which have been documented in Ortt & Kamp (2022) and supporting works (Kamp *et al.,* 2018). The theoretical framework has shaped the research questions and therefore also the data collection plan. To match the collected data with the framework, the case study interviews were all color-coded to match the corresponding research questions. In this manner, easy recognition and structure was achieved, which was useful during the analysis.

While initially planned for Atlas.ti, data analysis was done manually using the application Miro. This method was preferred, as more intricate patterns between core factors and influencing conditions can be elucidated. After coding all the interviews for core factors and influencing conditions, the codes were plotted in a mindmap-like fashion, as can be seen in Figure 4. Separate 'stars' were plotted for internal and external conditions, and for the main three subsystems, 'learning', 'analysis' and 'tailoring' resulting in six mind maps. The tentacles of the mind maps are displayed as the core factor categories from the framework. The results of these mindmaps are discussed in Chapter 4.

The preferred strategy shall be to rely on theoretical prepositions which have been documented in Ortt & Kamp (2022) and supporting works (Kamp *et al.,* 2018). The theoretical framework has shaped the research questions and therefore also the data collection plan. The data analysis is performed in several steps:

1. Mind Mapping and Table making for overview: As was evident from the coded interviews, the core factors were grouped over the categories internal and external. Next, they were divided over the main components of the technology: 'learning', 'analysis' and 'tailoring' as was also priorly made evident in the interviews, leading to six mind maps in total, with the core factors as the main axis. Following this, the influencing conditions corresponding to the building blocks as mentioned in the interviews were plotted in the mind maps as can be seen in Figure 5 and also p.84. Each influencing condition is given its own color to easily distinguish patterns, as seen in Appendix I. In order to be able to quickly reference back to the interviews, each core factor and influencing condition note has been labeled by their interview number and the corresponding line number. The mind maps may help visual thinkers in pattern

recognition to when it comes to which influencing condition occurs where and how often. However, difficulty discerning the contents on the influencing condition post added some difficulty.

Eventually, the mindmaps were left as is due to the increasing complexity when trying to integrate all interviews. Hence additionally tables were made from the interview data, which was more suitable to contain such a complex structure. These mindmaps are better suited for smaller or more developed services and technologies. More information on how information was combined into tables can be found in Example 6 in Chapter 4, p66.

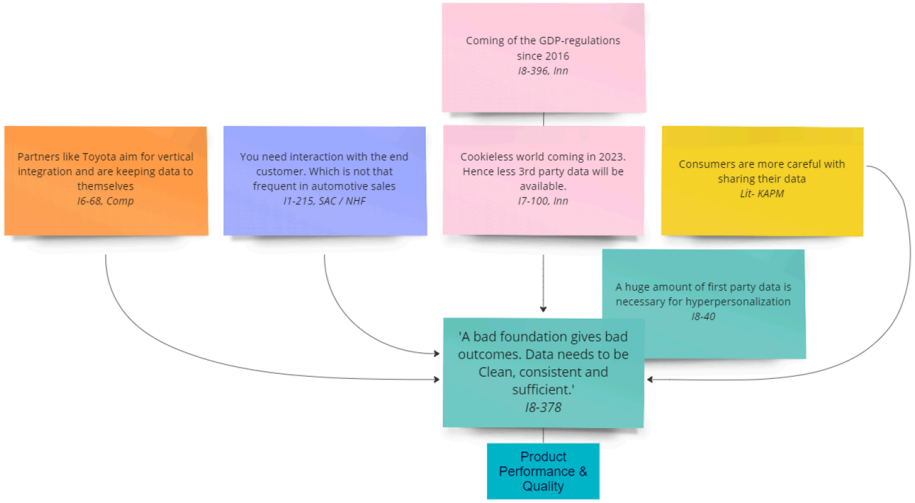


Figure 5: An example mind map for the core factor 'Product Performance and Quality' on the 'learning level', that affects the market context. External core factors are made seagreen, internal core factors are made blue for easy recognition. Influencing Conditions are all given their own color: orange for competition, purple for socio-cultural aspects, light pink for innovation specific institutions and dark yellow for knowledge and application of product and market.

2. Establishing most important core factors & influencing conditions: A weighted approach is used whereby the occurrence of each core factor and influencing condition is counted to establish a quantitative dominance for each factor (Weller, 2021). This step is important to determine the route of the recommended roadmap in which influencing conditions are prioritized. This describes which should be tackled first.

However, it must be noted that the counts may be biased in three ways.

- First of all, a bias may exist due to the expertise areas of the selected interviewees. While the snowballing sampling method should have ensured a knowledgeable ensemble of a variety of facets of the service of hyperpersonalization, a bias may exist because of overlapping knowledge.
- On top of that, some interviewees may find a certain core factor or influencing condition very important and could mention it multiple times. To avoid this bias, therefore each answer is only counted once per interview. Overall, the expert level / seniority of the interviewee in relation to their answers given on each topic is taken into account. This may lead to the exclusion of certain quotes or may help in choosing which statements must be chosen when contradictions between interviewees appear.
- A third bias may occur in case not all questions have been asked at a similar frequency as seen in Appendix A. This could occur either because of the interviewing style, or simply because the interviewee guided the conversation in that direction. By determining upfront which interview questions are asked per interview as was also done in Appendix A, this bias can be dampened.

3. Defining gaps: It must be discerned which core factors and influencing conditions were not mentioned and why. Is this because of a flaw in the research or knowledge gap, or because the factors are truly of no influence? Either way, it is an important basis for asking follow-up questions. Once established, it can help determine that some core factors or influencing conditions are not or only mildly applicable to the case of hyperpersonalization as a service.

4. Comparing company and market status: A traffic light system used by Ortt & Kamp (2022) is used for evaluating if TIS building blocks and influencing conditions are complete, incomplete or missing once established that factors are a patterned match to the general categories of the framework. Each interviewee was asked during their interviews to rank a core factor from 1 to 5 as can be seen in Appendix A. A system of 1 tot 5 intstead of 1 tot 3 was chosen because of the expected observable granularity at a meso-company level versus a macro-market level. Ultimately a finer scale allows to capture more subtle variances in opinions. The difference between the ratings on the market and the company context are an important indication of the readiness level of the technology. Besides, it may also indicate which core factors have not been solved in the market and hence should not be of primary focus for Company X, especially in light of the strategic choice of Company X not wanting to be a change leader. Lastly, it must be noted for the external mind map, that some factors have been derived from literature, hence no weight can be given to these as they have not been dealt with in the interviews.

To achieve external validity of the case study in all four steps rely on further analytical generalization instead of statistical generalization as found in surveys is the way to go. Analytical generalization is aimed for by applying the technique of pattern matching as proposed by Yin (2003). Pattern matching compares the predicted patterns with earlier, empirically established ones. If the patterns overlap, it may tentatively be concluded that the same phenomenon is observed, thereby strengthening internal validity of the case study. When applying pattern matching the researcher must keep in mind whether they are dealing with an explanatory or exploratory question and if they are dealing with the independent or dependent variables, since approaches slightly differ.

Data Analysis Part 2: Matching Niche Strategies

Once all core factors and influencing conditions of both the internal and external contexts are clear it is time to derive fitting niche strategies to allow for further partial adaptation. Niche strategies are obtained by going through three steps. These steps are contributions to the Ortt & Kamp (2022) framework.

1. **Niche strategies applied by frontrunner industries in hyperpersonalization and the automotive industry**: The external (informal) interviews with, amongst others Ikea, Fabletics, Booking.com and International Retailer provide ample insight in best practice as they are leading in hyperpersonalization. Literature was used to add on to these findings especially regarding earlier applied niche strategies in the automotive industry. The strategies were matched to the most important barriers as defined in the previous section through labelling.
2. **'Niche strategies' applied to overcoming organizational hurdles in a digital transition**: As this research is dealing with both internal and external core factors, there are some organizational hurdles which affect the internal adaptation of hyperpersonalization and determine if a niche strategy is suitable for the company climate or not. While these organizational aspects may not be overcome by true niche strategies, enabling factors should be defined to overcome these internal core factors. Enabling factors are extracted from a selection of the vast organizational management literature, with a focus on automotive case studies. In Section 3.2 matching between niche strategies and organizational aspects is derived further.

3. **Own analytic & reasoning**: The last step lies in combining all gathered information and filling in the blanks with own logic and reasoning skills. This step especially should be validated by experts on the topic such as Roland Ortt and company employees.

When dealing with many factors to determine a niche strategy, it might be difficult to establish causal relationships. The lack of causal relations might be overcome to ensure sufficient data is collected to avoid inference of events that have not been (directly) observed, thinking of rival explanations, theory building and by additional logic building when possible. Logic building relies on the tracing of events through time and matching to theoretical dispositions. It is a form of pattern matching, defined by sequential gates (Yin, 2003).

2.4.3 Verification

The verification phase focuses on checking whether the found results resonate within the company and ensure compliance regarding consent of interviewees. For the internal validation step, two crucial interviewees within Company X are asked for their opinion on the results. Data informants should be asked to review a draft of the case study report in the composition phase to reduce misconceptions and guarantee the necessary confidentiality level. For the validation of scientific findings the university supervisors are asked for their feedback. Also some new interviewees, although informally, were asked for their opinion, to avoid bias. If amendments were necessary these were made.

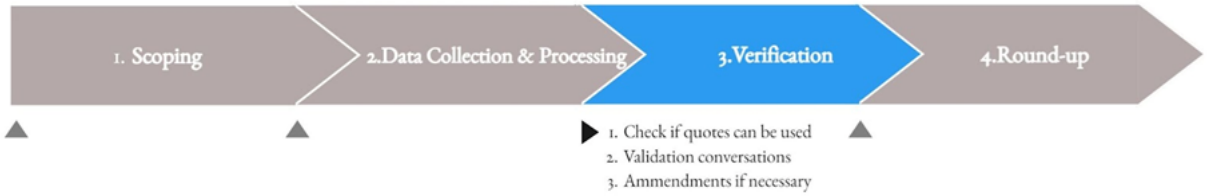


Figure 6: Phase three of the methodology outline. The verification phase consists of three sub-phases

2.4.4 Round-up

The last phase of this thesis consists of writing up the actual results. The report creation process has been supported by AI tools and friends as described in Appendix A. The interviewees have been invited to join a focus group on the 25th of january in which the findings of the thesis will be presented, with room for questions and discussion. The main aim of this focus group is to consolidate the next steps for Company X and appoint ownerships of the tasks. As this is a very practical step, it was chosen to exclude it from the thesis duration timeline.

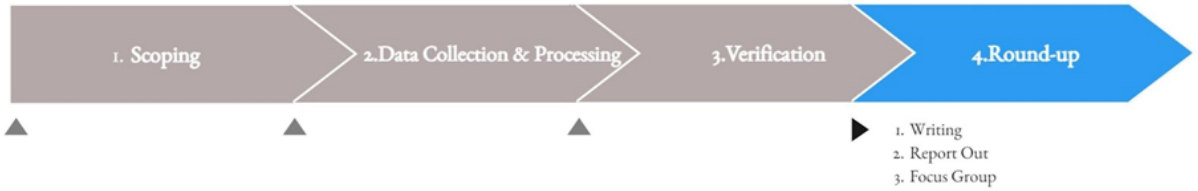


Figure 7: The round-up phase of the methodology consists of writing and sharing results with the appropriate places

3. Theoretical Background and Synthesis

This chapter describes hyperpersonalization as a service and its current status. Additional focus is placed on the automotive industry. Section 3.1 first gives the definition of hyperpersonalization and some remarks about the service. Next, the sliding scale between personalization and hyperpersonalization is set forth. Contributing components are described and shown in relation to effort and revenue to each other. Lastly, the diffusion statuses of hyperpersonalization in general and the automotive sector are given.

Section 3.2 introduces the framework of Ortt & Kamp (2022) which will help understand how several factors may block mass adaptation of the service. Based on the basis laid out by Ortt & Kamp (2022), several extensions are proposed to be able to apply the framework to the specific case of Company X, which will be discussed in the next chapter.

3.1 Hyperpersonalization

3.1.1 Definition

A very general description of hyperpersonalization is that it is an extended, enhanced and more granular version of e-commerce recommender systems found in standard e-commerce personalization approaches that have been around since the 2000's (Semerádová & Weinlich, 2019). The difference with personalization lies in real-time, individual customer recommendations on a predictive basis, with the help of advanced Artificial Intelligence (AI) algorithms. These individual recommendations may include not only personalized content and landing pages, but also individualized pricing. This is a contrast to regular personalization, where retrospective, group level customer segmentations are made. The difference between individual offers versus group level offers is illustrated in Figure 8.

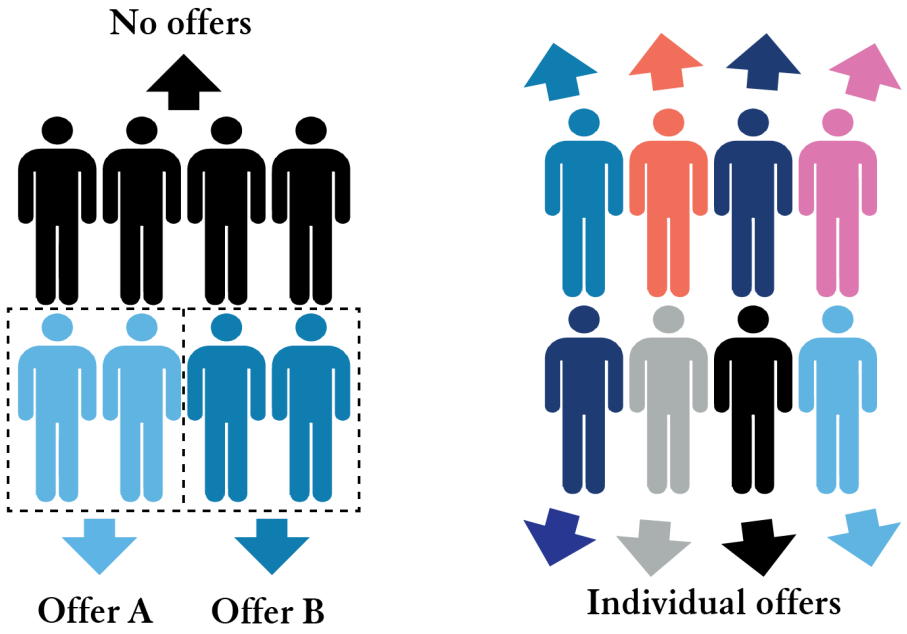


Figure 8: Demonstration of the difference between hyperpersonalization (right) and personalization (left) (Based on: Mialki, 2019).

Additionally, three remarks must be made around understanding the concept of hyperpersonalization.

1. **Hyperpersonalization > than the physical personalization or customization of physical objects**: Although incorporating hyperpersonalization of physical objects, such as the color of the car, is a small subset of the (hyper)personalization process. This research is aimed at the broader context and *process* of *how* products are recommended to the individual. This focus is chosen because it is considered to be a fundamental cornerstone of the Company X2035 strategy.
2. **Hyperpersonalization ≠ customization:** It is important to grasp the idea that hyperpersonalization distinguishes itself from other individualized marketing techniques in a way that the company adapts chosen touchpoints in the customer journey, rather than consumers directing that process (Bleieret al., 2018).
3. **Hyperpersonalization is not a crisply defined service:** The service of (hyper)personalization is built up out of different sub-technologies. This results in a multitude of possible technology status-compositions. Due to the various options, there resides a sliding scale between personalization and hyperpersonalization instead of a crisp, black-and-white scale. This is also reflected in the lack of consistent definitions in the literature and oftentimes the use of the term 'personalization' when it lies closer to hyperpersonalization.

In e-commerce, personalization aims to enhance user experience by providing relevant and customized offerings. It involves tailoring content, recommendations and services to individual users based on their preferences and behaviors projected on a group level segmentation (Mittal et al., 1999). Personalization considers attributes such as product and service satisfaction, behavioral intentions, and the evolving relationships between these factors over time (Mittal et al.,1999). Personalization is therefore not limited to the physical tailoring of products but focuses on understanding and meeting the needs of individual users within the context of consumption systems (Mittal et al., 1999). However, the term 'personalization' has often been denoted in a makeshift approach. Hence a variety of meanings and progressions can be found in the literature, without the consolidation of a proper definition, as will be discussed further in the next paragraph.

3.1.2 Sliding scale between personalization and hyperpersonalization

This paragraph describes the sliding scale between personalization and hyperpersonalization so the reader can understand what components contribute to the exact service considered in this thesis.

To bring clarity into the research field, Mehmood et al. (2023) proposes the use of six components to gauge when a reference to personalization may be placed during the development phase. The six components are placed into two overarching categories, 'Learning' and 'Tailoring' as can be seen in Figure 9. However, the method of Mehmood et al. (2023) merely shows the input (learning) of the (hyper)personalization process and the method of output (tailoring). It does not show how to get from A to B. According to Gomes & Meisen (2023), a third, intermediate phase may be referred to as 'Analysis' which entails the types of actions and computations to perform on the data gathered in 'Learning'. Additionally, Gomes & Meisen (2023) and Adams (2023) show that it is an iterative process: in advanced services, 'Tailoring' also feeds back as input on 'Learning'. In less intricate personalization services, this is often not the case.

Each of the six components can be expressed in the mentioned formats, or in a combination of the formats. For instance, tailoring of hyperpersonalization efforts can take place through the 'Digital' and 'Physical' channels. When both channels are used, the third option of an omnichannel shopping experience is created for the consumer.

Below is a description of the three subsystems of (hyper)personalization:

- **Learning:** Extraction and collection of relevant consumer data. This may include both first and third party data. The three underlying concepts refer to:
    1. *Manner:* The way in which consumers are involved in gathering their data, either implicitly (the consumer gives input) or explicitly (data is collected such as browsing behavior without direct input of the consumer).
    2. *Transparency:* refers to how open a firm is about collecting consumer data, which is either covert (the consumer is unaware of data being gathered) or overt (the consumer is aware of how their data is collected, stored and used).
    3. *Timing:* refers to at what moment in time data is collected, either in retrospective (decisions are based on previous consumer-firm interactions) or in real-time (in which data is collected and used for decision at the moment of the interaction).

- **Analysis:** Entails the types of actions and computations to perform on the data gathered in 'Learning'. Also forms the input for 'Tailoring'.
    1. C*ustomer Representation:* Customer representation refers to feature engineering techniques in which the attributes of a customer are extracted from the data. For instance, the combination of age, income and living area are extracted from the data and based on this, customer analysis is done. This is either done by hand or by Machine Learning (ML) or by Deep Learning (DL) techniques. ML techniques have been used for many years and may include K-Nearest-Neighbour or Recency Frequency Monetary clustering techniques. Deep Learning encompasses the booming field of Generative AI and other Neural Networks, in which models can produce novel output such as text, image or audio on its own. These models are called Large Language Models (LLM's), that make use of a variety of Natural Language Processing (NLP) techniques, this allows for instance of textual sentiment analysis.
    2. *Customer Analysis:* Customers are segmented according to various found features to form a customer group, which is expected to respond in a certain way when presented with a certain product. These segments may range from a single customer (hyperpersonalization) to multiple segments. This can again be done by hand, or by ML or DL.

- **Tailoring** : Refers to the transforming of gathered information into a tailored content display for the customer.
    1. *Touchpoint:* Channel through which the consumer is either reached through a digital or a physical.
    2. *Level*: The level of tailoring of the content to the individual. Here low refers to no or very low adaptations such as merely adding the individual's name to an offer. High means very individual specific content.
    3. *Dynamics*: Refer to whether or not offers are adapted on real-time (static) gathered data or on a retrospective format (adaptive). Pay attention that this last segmentation between 'static' vs 'adaptive' may feel counter intuitive name-wise.

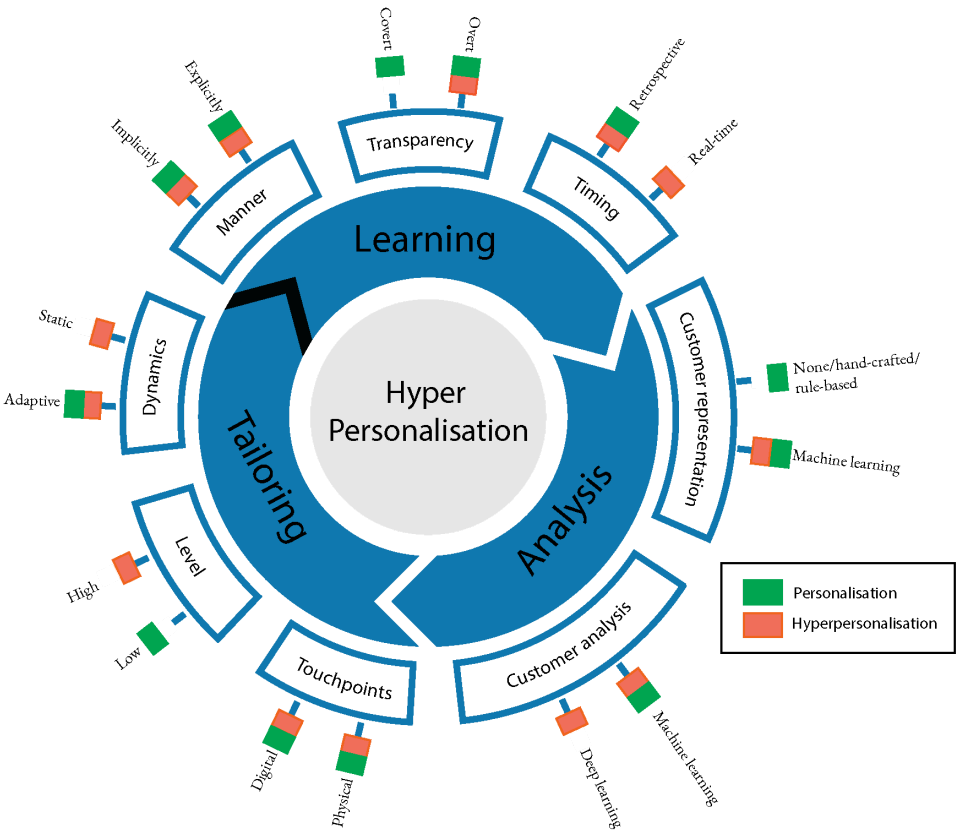


Figure 9: The subsystems and components for classifying the sliding scale of personalization, own image based on text Mehmood (2023) and Gomes & Meisen (2023).

By identifying the most granulated components that resonate most with a work of literature or business situation, one can now gauge how far on the (hyper)personalization spectrum the given context resides. For reference, the most low key form of personalization is shown in green in Figure 9. The most sophisticated form of personalization, being hyperpersonalization, is shown orange. Regarding hyperpersonalization, it must be kept in mind that real-time data gathering is a prerequisite, on which retrospective data might be added regarding the timing of data gathering. Similarly, for dynamics, static tailoring is a must on which adaptive tailoring might be added. Furthermore, hyperpersonalization goes a step further by utilizing a combination of advanced algorithms referred to as ML or DL algorithms to produce predictive, data analysis and targeting techniques to deliver highly specific and personalized content and messages in *real-time* on an *individual level*. Lastly, a difference between personalization and hyperpersonalization is the presence of a feedback loop between tailoring and learning in the latter. This is displayed by the black arrow in Figure 9. This is also the point in time when interactions with the consumer happen.

While Figure 9 seems to give a comprehensive understanding of the technological components, some crucial complementary technologies are missing. For instance, missing components are data storage facilities, or the degree in computational power to run the calculations. As boundaries must be drawn as close to the technology or service as possible to provide sufficient depth in this research, these complementary methods have not been incorporated in the process. To ensure accurate boundaries of the service, interviewees were asked to indicate the crucial components of hyperpersonalization themselves. Proposed altercations from the interviews are discussed in Chapter 4.

Maturity of (hyper)personalization

Overall, the maturity of (hyper)personalization efforts versus revenue is displayed by Figure 10 (Deloitte, 2020). The block within the dotted lines refers to personalization as given in Figure 9. Predictive personalization is given as hyperpersonalization in Figure 9. The part in between shows the various options in Figure 9 when moving from personalization to hyperpersonalization. For more practical insight in whether it is interesting to move towards a next phase, the axis of 'effort' could perhaps be added in Figure 10. Effort can be based on monetary and other resources, needed as investment to achieve this maturity, these insights were not publicly available at the time of this research. Furthermore it must be noted with the use of Figure 10 that even frontrunner Amazon is currently still struggling with rightly tailored predictive offerings (Rastogi, 2023).

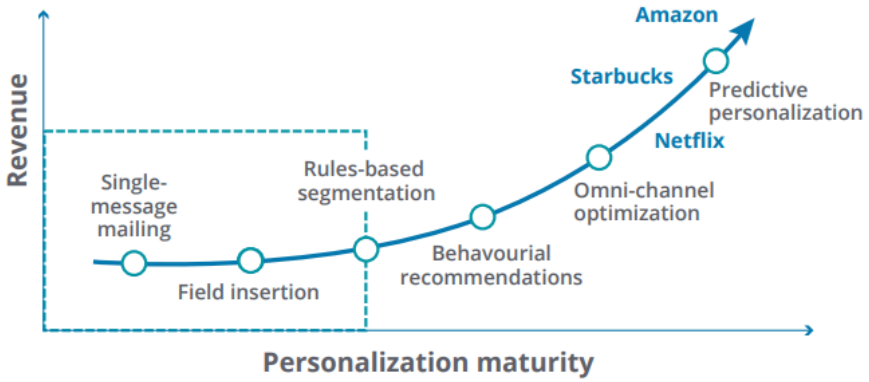


Figure 11: Personalization maturity curve, showing complexity versus potential revenue (Deloitte, 2020).

3.1.3 General diffusion status of hyperpersonalization

In this section, the current status of hyperpersonalization as a technology as a whole is discussed. Diffusion theory terms such as adaptation phase will be used several times. Understanding in which diffusion phase a technology or service currently belongs to is important, as residing in one phase or another influences the suitability of applying frameworks during the analysis. An explanation of these terms can be found in Appendix B.

Diffusion of hyperpersonalization

Hyperpersonalization may currently be categorized as an emerging breakthrough service, as the deployment of full-fledged hyperpersonalization delivers significantly more value to the experience of the consumer, compared to regular personalization. Furthermore, it demands significantly different capabilities from its deployers, mainly with regards to integrating systems and ensuring a smooth process (Boston, 2017). This is illustrated by recent advances in sub-technologies, which support the rise of hyperpersonalization (McKinsey, 2019). Furthermore, novel customer segments are reached, as the segments are becoming smaller and more specialized. In the end, hyperpersonalization is expected to replace a significant portion of traditional personalization efforts (Ortt, 2004).

However, clear-cut numbers about the diffusion of (hyper)personalization are difficult to obtain. First, because contrary to products or subscriptions, no 'sales-numbers' are recorded. Hence, estimations come from consultancy firms or supporting software companies and do not cover the years before 2018, nor the years 2021 - 2022. Second, as there is no consensus about the definition of (hyper)personalization, numbers between the few sources vary wildly because it is unclear what exact forms of the service are included when

referring to (hyper)personalization. Taking these considerations into account, the following diffusion of personalization in e-commerce in Europe is presented in Figure 10. It displays the first half of an S-shaped curve. While the curve would indicate that personalization has moved through the adaptation phase, it must be remembered that a simple form of solely changing a generic email salutation to a first name is also included in these numbers. However, giants such as Booking.com are most likely included as well, making 200 billion predictions per day, by using 350 machine ML models supported by 125 employees in real-time (Booking.com, 2023).

An interesting statistic to keep in mind to better grasp the current status of diffusion of hyperpersonalization, is that only 15% of retailers are confident about the operationalization and result of their personalization efforts (SalesForce, 2020). This means that a lot of experimentation is still taking place. From that number, it could very well be argued that personalization in general is still in the adaptation phase.

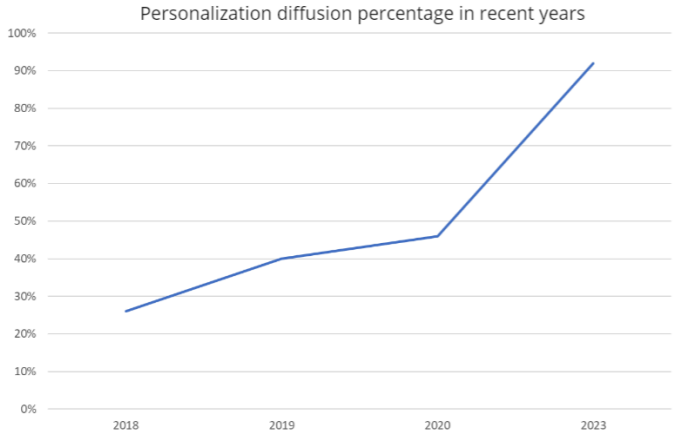


Figure 10: The diffusion of the service of hyperpersonalization between 2018 (26%), 2019 (40%), 2020 (46%) and 2023. (Twilio Segment, 2020; Twilio Segment, 2023)

Historical contributions to hyperpersonalization diffusion

To understand what has enabled the shape of the graph in Figure 10, it is interesting to look at influencing events and developments. A few major milestones that have accelerated the implementation of hyperpersonalization can be seen in Table 1. The cells have been segmented in the three main components of hyperpersonalization, learning, analysis and tailoring, as described in the previous section. The data show the trend that hyperpersonalized recommendations are becoming better & cheaper due to increases in computation power. However, trends regarding data shows that less and less is actually approved of by legislation. These trends are also reflected in the current status of each of the subsystems, as seen in Table 1.

Hyperpersonalizering timeline

Table 1: Current status per hyperpersonalization subsystem from the literature

Sub-system	Current status	Sources
Learning *1. Manner* *2. Transparency* *3. Timing*	1.First party data has become more important due to the new data act. Hence interactive methods are gaining momentum by for instance chatbots, quizzes and loyalty programs. Ikea asks customers to make a choice between inspirational images. These have been clicked 4.3 million times. 2. Data may no longer be allowed to be collected covertly. Consumers must give their consent. Companies need to learn to work with less and different data sources. 3. Real-time analytics are gaining momentum because of 1&2. Retrospective methods will however always hold a place for identified & consented consumers.	(Ikea, 2023) (Li, 2019)
Analysis *1. Customer Representation* *2. Customer analysis*	For both, Deep Learning is starting to take off, offering more individualized segmentations. Ikea is known to use off-policy deep reinforcement learning without exploration algorithms and double Q deep learning algorithms successfully. However, to keep computational costs low, complementary services such as chips or quantum computing must be further developed. This has proven difficult in the world wide chip shortage. More complex models also have longer computation times. Hence, while the technology offers possibilities, its performance is not always up to par with less complex machine learning methods yet.	(Fujimoto et al., 2019) (van Hasselt et al., 2016) (Ikea, 2023)
Tailoring *1. Touchpoint* *2. Level* *3. Dynamics*	1.Touchpoints have moved more online since Covid-19, and are now moving towards an omni-channel experience. 2. Customized homepages profiles are often used. Also, the content may be displayed differently. **Ikea** is a frontrunner in this. Augmented reality may be used to engage the used. The Ikea app users can place furniture in their living room, this feature has now been used 20.3 million times. While still of flimsy quality, **Ford** has gamified augmented test drives. 3. Chatbots and live interactions are becoming more mainstream.	(Ikea, 2023) (Ford, 2023) (Barton, 2013)

Consumer attitude towards hyperpersonalization

Consumer wishes seen in Figure 12 are also in line with the current developments of the (hyper)personalization market seen in Table 1. The top wants are referring to fitting recommendations on products (66%), in a tailored message (67%) at the tailored place (75%) and moment in time (59%) (McKinsey, 2021). Consumers expect brands to interact with them on a personal level, both before purchasing and in the after sales process. 76% of consumers think less of a brand when offerings are not tailored (McKinsey, 2021). However, sending too aggressive messaging or at the wrong moment in the customer journey has been found to be damaging for a brand image (Rastogi, 2023). 50% of consumers switch brands after having a single bad experience on this front, although numbers vary depending on the industry (Zendesk, 2021). Furthermore, as consumers become less brand loyal, and base their choices more and more on providing ease in the orienting and buying process, hyperpersonalization is expected to become more of a necessity to attract and retain clients. This contradiction possesses the need for brands to not only deploy, but actually master the art of hyperpersonalization.

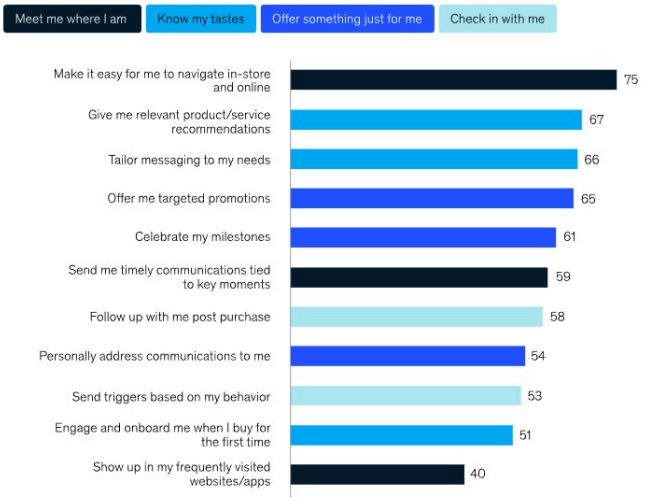


Figure 12: Consumer wishes for personalized actions (McKinsey, 2021)

Hyperpersonalization in the Dutch e-commerce landscape

Next, we will zoom in further onto the Dutch e-commerce landscape. While again no hard facts can directly be given about the adaptation of (hyper)personalization in the Dutch market, some factors can be distinguished that have a severe impact on the diffusion on other markets. These are at least, but not limited to, the regulatory landscape, culture, and knowledge. As The Netherlands is part of the European Union, the GDPR applies. These regulations are a lot stricter than the regulations enforced on other continents such as Asia or the USA. This means less freedom is pertained for online marketeers, often resulting in a lower return on investment (Li et al, 2019). Furthermore, the EU AI ACT will be published in 2024 and expected to be enacted two to three years later (Sathe & Ruloff, 2023), this will as well put a damper on expected growth. Furthermore, looking at the Dutch Culture versus other countries, the Dutch are one of the populations doing a lot of online shopping (Statista, 2023). On the other hand, the Dutch are the most warry in giving away their data out of privacy concerns (Simone Kucher, 2023). Therefore it may be concluded that the Dutch e-commerce market is lagging behind the US and Asian market, but is in front of other European countries.

3.1.4 Hyperpersonalization in the automotive industry

Hyperpersonalization challenges in the automotive industry

*Z*ooming in on e-commerce in the automotive sector, the vision and wish for hyperpersonalization is very clear by industry leaders. As consumers spend over 14+ hours online before making an appointment to dealerships, there is also clear value for the customer (Mckinsey, 2019). However, one of the drawbacks that is put forward is the low amount of customer touchpoints. This is due to the low frequency of purchasing a new vehicle. Also the size of the purchase plays a role in making online purchases more difficult. Some other industries are facing similar customer behavior. For instance, IKEA deals with similar issues in their kitchen commerce process. They have shown that this is not necessarily an un-overcomable problem, by inquiring about a customer's wishes through direct interactions, either by making use of images or text (Ikea, 2023). Moreover, the vision lies in offering solutions throughout the whole mobility journey in omni-channel format, thereby also increasing the number of interactions. On the subsystem of tailoring, Amazon Vehicles launched in 2023. The initiative has made a start by offering an immersive experience, thereby pushing to overcome the need for test drives. This is underscored by Ford who is offering a gamified, augmented reality test drive. When further developed, it might help further diminish the need for physical instore dealer visits and lower the threshold for buying online.

Hyperpersonalization advantages in the automotive sector

Hyperpersonalization in the automotive sector has a unique advantage over other sectors. The sold goods may function as data gathering assets and provide after sales opportunities or ways to fine tune algorithms for next purchases. Being able to gather data in this manner means customer profiles and recommendations might actually be more granulated than can be found on frontrunners hyperpersonalization applications such as Netflix or Starbucks for next purchases. Users have little choice when buying new cars but they agree with the privacy agreements enforced by the OEM's and containment must come from higher up institutions.

It is especially OEM's and not necessarily retailers that have been gathering vast amounts of data on their users. Nissan USA is currently able to make intricate user profiles based on the driver's behavior, intelligence and skill capacity (Bright, 2023). Hyundai gathers information on the products a user buys and website visits. In some countries than the Netherlands Kia gathers data on race, ethnicity, religious or philosophical convictions and sexual orientation. Not a single brand of 25 brands that took part in the privacy test of the

Mozilla Foundation passed the test. Multiple brands have admitted to listen to in car (phone) conversations and base advertisements on the captured information. Six from these brand even gather medical and gentical insights. 84% of OEM's participants sell or distribute some of the gathered data (Bright, 2023). How these brands behave exactly in the Netherlands is difficult to track down due to the exasperate extent of the privacy agreements(Bright, 2023). However, OEM's needing to comply with the strict GDPR regulations enforced in the EU, the situation is expected to be less severe than described in the USA or asian climate.

Dutch automotive status

Dutch (second-hand) online car sales companies have been growing. One of the leaders on the front next to Company X owned auto.nl, is Bynco (Buy Your Next Car Online) from mother company AutoBinck. It allows for consumers to buy their secondhand car online, at any time of the day. The company experienced a 500% growth in 2020 (Flowresulting, 2023). This growth shows that at least second hand cars are bought more and more online, also without test drives. The fact that people require less test driving, makes second-hand car platforms a good place to start with personalization efforts. AutoBinck has a smart way of gathering first party data, seen in Figure 13. AutoBinck may have a leg up in the future when it comes to having gathered data. When algorithms move from rule-based, an early stage of personalization, to more advanced machine learning generated recommendations based on user profiles data is necessary for training purposes. However, seen that even collecting data is in the infancy status, it must be concluded that the automotive sector is hence far behind on the status of hyperpersonalization for e-commerce in general.

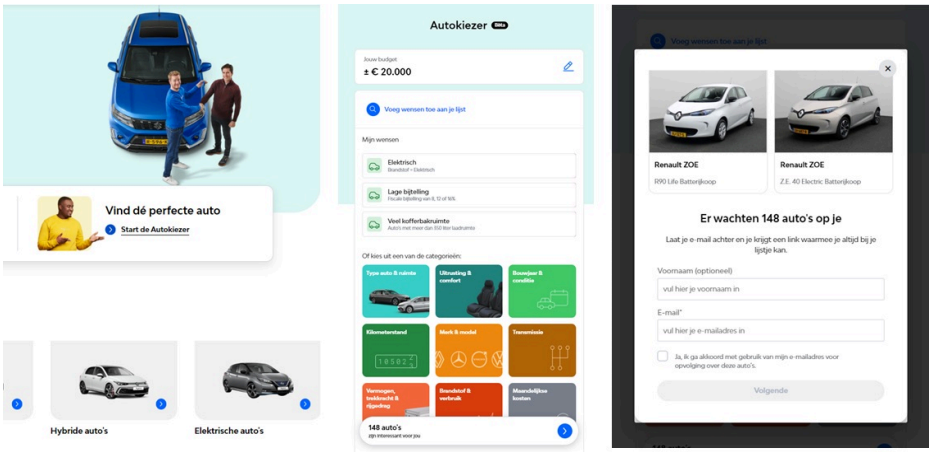


Figure 13: The left image entices customers to try the car recommender system. It is prominently placed on the web page. The second image illustrates the interaction with the customer. The third image shows the promise to the customer in exchange for their data (Bynco.nl, 2023).

Consumer behavior in the automotive sector

In the automotive sector a new generation of clients that are in need for mobility is on the rise. While the current generations are satisfied with less complex forms of personalization, Gen Z expects a different ballgame when it comes to user experience. Moreover, 55% of Gen Z and 53% of Millennials expect to buy their car online, versus 43% of Gen X and only 26% of Baby Boomers (Simon Kucher, 2023). The same sources show that 75% of Gen Z and 73% of Millenials prefer financing their next vehicles through subscription services versus only 53 % of Gen X and a mere 34% of Baby Boomers see Figure 14. Millennials are categorized to be born between 1983 & 1996, Gen Z between 1996 and 2010 (Barend, 2023). There are approximately 3 million people in this age group in the Netherlands (CBS, 2023).

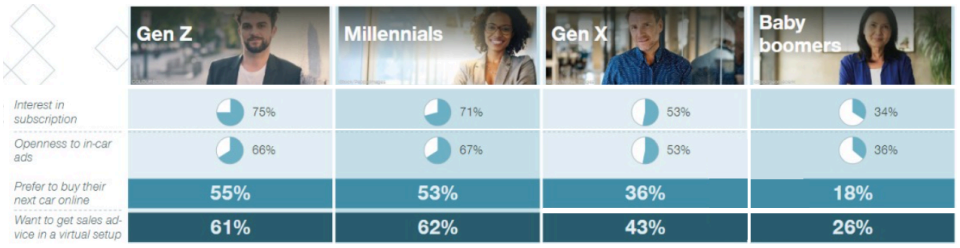


Figure 14: Diffusion in the automotive sector amongst different generations (Simon Kucher, 2023)

CBS, the Dutch Central Bureau for Statistics, shows that the car possession percentage is 3 and 7% for the generations of Gen Z and younger Millennials respectively. After that age group as seen in Figure 15, an increase to 33% is observed in the age group above 30, which includes older Millennials and Baby Boomers. Although car possession may not reach 33% for the younger generations due to environmental concerns, increased living expenses and other trends, this still implies that a new customer segment with increased service expectations of 3 million * (0.33-0.07) = 780,000 younger consumers will want to buy a new car in the coming 3 to 10 years. Hence, combining this with the information presented in the Figure 14 above, there should be a sense of urgency for the Dutch automotive industry to develop a more personalized online retail experience in the coming years.

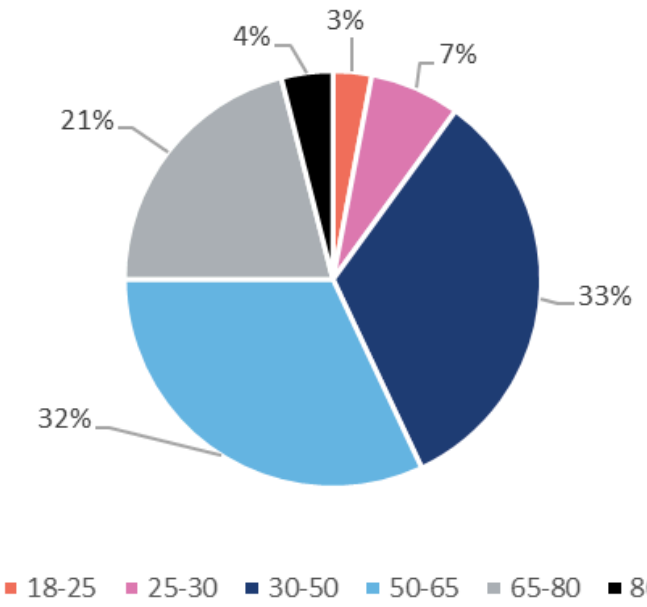


Figure 15: Dutch car possession statistics per age category (CBS, 2020)

3.2 Use & adaptations of the Ortt & Kamp (2022) framework

This section describes and examines the components of the framework of Ortt & Kamp (2022) that is used for analyzing the service of hyperpersonalization and the case study in Chapter 4. Following this basis, three contributions are suggested that extend the framework in various directions. These extensions are specifically required for analyzing hyperpersonalization in relation to the company Company X.

3.2.1 Ortt & Kamp (2022) framework explanation

To understand the (potential) roadblocks that will be faced when implementing hyperpersonalization, it is essential to look at the barriers that arise from the market status as described in Section 3.1 in a structured

manner. The Ortt & Kamp (2022) framework was therefore used to identify the barriers and match suitable niche strategies to overcome these barriers. This section first describes the need for niche strategies, how these niche strategies can be chosen and lastly explains the framework.

Niche strategies can help overcome the adaptation phase

To overcome the chasm of the adaptation phase as described in Appendix B, several scholars have noted that niche strategies serve as effective approaches for introducing radical innovations (Gerlagh et al., 2004; Ortt & Kamp, 2022). Radical innovations can either bring about transformative shifts in (price) performance or enable entirely novel applications, illustrated by Example 2A (Tushman and Anderson, 1986).

Example 2A: *Diffusion of cell phones*

Attributes of radical innovation: The shift from phones with cords at fixed locations to mobile phones allowed people to move around with their device, enabling an entirely novel way of communication (Ortt & Schoormans, 2004).

Especially regarding high-tech innovations, the deployment of subsequent niche strategies often leads to successful entering of the market (DeBruyne et al., 2002). A niche strategy emphasizes catering to a select subset of consumers with unique preferences and requirements. This group is also referred to as 'early adopters', which stands out due to distinct desires not yet shared by the broader market, the financial capacity to access innovations while they remain premium-priced, or an innate inclination to try novel products ahead of the majority, see Example 2B (Rogers, 2014).

Example 2B: *Diffusion of cell phones*

Early adopters: Traveling business men, who perceived the need to communicate on the go more than any other audience and had a larger budget to spend on the technology (Hardy, 2023).

Niche strategies are deemed necessary because the diffusion of groundbreaking technological advancements often takes a significant amount of time, sometimes even spanning several decades as illustrated by the cell phone Example 2C (Ortt, 2010).

Example 2C: *Diffusion of cell phones*

Adaptation phase of mobile phones: 17 years between the year of invention in 1973 and their widespread diffusion from the 1990's onwards (Gruber & Verboven, 2001).

The uncertain, and often extensive, time span between the launch of a technology and its widespread adoption carries considerable risks for the companies launching these innovations. Such risks might arise from various factors, including unpredictable technological developments and intricate competitive scenarios (Ortt & Kamp, 2022). Because of these risks, the adaptation phase, time between invention and mass market adaptation, often witnesses a cyclic pattern of companies launching, then retracting various product iterations. Companies that spearhead the introduction of these radical technologies frequently face setbacks or even failure as illustrated by Example 2D (Anderson & Tushman, 2018).

Example 2D: *Cell phone diffusion*

No set best product features: Nokia has retracted more than one model during the adaptation phase of mobile phones. Furthermore, Nokia missed the transformation to smartphones and was overtaken by companies such as Motorola and BlackBerry. In 2014, the demise of Nokia was complete when the once market leader got acquired by Microsoft (Sulphey, 2019).

Therefore it's insufficient for companies to merely recognize the use of a niche approach for mitigating risks associated with the market introduction of radical technologies. They must also discern the specific niche strategies best suited to their specific circumstances.

Finding a suitable niche strategy

The framework of Ortt & Kamp (2022) does determines which niche strategy to apply by setting apart seven Technology Innovation System (TIS) building blocks and another seven influencing conditions as can be seen in Figure 16. A TIS includes all actors & factors that relate to a technological innovation and hence is much broader than solely technological knowledge (Carlsson & Stankiewicz, 1991). For Ortt & Kamp (2022) the TIS boundaries are drawn at a market level. If any of the TIS blocks is missing or incomplete as seen in the second column of Figure 16, mass market diffusion is rendered difficult to impossible at that moment in time as illustrated by Example 2E. The first column of Figure 15, contains influencing conditions that explain *why* the TIS building block is missing. Lastly, the combination of the incomplete or missing building blocks together with one or more influencing conditions, points in the direction of a to be followed niche strategy (Ortt & Kamp, 2022). More in depth explanations of each of the blocks is given in Table 2 in Section 3.2 as definitions will be extended.

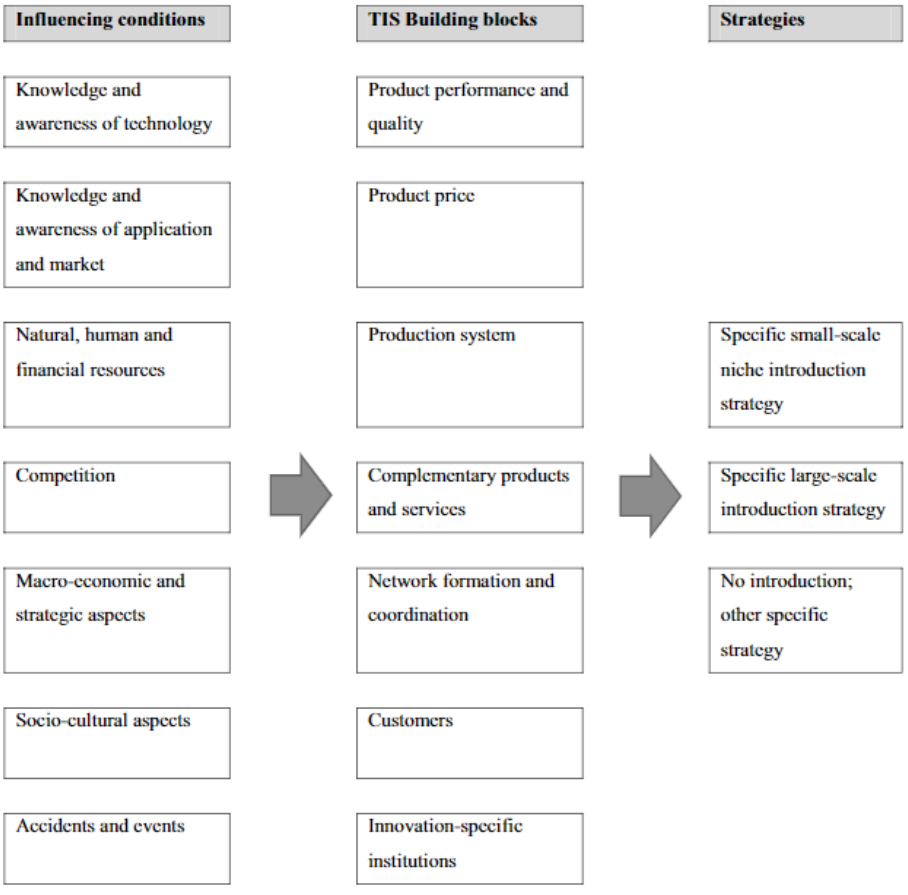


Figure 16: Framework Ortt & Kamp (2022), in depth explanation of building blocks and influencing conditions may be found in Table 2 *in* Section 3.2.

Example 2E: *Cell phone diffusion*[1]

Missing building block: Consumers. When asked about their thoughts on mobile phones, common reactions in the early stage were full of ridicule: 'I have a normal phone at home, why would I need a mobile one?'*(Video Bromet, 2015)*. Many found it invasive to be reachable at all times (Bromet, 2015). Later the coming of Complementary Products and Services in the form of social media played a role in heightening product value and speeding up diffusion.

Influencing condition: Socio-cultural aspects. As nobody was reachable outside of their home phones, why would they need to be reachable themselves? A shift in culture led by the younger generation who did see the value of faster communication, sped up the diffusion substantially (Sulphey, 2019).

Niche strategy: To stimulate mobile phone diffusion was by targeting the traveling business (wo)men who were not susceptible for the same sociocultural aspects as the mass market was and were willing to pay more (Hardey, 2019).

3.2.2 Ortt & Kamp (2022) applied to emerging services

While the Ortt & Kamp (2022) framework has proven to be relevant for multiple emerging technologies in a variety of industries (Dedecca *et al,* 2016; Kamp *et al,* 2018), the framework has not yet been applied to emerging services. To determine if and in what way the framework is applicable for determining niche strategies for services needing to bridge the adaptation phase, it is considered what the overlap is between technology innovation versus service innovation.

Service innovation definitions

Toivonen and Tuominen (2009 p. 893) coined service innovation as follows: "A new service or such a renewal of an existing service which is put into practice and which provides benefit to the organization that has developed it; the benefit usually derives from the added value that the renewal provides the customers. In addition, to be an innovation the renewal must be new not only to its developer, but in a broader context." The definition does not diverge significantly from the definition from Schumpeter (1934, p.65), where the author refers to technological innovation as the 'novel commercial applications of new goods, new production methods, new markets, new inputs, and new market organizations'.

Theoretical perspectives

While the above definitions provide a good starting point, the following theorethical perspectives provide deeper insights as service innovation can generally be studied from three perspectives: the assimilation, demarcation and synthesis perspectives (Coombs & Miles, 2000).

1. **Assimilation:** This perspective relies on the notion that service innovation is fundamentally similar to manufacturing innovation. Service innovation may therefore be studied according to the methods and concepts developed for manufacturing and product innovations in general. This is where most current measurement work is located. At most, minor modifications to conventional

[1] The case of cell phone diffusion is in reality much more complex than the two described building blocks and single influencing condition. However, for illustrative purposes the example is given in a condensed format.

survey and other instruments are required. This is even more true for high-tech service innovations (Gallouj & Savona, 2008).

2. **Demarcation:** This approach, on the contrary, states that service innovation is very different from product innovation, hence distinctive, novel theories should be developed and applied for this stream of innovation. This perspective, while still under development, is more and more applied by the use of questionnaires, which adopt different questioning styles for product versus service corporations.

3. **Synthesis**: The last perspective, which is in need for further, more extensive, developments, suggests that service innovation additional, often neglected, factors of the innovation process of product innovation. Examples being for instance the more tacit social aspects such as interfirm networks. Though these are displayed most obviously in service firms, they are expected to impact product innovation once studied further too.

The assimilation perspective is taken as a starting point for this research, as it has been used multiple times in the relevant literature described above. For instance, the diffusion theory research stream forms the basis for the framework of Ortt & Kamp (2022). Fichter & Klaussen (2016) group the use of service and technology innovation under the same header of the broader use of 'innovation' instead of under separate headers. Looking further back, it is found this taxonomy stems from Roger's (1995) foundational essay on diffusion theory. Roger focuses predominantly on technologies in telecommunication services. From the work, it may be derived that the combination of multiple technologies could lead to the formation of a service.

Use Ortt & Kamp (2022) framework for service innovation as-is

Hence it is likely that the framework of Ortt & Kamp (2022), while being developed for emerging technologies, may also be used for elucidating niche strategies for emerging services without grave adaptations. Especially so for the diffusion of high-tech services, under which hyperpersonalization may be categorized. Therefore the descriptions for building blocks and influencing conditions as given in Table 2 for technologies are used as a starting point. However, as the inventors of the framework have not done so explicitly, it is an objective of this research to critically assess if any adjustments or additions should be made. This would then be in line with the synthesis perspective.

3.2.3 Ortt & Kamp (2022) framework at the company level

This section provides the theoretical answer to why and how the Ortt & Kamp (2022) framework can be used on a company level and showcases the need for doing so.

Current setting of the Ortt & Kamp (2022) framework

The Ortt & Kamp (2022) framework was devised from merging socio-technical systems and strategic & innovation management literature. The framework has proven a valuable method for examining the complexities of technological innovation diffusion in emerging markets and then advising on what type of niche strategies may overcome barriers inhibiting large scale diffusion. The authors pick the Technological Innovation System as the specific socio-cultural system as the setting of their framework. A Technological Innovation System (TIS) can be defined as a concept that consists of interacting components, including actors, networks, institutions, and technology, with the purpose of producing and diffusing technological innovations (Bergek, 2008). This framework originally targets market-level analysis from a company perspective, focusing on how companies, as market actors, shape technological diffusion trajectories in the market.

Need for the novel setting for the Ortt & Kamp (2022) framework at a company level

While Ortt & Kamp (2022) mention that contextual factors such as size and structure of a company may affect their way of working in a network, these intricacies are not accounted for in a detailed matter in the framework. There is little specification on how a difference in organizational structure or culture affects the choice between suitable niche strategies. The author of this thesis argues that the framework hence should be extended to a company level, as successful deployment of niche strategies is partly contingent on a firm's dynamic capabilities or a company's characteristics in general (Porter, 1996, Toften & Hammervoll, 2013). Dynamic capabilities are the firm's ability to sense, seize, and transform opportunities in a dynamic and complex environment (Teece, 1997). The approach may aid in understanding which niche strategies applicable from a market perspective, are also suitable for a specific company in that market.

The interrelation between market level and company level is not only underscored by the fact that actions from companies affect a technology's market status, technological innovation as well directly impacts change in organizational structures and processes (Henderson & Clark, 1990; Doherty, 1992). This view is also supported by Damanpour (1991) who finds that technological and organizational innovation are intertwined, instead of developing separately, as argued by for instance Phillips (1997). The connectedness of the various levels supports the need to elevate the Ortt & Kamp (2022) framework from a market- to a multi-level framework.

Why changing from a market level to a multi-level framework is scientifically sound

The framework of Ortt & Kamp (2022) defines the market as the to be studied level when using a TIS. However, over time, several highly cited TIS scholars have shown the possibility to see a company as a TIS as well. Teece (1996) and Bergek (2015) argue that companies are complex systems by themselves. Literature emphasizes the importance of internal networks, knowledge flows, and organizational structures in driving technological innovation within firms. Dosi et al. (2011) even extends the concept of the firm as a TIS by incorporating the foundational concept of dynamic capabilities. The authors argue that firms must continuously develop and adapt their capabilities in order to effectively navigate the complex and dynamic environment. The framework's effectiveness is hence relevant for companies aiming to implement niche strategies, as it helps identify the specific organizational changes needed for successful strategy deployment.

Adaptations to building blocks and influencing conditions for multilevel framework setting

When comparing TIS system components from strategic management on organizational change literature to the Ortt & Kamp (2022) framework, it is noted that similar concepts at a company level are described to the building blocks and influencing conditions, when compared to those mentioned for the market level. For more detail on the comparisons, see Appendix C. From the comparisons, the following descriptions of the building blocks and influencing conditions at a company level are suggested for the Ortt & Kamp (2022) framework in TablEA & 2B.

Table 2A: Building block descriptions as proposed by Ortt & Kamp (2022) (O:), (C:) proposes alterations extracted from literature for applying the framework at a company level. (-) means no adaptations are necessary.

Building blocks	**Description**	**Source**
Product Performance and Quality	O: A product (with all subsystems including hardware and software components) is required with a sufficiently good performance and quality (absolutely or relatively compared to other competitive products). lacking performance of quality can hamper large-scale diffusion. C: -	(Ortt & Kamp. 2022) ---------- (Dremel et al., 2017;Vial, 2019; Bocken, 2020)
Product Price	T: A product (with all subsystems) is required with a reasonable price (absolutely or relatively compared to other competitive products). The price of a product involves financial and non-financial (e.g. time, effort) investments to acquire and use the product. A prohibitively high price can hamper large-scale diffusion. C:-	(Ortt & Kamp. 2022) ---------- (Bocken, 2020)
Production System	T:A production system that can produce large quantities of products with sufficiently good performance and quality (absolutely or relatively compared to other competitive products), is required for large-scale diffusion. A lack of production system can hamper large-scale diffusion. C:-	(Ortt & Kamp. 2022) ---------- (Dremel et al., 2017;Vial, 2019; Bocken, 2020)
Complementary Products and Services	T :Complementary products and services for the development, production, distribution, adoption, use, repair, maintenance, and disposal of an innovation are required. Unavailable, incompatible or too expensive complementary products can hamper large-scale diffusion. C: Placement of TIS boundaries has large influence on CPS inclusion.	(Ortt & Kamp. 2022)
Network formation and Coordination	O: Required actors and sufficient coordination of their activities to develop, product, distribute, repair, maintain and dispose of products are required for large-scale diffusion. Coordination can be emergent and implicit (e.g., the market mechanism) or can be formal and explicit (e.g., an industry association). Coordination can involve actual collaboration and a shared vision regarding the innovation and the TIS around it. If type of actors and coordination amongst these actors are needed yet missing, large scale diffusion can be hampered. C:Implicit coordination on a company level can be referred to as 'Product-Market Competition' . Explicit mechanisms could be referred to as groups of various stakeholders that meet on a regular schedule, such as perhaps cross functional teams. Network formation extends beyond company boundaries.	(Ortt & Kamp. 2022) ---------- (Damanpour, 1991; Shleifer & Vishny, 1997; Dremel et al., 2017; Vial, 2019; Warner & Wager, 2019; Bocken, 2020)
Customers	O: Customer segments are required for large-scale diffusion. Potential customers with a need for the innovation should be identified. To become actual customers, they should be aware of the product, see its benefits relative to other innovations and have the knowledge, means and willingness to acquire and use it. If actual customers are lacking, large-scale diffusion can be hampered. C: Working within a fragmented company means customers can also mean internal customers especially for process and organizational innovations.	(Ortt & Kamp. 2022) ---------- (Dremel et al, 2017
Innovation Specific Institutions	O: These institutions refer to formal policies, laws and regulations, either describing norms and describing norms and requirements regarding the product, production facilities, and complementary products and services or describing how actors (on the supply and demand side of the market) should deal with the product and system around it. Specific Institutions can stimulate or hamper large-scale diffusion. C: Within a company context the innovation specific institutions may be seen as the executive board, but also compliance or security committees. Product requirements could be translated into KPI's.	(Ortt & Kamp. 2022) ---------- Bocken, 2020)

Table 2B: Influencing condition descriptions as proposed by Ortt & Kamp (2022) (O:), (C:) proposes alterations extracted from literature for applying the framework at a company level.

Influencing Conditions	**Description**	**Source**

Knowledge and awareness of Technology	O:This involves both fundamental and applied technological knowledge. Fundamental knowledge refers to the technological principles involved in components of the TIS, like the product, production and complementary products and services. Applied technological knowledge refers to the knowledge required to develop, produce, repair, maintain, and improve these components. When relevant actors lack knowledge and awareness of technology for their role, this can affect the formation of several TIS building blocks. C:Within the company rather than in the market.	(Ortt & Kamp. 2022) ---------- (Damanpour, 1991; Schilke, 2018; Bocken, 2020)
Knowledge and awareness of application	O:This refers to knowledge of (1) potential applications, (2) knowledge of the market (structure) and the actors involved in these applications. This knowledge is required for all actors including customers to formulate strategies, articulate product requirements and find or target other actors. When actors lack such knowledge required for their role this can affect the formation of several TIS building blocks. C: Within the company it additionally refers to knowledge about internal applications and the company structure and company actors involved.	(Ortt & Kamp. 2022)
Natural, Human & financial Resources	O:Resources can refer to natural, human and financial resources. Natural resources refer to raw material that can be acquired by each organization separately or by associations of organizations. Human resources refer to individuals with the right knowledge and competences. Increasing human resources may involve education programs, courses and training on the job. Financial resources can come from various sources. Lack of natural, human or financial resources can affect the formation of TIS building blocks. C: At a company level human resources may be refined to a managerial and an individual level. Financial resources also include slack resources which give space for experimentation.	(Ortt & Kamp. 2022) ---------- (Vial, 2019; Warner & Wager, 2019)
Competition	O:Competition can refer to competition between products based on old and new technologies but may also refer to competition between different product versions with a new technology. Since different product versions often require different production systems and complementary products and services, competition arises between networks of companies. The combined complex patterns of competition may hamper the formation of C: Competition may arise between departments due to friction between old and new business models.	(Ortt & Kamp. 2022) ---------- (Vial, 2019; Bocken, 2020)
Macro-economic and Strategic Aspects	O: Macro-economic aspects refer to the overriding economic situation, such as a recession or economic growth. Strategic aspects refer to interests of countries which are often reflected in generic institutions and government policies. Macro-economic and strategic aspects can influence the formation of TIS building blocks. C: Macro-economic aspects in the case of the company level may refer to the economic situation in which the company finds itself. Such as a red number or uplift of the bottom line of a company. Strategic aspects relate to the interest of departments of innovation specific institutions.	(Ortt & Kamp. 2022) ---------- (Dremel et al, 2017; Schilke, 2018; Teece, 2018; Vial, 2019; Warner & Wager, 2019; Bocken, 2020)
Socio-Cultural aspects	O: Socio-cultural aspects refer to the norms and values in a particular culture or socio-technical system. These conditions might be less formalized than the laws and rules in the innovation-specific institutions. They include methods and habits, norms and values ("the way to do things") and may become visible in interest groups or relevant stakeholder groups. Socio-cultural aspects can influence formation of different TIS building blocks. C: May refer to the more detailed concepts of hierarchy, values, managerial attitude or administrative intensity for example	(Ortt & Kamp. 2022) ---------- (Damanpour, 1991; Vial, 2019; Bocken, 2020)
Accidents & events	O: Accidents and events may emerge both outside a TIS (e.g., wars, political turmoil or natural disasters)or from within a TIS (e.g., accidents with products or in production, emergence of new technologies). Accidents and events can influence the formation of several TIS building blocks. C: Events may also refer to changes in leadership (e.g. CEO).	(Ortt & Kamp. 2022) ---------- (Dremel et al, 2017)

Chosen interrelations within the Ortt & Kamp (2022) framework at a company level

From the literature it is also noted that there is no real consensus in the current publications on the way the components on an organizational level interact with each other and that relations are context dependent (Demanpour, 1991; Vial, 2019; Warner & Wager, 2019; Bocken, 2020). Schilke (2018) notes that the interaction between components at an organizational level is a topic that is in need of additional research.

Therefore the interrelations devised by by Ortt & Kamp (2022) for a TIS at a market level with a company perspective, form an interesting starting point for beginning to understand the interrelations at a TIS at a company level with a market perspective as the market and company context have been proven to be intertwined and are thus the closest context specific interrelations suggested in the literature. By doing so this exploratory study contributes additionally by setting apart interrelations at a company level in the specific context of using the original Ortt & Kamp (2022) framework. By choosing an alternate approach there is a possibility of gaining valuable insights that have not yet been uncovered by the current research directions of the strategic management literature.

3.2.4 Niche strategies for the market & company level

Niche strategies can be divided into a market level and a company level. The paragraphs below outline the synthesis and proposed progressions per segment.

3.2.4.1 Market level

The framework of Ortt & Kamp (2022)[2] has been used as the basis to understand why breakthrough technologies are hindered in their diffusion. The combination of TIS building blocks and influencing conditions give an indication in the type and timing of niche strategies that can circumvent or solve the contextual factors. Niche strategies are focussed on a small & specific group of consumers, with alternate requirement needs than the mass market (Dalgic & Leeuw, 1994). Niche applications often fundamentally differ from large scale applications as can bee seen in Example 3. Deployment of niche strategies have proven to be relatively successful, especially for high-tech products (DeBruyne et al., 2012). About 8 out of 10 successfully diffused technologies have been preceded by an average of two niche strategies (Ortt & Surprapto, 2011; Trevino et al., 2012).

Example 3: *Mobile phone niche introduction strategies before large scale diffusion*

Telephony was first used as a communication means between firms.
Furthermore in its early days it was used as a house alarm system.
Both introduction strategies can be classified as stand-alone niche strategies where the device functioned without a widespread network of users and functioned a very specific group of users only.

(Dordick, 1990; Huurdeman, 2003; Ortt & Kamp, 2022)

List of used niche strategies

On the basis of Ortt (2013), Nandigam (2023) has identified 33 niche strategies which have been proven successful for the automotive sector, as displayed in Appendix E. The information from the literature has been extended by indicating which building blocks and influencing conditions relate to the described niche strategy in a high-over fashion. This means that once identified which building blocks and influencing conditions are missing or incomplete to emerging technology or service in the automotive industry, the reader can match the barriers to the list of labelled niche strategies provided. An example of two niche

[2] The niche strategies Ortt &Kamp (2022) refers to may be classified in the literature as 'Strategic Niche Management' (SNM). These strategies are specifically designed for the adaptation phase in the pre-diffusion phase. Technological Niche Strategies may be deployed in the innovation phase. These are often only mere pilot projects residing in sheltered market environments (Weber et al, 1999). Whereas mature niches can be found in the market stabilization phase of the diffusion curve. Both the technological and mature niches are not the focus of this research. Hence when talking about niches, strategic niches are meant.

strategies can be seen in Table 3. To ensure validity, a second researcher with a MOT background was asked to also label the niche strategies to corresponding building blocks and influencing conditions. An accuracy score of 82% was achieved, see Appendix E. However, it must be noted that even though the list presents sufficient options to operate the framework, the list is not exhaustive as can be seen in Example 4. For completeness sake the strategy has also been added to the list, bringing it to a total of 34 strategies. From Example 4 it is noted that novel strategies may also be added in the future. Hence, Table 3 should be updated periodically.

Example 4: *Missing niche strategies*

The freemium strategy: The consumer is presented with a free product with lesser performance than the paid product. This lowers the initial decision threshold for the consumer. When using the free service, he or she is gaining the knowledge about the application to start considering the paid version with superior performance.

This strategy has been successfully used for many years by Spotify (Swanson, 2013). This strategy is relevant for the automotive market too, as consumers have become more and more open to a freemium model. For Gen Z, 66% are likely to accept advertisement in their car, versus only 36% of Baby Boomers (Simon Kucher, 2023).

Table 3: Example of labelling niche strategies according to their influence on the Ortt & Kamp (2022) framework. Full table with all 33 niche strategies can be found in Appendix E.

No.	Strategy	Description	Building Blocks / Influencing Condition	Source
5	Awareness Campaign	Focuses on creating awareness amongst necessary stakeholders. Increasing the knowledge level around basic information encourages participation.	BB: Network Formation and Coordination, Complementary Products and Service (knowledge about the technology may be seen as additional service needed for adoption), Customer IC: Knowledge and Awareness of Application and Market	(Balachandra et al., 2010)
13	Redesign	Focusses on finding alternate applications of the technology.	BB: Product Performance and Quality IC: Knowledge and Awareness of Application and Market, Accidents & Events	(Ortt et al., 2013)

3.1.4.2 Niche strategies on the company level

This section describes when and how niche strategies can be applied on a company level. To answer this, it must be determined how and when a niche strategy aligns with organizational capabilities and what to do if there are discrepancies. In order to do so, the reader must first understand what organizational capabilities entail.

Why market niche strategies can be used on a company level

The found niche strategies displayed in Appendix E are also deemed applicable at a company level with a market perspective. This is reasoned, as companies are the main actors in the bulk of the strategies and the

descriptions of the TIS blocks. Also, influencing conditions and building blocks descriptions for companies as determined in Table 2A & 2B were deemed comparable to a market level.

However, as explained in Section 3.2.3 an additional step must be taken as not all niche strategies may fit with the capabilities and design of an organization, even though they are generally suitable at a market level (Paladino, 2009; Toften & Hammervoll, 2012). In the framework of Ortt & Kamp (2022), niche strategies are chosen solely on market level. However, when doing so from a company perspective, firms may introduce products or services using a niche strategy for which they are missing the right organizational capabilities to bring the strategy to fruition, within the right time frame of the market being ready (Eddleston et al., 2019).

Organizational building blocks: dynamic capabilities and core competencies

Dynamic capabilities (DCs) are capabilities that enable consistent performance of novel activities directed toward strategic change. The way of working thereby differs from ad-hoc problem solving or 'one-off' results (Helfat & Winter, 2011, Winter, 2003). Hence DCs form the basis of reaching a sustained competitive advantage as a firm. As a sustained competitive advantage helps long-term firm survival, it are the dynamic capabilities that should logically form the backbone of business model design or niche strategy selection (Teece, 2018)[3]. The more the capabilities are integrated throughout the organization, the stronger the result. DCs are often the outcome of "collective learning" processes and can be bundled together in groups of distinctive qualities. These qualities are commonly referred to as Core Competencies (CCs). CCs typically cover several products or markets and form the cornerstone of a firm's behavior and are unique to a firm. Core competencies are strategically flexible and can hence be applied to alternate or novel markets as well. Unique is described as Valuable, Rare, Inimitable and Non-substitutable. These conditions are also referred to as the VRIN conditions explained in Appendix F (Bowman & Ambrosini, 2003).

Next steps of Ortt & Kamp (2022) for 'niche strategies' at a company level

When a DC or a CC checks all four conditions, the capability is hard to imitate for competitors. Hence the proposed market niche strategies should be compared to the DC and CC a company possesses to determine whether applying a niche strategy is a logical next step for a company. Comparing niche strategies and DC/CC requires significant insight and feel for the company, so it is then up to the project team within the company to decide the degree of overlap between the required and possessed DC and CC. If there is satisfactory overlap, this will be considered a match.

The following paragraphs describe possible next steps once it is determined if capabilities between a niche strategy and a company do or do not match. This is an extension of the Ortt & Kamp (2022) framework as visualized in Figure 16.

[3] Business models and niche strategies are two closely related concepts. A niche strategy defines the specific market segment that a business will target, while a business model outlines the plan for how the business will create and deliver value to customers in that niche. Often business models also include a company's strategy (Osterwalder & Pigneur, 2010; Teece, 2018). Hence selection of a niche strategy from a market level, fitting with the company organizational climate can be referred to as business model development.

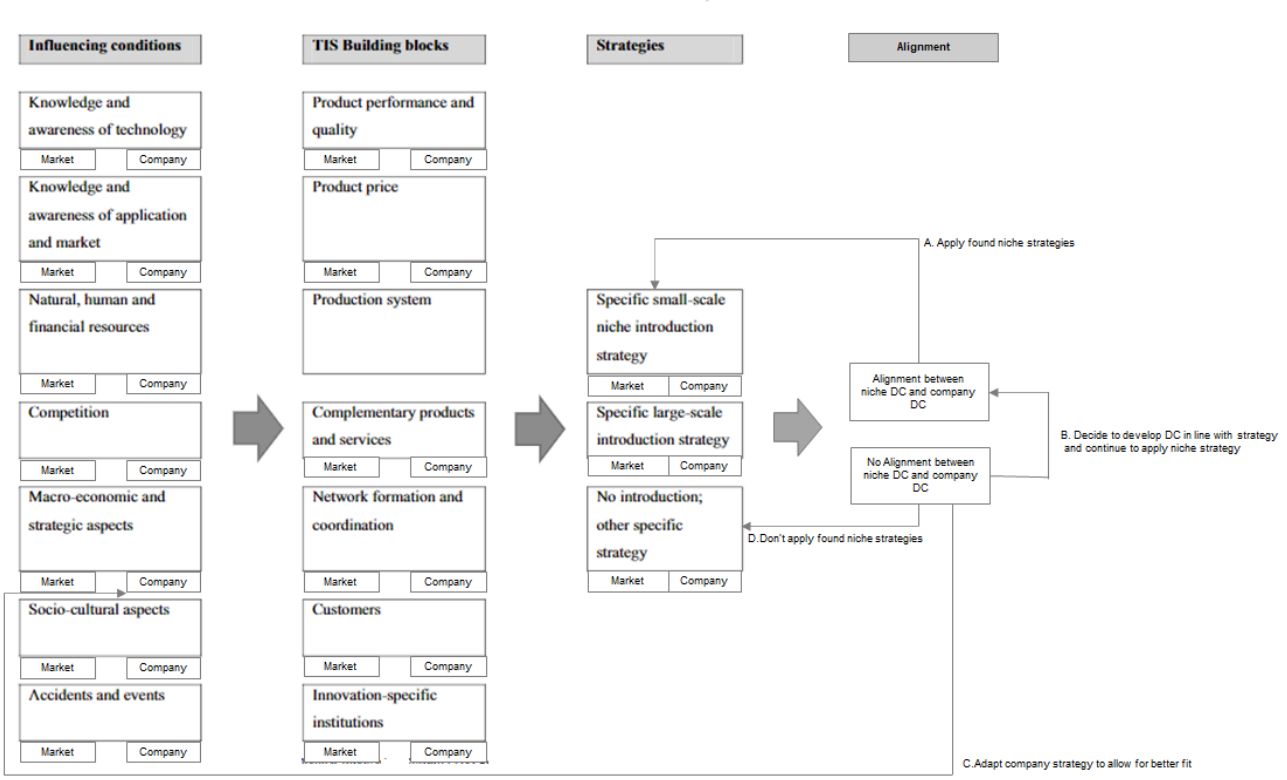


Figure 15: Extended Ortt & Kamp (2022) framework for choosing niche strategies suitable to the organizational context of companies.

Situation I: When niche and company capabilities align

Solution A: Choose the niche strategy without large adaptations in the company

When the compared niche strategy and company capabilities match to a satisfactory level according to the project team, the niche strategies can be implemented without further ado as seen under A in Figure 15.

However, the result of a sustained competitive advantage may be diminished by changing market conditions over time (Hafeez et al., 2002). This is even more relevant to the framework of Ortt & Kamp (2022), as it is applied in an emerging market setting, meaning the market is constantly subservient to change. Meaning that framework must be regularly reapplied to assess whether the found niche strategy is still suitable.

Situation II: When niche and company capabilities do not align

When the proposed market niche strategies do not align with the DC and CC in a company, an option is to develop the necessary DC or CC. Especially when the appointed DCs or CCs form the basis to realizing a long term (digital) strategy. However, forming novel DCs and CCs takes time. The study by Collis and Montgomery (2009) shows that it takes an average of five years for companies to develop novel CC's. Prahalad and Hamel (2009) found that it took an average of three years for companies to develop alliance capabilities, a specific type of CC. The time it takes to develop capabilities and core competencies can vary depending on a number of factors, including the company's industry, the company's legacy, the complexity of the capabilities, and the company's investment in developing its core competencies (Winter, 2003; Prahalad & Hamel, 2009).

As this research looks at applying niche strategies in emerging markets, it must be weighted if the necessary capabilities to perform the niche strategy are still relevant by the time they have been developed. This can be done by alignment with the digital strategy of a company and trend watching of the market. Setting up such

a digital strategy is a challenging, iterative process due to the continuously developing market landscape (Yeow, 2016; Dremel et al, 2017; Vial, 2019). Furthermore, forecasting the future of developing markets is accompanied with a level of uncertainty. Trying to develop DC's in a large fragmented organization without executive support or guiding direction of a strategy, takes more time and effort as initiatives may not be integrated as swiftly in other concerned areas of the organization.

Solution B: Dynamic Capability Development by applying enabling factors
When choosing to develop DCs such that a niche strategy can be deployed, the right environment for fostering the capabilities is necessary. These organizational aspects that underlie DCs are referred to as first order aspects (Bocken, 2020), enabling factors (Vial, 2019) or antecedents (Teece, 2018). The concept of enabling factors apply to the development of various DC's. Without these factors it will be difficult to get the capabilities developed to the level they need to be at.

Hence this thesis proposes which organizational factors to engage so DC's can be developed over time when a niche strategy does not fit with the current company climate so that it will develop the necessary dynamic capabilities over time. These antecedents are based on organizational change management literature as can be seen in Table 4. The table is divided into the three levels of institutional, strategic and operational enabling factors. The institutional level of organization design is influenced by well-established norms, regulations, and beliefs that characterize the organization's reality and direct behavior. Strategic enabling factors relate to activities that support central organizational goals and determine a company's long-term course. Operational practices focus at the day-to-day side of the organization and support a firm's core objectives. Bocken (2020) reasons that an organization should move down from institutional, to strategic, to operationals measures. When needing to choose enabling factors to develop dynamic capabilities for unaligned niche strategies, one can move from the top level of the table to the bottom and compare if enabling factors are present. If they are, one can move down a level and check again. If not present, then that level should be addressed. Choosing enabling factors within each level of Table 4 might be done by matching the labelled building blocks and influencing conditions to the labels in the niche strategy or by intuitively judging whether something is present by the project team as no further directions are given by the literature. Similarly, there is no consensus whether *all* factors on a level should be solidified or to what extent. Hence, this step must be judged by managers on the project. In this thesis both the matching and judgment is made by the author based on the interviews and verified by Company X employees. Developing a more scientific sound method falls outside of the scope of this exploratory and time limited thesis.

Novel DCs development however challenges the current status of the company. This 'Innovation Paradox' often creates friction within a company. Leonard-Barton (1992) points out that working on novel DC's is critical, and the right time to do so is when current core competencies are stable and well working.

Solution C: Divert strategy to fit niche strategies
When the niche strategies do not fit with the company climate and enabling factors cannot or are not wished to be deployed in a timely manner, the last option is to forfeit the niche strategy and choose another niche strategy that fits with the strategic direction of the company. If no niche strategies fit, this may mean the company should change strategic direction if it still wants to market the upcoming service or technology. Changing strategic direction inevitably changes allocation of resources within a company (Schilke, 2018). Therefore the framework must be applied again when strategy changes.

Solution D: Choose other niche strategies or even different services / market
Else the firm is suggested to search for other opportunities more in line with its current competencies and vision. This line of reasoning is depicted in Figure 16.

Table 4: Enabling factors that can aid in the development of dynamic capabilities.

No.	Strategy	Description	Building block / influencing condition	Source
	Institutional	**The institutional level of organization design is influenced by well-established norms, regulations, and beliefs that characterize the organization's reality and direct behavior.**		
1	Balancing Shareholder and Stakeholder Value	Valuing both shareholder and societal needs. Account for broader societal needs in firm decision making	BB: Innovation Specific Institutions, Network Formation and Coordination IC: Natural, Human and Financial Resources, Macro-Economic and Strategic Aspects, Knowledge and Awareness of Technology and Application and Market, Competition	(Bocken, 2020)
2	Embracing Ambiguity	Create willingness and tolerance to deal with uncertainty. Move beyond standard trade-offs.	BB: Innovation Specific Institutions, Network Formation and Coordination IC: Sociocultural Aspects, Competition, Accidents and Events, Knowledge and awareness of technology and application and market	(Damanpour, 1992; Bocken, 2020)
3	Valuing Digitalization	Embracing organizational resilience to digitally transform. Align stakeholder values and needs.	BB: Innovation Specific Institutions, Network Formation and Coordination IC: Sociocultural Aspects, competition, Natural, Human & Financial Resources	(Vial, 2019; Bocken, 2020)
	Strategic	**These enabling factors at the strategic level are related to activities that support central organizational goals and determine a company's long-term course.**		
4	Digital Strategy Alignment	A digital strategy determines the scope of business models. Aligning implementations with the strategy ensures efficient and effective engagement of stakeholders.	BB: Innovation Specific Institutions IC: Natural, Human and Financial Resources, Production System, Accidents & Events, Internal Competition, Internal Customers, Macro-Economic and Strategic Aspects,	(Warner & Wager, 2019; Bocken, 2020; Coreanni et al., 2020)
5	Executive Support	Can fast track implementation and align stakeholder behavior within the company. This should specifically come from the CDO.	BB: Innovation Specific Institutions, Network Formation and Coordination IC: Natural, Human and Financial Resources, Sociocultural Aspects, Competition, Macro-Economic and Strategic Aspects,	(Dremel et al., 2017; Warner & Wagner, 2019; Bocken, 2020)
6	Cross-functional Teams / Restructuring Organizational Structures	Cross functional teams engage various stakeholders with expert knowledge throughout the company. Necessary to provide a fluent line throughout the company	BB: Network Formation & Coordination, Production System, IC: Natural, Human and Financial Resources, Sociocultural Aspects, Knowledge and Awareness of Technology and Market and Application, Product Performance, Accidents and Events, Internal Customers	(Warner & Wagner, 2019; Bocken, 2020)
7	Patient Investments	Strategic investments in long term projects. Accounting for longer payback times	BB: Price, Innovation Specific Institutions, Product Performance & Quality, Production System IC: Natural, Human and Financial Resources, Macro-Economic and Strategic Aspects, Competition	(Bocken, 2020)
	Operational	**These practices focus at the operational side of the organization and support a firm's core objectives.**		
8	Ring-Fenced Resources for DBMI	Should include corporate budgets available for experimentation. These are sometimes also referred to as 'slack resources'. Also includes time availability and support functions for DBMI.	BB: Product Performance & Quality, Price, Customers, Innovation Specific Institutions IC: Natural, Human and Financial Resources, Macro-Economic and Strategic Aspects, Competition	(Damanpoour, 1992, Bocken, 2020)

9,	Enabling Innovation Structure	May include autonomous structurally separated units, tailored innovation process for DBMI where fast learning and fast failing is encouraged, and senior management supervision. Also includes overarching supporting IT-infrastructure within the organization.	BB: Network Formation & Coordination IC: Sociocultural Aspects, Production System	(Warner & Wager, 2019; Bocken, 2020; Coreanni et al., 2020 ; Yeow et al., 2020)
10.	Upskilling the workforce	Future Proofing the company for digital proposition means the creation of new roles. These can often be filled with current employees once upskilled. Strategy successfully deployed by Vodafone and Audi in the customer service department during their digital transformation. Roles can also be externally recruited. Facilitating additional exposure to the right stakeholders is also included in upskilling.	BB: Network Formation and Coordination IC: Knowledge and Awareness of Technology, Natural, Human and Financial Resources, Knowledge and Awareness of Application and Market	(Dremel et al, 2017; Bocken, 2020)
11	Incentive scheme for DBMI	Incentivizing long-term digital objectives. Rewarding DBMI champions accordingly.	BB:Innovation Specific Institutions, Network Formation and Coordination IC: Natural, Human and Financial Resources, Sociocultural Aspects, Competition, Macro-Economic and Strategic Aspects,	(Bocken, 2020)
12	Performance Metrics for Digitalization	Including DBMI in corporate targets, derived from digital strategy. Measuring digitalization performance. Compensated by leeway on 'old' financial performance metrics.	Innovation Specific Institutions, Network Formation and Coordination IC: Natural, Human and Financial Resources, Sociocultural Aspects, Competition, Macro-Economic and Strategic Aspects,	(Dremel et al., 2017; Bocken, 2020)

From Table 4 it is interesting to note that the strategy of upskilling the workforce is seen as a niche strategy as seen in Appendix E as well. This is another small sign of the need to overlap market level and company level perspectives.

3.3 Conclusions

3.3.1 Hyperpersonalization

Hyperpersonalization definition

Hyperpersonalization encompasses state of the art e-commerce recommender systems. Unlike traditional personalization that relies on retrospective group-level customer segmentation, hyperpersonalization utilizes real-time, predictive recommendations tailored to individual customers through advanced AI algorithms.(Hyper)personalization is focussed on the process of recommending products, not necessarily physically tailoring products to a consumer's individual taste. The progression from personalization to hyperpersonalization is not a binary shift but rather a sliding scale. The service exists out of the three subsystems learning, analysis, and tailoring which together define where on the scale a service resides. The concept of hyperpersonalization also

incorporates a feedback loop between these three systems, where the subsystem of tailoring feeds back into learning. Personalization misses this connection.

Current status of hyperpersonalization

The current status of hyperpersonalization as a service is played in the adaptation phase, even though actual numbers are unknown. The service is seen as radical as it offers significantly enhanced consumer experience compared to standard personalization, requiring different and more integrated capabilities. Despite its potential, the widespread adoption and diffusion of hyperpersonalization is still held back by amongst other things, regulatory limitations, varying consumer attitudes towards data privacy and a lack of computational power currently.

Specifically in the automotive industry, hyperpersonalization faces unique challenges due to fewer customer touchpoints and the significant investment involved in vehicle purchases. However, there are unique advantages as well, such as the potential for vehicles to serve as data-gathering assets for refining customer profiles and recommendations. The industry is exploring innovative approaches, like augmented reality and immersive online experiences to lower mentioned barriers.

3.3.2 Ortt & Kamp (2022) Framework

Section 3.2 provided an in-depth analysis of the Ortt & Kamp (2022) framework, focusing on its application in understanding and implementing hyperpersonalization strategies.

The framework for services instead of technologies

The Ortt & Kamp (2022) framework is crucial for identifying barriers to implementing hyperpersonalization on a large scale and finding suitable niche strategies to overcome these challenges. The framework distinguishes between seven Technology Innovation System (TIS) building blocks and seven influencing conditions. Thereby providing a structured approach to analyzing the market status to consider how to introduce a service. While the Ortt & Kamp (2022) framework was originally designed for emerging technologies, it's principles are also applicable to emerging services like hyperpersonalization without grave changes. The only change for services is the use of subsystems for technologies and the overarching context such as IT infrastructure between the subsystems. This line of reasoning is endorsed by the demarcation perspective that allows for application of technology innovation theories to service innovation.

The framework for company level instead of market level

The application of the Ortt & Kamp (2022) framework at the company level is another novel setting for the application of the framework. It was recognized that successful implementation of technologies and services depend not only on market-level factors but also on the internal capabilities, structures, and strategies of a company. Thereby the need for applying the framework at a company level was proven. Definitions of building blocks and influencing conditions of the market level were translated to be used at a company level. Interrelations between the blocks and conditions were kept the same as a starting point for this research. When applying the framework at a company level, it should still first be applied at a market level to understand better what barriers are caused by the company climate or are actual overarching barriers.

Niche Strategies for the market & company level

The framework draws from 33 niche strategies suitable for both the market and company levels. At the market level, strategies focus on overcoming barriers in the market level. At the company level, these strategies are checked for aligning with company strategy and capabilities. When aligned, niche strategies can be applied without further ado. When strategies do not align with core competencies of the company, it may be chosen to develop capabilities over time. To develop these capabilities a list of enabling factors was derived that can create the right company climate for this development. When the necessary capabilities are not a part of the companies (digital) strategy, one can opt to change the company's strategy. If developing DC's is not the preferred option, other niche strategies should be selected, or focus should be put on other initiatives than the studied service. Niche strategies and current CC/DC can be compared by experienced employees. Corresponding enabling factors are chosen from the institutional, strategic or operational level and should correspond with the labels given to the niche strategies.

4. Case Study: The Company X Group

This chapter first introduces the background information on the case study around hyperpersonalization for the Company X Group in Section 4.1. Second, the current status, needs and opportunities for hyperpersonalization within Company X will be covered in Section 4.2. The aim is to come to an answer of the main research question:

What (subsequential) niche strategies may Company X adopt through the utilization of the Ortt & Kamp (2022) framework to facilitate overcoming the adaptation phase with regard to the service of hyper-personalization in the online retail automotive sector?

4.1 Company X Background

Redacted

4.2 Case study results

The results section is structured as follows. First, the conducting of the interviews and creation of the mind maps are covered in Section 4.2.1. Additionally an example process is provided to aid the reader on reading and processing the data. In Section 4.2.2, based on the interviews, the three most pressing building blocks and influencing conditions found in the interviews are examined on the market level that hinder the effective implementation of hyperpersonalization. This identification takes place for the Dutch online retail automotive market, and specifically for the Company X Group. The company specific aspects are discussed in Section 4.2.3. Section 4.2.4 then describes niche strategies, both at the market and company level.

4.2.1 Interviews and mindmap

To get to these results, a total of 10 interviews have been conducted with a variety of interviewees, which were presented in Chapter 2 and Appendix A. The interviews have been documented and analyzed, leading to a mind map containing all relevant information in a structured manner. From the interviews, six mind maps were made: three for the market context and three for the company context. Both were initially divided over the hyperpersonalization subsystems: learning, analysis and tailoring. These can be found in Appendix H. However, based on the data from the interviews, it turned out that not all suggestions could be incorporated in just one subsystem. Therefore, a fourth subsystem of context was introduced.

Introduction of context subsystem

While the system as a whole was originally split up into the three systems of learning, analysis and tailoring as described in Chapter 3.1, common feedback in the interviews was that both the company and market context are actually of importance to determine the status of this service. The necessity of adding a contextual subsystem was given back by 5 out of 8 interviews (I2; I4; I5; I8; I9). It was found from the mindmaps that contextual factors weave through the systems as a common thread. For instance, having the right processes in place to connect production systems of subsystems, is relevant for all three subsystems and lack thereof occurs as a barrier in each subsystem. Hence, an additional subsystem was introduced labeled 'Context'. Especially in service innovation, this is arguably a valid addition, as the company context plays a major role (Witell, 2016).

Processing results

For the sake of readability, the mindmaps were translated to a table format, which can be found in Appendix I. Furthermore, to limit the amount of data, some tables were merged together by grouping building blocks into related blocks instead of repeating them, an illustration of this process is given in Example 6. Grouping of barriers is done because first of all, the interrelations between building blocks are lost and second because otherwise approximately 2 (settings) x 4 (subsystems) x 7 (building blocks) = 56 tables would be found, each filled with often multiple influencing conditions related to the building block. By grouping barriers manually as in Example 6, the total amount of tables was brought back to 17. However, 17 tables is still considered quite a large dataset.

Example 6: *Combining barriers into groups of barriers*

An example of a combined barrier is *'Getting the right and sufficient, consistent, consented data at the right time'.* The barrier is build up out of multiple sub barriers which were separately mentioned by various interviewees in one way or another.

- Getting the right data (I1; I2; I7: I10)
- Getting sufficient, but not too much data (I1; I3; I7; I10)
- Getting consistent data (I7; I9)
- Getting consented data meaning the customer has agreed with the usage of their data (I5; I6; I10)
- The above conditions at the right time. (I7; I8; I10)

All of these building blocks are centered around the same issue and mainly affect the building block of Product Performance and Quality. Without the described types of data, the quality of hyperpersonalization efforts seriously suffers. The grouping of sub barriers also shows that if one issue is not resolved, solving the others will not improve performance to the necessary quality.

However, each of the incomplete sub-building blocks additionally affects secondary building blocks such as Innovation Specific Institutions (consented data) , Product Price (sufficient data), Customers (consented data) and Company internal Network Formation & Coordination (right, consistent and consented data). Each of these building blocks are missing or incomplete to their own set of influencing conditions. Influencing conditions sometimes overlap between the subbarriers.

Although combining is considered essential for the conciseness of this thesis, a drawback of this approach is a potential loss of detail on the relation between a single specific sub condition and their corresponding building block. Thereby matching niche strategies to labeled barriers may happen in a quite high-over fashion. Grouping the barriers however does show that multiple niche strategies are sometimes necessary to overcome a single group barriers category. As from this example, having the right, consistent, consented data at the right time still forms a barrier if it is not available in a sufficient amount.

Important to note because of its managerial implications, is that it was argued that all core factors occurring in the external market sector are also applicable to the Company X company context. This was reasoned as Company X does not wish to be a frontrunner of technological innovation. Moreover, it was clearly established from the interviews and literature that the current status of Company X with regard to hyperpersonalization is indeed lagging behind the industry. This is relevant information, because this not only suggests the company context is merely an extension, it may also provide possibilities to find specific applications of niche strategies already applied somewhere in the market, when a company experiences a barrier in larger extent than the market. Or it might form an indication that pursuing the service or technology lies far from the core capabilities of the company and hence ask for significant strategic change and investments.

4.2.2 Building blocks found in the case study

In this section the top three building blocks and influencing conditions are presented in detail. Due to the large volume of data not all learnings can be presented on such a granular level. Readers are given the tools to go through the data themselves as well. To determine the most pressing factors limiting large-scale diffusion of hyperpersonalization within the automotive sector, the occurrence of each core factor and influencing condition is counted in the interviews to establish dominance of each factor. This step is of importance to determine which building blocks and barriers should be prioritized to apply niche strategies to. The occurrence was counted at most one time per interview, even though interviewees may have mentioned factors multiple times, as was described in Section 2.4.2 and Appendix A. The mentioned core factors were condensed into higher themes to retain a sense of overview as described in Section 4.2.1.The three barriers most mentioned by interviewees have been elaborated on below. Figures 19A to 19C show the relations as were found in the interviews regarding these topics.

Influencing conditions	TIS building blocks
Knowledge of tech	Performance
Knowledge of appl	Price
Resources	Production
Competition	Complements
Macro-economic	Network formation
Socio-cultural	Customers
Accidents	Institutions

Figure 19A: Framework usage

1. Consistent, Clean, Consented & sufficient data: The number one mentioned barrier belongs primarily to the core factor Product Performance and Quality as can be seen in Figure 19A, but also branches into Innovation Specific Institutions, Customers, Network Formation & Coordination and Complementary Products and Services as was also described in Example 5. The problem is mentioned so often, because it is considered to be the first step in building a hyperpersonalization service and cannot be skipped. Furthermore, it is mentioned because of the vast amount of stakeholders involved. Customers, regulators, competitors and company employees all influence this core factor. It is a part of the puzzle that takes time to get right knowledge-wise. This core factor was mentioned by 8 out of 10 interviews and is also a trending topic in literature (I1; I2; I3; I5; I6; I7; I8; I9; I10).

Influencing conditions	TIS building blocks
Knowledge of tech	Performance
Knowledge of appl	Price
Resources	Production
Competition	Complements
Macro-economic	Network formation
Socio-cultural	Customers
Accidents	Institutions

Figure 19B: Framework usage

2. Vertically integrating OEM's and the rise of new competitors threatening current business models: This core factor was first of all labeled in the category of network formation and often results from competition as seen in Figure 19B. While complex to get around because of the weak position of importers and retailers in the automotive industry, it is a crucial core factor to get around when setting up hyperpersonalization as a service because it limits data gathering possibilities. Furthermore, it is a task that might not be clearly assigned to employees in setting up the hyperpersonalization process as it seems as a problem that lies far away from the operational teams. The barrier relates to the first barrier as it makes getting the right data more difficult for retailers in the automotive sector. This core factor was mentioned in 7 out of 10 interviews (I1;I3;I4;I5;I6;I7;I8).

Influencing conditions	TIS building blocks
Knowledge of tech	Performance
Knowledge of appl	Price
Resources	Production
Competition	Complements
Macro-economic	Network formation
Socio-cultural	Customers
Accidents	Institutions

Figure 19C: Framework usage

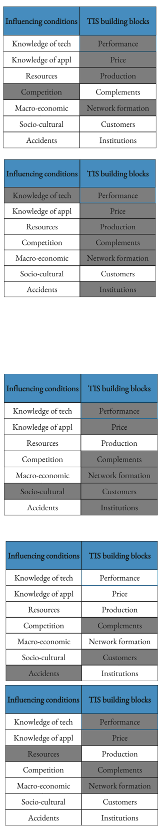
3. Getting the processes right: The third most pressing core factor regards the Production System category, but also relates to Network Formation and Coordination building block as can be seen in Figure 19C. The right processes should be in place throughout the whole hyperpersonalization production process. A crucial part is the IT infrastructure connecting all subsystems. Getting the right systems and people in place is a costly and time-consuming process with a lot of stakeholders involved. Additionally, the challenge of overcoming legacy costs play a role, this is a form of internal competition. When done incorrectly or not at all, investments are not earned back and the technology becomes unscalable. This core factor was mentioned in some form in 6 out of 10 interviews and additionally in

literature sources (I1; I4; I7; I8; I9; I10; Dremel et al, 2017; Yeow, 2018). Zooming in, the right processes also refer to the right hyperpersonalization moments in the customer journey. Done at the wrong moment or too aggressively, hyperpersonalization efforts have proven to scare customers away and damage brand reputation (McKinsey, 2021).

The above barriers found at the market level were also relatable to Company X's specific context and also have been mentioned as such in the interviews. The most important core factors on market level are hands-down also the most important core factors mentioned for the company level. However, the market level situation has proven to often be a few steps ahead of Company X. This can be seen by the way the interviewees have rated the incompleteness of the building blocks in the market versus for the firm in question as can be seen in Appendix J.

5.3.1.2 Case study found influencing conditions

Within the market, the influencing conditions were more prevalent in literature than in the interviews. Hence, actual ranking based on counting for all influencing conditions is unsure. Therefore, the most important conditions are based on professional expertise regarding the literature and counting of the interviews. Only the first influencing condition kept occurring in the interviews.



Figures 20A (top) to 20E (bottom)

1. **Competition:** Competition exists between OEM's and the automotive players to get their hands on both customer data and the final interactions. This core factor occurred in <u>7 out of 10 interviews</u> and influenced at least <u>four</u> different core factors as can be seen in Figure 20A.
2. **Knowledge and awareness of technology:** Originating from the GDPR rules and multiple data leaking scandals, consumer's awareness and perception of giving away data has been altered. On the company side however, it is clear that not even the biggest tech giants such as Amazon have fully optimized and finished their recommender systems for an extremely fluent experience. Also, knowledge for complementary products such as computing power is lacking (I7). Influences <u>six</u> different core factors as seen in Figure 20B.
3. **Socio-cultural factors:** Based on literature, These form a major aspect which has been under mentioned in the interviews. The younger generation, 'Gen Z', is likely to buy their first cars online in the coming years and is expecting a better customer experience, thereby this factor will become an enabler over time. Furthermore, the financial investment climate for hyperpersonalization tools is less. It can have an influence on <u>six out of seven</u> building blocks as seen in Figure 20C.
4. **Accidents and events:** Covid-19 has drastically changed the e-commerce and automotive landscape. Consumers have habituated buying online and are expecting better service because of it. Has had an influence on <u>two</u> different core factors as seen in Figure 20D (McKinsey, 2021).
5. **Natural, human and financial resources:** The investment climate in the Netherlands and Europe has lacked financial resources for app development. The engineer in the Netherlands are of high skill level, but are thought with a different focus than in the USA, ensuring lowered building skills (I1) Lastly, Simon Kucher (2023) shows that both the automotive and predictive analytics will be fields in the common years that might experience a shortage in recruitable candidates. This will influence <u>four out of seven</u> building blocks as seen in Figure 20D.

Interestingly enough these are the influencing conditions most witnessed related to the building blocks in the prior paragraph. Hence tackling the building blocks should suffice for an initial round of niche strategies.

4.2.3 Company level influencing conditions

On a company level, the same approach is taken as for the market level. It was found that the same core factors apply on a company level. Therefore, the market level influencing conditions are not mentioned again. The occurrences in the interviews have been counted to obtain the most pressing influencing conditions on a company level. The interrelations between these factors are also depicted in Figure 22.

1. **The way of working within Company X**: This influencing condition is a summary of interrelated problems and incidents that prevent the 'Mobility for Life' vision from getting further integrated than a brand promise by the previous CEO. This relates to both the core factor category Socio-Cultural Aspects and Macro-economic Aspects & Strategy. It was mentioned specifically in 7 out of 7 Company X-related interviews, by both internal and external contractors within Company X (I1; I2; I3; I4; I5; I6; I7). Sometimes the absence of explicit strategic direction may lead to unrest. However, not all interviewees have realized that while Company X has many characteristics of a hierarchical organization, it's organizational structure is in a hybrid format due to all it separately governed entities. The hybrid format consists of both hierarchical and network-like traits. Hence Sociocultural Aspects ensure that the players that do not reside in the Executive Board may still have ample power to block and accelerate initiatives. Hence a full-on top down command has not been accepted, and will probably not be accepted in the future. However, setting specific KPIs puts pressure on reaching KPI's by tying bonuses to reaching them, and excludes focus on other topics. This is reflected in the amount of financial and human resources made available to the subject, even if the operational divisions tacitly feel the importance of the topics. However, by not investing human and financial resources into topics, knowledge and awareness around the technology or market application is not extended and results on the field may fall behind, making it more difficult to gain approval in a next budget round.

2. **Knowledge of Technology and Knowledge of Application and Market:** In 6 out of 7 Company X specific interviews, it was given back that the right technological knowledge required for hyperpersonalization does not reside within the company (I1; I2; I3; I4; I5; I7). However, when interviewing domain specific agents about this, knowledge seems to be more abundant on the topics than the general consensus about the knowledge level (I6). As Company X is a large organization with 3800+ employees, this perception is hence an understandable outcome.

   On the consumer side however, a clear lack of knowledge around Company X's core business and operating model has been displayed. Customers often do not know they have both a bike or a car retailed by Company X, but assume they have bought the objects from the brand names related to the actual products, such as Toyota or in the case of bicycles, for instance from Leasefietsshop. This can potentially undermine trust in the service of hyperpersonalization. As long as no (financial) incentive is given by the executive board to the business units on this topic or that businesses recognize and are able to formulate the benefits, it is unlikely that knowledge levels are developed. This information was displayed in 3 out of 8 Company X specific interviews (I2; I4; I6).

3. **Natural, Human and Financial Resources:** However, while the knowledge might be present in the company at some level, there has also been consensus that there are limited human resources to act on these ideas. This has been mentioned in 4 out of 8 Company X specific interviews (I2; I4; I5 I7). To compensate, consultants are hired to support teams such as is now the case in the predictive analytics team. While beneficiary on the short term, functioning on consults may affect knowledge level in the long term (I7). On top of that, while never mentioned explicitly in the interviews, the disappointing financial results (macro-economic aspect) due to excessive inventory caused by consumers canceling their car orders due to delays in delivery caused by the global computer chip

shortage have put more pressure on financial resources in each department (I4; Bartlett, 2021). This has slowed down innovation processes as it is more difficult to get consent on innovative projects in the hybrid organizational structure of Company X.

The difference in influencing conditions at the market and company level indeed confirm that Company X is lagging behind on the market status as was also seen in Appendix J, but in the end must as well tackle the same barriers the market is dealing with. Furthermore it was found the mentioned trio of influencing conditions at the company level interact with each other. These relations are displayed in Figure 19. The fact that these ties indicate the need for further research of the framework at a company level.

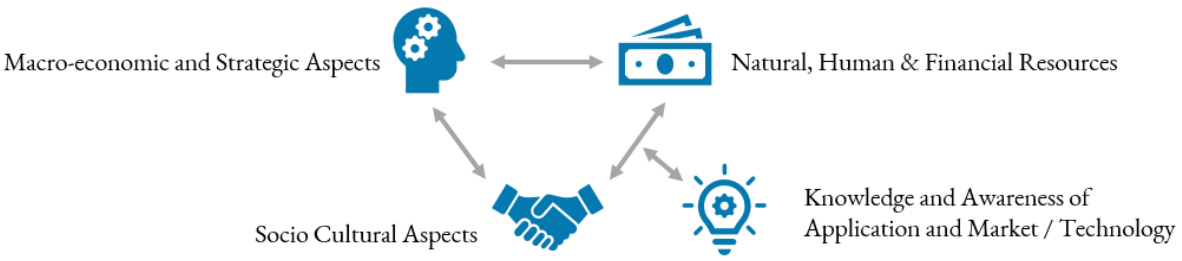


Figure 22: The interrelations at company level of influencing conditions. In this case Macro-economic and strategic aspects are perceived as the recession or upswing the company is in and the corresponding interests of the Executive Board.

Analyzing the gaps

As a check, it must be discerned which core factors and influencing conditions were not mentioned and why. However, contrary to expectations, all core factor categories have found at least a single mention by the interviewees or literature. A clear division can be seen in between the missing TIS building blocks found in the literature, and those commented about in the interviews. This is partly because of interviewing style and partly because people were less focused on overall market conditions by the interviewed Company X employees. Hence a provisional conclusion may be drawn that knowledge and awareness of technology and application and market is not at the state-of-the-art level as the literature.

The fact that all building blocks and influencing conditions are partly incomplete or missing in the market suggest the service of hyperpersonalization is severely underdeveloped in contrast to its definition used in this thesis. When comparing the definition to the practical performance of current market leaders such as Amazon, it is found that the definition is indeed quite optimistic compared to the day-to-day results.

4.2.4 Niche Strategies

The next step is to tie the found factors to suitable niche strategies that will assist in overcoming them. This will be explained in the following section. The section first presents an example showing the workflow of finding market level niche strategies. Next the niche strategy applicable to the top incomplete building blocks as found in Sections 4.2.2 are discussed both on a market and a company level. The duration of a niche strategy depends on the alteration of earlier established barriers in the market.

Note: The following part of the results section mainly serves as an example process description on how to comprehend and use the results of Appendix I, in which all found core factors, influencing conditions and matched niche strategies are included.

Workflow finding niche strategies on a market level

Building on the results of Section 4.2.2, the list of niche strategies found in Appendix E was matched to all of the missing or incomplete building blocks and influencing conditions that were identified regarding market conditions. For each combination of building blocks and influencing conditions on the market level, this was done by checking which overlapped with the labeled niche strategies. Suitability of niche strategies could then be determined by observing how many barriers or influencing conditions are resolved, or whether the most pressing barriers are solved (Dwisayawati, 2022). In this work however, niche strategies are chosen that best fit the company climate. This might mean that these niche strategies are deemed less effective on a market level, but are seen as more effective compared to the most effective market level niche strategy, due to chances of increased likelihood of successful implementation. The method of matching niche strategies with the company climate is described in Chapter 2.

An example of matching niche strategies on a market level can be seen in Tables 6A to 6D. In Table 6A, a TIS status is described with its corresponding TIS categories, which is matched with a market influencing condition and those corresponding categories. Based on the framework described in Section 3.2, these are matched to suitable niche strategies, which is shown in Table 6B.

Some niche strategies that come out of the table are very closely related to the problem, but are only applicable at a specific part of the organization as seen in Table 6C. This means some business acumen must be possessed to identify these. Lastly, some niche strategies that do not emerge in this manner could be identified to help adapt a precursor technology, in this example that is personalization. Therefore, one must very clearly define the technology that is under investigation to get the right niche strategies as seen in Table 6D.

Table 6A: Shows the TIS Status with according categories, and (for simplicity sake) one influencing condition with its corresponding categories. Each category is labeled with a separate color for easy scanning.

TIS categories: *Product Performance and Quality*, *Customers*, *Production System*	**TIS Status:** A lack of the right, sufficient, consistent and consented data at the right time blocks any quality in analytical efforts being made.
Market influencing conditions categories: *Natural, Human and Financial Resources*, *Socio Cultural Aspects*	**Market Influencing Condition:** In the automotive sector interactions with the customer are scarce as cars are only bought every few years.

Table 6B: Shows applicable and suitable niche strategies according to the lookup table in Appendix E . The colors match with the colors in Table 6A. The right hand column shows potential real world applications. These stem from literature or own logical reasoning.

	Strategy	Description	Building Blocks / Influencing Condition	Application
7	Initiate Training	Puts focus on improving accessibility to technological knowledge necessary for improved use of the technology. Includes providing necessary information through manuals and other sources.	BB: Complementary Products and Services, Customer IC: Knowledge and Awareness of Application and Market, Socio-Cultural Aspects	In this case, the training manual would be provided by the customer filling in a quiz or talking to an AI chatbot at the beginning of their shopping experience, to provide sufficient data to the algorithms.
17	Collaborative Product Utilization	Has the aim to reduce cost for the user by moving from an ownership proposition to shared access.	BB: Customer, Product Price, Complementary Products and Services IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects, Competition	Subscription models can be applied to increase touchpoints with the consumer and perhaps shorten cycles.
21	Partnerships	The formation of stakeholder groups with varying capabilities to together address problems.	BB: Network Formation and Coordination → Product Performance, Product Price, Production System Complementary Products and Services	By forming partnerships with parties that may provide complementary products, more touchpoints with the

			IC: Macro-economic and Strategic Aspects, Knowledge and Awareness of Application and Market, Knowledge and Application of Technology, Natural, Human and Financial Resources	consumer are created

Table 6C: Shows applicable, but apparently less suitable niche strategies according to the look-up table in Appendix E. While the strategy could overcome the barrier, it is not useful for large scale hyperpersonalization which is the focus for now.

20	Top-end	High-end products are only made in small batches. May enhance desirability of the product.	BB: Customer , Product Price, Product Performance, Production System IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects but also because of Natural, Human and financial Resources,	A high end way of gathering information could be to ask the customer to phone them to gather information and deliver a personalized recommendation. However, this is not scalable, but suitable for the department of Company X Exclusive selling luxurious vehicles.

Table 6D: Shows applicable, but undiscovered niche strategies from the look up table in E indicated by the only match found in building blocks, but not influencing conditions. The strategy would be suitable to overcome the same problem at a personalization level instead of a hyperpersonalization level. Hence one must crisply determine the service level one is looking for.

14	Dedicated System or Stand Alone	Aims to reduce reliance on complementary products and services.	BB: Product Performance and Quality, Complementary products & Services IC: Competition, Knowledge and Awareness of Application and Market	Present passive customer segments on websites for customers to choose from themselves.

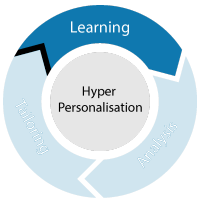
Niche strategies on a for the market and company level for the automotive industry and Company X

For each potentially suitable niche strategy for the top three identified building blocks, the additional influencing conditions occurring within Company X are described, followed by the corresponding enabling factors, categorized in Table 4, that could partly mitigate the issues experienced within Company X ecosystem. Based on these suggested strategies, Company X can examine each of the results beyond the top three incomplete building blocks in more detail in Appendix I.

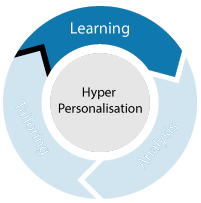
Before diving in the proposed niche strategies it must be mentioned that throughout the interviews the lack of institutional enabling factors around balancing stakeholder value, embracing ambiguity and valuing digitalization have been mentioned multiple times. This is supported by the quote on the next page. Ultimately however, it is unclear what the current status of these factors is as the upper management layer is still settling on their direction due to the coming of the new CEO. Hence, this layer of enabling factors is not taken into consideration at the moment, and focus for each niche strategy is put on the strategic and operational class of enabling factors as described in Section 3.2. On the strategic layer, the digital strategy is still seen as missing. Even Though the Company X2035 strategy in Appendix G has been made, it has not been approved by the executive committee or has therefore not yet been accepted by a broader audience within the company. Similarly, the data strategy within the company has been under development for the last two years, but the strategies have not yet been merged together yet. The missing digital strategy influences the implementation of many niche strategies and should therefore be considered a priority for the Company X Group. This may be achieved by dedicating a full FTE to a to be appointed strategic function or even a team.

Top three building blocks with accompanying niche strategies on a market and company level
Each of the niche strategies starts with the indication of which subsystem it affects. After the market status, the Company X status is presented, followed by an explanation whether the niche strategies match the companies core competencies / capabilities. Lastly it is set apart for each niche strategy whether or not enabling factors should be used to support the development of dynamic capabilities or that focus should be put on other niche strategies or services in general.

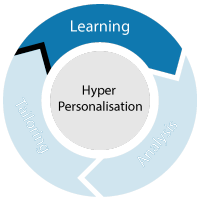
1. **Consistent, Clean, Consented & sufficient data:**
   - **Learning & tailoring niche strategy: Stand-alone** - Build an integrated consumer platform carrying the Company X brand for ensuring you get access to customer data before OEM's, thereby protecting one's position in the supply chain. Coolblue is an example of an integrated platform selling multiple brands of a single product, which started from separate webshops.
     - *Company X status:* Redacted.
     - *Company X competencies:* Redacted.
     - *Enabling factors:* Redacted.



   - **Learning niche strategy: Awareness campaign** - Inform the user in a transparent way about what the data will be used for and how it benefits them. This strategy may also be applied for raising internal knowledge levels. This niche strategy not only helps, looking at trends it is also more and more expected for data usage applications such as hyperpersonalization.
     - *Company X status:* Redacted.
     - *Company X competencies:* Redacted.
     - *Enabling factors:* Redacted.

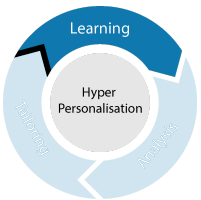


   - **Learning niche strategy: Initiate Training of the User** - Let the user fill in quizzes, or like moodboards when first coming to the webshop to gain insight in the user. Both Ikea and Fabletics use this strategy on their websites. This overcomes the problem of little interactions with the customer.
     - *Company X status:* Redacted.
     - *Company X competencies:* Redacted.
     - *Enabling factors:* Redacted.



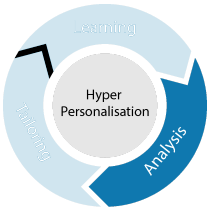
   - **Learning niche strategy: Freemium** - Offers the customer a look at a part of the premium product before asking for details. Ikea for instance first engages you in seeing your potential new furniture in the app, before asking you for your data.
     - *Company X status:* Redacted.
     - *Company X competencies:* Redacted.
     - *Enabling factors:* Redacted.

   - **Tailoring niche strategy: Collaborative Product Utilization** - Provide the consumer with (dynamic) subscription model services to stimulate interaction frequency and tracking and lower buying thresholds. Eventhough not profitable yet, Lynk & Co is an example of this in the automotive industry (Lynkco, 2023). Also ANWB and Centraal Beheer are following. Take note that none of these providers were original competitors from Company X. Ultimately, subscriptions to multiple products can be bundled together, creating so called 'rundles' (recurring bundles). Being able to do so decreases volatility of the business model for Company X and additionally provides upside for the customer by simplification of having a single provider and

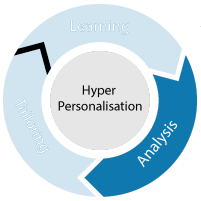


being able to cater to their wishes at any moment (I1). Drawback: Does not help with starting up the cycle of getting data about to customers, longer term solution. This technology is however, still seen as a cornerstone for selling new cars online.

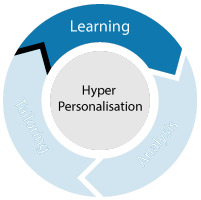
- *Company X status:* Redacted.
- *Company X competencies:* Redacted.
- *Enabling factors:* Redacted.



- **Analysis niche strategy: Partnerships** - Obtain (consented) data from third parties by working together. Has been performed by a project team within Company X regarding the combination of insurance and automotive. Drawback within the market: Data has become a core resource. Finding beneficial partnerships has become difficult.
  - *Company X status:* Redacted.
  - *Company X competencies:* Redacted.
  - *Enabling factors:* Redacted.

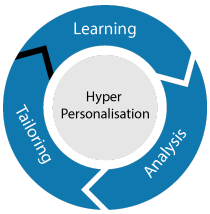


2. **Traditional business models are under pressure:**
   - **Learning niche strategy: Hybridization** - Build an integrated platform for ensuring access to customer data before OEM's claim the data. Coolblue is an example of an integrated platform selling multiple brands of a single product, that started from separate webshops.
     - *See Niche Strategy Stand-Alone*

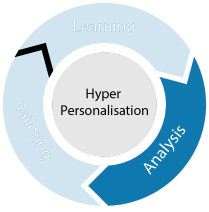


   - **Tailoring Niche strategy: Collaborative Product Utilization** - Provide the consumer with subscription model services to stimulate interaction frequency and tracking. Lynk & Co is an example of this in the automotive industry. Drawback: Does not help with starting up the cycle of getting data about to the customer, longer term solution and must therefore be combined with other strategies.
     - *Company X: See niche strategy collaborative product utilization*

3 . Wrong or inefficient processes:



- **Analysis & Context niche strategy: R&D** - The content explosion due to the introduction of generative AI must be managed within systems. This might include development of DAM systems, although *partnering* is also an option. Furthermore, computational power must increase for running more DL algorithms and understanding more characteristics of the user. Virtual test driving is on the rise, although current quality is still lacking. In relation to the Ortt & Kamp (2022) framework this means the following. As long as computational power is not in order, advanced hyperpersonalization cannot diffuse on a large scale in a cost-efficient and sustainable way. However, the general consensus is that this calculation complexity is still increasing due to for instance currently designed quantum computation techniques (Thompson, 2020). Hence preparing for an era with increased computational power seems reasonable.
  - *Company X status:* Redacted.
  - *Company X competencies:* Redacted.
  - *Enabling factors:* Redacted.

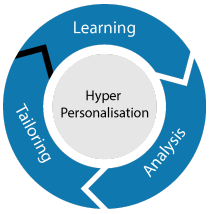


- **Analysis Niche strategy: Partnerships** - Entering partnerships that can help with organization of the data structure. This ensures that engineers can focus on analytics instead of on data workflows. Recognized partners in this field, in random order, include Twilio Segment,

Databricks, Dynamic Yield, Microsoft Azure and partly Google AI Recommendations. Both national (Albert Heijn) and international (Fabletics, Ikea) forerunner companies work with these systems. Not only for data structures, but also for basic recommender systems. Having an efficient system in place saves costs and boosts performance. Therefore having a right system in place is critical for large scale diffusion.

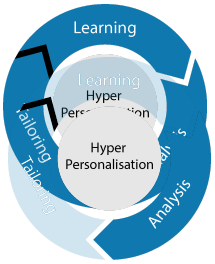
- *Company X status:* Redacted.
- *Company X competencies:* Redacted.
- *Enabling factors:* Redacted.

- **Context Niche strategy: Hybridization/Upskilling** - Old and new workflows need to be integrated. This also means new roles need to be created. Personalization efforts can exist in combination with hyperpersonalization efforts.

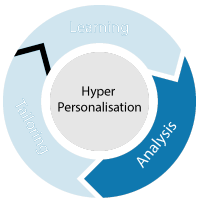


  - *Company X status:* Redacted.
  - *Company X competencies:* Redacted.
  - *Enabling factors:* Redacted.

- **Context Niche strategy: Formulate Requirements** - Formulation of requirements in this case specifically aims at integrating workflows between technology subsystems and partners. As well as formulating requirements of when consumers see benefit in the technology. This allows for calculating costs versus investment/operating costs or might lead to investments in the technologies based on vision(I9). One of the requirements for the automotive sector for instance seems to be virtual test driving.
  - *Company X status:* Redacted.
  - *Company X competencies:* Redacted.
  - *Enabling factors:* Redacted.



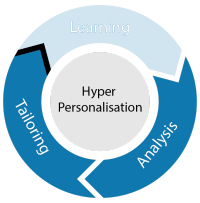
- **Analysis Niche strategy: Cost Reduction / Product Variants** - Product variants officially focus on finding more products to serve the same customers. However, in the case of hyerperpersonalization it is good practice to determine which products should be hyperpersonalized and which should not because of not earning back value. This can be done by using a decision requirement tree as done by (I9) and Fabletics. These decisions then form the basis on which to design the production process in the organization. Doing it the other way around leads amongst other things to inefficient work. Exemplary is the creation of much (waste) content. This is a specific niche strategy that can be deployed until computation costs get lower due to technological progress which allows for hyperpersonalization of all products (if and only if sufficient data can be gathered).
  - *Company X status:* Redacted.
  - *Company X competencies:* Redacted.
  - *Enabling factors:* Redacted.



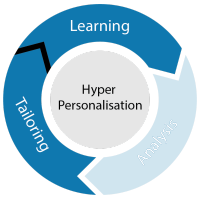
- **Tailoring Niche strategy: Continuous user engagement** - Hyperpersonalizing wrong moments in the customer journey irritates and creeps out customers, resulting in a loss of Customer Lifetime Value and sales. As processes are improved, the consumers should be engaged and asked for feedback. At a company level, the users are the employees involved in the production process. These should also be asked for feedback regularly, to avoid processing starting to diverge in development due to inconveniences of users. This niche strategy can be deployed iteratively and might even be needed to be redeployed when sociocultural context changes over time.
  - *Company X status:* Redacted.

- *Company X competencies:* Redacted.
- *Enabling factors:* Redacted.

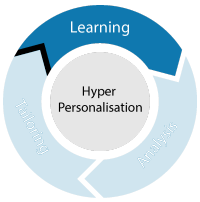
Even though not resulting from the most important missing or incomplete building blocks, the following next steps are interesting for Company X to take into account when developing hyperpersonalization as a service:



- **Analysis / Tailoring:** In some subsidiary companies Company X has started on with geographical based customer segmentation methods. Next steps that have currently proven in the market are collaborative and item-based filtering methods. When data is not readily in place yet, the niche strategy of Ikea, whereby data is gathered through quizzes can be used. A step like this would help move Company X from retrospective touchpoints to real-time touchpoints.



- **Learning:** The type of products Company X sells are able to function as data gathering products (I1). These sources have already shown to be able to provide sufficient data to develop granulated customer profiles from and from that predict next sales and offer advertisements (Bright, 2023). This would circumvent the problem of having difficulty getting to know the customer. However, this data is currently in possession of OEM's. The OEM's are not transparent on the actual data gathered, indicating that forming a partnership on this topic takes time. Furthermore, it may be questioned how ethically correct this data source is, thereby forming a big incongruence with the Company X culture. While extremely valuable, it is deemed too early on in the hyperpersonalization process to align resources on this strategy yet, especially as other aspects can be explored first.



- **Learning / Tailoring:** Another best practice source of continuously learning about the customer is through loyalty programs (I1; I8; I9). Company X sort of has a loyalty program, but the application has proven to be used in a correct fashion by the dealerships. Using the program for settling customer disputes has raised the internal costs of the program significantly (I10). Furthermore, natural, human and financial resources have risen in the last years (I4). As the loyalty program has not been subjected to business case calculations, it is unclear if the increased prices of 'freebies' to engage the customer to use the program still outweigh the benefits. Because of this lack of knowledge and awareness of the application, there is no support within the higher regions of the firms. A first step for Company X would hence be to recalculate the costs and benefits with the new service of hyperpersonalization in mind. This strategy is clearly recognized by the validation interview (V2).

4.3 Conclusions

Company X background

This section discussed the background of Company X, displaying some important aspects relevant to the implementation of hyperpersonalization. The Company X Group is a family owned, importer, retailer and service provider within the automotive sector in the Netherlands. The firm has expanded its portfolio beyond automobiles to a broad range of mobility solutions. Company X's success lies in its ability to integrate a large part of the value chain, supported by the core competences of operational excellence and a strong family culture. Operational excellence can also be found in broad marketing campaigns of the brands the company represents.

Horizontal expansion to other mobility modalities is currently initiated as part of the mission 'Mobility for life". However, this mission is not yet reflected in the current product offerings deployed by separate business units. At the moment, 95% of Company X's sales still comes from the automotive business. Partly because of

that, the existing organization is characterized by a clear, non-digital, commercial spirit and siloed behavior. Furthermore, Company X has some appetite for innovation, but often does not innovate in-house, nor positions itself as a very early adopter of a technology or service. Often, change can be met with resistance, as it does not directly contribute to KPI's, which often are steering directly on financial results or operational excellence. So, although Company X is working hard on its digital transition, exploration efforts are expected to still be met with friction by the part of the business responsible for exploitation. Part of this digital transition could be hyperpersonalization, although this is currently still in its infancy status.

Answers to the research questions

To answer the posed research questions, interviews were conducted with both experts in the field, and stakeholders within Company X. Based on these interviews, 6 mind maps were created. These mind maps were divided equally in company and market context. To create structure for usability in a later stage, these subsets were initially divided into three categories: learning, analysis and tailoring. Although these mind maps created a high level of overview, for the sake of readability in this thesis they were converted to tables. Based on the conducted interviews, it was concluded that three subsystems were not sufficient to properly categorize the findings. Therefore, a fourth subsystem was proposed, called "Context". All building blocks and influencing conditions that apply throughout the whole organization were found to apply equally to all three of the initial subsystems, and are therefore considered as context. An example is having the right processes in place to connect production systems of subsystems such as IT infrastructure. This does not fall into one specific subsystem, but applies to the "context" of all three.

Within the now four subsystems, missing building blocks and influencing conditions were identified. Three of the most frequently mentioned building blocks and influencing conditions were described in detail. All other findings are contained in the tables in Appendix I. During the identification of influencing conditions, it was observed that they are frequently correlated. This goes into the proposed framework of Ortt & Kamp (2022), in which there is an uncorrelated relation between the separate building blocks and influencing conditions. Based on it being a single case study with two new settings of the framework to services and a company level, it is not recommended to tie strong conclusions to this finding. However, it is an interesting topic for further research, especially because it contains the potential to influence the prioritization of niche strategies when executing the final strategy. After all, one altered influencing condition may overcome a series of other open challenges, by creating a domino effect. The proposed missing building blocks and influencing conditions answer research questions 1.1, 1.2, 2 and 2.2. Respectively, these questions focused on the building blocks (market context and Company X context) and influencing conditions (market context and Company X context).

In regard to research questions 1.1, 2.1 and 3.1, the theoretical starting point of applying technology innovation theories such as the framework of Ortt & Kamp (2022) to service innovations has held up in the results. No strong discrepancies were found when applying the framework in practice. Therefore, the theories can arguably be used as is. Except for a minor change when using the framework is that services consist out of multiple subtechnologies, bound together by an overarching context. Therefore, based on the findings in this study, the application of the framework does not strictly require alternate descriptions of the building blocks and influencing conditions, but does take more time to analyze.

Regarding research questions 1.2 and 2.2 it was retrieved that the applications of definitions of building blocks and influencing conditions as proposed in Section 3.2 are deemed suitable for the company level. However, approaching a company as a TIS seems less logical for Small Medium Enterprises (SME's) than for large corporations as for Company X due to a different and less complex structure.

For every building block/influencing condition combination, a match was proposed for a suitable niche strategy, thereby answering research question 3.2. This was done by identifying overlap between the BB/IC

combination with the proposed niche strategy table in Appendix E. To provide a handle for implementation by Company X, an example workflow for this was provided as well. Choosing niche strategies on a company level showed the need for aligning with the core competencies of a company. However, the method proposed by the literature, on which first institutional alignment should be reached, then followed by enabling the strategic level of a company and then subsequently unlocking operational enablers seem to contradict some results found in practice. Because even without institutional and strategic support some initiatives such as geographic based recommender systems are sprouting by themselves anyway in the organization.

5. Conclusion, discussion & recommendations

This research has aimed to answer which niche strategies may be adopted for hyperpersonalization in the automotive retail sector in the Netherlands, with a focus on the case study of mobility importer and retailer Company X Group. To elucidate this, the Ortt & Kamp (2022) was applied in two novel ways: on a service, instead of to a technology and on a company level instead of at a market level. By answering the main research question, this thesis scientifically contributes to the innovation management literature by using the framework in these novel contexts. Additionally, the selection of niche strategies as proposed by the framework is studied more in depth.

The scientific components of the conclusion, discussion and recommendations are therefore also structured around the topics: general framework, service, company level and niche strategies. The managerial implications for Company X are structured in terms of the framework and the case study. Hyperpersonalization is discerned on a market and on a company level. Zooming in, the market level is further specified into the case study of the automotive sector, with accompanying generalizations to other sectors and the company level to the case of Company X with accompanying generalizations to other companies inside and outside of the automotive industry.

5.1 Conclusion

5.1.1 Scientific contributions

General

In earlier work, the application of the framework of Ortt & Kamp (2022) has proven to be valuable for gaining insights in the diffusion status of historical cases. This thesis additionally applied the framework to a developing-market setting instead of in a retrospective manner. While the outcomes can only be verified over time, the initial results seem promising enough to tentatively conclude the framework is not only applicable in a historical, but also a real-time setting. This result is expected to be generalizable outside of the automotive sector and the case of hyperpersonalization, because the results are very similar to niche strategies applied in other sectors. This reasoning can be combined with the fact that the initial application of the framework also generalizes well based on literature.

A general refinement was suggested for processing the data that is collected by applying the framework. Creating a mindmap has proven to be visually pleasing, making the data easier to understand. The mindmaps show the relation between building blocks, influencing conditions, their occurrence at various places and thereby also their interrelations. This addition to the original textual processing method is may aid visual thinkers for intuitive pattern recognition. However, the process is experienced as more tedious when done for complex technologies or services involving large amounts of data.

Service

Several of the research questions were aimed to find out whether the Ortt & Kamp (2022) framework may be used for emerging services instead of emerging technologies. Based on the combination of literature and the presented case study, the framework has been deemed to be usable on emerging services, in addition to it being applicable to emerging technologies. According to the assimilation perspective, services are a combination of technological subsystems, complemented with, often tacit, social components. In literature, these overarching systems are referred to as relational and informational groups (Griliches, 1992; Gallouj & Savona, 2009). This also entails the IT infrastructure necessary to bind the systems together. Hence, when looking at a service instead of at a technology, the main difference is that multiple technologies must be

examined, in addition to the overarching context. This means data gathering and analysis becomes more time consuming and complex.
The findings from the interviews corroborated with the standpoint of the assimilation perspective. Hence, the building blocks and influencing conditions of the framework arguably do not need to be adapted to service technologies. This is in line with the starting point from this thesis.

Company

In a similar fashion, the question was posed whether the framework was usable on a company level. Based on literature and the case study, it is possible to use the framework for a large corporation. To do so effectively, it was proposed by the author of this thesis to first use the framework on a market level and then consecutively applying the framework at a company level. By doing it this way, niche strategies suitable at a market level can be chosen by finding a match with the company applying them. Furthermore, maturity gaps between the market and company level can be examined. If these gaps are large, upcoming best practices or niche strategies may be copied from the market by the company. Moreover, a large gap may indicate that a value proposition lies far away from the core competencies of a company. Pursuing the option anyway might require serious investment and digital strategy alignment to be successful. Lastly, by researching the market status first, the company can understand which barriers are currently not worth tackling and should be waited out before heavily sinking in company resources.

Applying the Ortt & Kamp framework (2022) to a company level was deemed possible, as a company itself can be seen as a TIS. Organizational management literature and the framework show significant overlap regarding building blocks and influencing conditions. It was suggested that the descriptions of the building blocks and influencing conditions should be refined to reflect the corresponding stakeholders with similar roles in the market TIS as within the company. This should reflect the tasks and intentions of the stakeholders at the market level. Examples of this are categorizing the executive board as an Innovation Specific Institution, or seeing internal departments also as either competition or customers, depending on their relation. Relations between building blocks and influencing conditions, as discussed on a market level, were copied for the company level. This was done as multiple frameworks from the organizational management literature propose varying relations between concepts at a firm level and indicate these relations are dependent on context and are in need for further research.

When applied, it was found that interrelations between at least the influencing conditions of sociocultural aspects, macro-economic and strategic aspects and natural, human and financial resources influence each other. These relations are expected to be generalizable to other large corporations because of the support found in the literature. Within a company level, it could be of help if the user of the framework can establish which of these factors is most accessible to circumvent, even if it is not directly mentioned in relation to a barrier under scrutiny.

Niche strategies

As originally proposed by the Ortt & Kamp (2022) framework, niche strategies can be applied to combinations of missing or incomplete building blocks and influencing conditions. By applying these small scale applications, barriers may either be circumvented, or in some cases even solved on a market level.

Since this research had many focal points, it was decided that the list of potential niche strategies was copied from previous literature related to the framework, to form the basis for niche strategy recommendations in this study. In general, it was found that lists of niche strategies are often incomplete due to their nature and the vast volume in which they therefore occur. Hence industry specific niche strategy lists may reasonably be extended with the users own insights, either from professional experience or examples from other fields. Especially so as it was seen that niche strategies are often generalizable to other industries.

To be able to determine which of the niche strategies belong to which combination of barriers and influencing conditions, the niche strategies were matched to the codes of the building blocks and influencing conditions found in the interviews and literature. In practice, it was found that when applied, combinations of barriers and influencing conditions resonated with multiple niche strategies. Furthermore, a single niche strategy may circumvent or lessen multiple barriers at the same time, either in a direct or indirect manner. Niche strategies were not ranked on importance on a market level. As it was determined which barriers were of the highest importance by the same weighted method.

The authors found that the niche strategies derived for the market level may also be used for the company level. However, it can be argued that not all strategies fit with each company due to organization-specific context. Hence, if niche strategies did not match with a company's core competencies or dynamic capabilities, organizational enabling factors were derived from literature to initiate development of necessary capabilities. This may help the acceptance and performance of a chosen niche strategy within the company climate. Enabling factors include alignment with a digital strategy, executive support, the existence of cross functional teams, the ability to test and fail fast and upskilling the workforce or working in a separate island away from the current company culture. This list of factors have been found to be incomplete and thereby may form an interesting avenue for future research. This will be further elaborated on in the discussion.

5.1.2 Managerial implications

Use of the framework

In this thesis, a substantial number of core factors and influences have been identified with regard to hyperpersonalization, both on a market level and a company level. Due to the set-up of applying the framework to both a market and a company level, the amount of results is expected to be similar for other companies applying the framework. To provide handles for processing and executing the results of this thesis, but also anyone's future application in general, the most pressing topics from the interviews were used as an example for explaining how to use the framework on Company X as a company. These examples can be used to process all of the other results that are included in Appendix I.

When using the framework of a company in general, it is also important to identify core factors on a company level besides the market level as well. Depending on whether a company is a frontrunner or more in lagging position, this determines the amount of variance between the barriers occuring at a market and a company level. Company X's culture and goals are not aimed at being an early adopter at the forefront of technological innovations. Therefore at least the same, but often more barriers are experienced on a market and a company level as the company still needs to catch up with the current market status. Companies residing at the leading edge of technological innovation and have technological innovation as a core competency may experience less differentiation between the company and market level. As market barriers are equal to company barriers.

Case study - hyperpersonalization at market & company level

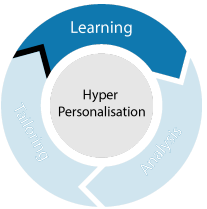
The case study on company level entailed the automotive retail company Company X Group. While Company X has a vast amount of subsidiary companies ranging from all different types of mobility services, the scope of this thesis was put on studying hyperpersonalization within this company solely for the online sales of automobiles from the perspective of the department Y department. All barriers and niche strategies described at the market level were also found to be present at the company level. Often even in aggravated condition, because the status of hyperpersonalization at Company X is still in its infancy.

In literature and in the interviews, the definition of hyperpersonalization was not found to be strictly consistent. The description used in literature described a higher technological level than was observed as

knowledge and awareness in the market. Therefore the author elucidated a definition that covers all different stages of (hyper)personalization in the market. A clear division was found between the missing TIS building blocks in literature compared to the conducted interviews. This was underscored as as all core factors were mentioned at least once to be missing or incomplete in the interviews. The amount of barriers imply that large scale diffusion of hyperpersonalization still requires multiple advancements in the automotive sector. These are discussed in the following paragraphs.

For analytical purposes, subsystems were defined in accordance with literature. This resulted in three subsystems: learning, analysis and tailoring. Moreover, as indicated by service literature, the technologies are bound together by a contextual layer, this is suggested as a fourth subsystem. This pillar entails both relational and informational aspects, such as the way of communicating by a company and the IT infrastructure transcending the individual subsystems. Synthesis of the interviews confirms the findings from the literature on the need for inclusion of a social context that overarches each subsystem. Altogether, this brought the hyperpersonalization service to four subsystems, each for which the framework was separately applied in order to maintain a sense of overview, and to be able to understand where next steps within the organization belong.

Learning

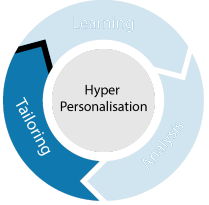


For hyperpersonalization in the automotive sector in general, based on the interviews, the most pressing issue is getting clean, consistent and consented data, in a sufficient and right format, at the right place, at the right time. This is considered as a part of the learning subsystem. The related building blocks include product performance and quality, production system, customer, product price and innovation specific institutions. The building blocks are affected by the influencing conditions of knowledge and awareness of technology, market and application, natural, human and financial resources, competition and sociocultural aspects. Getting quality consented data has also proven to be difficult for companies such as Ikea, Fabletics and Anonymous International Retailer in other industries as well. As this group of barriers is reflected by other industries, this result is deemed generalizable to hyperpersonalization in alternate fields as well. As influencing conditions and building blocks were generalizable, niche strategies are also deemed to be generalizable. Furthermore the barrier also forms a basis for many other digital services and hence is also generalizable to some extent outside of hyperpersonalization. For this building block, applicable niche strategies include organizing an awareness campaign, initiation of training the customer, and freemium versions of the service. In practice, this means data can be gathered through quizzes, loyalty programs or through step-by-step processes in which the customer is only asked for their data once invested instead of direct and substantial consent requests. Loyalty programs within the automotive market are difficult because of rising costs & muddied cost-benefit analysis.

Redacted.....

Analysis

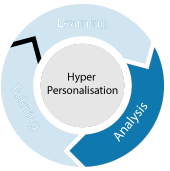
On the subsystem analysis, it was found that algorithms incorporating deeper psychological traits over simple demographics and past purchase / browsing behavior deliver lesser quality recommendations that still run in a too inefficient manner, both time-,finance- and sustainability-wise. Missing cost-effective computational power is reflected in the incomplete building blocks of product performance and quality, product price, but mainly by complementary products and services. The according influencing conditions lie in knowledge and awareness of technology and natural, human and financial resources. This barrier extends much further than the automotive industry or the service of hyperpersonalization. It is a critical component of the AI boom and big players both corporate and academic alike have been working on it. Without those products, it is unlikely that the current status of hyperpersonalization will deliver much more personalized results than as is today.



Within Company X the step from geographical recommender systems to collaborative filtering algorithms could be made. This introduces the potential to move from retrospective touchpoints in newsletters to real-time touchpoints on websites. This requires several process alterations, mainly in the learning subsystem. For instance, companies such as Ikea have implemented the use of quizzes to gather sufficient information to work with more information than just geographics.

However, even for hyperpersonalization alone, it is important to prioritize the various products to decide which service or product should be implemented first. Some products or services may never be suitable for implementation. To make this distinction, building a decision requirement tree is advised. For instance, a car or service that will only be in the catalog for one more year may not be very suitable to justify an investment. On the other hand, a car offer that already contains quite a large gross margin and will be available for years to come, could prove very suitable. Based on various parameters, this tree can be set up.

Lastly, an advice is posed to start working with partners on various aspects of hyperpersonalization. For instance, data structuring already has multiple very suitable options available in the market, making it highly illogical to invent the wheel again yourself, especially when this aspect is not a part of current core competencies.



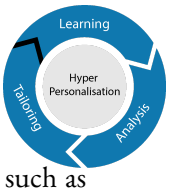
Tailoring

In the subsystem tailoring, the most important barrier to be found was the ability to granulate content on a finer level. Examples in changing the product background of an image in real-time suitable to the users interest is still under development in the market. This falls under the building block of production system and the influencing conditions of knowledge and awareness of technology and natural, human and financial resources. Removing the barriers enables the delivery of content display in a more personalized format. For instance, content backgrounds may adapt to a city or a mountain landscape depending on the personality of the customer. With the introduction of generative AI, this option is becoming more and more viable, although the business case of these alterations is not calculable yet. This progression is relatable to the earlier phase in the industry where photographs were superseded by computer generated images . Major novel production system updates are often difficult to justify solely based on the upsides of the novel business case. Therefore, decisions could be based on vision in alignment with a strategy or may find a wider supporting base when investment costs can be shared with other business case applications. In the case of CGI content, an alternate business case of product explanation video's was found by a retailer outside of the automotive industry. Niche strategies are hence designed to apply the novel technology to only specific products. A decision requirements tree should be developed to understand which products could benefit from the technology based on impact, effort and strategy alignment. For instance, seasonal products are not worth the investment, while a specific product that will be sold for many years to come with a high margin on the other hand might be worth the upfront costs. An add-on to the requirement tree for items and another suitable option for Company X is to invest in cross-selling services, in which multiple products from various company branches are offered to the same customer when it is deemed the right fit. This strategy can be seen as an addition to collaborative filtering algorithms. Up front however, decisions should be based on vision as understanding the business case for novel, radical services is a challenging endeavor with often hard-to-sell results.

For the automotive industry, the increasingly incomplete block of network formation and coordination plays a role in the subsystem of tailoring as mentioned before. Manufacturers curate which content can be displayed and thereby determine the pace at which innovation in the tailoring block happens for players like Company X. On the other hand, the automotive sector is known to work with digital twins of vehicles in the manufacturing process. This means upfront investments for CGI content is lower than in other industries due to the shared business case. Explanatory videos may as well form an additional business case.

Complementary products and services that have been explicitly mentioned several times are (dynamic and later on even bundled) subscription services and virtual reality test drives to lower the threshold for buying a car online. In Particular, subscription services have already been upcoming in the automotive industry. The strategy stimulates interaction frequency, tracking and lower buying thresholds. Moreover, the integration between hyperpersonalization and customer service may decrease running costs and increase revenue. A good starting point is proposed in second-hand car sales. However, to move from digital twins used in manufacturing to quality virtual test drive facilities, more development is needed. This is demonstrated by the lack of quality of the gamified test drive experience of Ford. These services tune into the subsystem of tailoring and have successfully boosted the adoption of hyperpersonalization in the fashion and furniture retail industry. Without virtual test drives, a lower segment of vehicles, such as second hand cars seem the more obvious case for selling cars completely online. Additionally omnichannel experiences where consumers research online, test in real-life and then buy online or in the physical store are more obvious customer journeys. A last complementary service opportunity lies in dynamic pricing, even though current digital capabilities on this front are still missing. Especially important when implementing these strategies, is to keep the customer in the loop, creating an iterative system. By asking the customer for feedback, the development of the service can be kept on the right track and away from it producing negative results.

Context



The context subsystem was proposed in this work to better describe and categorize aspects of a service. It contains the industry-overarching processes, which are in place to bind together the three service subsystems of learning, analysis and tailoring. This can be seen as the backbone of a service such as hyperpersonalization. One of the found components can be referred to as a Data Asset Management system which should be a part of the IT infrastructure. It allows for efficient and a clear way of collaboration between departments. Furthermore it minimizes the time of engineers managing workflows instead of actual engineering jobs. More mature industries argued that the system must be designed by supporting the workflow from finish to start, meaning the customer requirements bleed backwards into content structure and requirements then work all the way backwards through the subsystems of analysis and learning. When commencing to set up these systems it was often found that it is done the other way around, starting at the data side. Setting up the full system may encompass a time frame between 1 to 2 years. Industry leaders such as Fabletics, Albert Heijn and Ikea have embraced partnerships to speed up the process and enhance results. The partners often also possess basic, but easily applicable, recommender systems. Use of such partner systems hence also reduces needed workforce and internal knowledge levels. A list of potential partners include Twilio Segment, Adobe, Google AI recommendations, Azure and others. On a managerial level the recommendation is done to research the differences between providers to understand which platform suits which industry.

For overcoming process inefficiencies, it has been recommended by Fabletics and Anonymous International Retailer to start with defining which products are worth hyperpersonalizing from a content perspective, through creation of a decision tree. Based on their recommendation, the following step should then be reasoning back the production system throughout the company. New roles may have to be put in place, such as data asset managers. These roles may very well be filled by upskilled employees. Company X has implicitly started this process recently. Making the decision requirements explicit can help Company X to keep costs under control

Regarding the fourth subsystem, not only data infrastructure should be managed, but also, and primarily the alignment within the company. This should be done at the hand of a digital strategy, supported by upper management. Upper management should also possess sufficient digital knowledge to oversee such these decisions. A general recommendation for companies setting up such extensive digital services such as hyperpersonalization is to ensure a CDO is installed within the executive board. The role of the CDO entails

reorganization of organizational structures in support of digital transformation efforts based on a holistic digital vision (Haffke et al., 2016). The CDO most effectively reports directly to the CEO, whereas an CIO does not.

Lastly, from literature it was found that the most important incomplete building blocks in the subsystem of context are also difficult to accomplish cornerstones of other digital services in general. This enforces the notion of the framework being applicable to more digital services than just hyperpersonalization.

5.2 Discussion & Recommendations

5.2.1 Scientific contributions

General

As discussed, the framework was additionally applied in a prescriptive setting where niche strategies are recommended to apply in the current market, instead of looking back on a market status to understand what has already happened. In order to validate whether this type of application holds true for the framework, a recommendation is made to extend this case study, or another, into a longitudinal format. This will show whether the selected strategies turn out to be successful over time.

In this thesis, barriers were grouped together as some of the incomplete sub-building blocks additionally affected secondary building blocks. Each of these building blocks are missing or incomplete to their own set of influencing conditions. In some cases those influencing conditions have overlap between subcarriers. Although combining is considered essential for the conciseness of this thesis, a drawback of this approach is a potential loss of detail on the relation between a single specific sub condition and their corresponding building block. Thereby matching niche strategies to labeled barriers may happen in a quite high-over fashion. Grouping the barriers however does show that multiple niche strategies are sometimes necessary to overcome a single group barriers category. As from this example, having the right, consistent, consented data at the right time still forms a barrier if it is not available in a sufficient amount.

Furthermore, the original Ortt & Kamp (2022) framework mentions that the application of niche strategies may alter the market status. However, no feedback loop is shown in the model. Although simplifications are necessary to ensure usability, adding this specific feedback loop might actually enhance usability as it shows the importance of doing regular market status checks and reapplying the framework in a timely fashion.

A point of discussion is the amount of topics that have been researched at the same time. The framework of Ortt & Kamp (2022) had not been applied yet to a service and also not to a company level. Therefore, there might be some correlation between findings on the two topics. An example is the introduction of the contextual fourth subsystem. Service literature has indicated the need for such a subsystem, but its actual display is predominantly found on a company level. Hence the question remains whether such a subsystem also plays a significant role at a market level when wielding the framework. Therefore, there is some limitation to the generalization of this study. We therefore recommend to study the Ortt & Kamp (2022) framework solely at a company context level for a technology and separately, solely for a service on a market level to corroborate the findings of this thesis.

Service

It is debatable whether the overarching subsystem of a service is truly noticeable at a market level. The relational and informational groups seem to be more present on a company level, but have been given back by all interviewed companies as a critical component of hyperpersonalization as a service in general.

Furthermore, it is interesting to determine whether technologies with subsystems residing in various fields or departments truly experience such overarching subsystems to a lesser extent. A last new avenue of resource would be to examine which building blocks and influencing conditions are of importance to these overarching systems.

Due to the additional work when applying the framework to a service, the admired simplicity of the framework for technology niche elucidation comes into question. Whether this remains a generalizable result remains to be seen. For instance, one could imagine that a different service than hyperpersonalization such as the financial service of offering vehicle financing in the novel format of subscriptions might require one less subsystem due to a more compact definition.

However, services have been notoriously difficult to measure when it comes to the output units. In comparison to 'units sold' for technologies, 'units applied' for the case of services are often not registered. Therefore, it is difficult to establish whether a service resides in the adaptation phase. As one of the assumptions of the Ortt & Kamp (2022) framework is the residing of the technology or service in the adaptation phase of innovation diffusion, the use of the framework stands per discussion. Moreover, the framework gives the best results when using a crips definition of the studied technology or service. For the service of hyperpersonalization definition setting was found to be a difficult task due to the variance seen in scientific and industry sources. This might as well be attributable to the fact that 'output units' are not measured.

Company

When using the framework on a company level, the author poses the market context must still be examined initially. Not doing so could result in overlooking barriers as the knowledge level in a company might be lower than the aggregate market level. Furthermore, it gives an indication of the market position of the company. This means double work must be done to get to satisfactory results, according to the methodology in this thesis. Furthermore, company context sources are less efficiently accessible compared to literature reviews, elongating the data collection and analysis phase, compared to the usual working of the framework. However, while requiring significantly more effort, the method has also provided results for the company of Company X. Thereby the aim of applying the framework in the company context should be revisited and re-evaluated on impact vs effort. For instance, for the goal of explicitly proving which roles are missing in the company or which network relations are dysfunctional, thereby blocking niche strategies suitable for the market, it could be a suitable method.

From a theoretical standpoint, the author posed that a company should also be seen as a TIS as this creates the same setting for the framework at a market level. However, seeing a company as TIS is possibly more suitable for large corporations such as Company X than for SMEs with less hierarchical and smaller organizational structures in general. Therefore it would be interesting to examine if applying the framework at a company level for SMEs would deliver different adaptations to the framework than for large corporations. Moreover, within this case study the department Y was taken as the main source of interviews. Including the departments that run the sales and e-commerce departments of the separate brands could also aid in better understanding if smaller entities within such a large organization can function as individual TIS.

Moreover, interrelations were found between influencing conditions themselves than are accounted for in the framework on a market level. An interesting avenue of further research lies in defining the strength, order and direction of the ties between the blocks. This should help determine which barriers is the most effective

to tackle within the ecosystem. A suggestion would be to maintain the order for enabling factors as suggested by the literature. The institutional level couples directly to the Innovation specific Institutions, being the executive board or committee, strategic factors relate to the macro-economic and strategic influencing conditions and operational level relates to knowledge awareness of technology, application and market, but also natural, human and financial resources and sociocultural aspects. Looking solely at the company level without the market level contexts, this would imply a different structure of the Ortt & Kamp (2022) framework more similar to traditional organizational innovation management literature.

For quickly determining which niche strategy to choose, the extended framework seems overcomplicated. The niche strategies from the market level could perhaps simply be presented and 'eye-balled' by employees to determine which niche strategies work best with the company. This does provide less ammunition to change core processes and roles in the company. It is deemed likely that the framework is also applicable for SMEs, even though this thesis has only studied the use of Ortt & Kamp (2022) for a large corporation. After all, it can be imagined that similar barriers apply to smaller businesses.

Niche strategies

As the combinations of building blocks and influencing conditions still result in several applicable niche strategies, future research should explore a method to refine the selection of strategies on a market level. Another avenue in need for further theoretical confirmation and detailing, is a roadmap that leads to moving from an outside-in perspective towards an inside-out lens. As mentioned before, the enabling factors on niche strategies on a company level could also be further investigated primarily through a more expansive literature review. Lastly, a way to elucidate subsequent niche strategies could be researched. This is a complex task as resolving a (part of an) influencing condition, changes the coherence of the studied ecosystem.

As far as matching automotive related niche strategies to the framework, a labeled set of niche strategies was proposed by the author in which the user of the framework is able to classify their own barrier and building block combinations. These combinations were validated by applied niche strategies from literature and interviews. However, the combinations of building blocks and influencing conditions fit with multiple niche strategies. Therefore, the user needs to have some business knowledge to use the tool. Furthermore, future research could look at refining the niche strategies further.

The list of strategies used in this framework have been observed in the automotive industry, but many niches are general strategies applied in other industries as well. This is illustrated by the fact that many of these niche strategies occur in other industries that lead the way regarding hyperpersonalization. Therefore the list of niche strategies is generalizable to other sectors as well. However, industry specific niche strategies can always be added. The list should be recurrently updated if more strategies are found.

Determining importance of niche strategies

To determine the importance of building blocks and influencing conditions, the author suggest sending the interviewees a survey listing all factors. Participants should then be asked to rank the items on 1. Urgency, 2. Impact and 3. Effort instead of solely on readiness as is done by Ortt & Kamp (2022). By sending all conditions in the survey to all participants, an average can be calculated. Providing an 'I can't estimate this' option, participants are given the chance to bow out when their expertise is not adequate. This could enhance credibility of the results.

Niche strategies have been based on the importance of barriers and their fit with the company. However, Dwisatyawati (2022) reasoned that the importance of niche strategies at a market level can be determined by another two scoring levels. These methods could be integrated within this work for even more precise recommendations. First the same weighted scoring method. In this method a point is assigned to a niche

strategy every time it circumvents a combination of a TIS building block and an influencing condition as experienced by the studied situation. The niche strategy with the most points is deemed the most suitable. This method is a good way of targeting the most problems in a TIS at once with a single strategy. However, the importance of building blocks is not taken into account.

The second method proposed by Dwisatyawati (2022) is the different weighted scoring method. Similar as in this thesis, experts are asked to rank the incomplete or missing building blocks on priority. Then the same way of working as in the same weighted scoring method is applied initially, but suitable niche strategies are given the same weights as the corresponding building block given by the experts. Again the niche strategy with the same number of points is chosen. This method does not aim to target as many barriers as possible at once, but the most important barriers in the market at once. However, targeting the most barriers in the market at once may not necessarily be the best strategy for the company.

Matching niche strategies and dynamic capabilities

In the current proposed niche strategies are compared to a company's dynamic capabilities. Dynamic capabilities and core competencies have been extracted from a Nyenrode thesis around Company X. This method is poorly generalizable to other companies as not all companies will have such a document to work from. Although significantly more work, the method of Hafeez et al. (2002) is proposed for extracting dynamic capabilities and core competences. Another method of defining how strong a capability is present within a company can be found in Kump et al. (2019). However, choosing a method for future work depends on the purpose of the research. For managers where ample documentation on the topic is available, it makes no sense to spend more time on taking the more scientific, but more time consuming routes. For scientific research however, it would be more correct to use the proposed scientific methods.

The second point of discussion lies in how these competences are matched to the niche strategies, in order to do so in a more scientific manner. This has been identified as a current gap in the literature and could use additional research to this thesis in dissolving niche strategies back into needed capabilities. Again, on a managerial level, the method of asking or extracting from the interviews does suffice.

Lastly, when it comes to choosing the correct niche strategies, it was proposed to use enabling factors when capabilities are not yet sufficiently present in the company climate. The literature proposed the order (institutional, strategic, operational) in which the capabilities must be developed. However, seen from the Company X company climate it may be put up to discussion if the separate entities could all be seen as separate TIS than as well with their own levels. The reason this question is brought up is because even though some initiatives within the company do not have institutional, strategic or operational support, self appointed project champions still are ‘grass-rooting’ initiatives. In the long term, some manage to create traction within the organization which in the end leads to changes on the strategic level. Furthermore, no handles were given on how to bring about these changes on the institutional, strategic and operational level, just that they need to happen. In practice however, these changes, such as matching KPI’s at the operational level or executive support, are recognized by many, but still take a lot of time & lobbying to be implemented.

5.2.2 Managerial implications

Use of the framework

In order to move from the framework from an academic retrospective perspective to a prescriptive tool for non-scholars, we recommend that the framework is further simplified in terms of jargon and visualization outside of a scientific research format. An example includes for instance a numbered route that the user should follow through the framework with a short description of to be performed tasks. Furthermore, in this thesis the interview questions were derived by the professional insight and reasoning of the interviewer and

where sometimes extended in the interviews to gain more thorough insights. Using the framework in practice would benefit from a more extensive list of questions to aid professionals from other areas with lesser feel for market research. The level of detail of the questions should depend on what stage of research the framework is used. Using the framework as a first elucidation step would mean coarser questions then when it may be used as a validation step in combination with for instance the often used Business Model Canvas of Osterwalder & Pigneur (2010).

Furthermore, an online program or app could be developed in which the manually found building blocks and influencing conditions are put in, that then automatically sort through the list of niche strategies to propose possible options. Such an app may diminish time investment when it comes to processing data and is not very time intensive to develop once a complete overview of niche strategies is present. As adding context to such an application is a feature to be added much later in a development process, professional skills should still be present for correct usage.

The work in this thesis is done in a static format, meaning it relates to a market situation at a specific point in the adaptation phase. It is reasoned that it would be possible to apply these niche strategies sequentially without an immediate reassessment of the market status. However, as circumventing, lessening or solving barriers often affects the broader TIS or company composition, niche strategies may no longer be needed as effective or in the right order of priority anymore. Further research into sequential application of niche strategies is hence deemed necessary by the authors. By doing so, strategic decisions and planning around novel propositions might become more possible. The coming of generative AI and hopefully quantum computing in the near future would be of help when calculating through the many possible variations that arise when looking at applying the framework in a sequential order through time.

Case study market level

This study has focused on hyperpersonalization in online retail for the automotive sector. From the literature, it was concluded that true hyperpersonalizationis an omnichannel experience, rather than strictly online. This means physical shops should be part of the customer journey. This holds true for multiple sectors, whereby the fashion sector has taken the lead regarding implementation (Riegger et al., 2021). An omni-channel experience is especially important for the automotive sector compared to other markets, as the complementary services of virtual test-drives are currently still lacking in quality and subscription services have not been readily adapted either. The need for an omnichannel experience in this industry is underscored by the fact that 2 out of 3 buyers would prefer to test drive under current circumstances before buying (McKinsey, 2021). Therefore, a recommendation is made to extend the study on hyperpersonalization to an omni channel setting.

Case study at the company level

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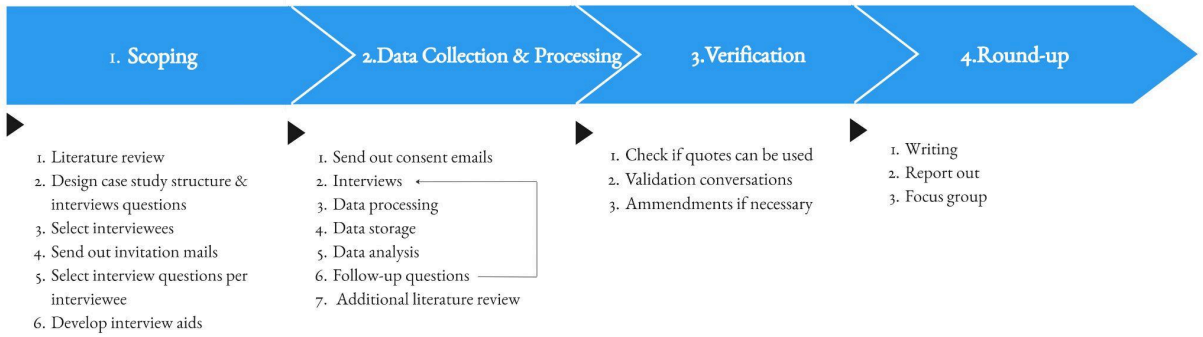
Appendix A: Methodology

This appendix contains the additional information on the research steps as displayed in Figure 20. The heading numbers refer to the steps in the process.

Figure 23: A reminder of the research phases.



1.3 Select interviewees

A maximum of ten interviews was aimed for due to the time limits of this research. A division was made between six interviewees from the company and four from the industry. Interviewees were selected because of their expertise on the topic, or their importance in the realization process, disregarding if their influence is positive or negative. The numbers corresponding to the interviewees in Table 7, are explicitly randomized with the numbers of the interviewees in Table 8, to respect anonymity of the interviewees. The expertise of the interviewees in relation to the factors of the framework is also described in Table 8. The Ortt & Kamp (2022) framework will be described in Section 3.2.1.

Table 7: Interviewees for the case study. Informal interview 9 was taken out later, because it had too little relatedness to the topic due to Booking.com being in a too different industry and too far ahead.

	Institution	**Function**	**Answers core factor/influencing condition/niche strategy**
1.	Company X department Y	General Manager	Learning, Analysis, Context: Product performance & Quality, Product Price, Network Formation, Socio Cultural Aspects, Financial Resources, Strategy
2.	Company X department Y	Insights	Learning, Context: Production System, Knowledge & awareness of application
3.	Company X department Y	Analytics	Analysis: Production Process & Product Performance and Quality, Knowledge and Awarenss of Technology
4.	Company X department Y	Innovation Strategist	Context: Strategy, SocioCultural Aspects
5.	External partner	Founder	Learning, Context: Knowledge and awareness of application and market, production system, competition, innovation specific institutions, Network formation
6..	External partner	Founder	Learning, Analysis: Production system, socio-cultural conditions, strategy, knowledge and awareness of application & technology, human and financial resources
7.	Company X Customer Experience	Team Lead CRM	Analysis, Tailoring: Customer, Human & Financial Resources, Knowledge and awareness of application
8.	Ikea	Director of Data	Learning, Analysis: Production Process, Human and Financial Resources, Knowledge and

		Analytics	Awareness of application,
9.	Booking.com	Director Product Machine Learning	Analysis: Production Process & Product Performance and Quality, Knowledge and Awarenss of Technology
10.	Fabletics	Personalization Lead	Learning, Analysis: All
11.	International Retail Company	Content Strategist	Tailoring: All

1.5 Select interview questions per interviewee

The interview questions can be seen in Example 7. As 60 minutes is too short to ask about all core factors and influencing conditions not all interviewees are asked about all barriers. Instead barrieres related to there expertise are asked as can be seen in Table 8, so that there is time to dive deeper into the questions if necessary. Each question on both the market and the company level was at least answered twice. Some questions, were not scheduled to be asked, but came up naturally, this holds especially true for questions regarding influencing conditions. Therefore, the asking ratio has become naturally skewed towards the influencing conditions and building blocks found most important by the interviewees. More attention could have been paid to ensuring equivalent number of questions were asked about the subsystems.

Questions are posed in line with an open-ended approach, allowing interviewees to share anecdotes, experiences, and personal insights beyond just the structured questions. It will give depth to the case study and provide a holistic view of the subject.

Example 7: *Interview structure*

Part 1: Introduction & State Expertise (10 min)

- Could you briefly introduce yourself and your role within Company X / personalization / the automotive industry in the Netherlands?
- How long have you been involved in this sector, and what changes have you observed during your tenure, especially in relation to hyperpersonalization?

Part 2: Semi-Structured Questions on the Future of Hyperpersonalization (20 min)

- How do you see the future of hyperpersonalization evolving in the Netherlands' online automotive retail sector? How do you see it evolving for Company X?

- What barriers to the adoption and scaling of hyperpersonalization have you observed or anticipate in the near future? Both in the industry and within Company X?
- Are there specific influencing conditions you believe have a significant impact on hyperpersonalization in this industry or this company?

Part 3: Discussion of Barriers & Influencing Conditions (20 min)

Barriers:

Q1. How do you evaluate product performance and quality in the context of hyperpersonalization in online automotive retail?

Q2. What are your thoughts on the product pricing? Do you think current pricing strategies for hyperpersonalized offerings are sustainable?

Q3. How equipped do you believe the current production systems are in producing hyperpersonalized products at scale?

a. What are parts of the production system you think? What are barriers for the separate parts?

Q4. Are there enough complementary products and services in the market to support the rise of hyperpersonalization?

Q5. How would you rate the industry's/company's network formation and coordination capabilities around hyperpersonalization?

Q6. How receptive are the customers to hyperpersonalized products and services in the online automotive sector?

Q7. Can you comment on the current state of innovation-specific institutions in the Netherlands / Company X concerning hyperpersonalization in automotive retail?

Influencing Conditions:

Q8. How aware and knowledgeable are industry/company players about the technology behind hyperpersonalization? Which other players are the worst?

Q9. What are the key gaps in market/company knowledge and understanding of potential applications of hyperpersonalization?

Q10. How would you rate the industry in terms of human and financial resources dedicated to hyperpersonalization initiatives?

Q11. Can you shed light on competition, especially between old and new technologies or different hyperpersonalized product versions?

Q12. How have macro-economic aspects and strategies influenced hyperpersonalization trends in this sector/company?

Q13. Are there socio-cultural aspects in the Netherlands/Company X that you think might favor or hinder hyperpersonalization in online automotive retail?

Q14. Have there been any significant accidents or events that affected the trajectory of hyperpersonalization in this sector?

Part 4: Discussion of Discrepancies (10 min)

- Reflecting on our discussion, were there any areas where you felt there were discrepancies between your initial thoughts and the deeper discussion on barriers and influencing conditions?
- How would you reconcile these discrepancies in understanding the state and future of hyperpersonalization in the online automotive retail sector?
- Are there any other things that we should have addressed?
- Please give me feedback

Table 8: Asked questions per interview. L stands for liteterature. M represents questions directed at the market level, C represents questions directed at the company level. It was ensured each question was at least covered twice.

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	L
Q1	*M C*	*C*				*C*		*M*	*M*	*M*	*C*
Q2	*M C*	*C*	*C*			*C*		*M*	*M*	*M*	
Q3	*M*	*C*		*C*	*M C*	*C*		*M*	*M*		*C M*
Q4	*C*	*C*			*MC*	*C*		*M*	*M*		*M*
Q5	*M*	*C*	*C*	*C*	*MC*	*C*		*M*			*M*
Q6	*M*	*C*			*MC*		*M*	*M*	*M*	*M*	*M*
Q7	*M*		*C*	*C*	*MC*	*C*		*M*			*C M*
Q8	*MC*		*C*		*C*	*C*	*MC*	*M*	*M*	*M*	*M*
Q9	*M*	*C*	*C*		*C*	*C*	*C*	*M*	*M*		*M*
Q10	*M*	*C*	*C*	*C*	*C*	*C*	*C*	*M*	*M*		
Q11	*M*	*C*	*C*	*C*		*C*			*M*		*CM*
Q12		*C*	*C*	*C*	*C*	*C*		*M*			*M*
Q13	*M*	*C*	*C*	*C*	*C*	*C*				*M*	*M*
Q14		*C*	*C*			*C*					*M C*

1.6 Developing Interview Aids

With the help of the interview structure and questions, interview aids were developed. As most interviews were held online, the aid consisted of a powerpoint presentation which was shown at specific moments in time during each interview. The main powerpoint slides consisted of the topics:

1. Company X2035 vision (shown by explanation purpose of the thesis)
2. Visualization definition hyperpersonalization
3. Subsystems of hyperpersonalization (shown depending on expertise and subquestions)
4. Used framework Ortt & Kamp 2022 (Shown when going from the open to the specific questions)
5. Rating scale of 1 to 5, with 1 being complete missing, and 5 being completely ready (Shown to rate the specific core factors and influencing conditions)

2.1. Send Invitation Emails / Schedule appointments

Each interviewee was invited through the email. The build up of the email consisted of:

1. Aim of the thesis
2. Why their specific input is valued
3. Interview structure & what to expected.
4. Consent to interview transcription, storage and anonymised use

5. Data & Time

Interviewees were invited in random order. In hindsight, it would have been better to first interview the external parties, followed by the internal parties. This would have ensured better oversight over the difference in market and internal status. There were no declines to the email invitations at the company level.

2.2. Interviews

All interviews were held online. All interviews were recorded in triple. First by the automatic transcription service Firefly.ai, second by speechtexter.com and third by a voice recorder on a phone. As time of the interviewees is precious, all interviews were strictly kept within the hour. All recording applications were checked and deemed secure on privacy compliance. After each interview an hour is taken to write down the first thoughts about the interview. Interview questions can be found below in Table X.

2.3 Data storage

The data collection protocol starts off by establishing a case study database. This database will be hosted through a shared group in the bibliographic software Mendeley. Second, a chain of evidence must be kept. This includes (transcriptions) of interactions and correspondence with the interviewees. These will also be stored in a folder to be accesses by the complete thesis committee on Mendeley. All steps made must be traceable from the start to the end and vice versa to ensure other researchers would be able to replicate the study. This promotes the reliability of the study (Yin, 2003).

Each of the written out interviews was stored in a shared Mendeley group with supervisors Roland Ortt & Asli Boru. No access was given to company supervisor Paula van den Boer as not to compromise the privacy of her coworkers. If not otherwise discussed (in the near future), all the raw data from the interviews shall be deleted on december 6th 2023. Quotes were stored as well in Mendeley in an Excel file. The quotes contain a reference to the interview, page and line number to ensure easy traceability. A de-anonymising key is stored in the semi-shared Mendeley account.

2.4 Data processing

The transcript of Firefly.ai were checked & were completed were necessary by either the voice memo or the speech to text. Colloquial speech was removed by hand such as ‘ja’, ‘uhm’. Special attention was given to not remove any intonations underlying colloquial language. The interviews were not translated into English t

The interviews were then given page and rule numbers and were then coded in Atlas.ti. Each core factor and influencing condition for both the internal and external situation were given their own label. Two interviews were partly coded a second time by a researcher with a master Management of Technology at the TU Delft, but with no specific knowledge on hyperpersonalization or the Ortt & Kamp (2022) framework. Coding categories were compared and adjusted where necessary. A minimal consistency score, meaning the overlap between coding, of 70% was deemed sufficient quality. The measured score was 74 %. Quotes were then carefully translated back into English.

In a later phase, all coding was transferred back from Atlas.ti to Word, as Atlas.ti could not provide insights between the influencing conditions and core factors as was deemed appropriate.

2.6 Follow-up emails

Follow-up questions were send to some of the interviewees for further clarifications. Then the necessary iterative steps were taken to include the clarified data into the thesis.

4.1 Writing

Writing was assisted by AI tools such as Bard & ChatGPT. The tools were used for ideation and rubberducking. AI generated texts may have been used as basis, but were always rewritten in own words. Next due this aiding in the learning process, it was a necessity as the tools often cannot gain enough depth or specificity. This especially holds true for researching sources. Hence, all 'facts' and ideas presented by the tools were verified by other sources before inclusion. Company X specific information was handled with care and was not placed in the generative AI applications. As an extra precaution, the paid version of ChatGPT, ChatGPT4.0 was used to ensure the model will not be trained on the data.

Figure 21 shows screenshots of an example inquire to ChatGPT about the current potential of virtual assistants, to illustrate the level of questions that have been asked.

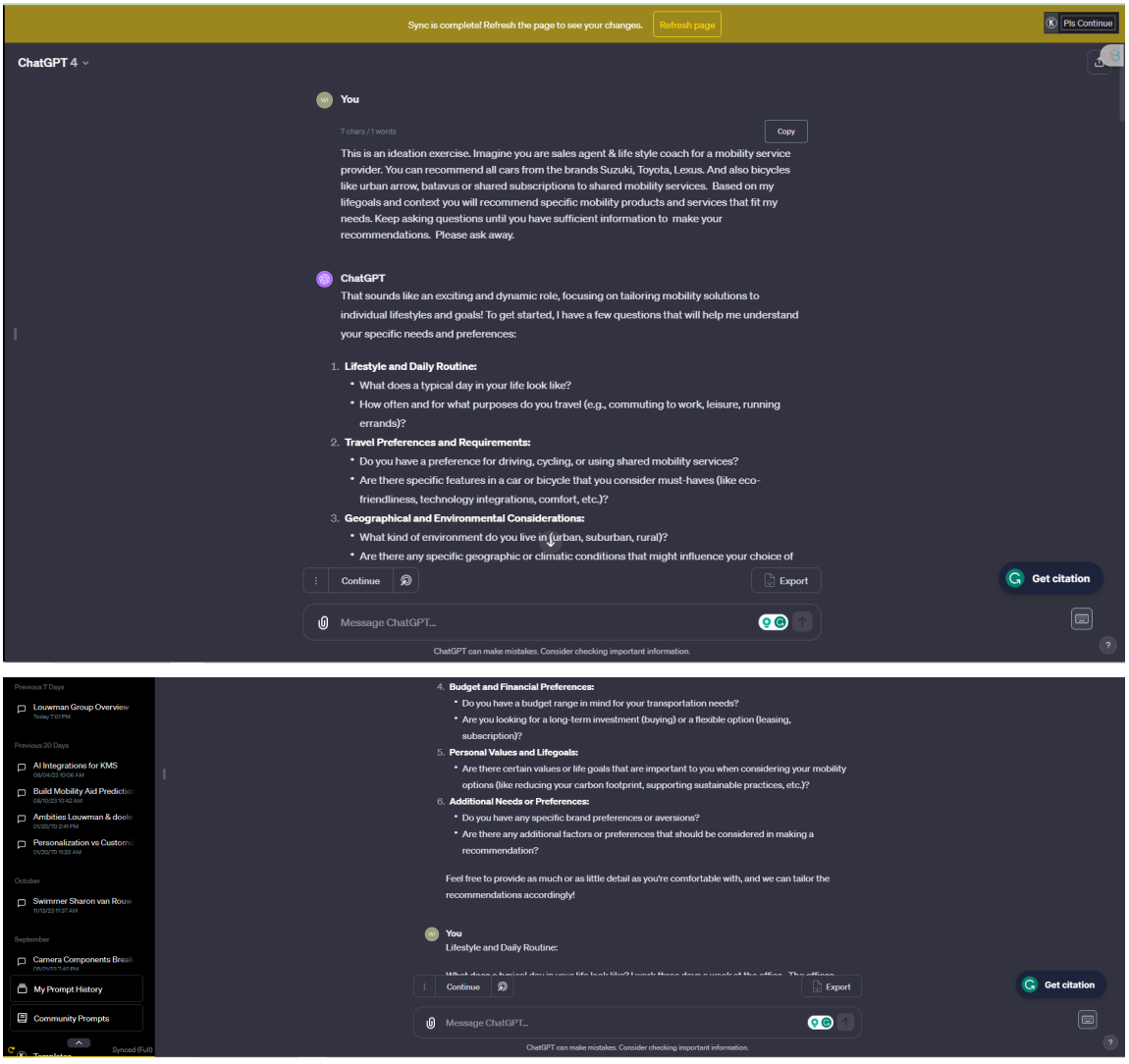


Figure 21: Examples of ChatGPT assistance.

Additionally to AI tools, Jelmer Koedood & Miranda van Duijn, both non Management of Technology (former) students, but TU Delft alumni, have pleaded their time to help with image making. Pim Wubben has dedicated some time to proof reading the thesis.

Appendix B: Diffusion Theory

E.1 Roger's diffusion theory of Innovation

Diffusion is the process in which new ideas, technologies, and services spread throughout a society or social system. Specifically Roger's diffusion theory (Rogers, 2014) is a widely recognized and influential framework in this field of research. Roger's diffusion curve is a model that shows how the adoption of a new technology or service typically takes place over time. Figure 22 shows a typically shaped curve. In general, the curve is S-shaped, with on the vertical axis the cumulative percentage of adopters, which together represent the adopted percentage of the market. The curve is divided into sections of early adopters, followed by mainstream adopters, and then late adopters. The types of adopters together are normally distributed. To reach mass-diffusion it is theorized that a critical mass must be reached. This lies around the segmentation of early adopters and early majority. The phase of gaining enough users to move from the early adapters to the masss-market diffusion is often referred to as 'crossing the chasm' (Moore & McKeanna, 1999). This reference is given as it is often perceived as difficult as there are discrepancies between what the groups accept in for instance product performance, price and needed complementary products or services. The segmentation lines of the normal distribution may be extended onto the overlapping position the S-curve.The theory provides insights into the factors that influence the diffusion process and the patterns of adoption of new ideas or technologies

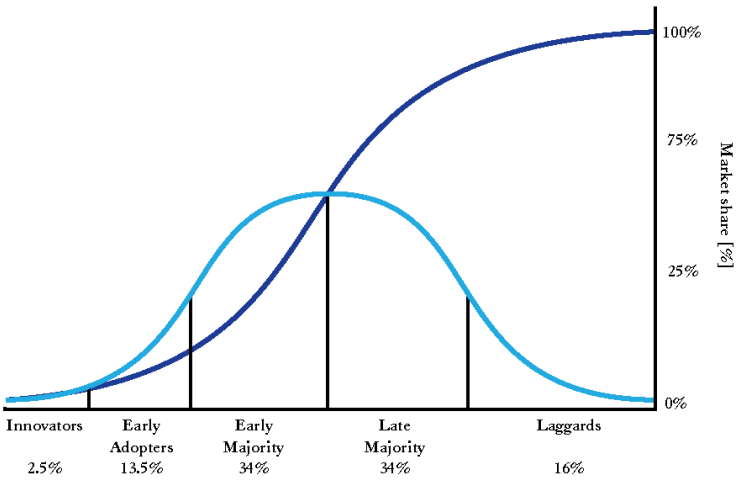


Figure 24: Diffusion theory S shaped curve, divided into different adaptor groups (Rogers, 2014).

E.2 Adaptation Roger's diffusion theory

However, a significant share of innovative technologies do not reach full-fledged diffusion. It is often even observed that many partially shaped S-curves of precursor technologies precede a fully matured diffusion curve as was described by Roger's theory. Figure 23, also shows the phase with precursor curves. This phase is referred to as the 'pre-diffusion phase' (Ortt, 2010), and may last several decades. The phase is divided into two sub-phases, the innovation phase and the adaptation phase:

- **Innovation phase:** Refers to the period between the invention of a high-tech product or technology and its initial market introduction. The length of the innovation phase is approximately 10 years, based on empirical data. Inventors and researchers work on translating their inventions into practical applications and prototypes. The innovation phase involves testing and validating the feasibility and functionality of the product, as well as addressing any technical challenges or limitations. It is a period of experimentation, trial, and failure, where the focus lies on perfecting the technology and preparing it for market introduction.

- **The adaptation phase:** Refers to the period between the initial market introduction of a high-tech product or service category and its large-scale production. During this phase, companies work on refining and improving the product, making necessary adjustments based on market feedback and demand. It is a period of learning and adjustment, where companies aim to optimize the product's features, functionality, and production processes to meet the needs of the market (Ortt, 2010). In this research, the focus lies on the adaptation phase. Being able to examine whether or not a technology or service has the potential to reach mass-market is one of the most useful predictions a business strategist or entrepreneur can make, as it justifies investments and commitment for the company

The focus of this thesis lies on using tools to recognize which factors block completion of the S-curves (Section 3.6) for hyperpersonalization and how to identify niche strategies that can overcome the chasm (Section 3.7).

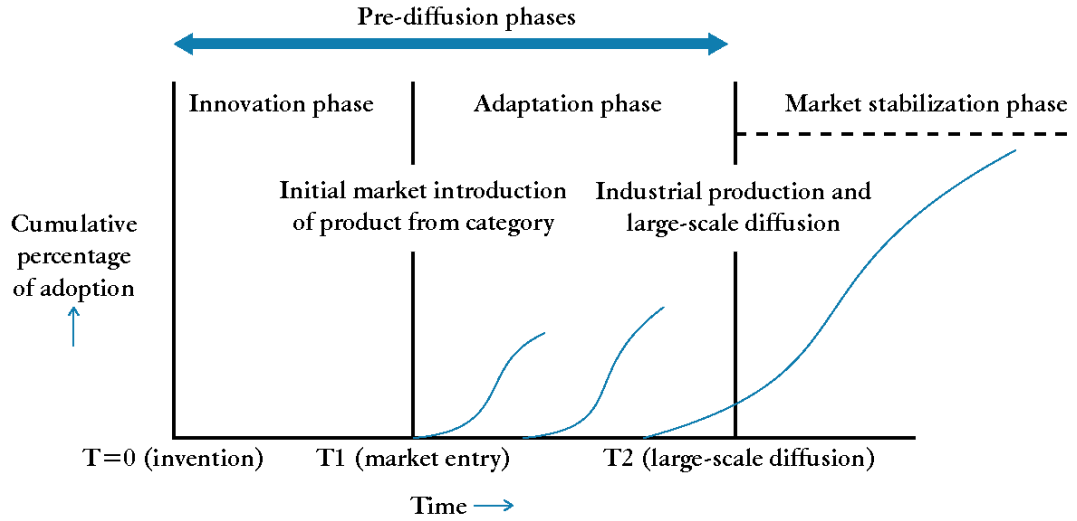


Figure 25: Shows that there is a precursor phase before the final S-shape adaptation curve is reached. The phase is referred to as the pre-diffusion phase and is split up in the innovation and adaptation phase (Ortt & Kamp, 2010).

Appendix C: Explanation TIS Building Blocks & Influencing Conditions Ortt & Kamp (2022)

Table 9A: TIS Building blocks as literally defined by Ort & Kamp (2022). The original placement of the word 'product' may be replaced by the word 'service'.

TIS Building Block	**Explanation**
Product Performance & Quality	A product (with all subsystems including hardware and software components) is required with a sufficiently good performance and quality (absolutely or relatively compared to other competitive products).
Product price:	A product (with all subsystems) is required with a reasonable price (absolutely or relatively to other products). The price of the product involves financial and non-financial (e.g. time and efforts) investments to, acquire and use the product.
Production system:	A production system that can produce large quantities of products with sufficiently good quality and performance.
Complementary products & services:	Complementary products and services for the development, production, distribution, adoption, use, repair, maintenance and disposal of an innovation are required.
Network formation and coordination:	Required actors and sufficient coordination of their activities to develop, produce, distribute, repair, maintain and dispose of products are required for large-scale diffusion. Coordination can be emergent and implicit (e.g., the market mechanism) or can be formal and explicit (e.g., an industry association). Coordination can involve actual collaboration and a shared vision regarding the innovation and the TIS around it.
Customers:	Customer segments are required for large-scale diffusion. Potential customers with a need for the innovation should be identified. To become actual customers, they should be aware of the product, see its benefits relative to other innovations, and have the knowledge, means, and willingness to acquire and use it.
Innovation Specific institutions:	These institutions refer to formal policies, laws and regulations either describing norms and requirements regarding the product, production facilities, and complementary products and services or describing how actors (on the supply and demand side of the market) should deal with the product and system around it.

Table 9B: The influencing conditions as literally set apart by Ortt & Kamp (2022) . The original placement of the word 'product' may be replaced by the word 'service'.

Influencing Conditions	**Explanation**
Knowledge and awareness of technology:	This involves both fundamental and applied technological knowledge. Fundamental knowledge refers to the technological principles involved in components of the TIS, like the product, production and complementary products and services. Applied technological knowledge refers to the knowledge required to develop, produce, repair, maintain, and improve these components.
Knowledge of awareness and application and market:	This refers to knowledge of (1) potential applications, (2) knowledge of the market structure) and the actors involved in these applications. This knowledge is required for all actors including customers to formulate strategies, articulate product requirements and find or target other actors.

Natural, human and financial resources:	Natural resources refer to raw materials that can be acquired by each organization separately or by associations of organizations. Human resources refer to individuals with the right knowledge and competences. Increasing human resources may involve education programs, courses and training on the job. Financial resources can come from various sources.
Competition:	Competition can refer to competition between products based on old and new technologies but may also refer to competition between different product versions with a new technology. Since different product versions often require different production systems and complementary products and services, competition arises between networks of companies.
Macro-economic aspects and strategy:	Macro-economic aspects refer to the overriding economic situation, such as a recession or economic growth. Strategic aspects refer to interests of countries which are often reflected in generic institutions and government policies.
Socio-cultural aspects:	Socio-cultural aspects refer to the norms and values in a particular culture or socio-technical system. These conditions might be less formalized than the laws and rules in the innovation-specific institutions. They include methods and habits, norms and values ("the way to do things") and may become visible in interest groups or relevant stakeholder groups.
Accidents and events:	Accidents and events may emerge both outside a TIS (e.g., wars, political turmoil or natural disasters) or from within a TIS (e.g., accidents with products or in production, emergence of new technologies).

Appendix D: Comparison of market- and company level building blocks and influencing conditions

When comparing TIS system components from strategic management on organizational change literature to the Ortt & Kamp (2022) framework, it is noted that similar concepts at a company level are described to the building blocks and influencing conditions, when compared to those mentioned for the market level.

- The influencing conditions **'Knowledge and Awareness of Technology'** and **'Knowledge and Awareness of Application and Market'** are relatable to 'experience' (Schilke, 2018; Bocken, 2020) or 'Technical Knowledge' (Damanpour, 1991, Schilke, 2018).
- **'Natural, Human and Financial Resources'** are a key component returning in all literature, but are often found in a more granulated format than found on the market level definition. Examples include terminology such as 'Leadership' and 'managerial tenure' and on the financial front 'slack resources'. Slack resources describe the fraction of resources that can be spend without the immediate need for result to keep the company afloat (Vial, 2019; Warner & Wager, 2019).
- **'Competition'** of the market still plays a role at the company level, but additionally may be found between divisisions within the company or old and new technologies or business models (Vial, 2019, Bocken, 2020).
- **'Macro-economic, but especially, strategic aspects'** play a dominant role at the company level and are referred to by the same terminology (Dremel et al, 2017; Schilke, 2018; Teece, 2018; Vial, 2019; Warner & Wager, 2019; Bocken, 2020).
- **'Socio-cultural aspects'** are another heavily researched concept on the company level and is often referred to in the more detailed concepts of 'Hierarchy', 'Inertia / resistance' 'Silo'd behaviour' indicating behaviour resulting from loosely coupled entities within a large organisation, but also often the separation of information technology systems and the business, 'short term thinking' (Bocken, 2020), 'values' referring to an innovative or digital mindset (Vial, 2019; Bocken, 2020), manegerial attitude and adminstrative intensity (Damanpour, 1991).
- **'Accidents & Events'** may occur in the market, but can also take place at an organizational level. Changes in leadership often bring about significant changes in strategic direction of a company (Dremel et al., 2017).

Similarly, the presented literature broadly supports the concepts described by the market-level building blocks of Ortt & Kamp (2022) at a company level, although often in a more granulated format.

- **'Product Performance and Quality'** is the exception here as the strategic management literature often sees this as a higher order level concept referring to organizational performance in general. The performance of a product or novel business model within an organization has not been discussed as a one-on-one comparison. But a products or service's performance may be deducted by its return over a certain timespan and therefore better fits under the block of 'Product Price' if described in this way (Bocken, 2020). Similarly, performance might also result from a lacking compatible 'Production System' within the organisation (Dremel et al., 2017; Vial, 2019; Bocken, 2020).
- **'Complementary Products and Services (CPS)'** typically depend more on the product or service itself than on organizational aspects. What does and does not fall into this category heavily depends

on how the boundaries and the focus of a TIS are drawn. For instance, IT-infrastructure can be classified as part of a production system if it is an integral part of a service, but may just as well be classified as a CPS in other cases when less integral to the technology or service. Therefore this term has not been used specifically in the studied literature, but is believed to be of essence because it caters to context just outside of the boundaries of a focal TIS.

- **'Network Formation & Coordination'** comparably takes place at a company level (Ambrosini & Bowman, 2009). A network at a company level tends to include actors residing in the market, outside of the company boundaries as well. Networks occur in an implicit and an explicit manner too. Implicit coordination on a company level can be referred to as 'Product-Market Competition' which is comparable to the market mechanism(Sleifner & Vishny, 1997) . Explicit mechanism could be referred to as groups of various stakeholders that meet on a regular schedule. A specific explicit mechanism of importance in digital transitions within this building block is the formation of cross-functional teams (Damanpour, 1991;Dremel et al., 2017; Vial, 2019; Warner & Wager, 2019; Bocken, 2020). The structure of a company, with high or low centralization can also be seen as part of the network formation and coordination building block (Damanpour, 1991).
- **'Customers'** at a company level refer to both the customers defined at the market level, as well as often internal customers of a company. Internal customers can be other departments (Dremel et al., 2017).
- '**Innovation Specific Institutions'** on a company level still refer to formal policies, laws and regulations. Hence, market level influences inevitably seep through to the company. Formal policies however are imposed by different froms of governing bodies than in the market. For a company an executive board, upper management or security & compliance control committees are institutions within an enterprise that form and execute said policies. Policies can often be seen as KPI's that must be met or are even rewarded with financial incentives as bonuses (Bocken, 2020).

Appendix E: Labelling niche strategies to the Ortt & Kamp (2022) framework

Table 10A: The labeled niche strategies supported by sources.

No.	Strategy	Description	Building Blocks / Influencing Condition	Source	
1	Liberalizing the Market	Aim of liberalizing the market, for instance through setting up independent regulatory bodies, promoting competition or restructering the sector.	BB: Network formation & Coordination, Innovation Specific institutions IC: Competition, Macro-Economic Aspects, Socio-Cultural Aspects	(Nandigam, 2023; 't Veld, 2020; Painuly, 2001)	
2	Guaranteed Market	Governments hold the power to facilitate garantueed markets to some actors entering the market. This creates a stable and secure environment for technology.	BB: Innovation Specific institutions IC: Competition, Macro-Economic Aspects,	('t Veld, 2020)	
3	Economic /Financial Incentive	The strategy creates incentives for stakeholders by providing additional (financial) benefits. May include tax cuts, subsidies, and grants, but also discounts on the product.	BB: Network Formation and Coordination, Product Price, Innovation Specific Institutions IC: Natural, Human and Financial Resources,	(Painuly, 2001)	
4	Investment	Aims to bring growth to an ecosystem through financial infusions. This creates room for innovation, job creation and overall progress.	BB: Network Formation & Coordination IC: Natural, Human & Financial Resources, may result in in creased Knowledge and Awaresness of Technology and Awareness and Applicaion of Market	(Pratiwi, 2016)	
5	Awareness Campaign	Focusses on creating awareness amongst necessary stakeholders. Increasing the knowledge level around basic information encourages participation.	BB: Network Formation and Coordination, Complementary Products and Service (knowledge about the technology may be seen as additional service needed for adoption), Customer IC: Knowledge and Awareness of Application and Market	(Balachandra et al., 2010)	
6	Cost-Reduction	Aims to reduce costs by using economies of scale and technological improvements.	BB: Production system, Product Price IC: Knowledge and Awareness of Technology	(Reddy & Painuly, 2004)	
7	Initiate Training	Puts focus on improving accessibility to technological knowledge necessary for improved use of the technology. Includes providing necessary information through manuals and other sources.	BB: Complementary Products and Services, (Customer) IC: Knowledge and Awareness of Application and Market, Socio-Cultural Aspects	(Zafat et al., 2018)	
8	R&D	This strategy specifically funds R&D activities to increase Technological Readiness Levels and foster collaborations.	BB; Innovation Specific Innovations, Network Formation and Coordination IC: Knowledge and Awareness of Technology, Production System	(Dwisatyawati, 2022)	
9	Education	Aims to increase knowledge level of users and workforce through for instance workshops or more formal training programs. Increases internal knowledge sharing.	BB: Network Formation and Coordination IC: Sociocultural Aspects, Knowledge and Awanress of Application and Market, Knowledge and Awareness of Technology	(Ortt et al., 2013, Zafar et al., 2018; Dwistyawati, 2022)	

10	Lead-user	Focusses on pinpointing and engaging forefront users of a technology. It is necessary to understand the lead-users requirements as these often differ from the general user.	BB: Customers IC: Knowledge and Awareness of Application and Market, SocioCultural Aspects, Knowledge and Awareness of Technology	(Ortt et al., 2013)	
11	Finance Sourcing	Locks down financial aids especially for implementation or scaling. ranges from loans to crowd funding approaches.	BB: Network Formation And Coordination, Customer, Production System IC: Natural, Human and Financial Resources,	('t Veld, 2020)	
12	Subsidized	This strategy reduces the price point of the technology for the user by providing tax benefits.	BB: Innovation Specific Institutions, Product Price IC: Natural, Human and Financial Resources, Macro-economic or Strategic Aspects	(Ortt et al., 2013), (Dwisatyawati, 2022)	
13	Redesign	Focusses on finding alternate applications of the technology.	BB: Product Performance and Quality IC: Knowledge and Awarness of Application and Market, Accidents & Events	(Ortt et al., 2013)	
14	Dedicated System or Stand Alone	Aims to reduce reliance on complementary products and services.	BB: Product Perfomrance and Quality, Complementary products & Services IC: Competition, Knowledge and Awarness of Application and Market	(Ortt et al., 2013)	
15	Hybridization or Adaptor	By combining an existing product with a new product reduces friction within the company and ensures heightened compatibility.	BB: Production System, Complementary Products and Services IC:Competition, Knowledge and Awareness of Technology, Knowledge and Awareness of Application and Market	(Ortt, et al., 2013)	
16	Lobbying / Advocacy	Aims to influence innovation specific institutions in forming their public policies. This can be done in a direct and indirect manner.	BB: Network Formation and Coordination, Innovation Specific Institutions IC: Macro-economic and Strategic Aspects, Natural Human and Financial Resources, Competition, Knowledge and Awareness of Application and Market	(Hardman et al., 2013)	
17	Collaborative Product Utilization	Has the aim to reduce cost for the user by moving from an ownership proposition to shared access.	BB: Customer, Product Price, Complementary Products and Services IC: Knowledge and Awareness of Application and Market, Socio-cultrual Aspects, Competition	(Schulz, 2019)	
18	Buy-one, Give-on	Promotes a sustainable image by giving an additional product to consumers in markets in need, when a high-end consumers buys the product.	BB: Customer, Complementary Products and Services, Product Price IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects	(Schulz, 2019)	
19	Geographical	Focusses on specific consumer segments located in certain geographical areas of interest.	BB: Customer IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects	(Ortt et al., 2013)	
20	Top-end	High-end products only made in small batches. May enhance deseriability of the product.	BB: Customer , Product Price, Product Performance IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects but also because of Natural, Human and financial Resources, Production System	(Ortt et al, 2013)	
21	Partnerships	The formation of stakeholder groups with varying capabilities to together address problems.	BB: Networkformation and Coordination → Product Performance, Product Price, Production System Complementary Products and Services IC: Macro-economic and Strategic Aspects, Knowledge and Awareness of Application and Market, Knowledge and Application of Technology, Natural, Human and Financial Resources	(Hardman et al., 2013; Dwisatyawati, 2022)	

22	Integrated Network	Aims to build networks in both the internal as external company environment. This allows for extension into new consumer groups without needing to develop entirely own new distribution channels.	BB:Networkformation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects	(Dwisatyawati, 2022)	
23	Marketing	Making use of external parties such as influencers to create more awareness and brand representation.	BB:Network Formation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects, Knowledge and Awareness of Application and Market	(Schulz, 2019; Dwisatyawati, 2022)	
24	Stepping Stone	Moving from one geographically or culturally close consumer segment to another.	BB:Network Formation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects, Knowledge and Awareness of Application and Market	(Dwisatyawati, 2022)	
25	Product Variants	Diversifying the product portefolio in order to reach more consumers. Might be done by modularizing products and ensuring high compatability.	BB: Complementary Products and Services IC: Competition, Knowledge and Awareness of Technology,	(Dwisatyawati, 2022)	
26	Cross-Selling	Providing the client with recommendations on additional product categories. Creates extra revenue and customer loyalty and awareness.	BB: Complementary Products and Services, Customer IC: Competition, Knowledge and Awareness of Technology, Knowledge and Awareness of Application and Market	(Dwisatyawati, 2022)	
27	Result-Oriented Contracting	'No cure, no pay'. Lowers the buying threshold and creates the belief a product must be of high value.	BB: Customer, Product Price, Product Performance IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects	(Dwisatyawati, 2022)	
28	Blue Ocean	Focusses on introducing products in novel, untapped market. Renders aspects of competition, temporarily unimportant.	BB: Network Formation and Coordination, Product Performance and Quality IC: Competition, Knowledge and Awareness of Application and Market	(Sharma, 2016)	
29	Explore Multiple Markets	Using the same product to serve the same consumer need in different markets. Demands thorough understanding of consumer needs andtrend in the new markets.	BB:Network Formation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects, Knowledge and Awareness of Application and Market, Competition	(Ortt et al., 2013)	
30	Formulate Requirements	Aims to align with users on aspects that are important for them to use the service. This creates better product requirements, better performance and trust from the consumer	BB: Customer, Product Performance and Quality IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects	('t Veld, 2020)	
31	Influential Community Member	Finding an influential persona within the community to actively create awareness and promote the product.	BB:Network Formation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects, Knowledge and Awareness of Application and Market	('t Veld, 2020)	
32	Word of Mouth	Aims to let consumers (digitally) spread the word about the technology. May be encouraged by incentives such as discounts. Powerful tool to spread	BB:Network Formation and Coordination , Customers IC: Natural, Human and Financial Resources, Socio-cultural Aspects, Knowledge and Awareness of Application and Market, Accidents and Events	('t Veld, 2020)	

		information.			
33	Continuous User Engagement	Aims to actively engage stakholders through the whole customer journey. Creates a sense of loyalty and gives insight in stages of the journey that could be enhanced.	BB: Customer, Production System, Product Performance IC: Knowledge and Awareness of Application and Market, Accidents and Events	('t Veld, 2020)	
34	Freemium	Provides a free, lesser quality version to consumers in order to educate them about the product	BB: Customer, Product Performance, Product Price IC: Knowledge and Awareness of Application and Market.	(Holm, 2017)	

Stanley Noorlander performed a total of 10 checks for labeling at his own predisposition as can be seen in Table 10A. Three differences were spotted, colord in pink. Winnifred classified two differences more broadly than Stanley. 70% Accuracy was achieved, which is just within limits. From the inconcruegencies is what spotted that the author of this thesis labelled the niche strategies more widely than the second reacher. This may be due to having the Ortt & Kamp (2022) framework in mind more vividly.

Table 10B: Labeling check by fellow MOT student Stanley Noorlander to ensure internal validity.

No.	**Strategy**	**Description**	**Building Blocks / Influencing Condition**	**Building Blocks / Influencing Condition Check**	**Source**
2	Guaranteed Market	Governemetns hold the power to facilitate garantueed markets to some actors entering the market. This creates a stable and secure environment for technology.	BB: Innovation Specific institutions IC: Competition, Macro-Economic Aspects,	BB: Network formation and coordination IC: Competition, Macro-Economic Aspects	('t Veld, 2020)
4	Investment	Aims to bring growth to an ecosystem through financial infusions. This creates room for innovation, job creation and overall progress.	BB: Network Formation & Coordination IC: Natural, Human & Financial Resources, may result in in creased Knowledge and Awaresness of Technology and Awareness and Applicaion of Market	BB: Network formation and coordination IC: Natural, Human and Financial resources,	(Pratiwi, 2016)
6	Cost-Reduction	Aims to reduce costs by using economies of scale and technological improvements.	BB: Production system, Product Price IC: Knowledge and Awareness of Technology	BB: Product price, Production system IC: Knowledge and Awareness of Technology	(Reddy & Painuly, 2004)
8	R&D	This strategy specifically funds R&D activities to increase Technological Readiness Levels and foster collaborations.	BB; Innovation Specific Innovations, Network Formation and Coordination, Production System	BB: Product performance and quality, Network formation and coordination, innovation specific- institutions,	(Dwisatyawati, 2022)

			IC: Knowledge and Awareness of Technology,	IC: Knowledge and Awareness of Technology	
10	Lead-user	Focusses on pinpointing and engaging forefront users of a technology. It is necessary to understand the lead-users requirements as these often differ from the general user.	BB: Customers IC: Knowledge and Awareness of Application and Market, SocioCultural Aspects, Knowledge and Awareness of Technology	BB: Customers IC: Knowledge and Awareness of Application and Market, Socio-cultural aspects, Knowledge and Awareness of Technology	(Ortt et al., 2013)
12	Subsidized	This strategy reduces the price point of the technology for the user by providing tax benefits.	BB: Innovation Specific Institutions, Product Price IC: Natural, Human and Financial Resources, Macro-economic or Strategic Aspects	BB: Product Price, Innovation-specific institutions IC: Natural, Human and Financial Resources, Macro-Economic or Strategic aspects	(Ortt et al., 2013), (Dwisatyawati, 2022)
14	Dedicated System or Stand Alone	Aims to reduce reliance on complementary products and services.	BB: Product Performance and Quality, Complementary products & Services IC: Competition, Knowledge and Awarness of Application and Market	BB: Complementary Products and Services, Product Performance and Quality IC: Competition, Knowledge and Awareness of Applications and Market	(Ortt et al., 2013)
16	Lobbying / Advocacy	Aims to influence innovation specific institutions in forming their public policies. This can be done in a direct and indirect manner.	BB: Network Formation and Coordination, Innovation Specific Institutions IC: Macro-economic and Strategic Aspects, Natural Human and Financial Resources, Competition, Knowledge and Awareness of Application and Market	BB: Innovation-Specific Institutions IC: Macro-Economic and Strategic Aspects, Natural, Human and financial resources, Competition, Knowledge and Awareness of Application and market	(Hardman et al., 2013)
18	Buy-one, Give-one	Promotes a sustainable image by giving an additional product to consumers from markets in need, when a high-end consumers buys the product.	BB: Customer, Complementary Products and Services, Product Price IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects	BB: Complementary Products and Services, Customers, IC: Knowledge and Awareness of Application and Market, Socio-Cultural Aspects	(Schulz, 2019)

20	Top-end	High-end products only made in small batches. May enhance deseriability of the product.	BB: Customer , Product Price, Product Performance IC: Knowledge and Awareness of Application and Market, Socio-cultural Aspects but also because of Natural, Human and financial Resources, Production System	BB: Product Performance and Quality, Product Price, Customers IC: Knowledge and Awareness of Application and Market, Socio-Cultural Aspects	(Ortt et al, 2013)

Appendix F: VRIN conditions

Valuable: Resources generating rent that can be seized by the firm. Cost of the resource must not off-set long term profitability to be valuable. Resources can also cease to be valuable or be destroyed by internal factors such as downsizing or external factors such as competitors imitating the resource.

Rare: The relative scarcity of a resource. Having a rare resource often results in crating a cost or scale advantage that competitors can't. Regarding hyperpersonalization this could for instance refer to a stronger GPU, able to make more complex calculations faster and better.

Inimitability: Relates the longevity of a value proposition. When resources are imitable by comepitors, rents are protected. Resources can be intangible such as the Company X family legacy.

Non-substitutable: If there is no easy way to substitute a resource for another that has the same effect, then that resource is considered non-substitutable. To evaluate substitutability, one must understand the resource's use value. An example in the case of hyperpersonalization is customer data.

Appendix G: Redacted

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Appendix H: Mind Maps

Figure 26: Legend for influencing conditions from mind maps.

Figure 27: Mindmap of the subsystem learning for the company status made in Miro. Blue blocks represent building blocks. Other colors are influencing conditions. Legend of influencing conditions is according to Figure 26. Mind maps are solely build of interviews, literature has not been included.

Unfortunately some of the finer prints were even unreadable at an A3 format. Hence the decision was made to provide the mind maps in an online format through the following link. However, all data can be accessed through table format found in Appendix I. Maps were made for all subsystems both on a market and a company level. Often influencing conditions affect multiple building blocks or fall in multiple influencing condition categories. However, for the mind maps the most pressing condition was chosen as the cards can only be represented by a single color. At the bottom of the card the other factors are mentioned in text. The visual overview shows which building blocks and influencing conditions are most prevalent. And also the amount of missing components in a subsystem.

However, while it was easy to oversee the occurrence of the type of influencing condition, for instance 'competition', it was difficult to see the content of the post-it. Was it competition caused by new players in the field or established ones? Therefore using mind maps was not deemed very suitable for depiction of a service this large or underdeveloped. Therefore mind maps were only used for initial pattern recognition and to obtain a rough understanding of the situation. Next to that tables were made in which the quotes of the interviews were summarized. This can be found in Example 6 in Chapter 4 on page 66.

Appendix I: Tables from mind maps determining niche strategies

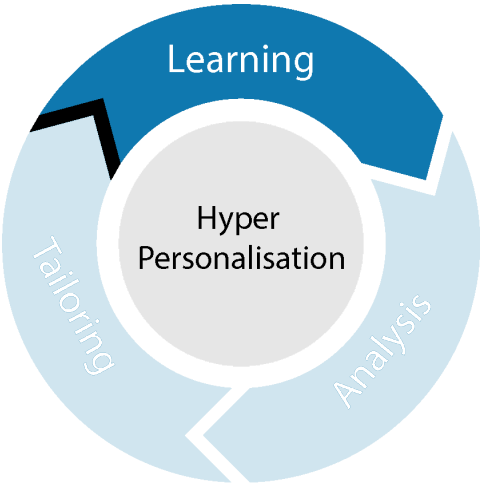
This appendix contains the result the process described in Section 4.2. Every table described a different TIS. The various tables are ordered into the three main blocks of hyperpersonalisation: Learning, Analysis and Tailoring. Some TIS' apply to two or even three blocks. The image below shows the format of the tables.

- **Blue**: The cells depicted in blue contain the TIS and the corresponding categories it applies to. Most TIS' contain aspects from multiple categories. In those cases, all applicable categories are mentioned. However, the most relevant one will be noted first.
- **Orange**: The TIS and corresponding categories are dissected into market influencing conditions and company influencing conditions. For each influencing condition, the status will be described. If an interview source is provided, it is done with an arrow pointing to the respective cell. The reference I2, corresponds to Interview 2.
- **Marine blue**: The marine blue cells describe the niche strategy that corresponds to the combination of the TIS categories and influencing condition.

Table 11A: Workflow of going through result tables.

TIS categories: *Product Performance and Quality, Innovation Specific Institutions, Customers, Network formation & Coordination, Complementary Products and Services*	**TIS:** A lack of the right, consistent and consented data at the right time blocks any quality in analytical efforts being made. Simply put: no data, no hyper personalization. Bad data, bad hyperpersonalization. GDPR rules and Google enforcing the cookieless world complicates the situation.		
Market influencing conditions: ↓	**Status:**	**Source**	**Stategy** ↓
Competition	Manufacturers are keeping data more and more to themselves inhibiting cross-selling of products or reaching out to customers for extensive after sales trajectories	←I2 I7,I8, I9, Ikea, CoolBlue, →	Strategy: *Stand-alone* Build integrated platform to ensuring you get to customer data first, Loyalty programs

Table 11B: Results in the subsystem of learning



TIS categories: *Product Price, Customer*	**TIS:** The price is sometimes too high for the consumer using the service of hyperpersonalization. For consumers the price is denoted as the effort of filling in their information and loss of privacy.		**Learning**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Natural, Human and Financial Resources	As cost prices are rising it becomes more difficult to compensate effort by giving away products or services for free. Not only because of rising prices of natural resources, but also the wages of employees in the workshops.	← (I4; I10)	Strategy: *Top-end* Find segments that still make a lot of profit to offer loyalty programs or services to. Also streamline processes in the workplace to bring down costs (has no strategy)
Knowledge and awareness about Technology, Accidents & Events	Customers have gained more awareness about sharing their data and potential consequences such as data leaks. Wanting more in return.	←(Ikea, 2023; ; Albert Heijn, 2023)→	Strategy: *Awareness campaign* Transparancy, offer more value than the worries and effort are worth Strategy: *Lead-user, formulate product requirements, freemium, marketing*
Company influencing conditions	**Company status**	**Source**	**Niche stategies**
Knowledge and Awareness of Application and Market, Competition	Company X is not known as an all-round mobility provider as products are sold under the brand name.	←(I3;I4; I5; I6)	Strategy: *Marketing, Influential Community members, Word-of-Mouth, Lead-User*

Table 11C: Results in the subsystem of learning & tailoring

TIS categories: *Complementary services and products, Customer*	**TIS:** Complementary services necessary for hyperpersonalization in learning		**Learning / Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Natural, Human and Financial Resources, Knowledge and Awarenss of Application and Market, Macro-economic Aspects and Strategy	Loyalty programs must offer enough value for the customer in order to gather first party data. Might be done through gamification. 'Cheap'-giveaways have risen in cost price.	←(I6;I8; I9;I10)	Strategy: Redesign, Subsidized, Top-end, Cross-selling
Sociocultural Aspects, *Knowledge and Awarenss of Application and Market*	Subscription services allow for more frequent interaction with the customer. But ask for significant financial investments from the companies that have the assets on the balance sheet. The change in consumer behaviour was already noticed when the mobility scooter company Scoozy started offering their high-end mobility scooter's in subscription format. While clients had an average of two test-drives before buying in the standard financing format, the number of test-drives went to zero for all subscription-based purchases. Furthermore, conversion rate increased. These findings were later corroborated by Company X's own mobility scooter service, ScootFlex. By lowering the purchase threshold, not being able to experience a vehicle with all your senses in a virtual test drive becomes less necessary.	←(I1; I2; I8; I10)	Strategy: Collaborative Product Utilization, Product Variants
Knowledge and Awarenss of Technology and Application and Market	Test drives are still a service that almost all consumers expect in the customer journey. Hence Augmented Reality, boosted by progressions in spatial computing could help	← (I1;I9;Simon Kucher, 2023)	*Strategy; Product Variants*

	improve performance of this complementary technique.		
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Natural, Human and Financial Resources, Knowledge and Awareness of Technology	Dynamic pricing allows for for a saving in discount costs, but need some analysis capabilities and prioritizing to be put to work.	← (I7; I10)	Strategy: Product Variants, Fast Decision Making

Table 11D: Results in the subsystem of learning

TIS categories: *Customer*	**TIS:** Customers do not want to share their data		**Learning**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Knowledge and awareness about Technology, Knowledge and Awareness of Application and Market	Customers don't have faith in the company delivering their propositions	←(I3;I4;I5;I6)	Strategy: Freemium, Awareness Campaign, Marketing, Influential Community Member, Word-Of-Mouth, Continuous User Engagement
Knowledge and Awareness of Application	Customers have gained more awareness about sharing their data and potential consequences	←(Simon Kucher, 2023)	Strategy: Awareness Campaign Financial Incentive, Freemium
Natural, Human & Financial Aspects, Macro-economic Aspects & Strategy	The price of manufacturing mobility products such as cars or bicycles is rising due to an increase in price in natural and human resources. Hence the prices of the cars and bicycles also rise. This ensures less people from the poorest segments can afford mobility.	←(I4;I10)	*Strategy:* Buy-one, Give-on, Cost-Reduction, Subsidizing, Top-end
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Knowledge and Awareness of Application and Market	Customers must have Company X top-of-mind as their mobility provider. But Customer are unaware of the large portefolio of mobility services Company X is offering. Therefore it is difficult to gain consent. An influencing condition is that big brands such as Toyota are used to being sold under their own brand name for now. Furthermore Company X is a family company who are modest about their name, taking the Coolblue approach of merging websshops under that name is frowned upon a little from the highest hierarchies of Company X.	←(I3;I4; I5; I6)	Strategy: Freemium, Awareness Campaign, Marketing, Cross-selling
Socio Cultural Aspects, Natural Human & Financial Resources	Company X has a loytaly program, but has not measured the upside of the program and can offer less and less benefits due to rising cost prices. Also the loyalte program is miss-used by dealers to solve conflicts with consumers.	←(I3;I4; I5; I6;I10)	Strategy: Digital Strategy Alignment
Competition, Knowledge and Awareness of Application	Business units don't see value in the promised propositions by the company. Getting first party data from a consumer now forms an additional, but essential step in the sales funnel.	←(I2;I5)	Strategy: Financial Incentive

	Without proper data, performance of the service of hyperpersonalization plummets.		

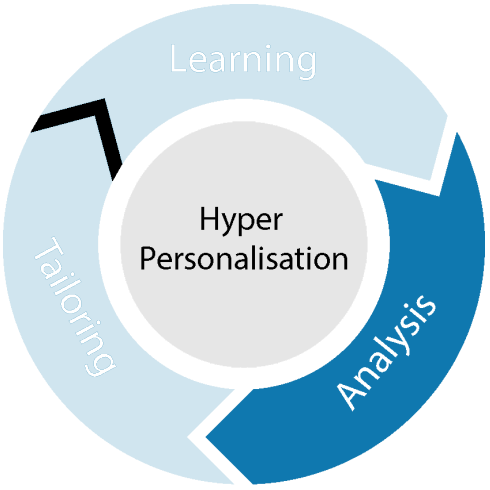


Table 11E: Results in the subsystem of analysis

TIS categories: *Product Performance and Quality*	**TIS:** There are actually five main problems found in the literature and interviews regarding algorithm performances.		**Analysis**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Natural, Human and Financial resources	Cold start problem & latency. When a user first shows up and has not interacted enough for the algorithm to be able to generate a useful recommendation. Especially a problem in Collaborative Filtering.	←(I7; I8; Ikea, 2023)	Interactive User profiling can help at the start of an interaction or Bayesian networks to fill in the gaps in a later stage when data is still sparse.
Natural, Human and Financial resources	Data sparseness: The algorithm should get feedback on the recommendations given. As new items are added to the matrix this becomes a problem or when users do not leave reviews.	←(I7; Memhood, 2023) (I8) →	Implicit recommendation reviewing may be a solution based on buys and returns. The recommendation may be seen as a natural resource in this case.
Knowledge and Awareness of Technology	Getting the right amount of diversified recommendation instead of only relying on recommendations that are the 'best'. Dynamic user interest: user preferences may change over time, the time line varying per topic. This means old recommendations would not suit the consumer at a later moment in time. An example is when a consumer searches for a restaurant around noon to grab lunch, or in the evening when he or she is looking for a place to dine.	←(I8)	Use content-based approaches for embedding new items in to the search structure or use collaborative filtering approaches with a focus on cross-subject recommendations.
Company influencing conditions	**Company status**	**Source**	**Niche stategies**
Knowledge and Awareness of Application and Market	Newly starting companies on gathering first party data, such as is almost the standard in the automotive industry, are seriously lagging behind on companies such as Spotify, Amazon and Netflix for who it has been their core business for years in understanding formation of smart models of all collected data.	←(I1;I8)	Strategy: *Partnerships* Either finds partners who can set up the process or find partners to buy data from

	Non-digital companies are expected to have a much slower learning curve. (Knowledge and Awareness of Technology)		

Table 11F: Results in the subsystem of analysis

TIS categories: *Product Price, Product performance, Production System*	**TIS:** Computations may become too expensive or too opaque.		**Analysis**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Natural, Human and Financial Resources, Knowledge and Awareness of Technology	Having more data asks for extra storage. This can become very expensive if data is collected mindlessly. Furthermore not all products wil benefit from the expensive service of setting up hyperpersonalization.	←(I6, I9)	Strategy: *Lead-user,* No great fitting strategy
Knoweldge and Application of Technology, Natural, Human and Financial Resources	The more items and users are added to the system, the more computational times & costs go up to the increased amount of data. Adequate testing and efficient design might alleviate these problems. Together with data reduction or the use of model serving tools to help with managing your models.	←(Mehmood, 2023)	No great fitting strategy

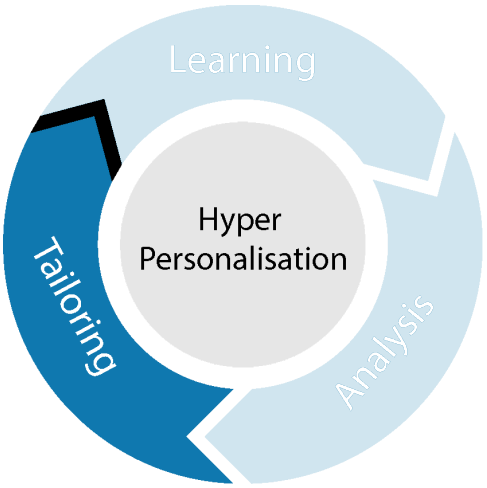


Table 11G: Results in the subsystem of tailoring

TIS categories: *Product Performance and Quality, Innovation Specific Institutions, Customers, Network formation & Coordination, Complementary Products and Services*	**TIS:** A lack of the right, consistent and consented data at the right time blocks any quality in analytical efforts being made. Simply put: no data, no hyper personalization. Bad data, bad hyperpersonalization. GDPR rules and Google enforcing the cookieless world complicates the situation.		**Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**

Competition	Manufacturers are keeping data more and more to themselves inhibiting cross-selling of products or reaching out to customers for extensive after sales trajectories	←(I2) (I7;I8; I9; Ikea,2023; CoolBlue, 2023) →	Strategy: *Stand-alone* Build integrated platform to ensuring you get to customer data first, Loyalty programs
Natural, Human and Financial Resources, Socio Cultural Aspects	In the automotive sector interactions with the customer are scarce, as cars are only bought every few years.	←(I1;I2;I6) (Ikea, 2023)→	Aftersales interactions, loyalty program, quizzes / moodboards on websites for low-data customers
Knowledge and Awareness	Customers are more aware of leaving their data and consent less easily than before.	←(I2; I6) (Ikea, 2023; I7, Albert Heijn ,2023) →	Strategy: *Awareness campaign* Transparancy, offer more value than the worries and effort are worth Strategy: *Lead-user, formulate product requirements, freemium, marketing*
Company influencing conditions	**Company status**	**Source**	**Niche stategies**
Knowledge and Awarenss of Application and Market, SocioCultural Aspects	Within Company X there are very few attempts at gathering extensive first party data as there is no urgency from the business. Hence CEC, the data department, must show the need for building new data fields with a business case, but are not always mandated to do so by the business.	←(I1;I2;I3:I5;I6;I7)	Executive support, cross-functional teams
Competition, Natural, Human and financial resources	There are 341 legal entities related to Company X. Merging all data processing agreements between entities must be made.	←(I3;I4:I5;I6) (I7;Dremel et al., 2017;Warner & Wagner, 2019) →	Strategy: Restructuring, Executive support, alignment of digital strategy Can be done by appointing a CDO
	Interviewees often answered the lack of human capabilities and capacities. This may be due to the workings of the Company X network as described under price.	←(I1;I2;I4;I5;I6;I7)	Upskilling,
	Company X customers are not asked for a Company X consent.	←(I5;I6)	Strategy: Restructuring, Executive support, alignment of digital strategy
	Data fields from Company X corporations can still be filled in an inadmissible way. For emails for instance: email@email.com or for phone numbers, +31611111 (my mothers number). In this case the owner of the given phone number has not consented themselves. Luckily,The quality of data has significantly ammeliorated in the last years to a data strategy. 44% of data is now clean data linked to a unique customer.	←(I6)	Upskilling
Knowledge and Awareness of Technology	Company X is not aware yet of which of its customers own multiple Company X assets, such as a bike and a car.	← (I3;I4;I6;I10)	

Table 11H: Results in the subsystem of tailoring

TIS categories: *Product Performance and Quality, Customer, Production System, Consumer*	**TIS:** Tailoring may be too aggressive or wrong and irritate/scare away customers.		**Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**

Knowledge and awareness of application and market, Knowledge and awarenes of Technology	A certain level of fluency is expected, too much will deter clients, because it seems creepy. It al depends on when in the customer journey and under which consent & transparancy an offer is to the consumer is placed.	←(I8)	Strategy: *Continuous user engagement, Formulate Requirements*
Knowledge and awareness of technology	Cross-selling is notoriously difficult and silly offers may even cause an adverse reaction of the customer. It is difficult to identify which products match with the current product because customers either know really well what they want, or already have chosen everything they need.	← (I7, I10)	Strategy; *Formulate requirements, Stepping Stone, Cross-selling R&D,*
Knowledge and awareness of technology	A large part of the customer base is often unknown. Generalized offers would provide better results in these cases than (hyper)personalized offers. The problem lies in determining when a customer is 'known-enough' . Also barrier 1.	←(I2, I9)	Strategy: *Do not apply niche strategy,* but offer 'general' version instead or see it as a *Freemium strategy* for the clients that

Table 11I: Results in the subsystem of tailoring

TIS categories: Production System, Network Fromation & Coordination	**TIS:** Content granulation to achieve a layered approach of dynamic content is not at the right level yet. Comparing the current status, the market can make at 'lego-level', but needs to be on 'technical-lego' level. Company X is still on a 'Duplo' level.		**Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Knowledge and Awareness of Technology, Complementary goods & services	Centralized DAM systems and spatial computing could help.	←(I9)	Strategy: Investment, Digital strategy Alignment, R&D , Redesign
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Competition	Company X is bound by certain manufacterers to content to a strict brand image. This means it is difficult to impossible to alter images to suit user specific needs by for instance changing background.	←(I4)	
Natural, Human and Financial resources	Within Company X there are no roles that support a centralized DAM system.	←(I5)	Strategy: Digital Strategy Alignment, Executive Support, Economic / Financial Incentive
Sociocultural Aspects	Company X is dealing with multiple manufacturers / brands. Unifying all content in a central DAM might prove difficult due to the silod infrastructure of the company and the behaviours that come with it.	←(I6)	Strategy: Cross Functional Teams, Executive Support, Economic / Financial Incentive

Table 11J: Results in the subsystem of tailoring

TIS categories: *Product Price, Product perfomance, Network Formation and Coordination*	**TIS:** People may be anxious to get there jobs replaced by AI and automation.		**Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Knowledge and Awareness of Application and Market, Socio Culturel Aspects	Anxious employees might hinder the development process.	←(Correani, 2020) -->	Strategy: Upskilling

Company influencing conditions	Company status	Source	Niche stategies
Natural, Human & Financial Resources, Sociocultural Aspects, Knowledge of Application and Market	While not currently experienced by Company X yet, there are examples within Company X that could inspire this behaviour. For instanc eCompany X.nl's blog content creations showed a decrease from 8000 to 2500 euro per month in production costs.	←(Correani, 2020) -->	Strategy: Upskilling / Education
Natural, Human & Financial Resources, Sociocultural Aspects	Making people redundant is not in line with with the Company X family culture and way of working.	←(Correani, 2020) -->	Strategy: Executive support, Digital alignment

Table 11H: Results in the subsystem of tailoring

TIS categories: Customer, *Product Performance and Quality,*	**TIS:** Customers are expecting better service		**Tailoring**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Sociocultural aspects	Younger generations of consumers prefer subscription models and see less value in actual ownership.	← (Simon Kucher, 2023)	Strategy: Collaborative Product Utilization
Accidents & Events	On top of that, consumers have generally been enticed to shop online more. This was stimulated by the COVID-19 pandemic, and has shown to brought about lasting changes.	← (Simon Kucher, 2023)	Strategy: Redesign, Digital Strategy Alignment
Sociocultural aspects	The younger generation os consumers seem to be less brand loyal, but gravitate more towards who can deliver the best experience to fullfill their needs	← (Simon Kucher, 2023)	*Strategy:*Formulate Requirements, Continuous User Engagemen

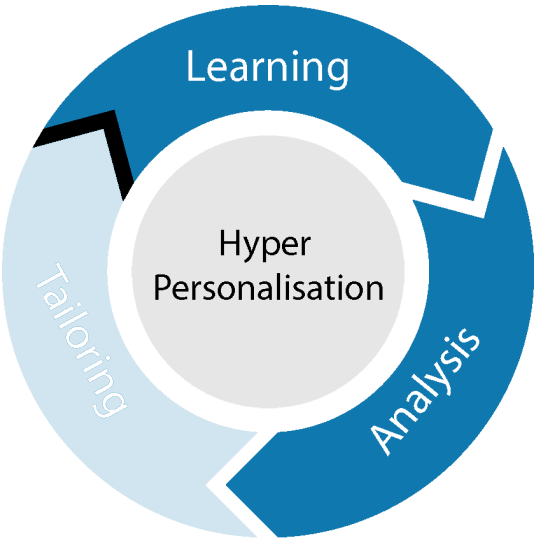


Table 11K: Results in the subsystem of learning & analysis

TIS categories: *Production System, Network Coordination and Formation*	**TIS:** Missing, wrong or inefficient processes.		**Learning & Analysis**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Socio Cultural Aspects, Macro-economic and strategic Aspects	Novel parts of the process design means extra roles such as data asset managers are needed. Data must have a specific owner. Or that roles need new skills like. The speed at which large companies gain these skills & roles is very slow, like a mammot tanker changing direction instead of a speed boat. (sociocultural aspects)	← (I9)	Strategy: *Upskilling / Education, Executive Support*
Company influencing conditions	**Company status**	**Source**	**Niche stategies**
SocioCultural Aspects	Silo'd infrastructures leave engineers spending more time on getting / moving data than on doing something with the available data. Stakeholder management hence plays an enormous role starting and streamlining workflows.	← (I7; I8; I9)	Put a DAM system in place
SocioCultural Aspects	It is difficult to pinpoint where to start in the organization as the company works through a hybrid network/hierarchy model and not all agents are connected with the necessary information or mandate to act.	←(I2;I3)	Strategy: *Executive Support, Cross Functional Teams, Digital Strategy Alignment, Fast Decision Making/Testing*
Knowledge and awareness of Technology, SocioCultural Aspects Natural, Human and Financial Resources	It is unclear what data is needed or even where to start. Company X has only formed the CEC department since .. and the Mobility Innovation department since ..... Furthermore, projects often still start via a 'popcorn-like' structure. Meaning the initiatives pop-up where a division or departments feels like they are of short to medium-term benefit for their piece of the organization. Roadmaps that look further ahead bridging proceedings between entities are few and far in between.	←(I6)	Strategy: *Cross-Functional Teams*
Natural, Human and Financial Resources, Socio Cultural Aspects	While there is a wishlist of to be asked data from the applications, business cases must be made to add additional fields to show the benefit/ extra expected conversion from asking out that extra information from the customer. This means the process is slowed down and does not allow for easy experimentation.	← (I6)	Strategy: *Cross Functional Team, Digital Strategy Alignment, Executive Support*
Knowledge and Awareness of Application and Market, Natural Human & Financial Resources)	'Everybody is said to want furher forms of personalization, but nobody knows where to start.' However, customer segmentation throug GeoMapping is under development and providing solid results in the piloting phase. The inconsistency in answers also shows that	←(I3)	Strategy: *Executive Support, Cross Functional Teams, Digital Strategy Alignment, Upskilling*

	stakeholder management is of importance in this process .		
Network Formation & Coordination	There are 30+ data applications for 341 legal entities within Company X. All with own data field structures. On top of this the legal structures are often reshuffled. Not having process agreements means not being able to share dat between the businesses.	←(I5;I6)	Strategy: *Executive Support, Cross Functional Teams, Digital Strategy Alignment,*
*Knowledge and Awareness of Technology, Market and Application, Socio-Cultural Aspect*s	'Data is our lifeblood, but getting an accurate view of the data that is available through the organization has proven to be very difficult.' Differentiating products to customer needs only happens very little. This is partly due to a lack of competencies or lack of mandate for the engineers due to the structure of pass-through tax. There is no steering on building more capabilities. Although not entirely true, since a new predictive analytics and ecommerce team is buying build. However the team is now hiring more consultants than that there are people working in it. The team is working on updating an algorithm in which it can predict when people want to change cars.	←(I7;I8;I9)	Strategy: *Executive Support, Cross Functional Teams, Digital Strategy Alignment, Upskilling*
Sociocultural Aspects, Natural, Human and Financial Resources	Priority on analytics capacity now goes to pushing out reports about the status of the previous weeks instead of looking at the future.	←(I2;I3)	Strategy: Partnerships, Digital Strategy, Executive Support
Natural, Human and Financial Resources	The new engineer that will be educated on customer profile analytics stilll needs to be educated.	←(I6)	Strategy: Upskilling
Natural, Human and Financial Resources, Knowledge and Awarenss of Technology	While there has been a focus on getting the data quality up, there are questions if the models that should be build upon the data can be maintained and shold be maintained by who. There are questions if the 2035 vision is the right way to move.	←(I5)	Strategy: Digital Strategy Alignment, Executive Support

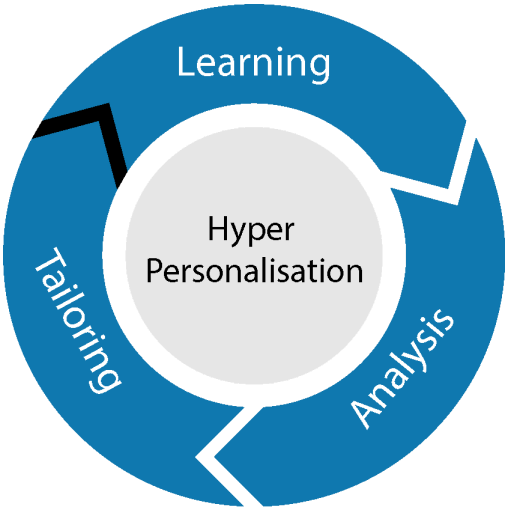


Table 11L: Results in the subsystem of context

TIS categories: *Product Prices, Production Process*	**TIS:** Business case for services as hyperpersonalization are difficult to complete.		**Context**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Knowledge and Awareness of Application and Market	Degree of granulation can become more expensive than the monetary upsides it brings. Hence not all products should be offered in a hyperpersonalized fashion and products to be offered should be chosen with care.	←(I8) (I9)→	Strategy: *Cross functional teams* Work-around: requirement decision tree. This could be continuous user engagement, but made with production journey
Company influencing conditions	**Company status**	**Source**	**Niche stategies**
Knowledge and application of market, Knowledge and application of technology, Socio-Cultural Aspects	It is difficult to put a price on business models that require a yet unknown amount of data collection, for an uncertain price that the customers ask for giving away their data. The business case of such a complex service touches upon many facets of the business, making calculations of investment and stakeholder management an intricate process. Outcomes may vary wildly across industries and type of company within the same industry but also on degree of execution. Therefore results of business cases are not straight forward.	←(I8;I9) →	Strategy: *Digital strategy alignment, Executive support, Cross-functional teams* Leading by vision instead of working by exact computations often speeds up process. Also: *Hybridization*: By seeing if expensive technological investments, for instance in producing CGI images, might serve another business case in the company. For CGI, product explanations have proven useful.

Table 11M: Results in the subsystem of context

TIS categories: *Production System, Network Formation and Coordination*	**TIS:** Wrong or inefficient process design.		**Context**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**

Knowledge and Awareness of Technology, SocioCultural Aspects, Accidents & Events	Not having the right workflows in place amounts to a lot of wasteful content	←(I9)	Strategy: Cross-Functional Teams, Formulate Requirements
Knowledge and Awareness of Technology, Market and Application	Due to generative AI there is going to be a content explosion. Not having the right workflows in place will clog the system.	←(I1;I9)	Strategy: R&D , Hybridization
Knowledge and Awareness of Technology, Market and Application, Socio-Cultural Aspects	You must thoroughly understand what products need to be sold through recommender systems & which do not because it defines your production work flow. If process design is not in order, you cannot ramp your technology eventhough the technology itself could be rampen because you for instance have a different way of producing content. In CGI instead of through photography. This creates extra roles such as DAM	←(I9)	Strategy: Cross-Functional Teams, Formulate Requirements, Continuous User Engagement
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Natural, Human and Financial Resources, Knowledge and Awarenss of Technology	Marketing campanges are now send in hindsight, not directly in real-time from the website. There is interest to do so, but employees are too absorbed in their work to learn new skills.	←(I2;I3;I4)	Strategy: Digital Strategy Alignment, Upskilling
Natural, Human and Financial Resources	The department of e-commerce is still being build and still needs to gain traction with other departments	←(I4)	Strategy: Digital Strategy Alignment, Cross Functional Teams, Executive Support, Economic / Financial Incentive

Table 11N: Results in the subsystem of context

TIS categories: *Network Formation & Coordination, Customer*	**TIS:** Traditional business models are under pressure.		**Context**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Competition	Manufacturers are keeping data more and more to themselves, inhibiting cross-selling of products or reaching out to customers for extensive after sales trajectories.	←(Benckhuijsen, 2023; I1;I2;;I3;I4;I5;I6)	Strategy: Hybridization By making a mobility platform on which consumers land first, before they land on brand specific products may mean the first party data partly becomes from Company X
Competition, Knowledge and Awareness of Technology	Forward integration has become easier with the coming of the internet, but is becoming more and more important now that e-commerce is on the rise amongst consumers. Nike has launched the Consumer Direct Accelartion program to increase Direct-to-Consumer sales and obtain even tighter control over the brand image. Toyota has been known to focus on both backward and forward integration as part	←(Benckhuijsen, 2023; I1;I2;;I3;I4;I5;I6)	Strategy: Hybridization By making a mobility platform on which consumers land first, before they land on brand specific products may mean the first party data partly becomes from Company X

	of its business regimen. While Toyota has always maintained a strict brand image and guidelines for Company X, Company X is now starting to feel the push of Toyota trying to obtain some of her space in the supply chain. In the mean time, vertical integration is also becoming more important for Company X herself. This creates a tension field. However, it is highly likely that Company X will start getting kickback remuneration per sale instead of the business model they now have due to vertical integration of the supply chain. People are more aware that the current business model is under pressure. The oligpoly market is facing new types of competition in the mobility market from either start-ups or large digital native corporations such as Lynk&Co and AmazonVehicles. The performance of hyperpersonalization will depend on how quickly and broadly Company X can position itself in the automotive & mobility market towards its old & upcoming competitors.		
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Socio-cultural aspects, Macro-economic aspects Natural Human and Financial Resources	The Company X fragmented and traditional trading house structure and mentality, is cautious with change and has a tendency to focus on the current goals and targets. This is the classical 'innovation paradox' often experienced by big companies.	← (I3;I5)	Strategy: Digital Strategy Alignment, Executive Support, Economic / Financial Incentive
Macro economic and Strategic Aspects	The 'Mobility for Life' vision / strategy has not been solidified further than a brand promise within the company by the last CEO John Heller. This resonates in the lack of cross-divison KPI's steering on cross-selling, innovation, system integration, novel business models or the accreditation of the Company X2035 vision. The coming of the new CEO, CEO of company X, in augustus 2023 is showing signs of moving in the right direction.	← (I5;I6;I7)	Strategy: Digital Strategy Alignment, Executive Support, Economic / Financial Incentive
Socio-cultural aspects	The Company X family culture is a very prominent thing. There are many people who have worked here and would like to work here for many more years. When threats are felt of losing work or not understanding change people start using old arguments and say silo's are a problem . In this culture people are not often addressed when they do not fullfill agreed upon expectations.	← (I3;I5)	Strategy: Digital Strategy Alignment, Executive Support, Economic / Financial Incentive
Socio-cultural aspects,	People are working on their own little island. There used to be little thinking about combining the true Company X-wide value proposition. The moblity platform did not manage to take-off due to a lack of support. However, the e-commerce and predicitive analytics team have just been started. Category Management is a position that has not been	← (I4;I5;I6)	Strategy: Executive Support, Cross Functional Teams. Category Management meetings might be useful to support the newly founded e-commerce department.

	created yet, but often does exists in these types of environments.		
Socio-cultural aspects,	Often the implementation phase of a project where it is secured in the organization is missed when working with external partners.	← (I5)	Strategy: Initiate training
Socio-cultural aspects, Macro-Economic Aspects & Strategy	Colleagues exhibit quite specialistic or practical skills, but the vision or strategy is sometimes lacking. This makes sense due to the nature of how Company X has developed over the last years. It is therefore a challenge in getting everybody to act along a vision such as Company X2035.	← (I5)	Digital Strategy Alignment, Executive Support, Economic / Financial Incentive, Cross Functional Teams
Socio-cultural aspects,	Horizontal integration is key towards reaching the 'Mobility for life' vision of Company X. While all product categories are sold separately, integrating them within Company X has proven difficult due to the company structure. The company structure, while assumed to be hierarchical at first point of view is actually a hybrid between a network and a hierarchical structure. On top of that, the family culture must be taken into conserderation.	←(I1;I4;I5;I6)	Digital Strategy Alignment, Executive Support, Economic / Financial Incentive, Cross Functional Teams
Natural, Human & Financial Aspects, Macro-economic Aspects & Strategy	The price of manufacturing mobility products such as cars or bicycles is rising due to an increase in price in natural and human resources. Hence the prices of the cars and bicycles also rise. This ensures less people from the poorest segments can afford mobility. In that same line of reasoning, as wages have increased, the services delivered from the workshops are also under pressure.	← (I4;I10)	Strategy: Cost-Reduction, Top-end, Redesign, Hybridization

Table 11O: Results in the subsystem of context

TIS categories: Innovation Specific Institutions	**TIS:** The European business climate is not as favourable as the USA or Asia		**Context**
Market influencing conditions	**Market status**	**Source**	**Niche stategies**
Natural, Human & Financial Aspects, Macro-economic Aspects & Strategy	American tooling has been in front of European tooling. This is due to the less favourable business climate, with smaller investment and less risks.	← (I1)	*Strategy; Investment, R&D , Partnerships, Subsidizing, Guaranteed market, Liberalizing the market*
Natural, Human & Financial Aspects, Macro-economic Aspects & Strategy, Knowledge and Awareness of Technology	Dutch educational facilities are above par with all of the more than 25 relational master studies rank between 0.5 and 3% on the world ranking (Studyportals Masters, 2023). However, interviewees have indicated that focus lies less on actual development skills.	←(I1)	*Strategy; Investment, Partnerships, Subsidizing, Education*

Macro-Economic and Strategic Aspects, Accidents and Events	The EU AI Act 2024 proscribes that all AI generated content, whether it be text, audio or visuals, must be labelled to be AI. Furthermore, companies must undergo certain safety steps depending on the case of application. This means compliance protocols must be established within corporations such as Company X. Depending on vision & knowledgeability some applications might then not be deemed feasible / wish-able for a company. Furthermore it might lead to customers not accepting AI generated content for a certain period of time and might come with a plateau in developments around AI tooling.	← (I1)	*Strategy: Awareness campaign, education, Dedicated system*
Company Influencing Conditions	**Company Status**	**Source**	**Strategy**
Macro-Economic and Strategic Aspects, SocioCultural Aspects	The innovation specific institutions within Company X can be seen as the high over governing bodies withing the companies. That have influence on the right of existence of a service or the direction it developed in, and will do so based on its level of understanding of a certain topic. Within Company X three of such organs have been detected. The Executive Board and the Excutive Committee. This committee formally chooses or blocks certain directions by (not) granting financial resources to initiatives. The third is the DAC, Data Acquisition Committee. This group of both internal employees and consultants ensures security and compliance measures are within regulations and safety standards for the company. Their judgments are seen as final and are well respected within the netwerk setting of Company X.	← (I5;I6)	*Strategy: Upskilling*

Appendix J: Market status vs company status

This appendix shows the difference between the market status(blue outline) and the company status (gray outline). Figure 30 sets apart the status as perceived by interviewees and the literature. Interviewees were asked to rate each building block and influencing condition that occurred in their interview question on a scale from 1 to 5 as can be seen in Figure 29. The scale was chosen from 1 to 5 as it was thought to match the granularity level of the interviews.

Figure 28: Rating scale for building blocks and influencing conditions

Market status indicates the possibilities for hyperpersonalization in the automotive industry even though sometimes not applied yet in practice. An illustration of an unfulfilled possibility can be found in the subsystem of learning under the influencing condition of 'knowledge and awareness of technology'. While recommender systems are not mainstream in the automotive market, well performing algorithms can be found in other ecommerce industries as well and are most likely applicable here too. The reason they are not applied lies in the fact that vehicles are just beginning to be sold online and hence the automotive industry is lagging behind on what is already technologically possible.

For the company status, aspects (partly) belonging to the subsystem of context are displayed in red. These include the building blocks of production system, network formation and coordination, innovation specific institutions and the influencing conditions of financial resources, macro-economic and strategic aspects and socio-cultural. An example is the one of production system, an overarching IT infrastructure must be implemented that binds the subsystems together. Similarly, a digital strategy falling in the block of macro-economic aspects and strategy is needed to steer socio-cultural aspects.

Lastly it must be pointed out that not all building blocks or influencing conditions were mentioned or specifically rated in the interviews. As a result, some building blocks were left empty. Other ratings were extracted from the literature review that took place before the interviews and were not repeated in the interviews as time was limited. An example is found for accidents in complementary products and services on the analysis level. As described in Section 3.1 current AI computations are costly, slow and unsustainable due to their energy usage. Hence, new computational chips such as quantum chips need to be researched to enable deep learning algorithms to make more granular recommendations. Without this building block large scale diffusion is deemed impossible. Hence the building block receives one star in the market, even though it has not been mentioned within interviews Sometimes barriers are not mentioned in interviews because the questions simply were not asked due to time limitations as literature painted a sufficient picture, other times it may point to a lack of knowledge of the subject of the interviewee in that specific region or having unclear interview questions.

Figure 29: Comparison of market and company status on the four subsystems of learning, analysis, tailoring and context from interviews and literature. Blue outline refers to the market status, gray coloring shows Company X's status. The red letters represent (part of) the subsystem of context.

From Figure 30 it can be concluded that hyperpersonalization in general is ahead of Company X. However, it can also be seen by the fact that none of the building blocks reach five stars, the market is still facing significant barriers as well. However, knowledge of the application and main technologies seems present in the market. Gartner's hype cycle as seen in Figure 31 may explain the difference between the positive attitude about the possibilities of hyperpersonalization in the gray literature and actual maturity applications in the market at this point in time (Linden & Fenn, 2003)[4]. Overall, the market status indicates the need for the expectation of multiple niche strategies to circumvent the barriers.

[4] The actual point of existence in the hype cycle, and the relation to the diffusion curve as described by Linden & Fenn (2003) is not investigated in this thesis due to scope limitations.

Furthermore, a difference in readiness can be seen between the three subsystems. A clear focus is seen in the learning part of the analysis. This is typical because of the chosen interviews within the department Y department of Company X and the current status of Company X that is now starting to move from the learning to the analysis subsystem. Furthermore, tailoring often happens with the subsidiary companies within Company X and cannot happen without the systems of learning and tailoring in place. In the market a similar trend is observed. With the coming of generative AI the subsystem of tailoring is expected to catch up fast (I8).

Figure 30: Gartner's hype cycle may explain the positive attitude in gray literature and actual application maturity in the market for hyperpersonalization (Linden & Fenn, 2003). The actual status of hyperpersonalization on the hype cycle is not investigated in this thesis.