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Doing it the Smart Way

An Exploration of Consumer Adoption of New Practices Enabled by Smart Products

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Preface

This master thesis is one of a series of papers and reports published by the Center for Service Innovation (CSI). Centre for Service Innovation (CSI) is a coordinated effort by NHH to focus on the innovation challenges facing the service sector and involves 15 business and academic partners. It aims to increase the quality, efficiency and commercial success of service innovations and to enhance the innovation capabilities of its business and academic partners. CSI is funded through a significant eight year grant from the Research Council of Norway and has recently obtained status as a Centre for Research-based Innovation (SFI).

Abstract

Products across categories are increasingly being attributed with the adjective *smart*. Today, consumers are thus able to purchase everything from smart phones to smart refrigerators and smart toothbrushes. These products have been embedded with technologies which serve to elevate their capabilities and allow them to operate in different ways than non-smart alternatives. As a consequence, smart products can instigate changes to current practices of consumers. The purpose of this thesis is to explore why and how consumers adopt the practices introduced by smart products. This involves gaining an understanding of how consumers perceive such products, investigating their motivations for adopting them and determining what characterises the adoption process. To achieve these goals, the paper employs a qualitative and exploratory approach, which is empirically founded in interviews with consumers, observations and secondary sources. The collected data is interpreted through an institutional lens, which addresses the limitations of seminal adoption frameworks by examining the influence of social constructions on the rational decision-making of the individual and emphasising the impact of context on consumer evaluations of new practices. The study found that smart products are seen as technological advancements which either substitute or provide add-ons to existing practices. Products are more likely to be perceived as smart when they substitute inefficient parts of existing practices or provide add-ons that are congruent with existing practices. In addition, consumers can base their decisions to adopt practices enabled by smart products on social rationales, as they can be used to signal technological competence and wealth, and thereby contribute to preserving or enhancing the social status of the adopter. Reluctance to adopt new practices enabled by smart products arises in contexts where sacredness is attributed to parts of the established practice. New practices that violate the sacredness of established practices are less likely to be adopted. Finally, the paper presents a view of adoption as cyclical transition periods between practices.

Key words: smart products, practices, adoption, institutional theory, context

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This thesis could not have been completed without the extraordinary support of our supervisor, Seidali Kurtmollaiev. While our interest in technology and consumer adoption inspired us to investigate smart products, Seidali introduced us to the field of institutional theory, which came to define our project. His incredible dedication, guidance, and feedback has been crucial for us. Thank you.

At times, this project has pushed our abilities to the very limit. Nevertheless, it has taught us valuable lessons about ourselves and the subjects we have studied. After countless hours spent in libraries, study halls and group rooms, we are proud of our collaboration. Lastly, we would like to thank everyone who participated in the interviews conducted as part of this project.

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1 Introduction

1.1 Background and problem

Figure 1: Promotional pictures of two vacuum cleaners

The Electrolux UltraOne (left) (Electrolux, 2018) and the iRobot Roomba 960 (right) (iRobot, 2017)

The promotional pictures above showcase two different vacuum cleaners. The product on the left, from Swedish appliance manufacturer Electrolux, is called the UltraOne. The product on the right, from American technology company iRobot, is called the Roomba 960. As vacuums, the purpose of the two is fundamentally the same; to clean floors. Their methods for achieving this goal are also comparable, as they both use a centrifugal fan to create a partial vacuum to suck up dust and dirt, passing it through a filter before collecting it in an integrated bin. In retail, the two are often grouped together as part of the same overall category. In fact, if one wanted to purchase either of them, they could be found right next to each other on Elkjøp.no under the headline "Vacuums and cleaning" (Elkjøp, 2018). The UltraOne works in a way familiar to most people; requiring the user to actively maneuver it around the room, directing the nozzle at dust-filled surfaces. According to its manufacturer, it provides "simple handling for problem free cleaning" (Electrolux, 2018) and makes less noise than its predecessors. The Roomba 960, on the other hand, uses built-in microprocessors and sensors to navigate around the house on its own. It can be controlled with a smartphone and set to autonomously clean while the user is doing other things. Similar to Electrolux' description of the UltraOne, iRobot use adjectives like "simple" and "clean" to characterize the Roomba. Unlike their competitor however, they also attribute their product

with the adjective *smart* (iRobot, 2018). While this could be interpreted as simple marketing jargon used in a bid to sell more Roombas, further investigation reveals another story. Typing the words "smart vacuum" into Google image search will thus result in countless pictures of robotic vacuum cleaners in the style of the Roomba, but no traditional vacuum cleaners like the UltraOne. Based on this, the conclusion must be that the Roomba is seen as smart while the UltraOne is not. But why is this the case? The two products are both marketed as efficient tools for cleaning floors and, if used correctly, ultimately produce the same outcome. The qualitative difference between them is therefore, in principle, limited. However, whereas the UltraOne demands active participation by its user, the Roomba can basically operate on its own. This creates a difference in the quantitative amount of effort and time that each vacuum requires of the user. Is this what makes the Roomba smart? And would that mean that the UltraOne is smarter than earlier vacuum cleaners that required more time and effort to use? Or is there more to the equation?

Vacuum cleaners are not the only products with the potential to be considered smart. Today, offerings across an increasing number of different product categories are thus claimed to possess smartness. A cursory web search will reveal the existence of smart phones, smart watches, smart refrigerators, smart thermostats, smart TVs, smart lighting, smart security cameras, smart cars, smart jackets, smart pillows, smart water bottles, smart floors and much more. Given the diversity of these examples, it would appear that any type of product can be made smart. But what does this entail? Academic literature generally agrees that smartness is based on the embedding of computing, networking and sensing technologies into a physical product in order to increase its capabilities. However, while established definitions emphasise capabilities such as autonomy, adaptiveness and proactivity, they are unclear on the extent to which a product must possess these to be considered smart. Consequently, it can in many cases be a difficult task to make an exact distinction between a smart and a non-smart product. In addition, it is unclear whether consumers, the adopters of smart products, have the same understandings of product smartness as those provided by academic literature.

Although confusion remains in identifying the boundary between smart and non-smart, it appears that product smartness will only become more prevalent in the coming years. Statista projects that sales of smart products to the consumer market will increase to more than 3.5 billion by 2020 (Statista, 2018). Still, this does not mean that all smart offerings are destined to emulate the success of the smartphone. In fact, many smart products have so far failed to

catch on with consumers. For example, most people still brush their teeth with manual or electric toothbrushes, even though so-called smart toothbrushes have been introduced to the market. It is therefore relevant, from a marketing point of view, to improve the understanding of consumer adoption of smart products. Several studies have approached the topic by applying seminal frameworks for explaining diffusion and adoption of innovations, like the innovation characteristics (Rogers, 2003) and the technology acceptance model (Davis, 1989). Although these models are still widely used in adoption research, they are characterised by a view of adoption objects as products and standardised services, narrow perspectives on the social influences that guide individual rationality and a lack of deliberation on the role of context in the adoption process. This, we argue, serves to constrain their power in explaining smart product adoption.

Considering the vagueness of academic definitions of product smartness and the limitations of existing adoption frameworks, relatively little has been contributed to the understanding of consumer perceptions of such products and the underlying rationales for adopting them. In other words; in the case of smart products, we know little about *what* is adopted and *why* it is adopted. To address this knowledge gap, we use an exploratory research design and take a novel approach by applying an institutional perspective to smart product adoption. By using qualitative methods such as semi-structured interviews and observations, we investigate consumers' perceptions of smart products and their reasons for adopting them. The collected data is interpreted through an institutional lens that addresses the limitations of existing adoption models by:

1. Viewing the objects of adoption as the new practices introduced by smart products rather than the individual products themselves.
2. Focusing on the social structures (institutions) that determine the legitimacy of consumer behaviour.
3. Considering how context influences perceptions of smartness and adoption of smart products.

The study will use this approach to study the following research question:

Why and how are consumers adopting new practices in the case of using smart products?

By studying this research question, we hope to achieve two main goals; (1) contribute to the understanding of consumer perceptions of smart products, their motivations for adopting the practices enabled by them and how this adoption process takes place, in order to (2) produce useful findings for marketers of smart products.

1.2 Scope of paper

In this paper, we take the approach suggested by Fisher (2018) and look at practices as the objects of adoption. Specific products are therefore used here only to illustrate their enabling or elevation of certain practices, and in cases where they are relevant for discussions about the transition between practices. A practice in this study is defined as the activities a person engages in to accomplishes certain goals or solving problems. These practices are applied within certain contexts. By context, we mean the circumstances or setting in which a practice takes place. For example, a person may engage in the practice of driving a car in the context of transportation or in the context of recreation. Smart products provide both an interesting field in which to study shifts in practices. To keep the study as clear as possible, we deemed it reasonable to limit our discussion to the most accessible examples of practice shifts instigated by smart products (e.g. regular vacuum cleaning versus autonomous vacuum cleaning).

Finally, our primary data has been extracted from a pool of Norwegian participants. Our discussion is therefore mainly focused within Norwegian markets, laws and culture. As a technologically advanced country in which smart products are very much a current phenomenon, Norway provides an appropriate area of study.

1.3 Structure of paper

This paper contains six chapters. Following this introduction (1), we will present various perspectives on smart products in order to formulate our own (2). The theory chapter (3) will describe frameworks widely applied to explain consumer adoption of technology and identify their limitations. Following this, institutional theory will be used to formulate a perspective to address these limitations. The method chapter (4) will describe the methodology used in our research. The findings chapter (5) will then be presented in four parts, resulting in 11 propositions. Finally, the conclusions chapter (6) will consist of theoretical contributions, managerial implications, as well as the study's limitations and our recommendations for future research.

2 Smart products

As early as 1991, the late computer scientist Mark Weiser outlined his vision of ubiquitous computing, also called pervasive computing. The essence of the idea involved the creation of entire environments infused with computing and communicative capabilities that would seamlessly integrate with human living (Satyanarayanan, 2001). Weiser foresaw a future where users unconsciously interact with computers in many different forms to accomplish everyday tasks. In his paper, he predicted that putting computers in the background of everything will make completing tasks faster and easier while also lowering the required mental strain on humans. He suggested that "the most profound technologies are the ones that weave themselves coherently into everyday life until they are indistinguishable from it" and that fitting computational machines into the human environment would have positive practical and sociological benefits (Weiser, 1991). While Weiser's vision was far ahead of the technological capabilities at the time, it served as an early articulation of a future where computers play an integrated role in every aspect of human life. In the decades after Weiser first formulated his vision, hardware technology has evolved significantly, and objects are increasingly being instilled with software and other technology to amplify their capabilities. This has given rise to a new class of products commonly known as smart products.

2.1 Definitions of smart products

In the last two decades, smart products have become an increasingly studied subject in academia. While many authors have provided their own definitions of what constitutes a smart product within different research streams of technology, design and management, no unified definition of the term or the related capabilities exists. The concept of product smartness has thus remained largely ambiguous, as contributions have focused on hardware and technical characteristics (Lee, 2012; Neuhofer, Buhalis, & Ladkin, 2015).

By studying 26 different definitions of smart products from between 2008 and 2012, Gutiérrez, Garbajosa, Diaz, and Yagüe (2013) found the three most cited definitions were from Maass & Janzen (2007), Mühlhauser et. al (2008), and the SmartProducts Consortium, a research project on smart products under the European Commission (Sabou et al., 2009). Through our research into the topic, we have also found other often-cited contributions and capability descriptions from the last two decades. These are shown in Table 1.

Author	Definition
Dhebar, 1996	*"Smart products are physical products that have IT incorporated in them"*
Buurman, 1997	*"Smart products are characterized by having built-in processing power as well as a programmable memory, which allows them some form of self-controlled operation. Most smart products integrate multiple complex functions with several features, which are made accessible to user in more than one way"*
Mass & Janzen, 2007	*"Smart products are hybrids of physical products and information products"* Requirements of capabilities: Situatedness, personalization, adaptiveness, pro-activity, business awareness, network capability
Mühlhäuser, 2008	*"A smart product is an entity (tangible object, software, or service) designed and made for self-organized embedding into different (smart) environments in the course of its life cycle, providing improved simplicity and openness through improved peer-to-user and peer-to-peer interaction by means of context-awareness, semantic self-description, proactive behavior, multimodal natural interfaces, AI planning, and machine learning."*
Sabou et al., 2009	*"A smart product is an autonomous object which is designed for self-organized embedding into different environments in the course of its life-cycle and which allows for a natural product-to-human interaction. Smart products are able to proactively approach the user by using sensing, input, and output capabilities of the environment thus being self-, situational-, and context-aware. The related knowledge and functionality can be shared by and distributed among multiple smart products and emerges over time."*
Rijsdijk and Hultink, 2009	*"Smart products are able to collect, process, and produce information and can be described as 'thinking' for themselves".* Product smartness depends on the extents to which a product possesses one or more of the following dimensions: autonomy, adaptiveness, reactivity, multi-functionality, ability to cooperate, human-like interaction, personality.
Porter and Heppelmann, 2014	*"Smart, connected products have three core elements: physical components, "smart" components, and connectivity components.* Capabilities (building on each other): 1. Monitoring of product conditions and environment 2. Control of functions and personalisation of user experience 3. Optimization of product performance and diagnostics 4. Autonomous product operation.
Schmidt et al., 2015	*"Smart products are products that are capable of doing computations, store data, communicate and interact with their environment. Today's smart products not only provide their identity but also describe their properties, status and history."*

Table 1: Academic definition of smart products and critique

The definition of smart products has evolved as technology has improved. The early conceptualisations thus relate primarily to the general incorporation of information technology into products (Dhebar, 1996). In his 1997 paper on user-centred design, Buurman (1997) states "that smart products are characterized by having built-in processing power as well as a programmable memory, which allows them some form of self-controlled operation." He refers to what he calls 'modern micro-electronic products' as smart products and goes on to list examples such as programmable kitchen appliances, alarm clocks, microwave ovens and remote controlled television sets (Buurman, 1997). While these products, along with many other of today's household products, incorporate some form of IT or are embedded with microprocessors, it is not further elaborated what makes them smart. In addition, it is doubtful whether such products would be considered smart today. Starting in the mid 2000's however, definitions of smart products became specifically centred on the enrichment of physical products with technology that allows them to sense, process and communicate information about themselves, their condition, and their environment. These interpretations of smart products are grounded in three different technologies; sensor technology, computing technology and network technology (Mayer, Volland, Thiesse, & Fleisch, 2011).

1. Sensor technology allows products to collect data. Sensor data constitutes any information which the product is able to receive about itself or its environment and, once collected, can be organized and used for functional purposes. Sensor technologies can include both satellite-based global sensing technology such as GPS, as well as local sensing technologies based on video, radio frequencies and more.
2. Computing technology is instilled in products by embedding them with processors, data storage units, software and machine learning. These semantic technologies allow the product to process the gathered information and facilitate the execution of smart behaviour.
3. Network technologies such as Wi-Fi and Bluetooth enable smart products to be connected to and communicate with other smart products. Machine to machine communication thus facilitates the creation of entire smart environments.

These technologies are often used to distinguish between regular physical products (or non-smart products) and smart products (Mayer et al., 2011). While smart products are still manifested by their physical parts, they are embedded with technology which allows them to

transcend these. In line with this view, Porter and Heppelmann (2014) divides smart products into physical, smart and connectivity components. The physical components comprise the product's mechanical and electrical parts, while the smart component refers to the sensor and computational technology embedded into the product. Finally, the connectivity components are the port and antennas enabling the product to connect to other objects. According to Porter and Heppelmann (2014), *"*the smart components amplify the capabilities and value of the physical components, while the connectivity components increase the capabilities of the smart components and enables some of them to exist outside the physical product itself.*"* In this interpretation, a smart product is a product enriched with layers of technology increasing its capabilities beyond its physical parts.

Although the contributions offer differing descriptions of such smart capabilities, there are significant overlaps among them, as they refer to many of the same concepts. While it would be counterproductive to attempt to create an exhaustive list of the smart product capabilities suggested in the literature, it is possible to identify the main themes. Multiple sources thus describe smart products as being autonomous, context-aware, adaptable to their environment, proactive and able to cooperate with other products. These capabilities are explained and exemplified in Table 2.

Characteristic	**Explanation**	**Example**
Autonomy	The ability to operate in an independent, goal-oriented way.	The Roomba Robot Vacuum is able to vacuum the house on its own without being directed by a human.
Context-awareness/adaptability	The ability to collect information about the environment and infer and act from this raw data.	Philips Hue Automated Lighting can detect whether the user is home or not via the geolocation on their phone and adjust the lighting accordingly.
Proactivity	The ability to make use of the gathered information to engage in proactive behaviour.	The Nest Learning Thermostat is able to automatically adapt the temperature based on previous data collected about user habits and outside temperature.
Cooperation	The ability to form and join networks with other products.	The Tesla Model S can communicate with a smartphone, which allows for

		remote control of its climate control system and monitoring of its location and charge status.

Table 2: Common characteristics of smart products in academic literature

2.2 The perspective on smart products used in this paper

By reviewing the literature on the subject, we found that academic definitions of smart products refer to products infused with technologies enabling them to process information and interact with their environment. This instils them with levels of context-awareness, proactivity, autonomy and cooperability not found in non-smart products. However, while this description provides a general idea of the concept, it is still too vague to be used to definitely categorise products as either smart or non-smart.

Many real-life products utilise technologies or possess capabilities which make it unclear whether they can be classified as smart products. For example, most common washing machines possess processing abilities allowing the user to pick between different washing cycles, which the machine will be able to semi-autonomously complete upon initiation. Also, modern stoves are able to sense whether the active stove tops are being used and react automatically if the user forgot to turn them off. Despite these abilities, it is debatable whether such products can be labelled smart products. Even products commonly identified as smart products like smartphones, autonomous vacuum-cleaners, sensor-based heating and lighting systems and car navigation systems differ in their utilization of smart technologies and, as a result, possess varying degrees of the associated functionalities. The mentioned examples illustrate the fact that the classification of a smart product is not based on any fixed threshold of technology or capabilities. This suggests that smartness should perhaps be viewed as a continuum on which a product can be judged more or less smart depending on its technologies and capabilities.

More importantly, consumers may hold their own ideas about what constitutes a smart product and these understandings can be independent of the technologies and capabilities described in the literature. There may even be cases where consumers perceive a technologically enhanced product as the opposite of smart. For example, some may question the value of fitting a toothbrush with bluetooth connectivity and sensors if this technology

contributes to making the process of brushing your teeth more arduous than it would be with a regular toothbrush. During our research into the topic of smart products, we have encountered several instances where consumers have reacted negatively towards a product because they deemed the embedded technology unnecessary or even damaging to its utility. This illustrates the disconnect that can exist between academic definitions and consumer understandings of smart products.

This paper will therefore adopt an approach which allows consumers to elaborate upon their personal interpretations of smart products. Although academic literature links product smartness to specific technologies and capabilities, we recognize that consumers attach their own meanings to the concept and that these hold value for the study of smart product adoption. Therefore, the perspective on smart products used in this paper will be shaped by the collected data.

3 Theory

Two of the most widely used diffusion and adoption frameworks; the innovation characteristics and the technology acceptance model, have long been applied to research to improve understandings of adoption of new technology. Their parsimoniousness has allowed them to be applied to a wide range of adoption contexts since their formulation in the latter half of the 20th century. A third model, the unified theory of acceptance and use of technology, is the result of an attempt to create a unified view of technology adoption by building on previous frameworks. All three models have previously been applied in studies of smart product adoption.

In the following chapter, we will outline these models and chronicle previous research into smart product adoption, before identifying and reflecting upon the limitations in their perspective. We will consequently present institutional theory and explain how the perspective on adoption used in this paper addresses these limitations.

3.1 Adoption frameworks

3.1.1 Innovation characteristics

Everett Rogers' diffusion theory of innovations is one of the most used theories for studying adoption of new technology and understanding how innovations spread within and between communities. Rogers' theory has been used since the 1960s to study the adoption of a variety of innovations within a multitude of different contexts ranging from agriculture to information technology (Venkatesh, Morris, Davis, & Davis, 2003). Rogers (2003) describes adoption as the decision of *"*full use of an innovation as the best course of action available*"* (p. 12), while diffusion is seen as *"*[...] the process by which an innovation is communicated through certain channels over time among members of a social system" (p. 5). Here, an innovation refers to any idea, process or technology that is perceived as new or unfamiliar by an individual. Because of this unfamiliarity, the adoption and diffusion processes involve degrees of uncertainty and risk, which can only be reduced by the adopter obtaining more information about the innovation. While diffusion theory includes communication channels, time and the social system itself as determinants of adoption and diffusion, its most widely applied contribution are five innovation characteristics, which can help determine an

innovation's rate of adoption in a social system. These are relative advantage, compatibility, complexity, observability and trialability (Rogers, 2003).

- *Relative advantage* is the degree to which the innovation is seen to improve upon the current alternative. It refers to the extent to which the user perceives benefits to adopting an innovation as opposed to not doing so. Relative advantage is thus positively correlated with the individual's willingness to adopt as well as the rate of adoption within the social system.
- *Compatibility* is the degree to which an innovation is perceived as being consistent with the values, needs and past experiences of the potential adopter. The greater the ability of the innovation to integrate or co-exist with these, the greater are the prospects of adoption.
- *Complexity* refers to degree to which an innovation is perceived as being difficult to understand, implement or use. An innovation that is seen as less complex is more likely to be rapidly accepted and adopted by users.
- *Observability* captures the extent to which the benefits of an innovation is visible to adopters. If the benefits of the innovation are easily observable to individuals, they are more likely to adopt it.
- *Trialability* is the extent to which an innovation may be experimented with before adoption. An innovation with a higher trialability is more likely to be adopted.

Roger's innovation characteristics remain an influential construct widely applied in academic literature seeking to investigate and predict adoption of technologies. Supporting evidence for its relevance and predictive validity has been found across multiple studies, and they have been adapted for use in many different fields such as policy-making (Moore & Benbasat, 1991, 1996; Tornatzky & Klein, 1982).

3.1.2 Technology Acceptance Model

Research models seeking to explain technology adoption often do so by examining how users come to accept and use technology. It is thus held that an individual's attitude towards a technology ultimately determines their intention to adopt it. Originating in social psychology, the Theory of Reasoned Action (TRA) is one of the most influential and fundamental theories on human behaviour and has provided the theoretical foundation for this view of adoption.

TRA is founded in the belief that an individual's behaviour (in this case adoption or rejection of technology) is determined by his/her behavioural intentions. These intentions are in turn dictated by the individual's attitudes towards engaging in specific behaviours as well as their subjective norms (Fishbein & Ajzen, 1975; Venkatesh et al., 2003).

The Technology Acceptance Model (TAM) developed by Fred Davis and Richard Bagozzi builds on the underlying assumptions of TRA to explain and predict the adoption of information technology (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). Originally designed to predict technology acceptance and usage in jobs, TAM has become one of the most extensively utilized theoretical adoption models and has been applied to analyse adoption of a diverse set of technologies (Kim & Shin, 2015; Venkatesh et al., 2003). TAM introduces the concepts perceived usefulness and perceived ease of use as the key psychological determinants of user attitude towards a technology and, consequently, their intention to use it. Perceived usefulness is described as *"*the degree to which a person believes that using a particular system would enhance his or her job performance.*"* (Davis, 1989). Perceived ease of use refers to *"*the degree to which a person believes that using a particular system would be free of effort" (ibid.). Perceived usefulness and perceived ease of use are in turn affected by external antecedents.

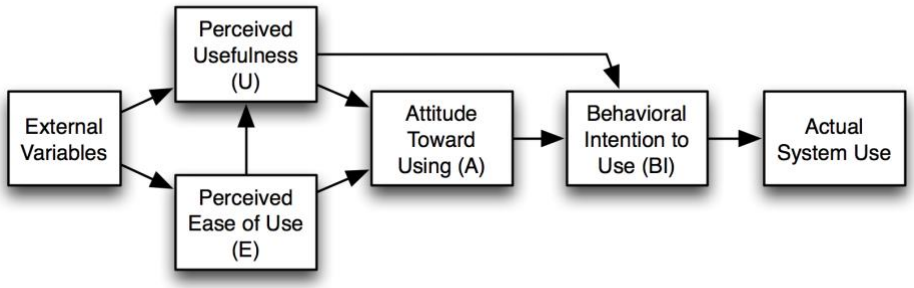

Figure 2: Original TAM

(Davis et al., 1989)

While TAM represents a valid and parsimonious application of the TRA philosophy on technology adoption, it did not originally include subjective norms as an explanatory variable of usage intention. However, Venkatesh and Davis (2000) found that subjective norms do have significant indirect influence on usage intention by affecting perceived usefulness. The framework was consequently extended to include subjective norms as the third explanatory variable in the model. This extension was called TAM2.

3.1.3 Unified Theory of Acceptance and Use of Technology

In 2003, Venkatesh et al. (2003) conducted a review of the existing literature on user acceptance of technology. Eight different models (including the innovation characteristics, TRA and TAM) were compared and tested in an attempt to provide a unified view. In the end, elements from across the models were integrated into a new model called the Unified Theory of Acceptance and Use of Technology (UTAUT). Similar to TRA and TAM, UTAUT hypothesise that behavioural intention leads to behaviour. In the model, three main constructs determine behavioural intention. These are performance expectancy, effort expectancy and social influence (see Table 3) (Venkatesh et al., 2003).

Construct	Definition	Builds on (among others)
Performance expectancy	*"The degree to which an individual believes that using the system will help him or her attain gains in job performance"*	Perceived usefulness (TAM) Relative advantage (innovation characteristics)
Effort expectancy	*"The degree of ease associated with use of the system"*	Perceived ease of use (TAM) Complexity (innovation characteristics)
Social Influence	*"The degree to which an individual perceives it important that others believe that he or she should use the new system"*	Subjective norm (TRA, TAM2)

Table 3: The three constructs that determine behavioural intentions in UTAUT

Adapted from Venkatesh et al. (2003).

The model also includes four moderating variables, which influence the relationships between the main constructs and behavioural intention. These moderating variables include gender, age, experience and voluntariness of use. While relying on much the same constructs as the innovation characteristics and TAM, UTAUT thus represents a more comprehensive framework for providing an understanding of technology acceptance and adoption. It has, however, been criticized for containing too many independent variables at the expense of parsimoniousness (Bagozzi, 2007).

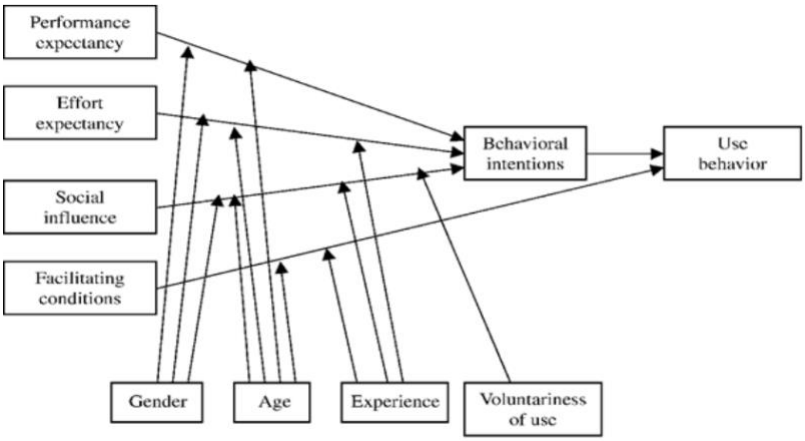

Figure 3: Unified Theory of Acceptance and Use of Technology

(Venkatesh et al., 2003)

By presenting three of the most widely applied frameworks on adoption of technology in the innovation characteristics, TAM, and UTAUT, we have sought to provide an overview of the predominant prism through which the subject is approached in research. The presented models also form the theoretical foundation of several studies into consumer evaluation and adoption of smart products. In the following section, we will review the research done in this area.

3.2 Adoption of smart products

While still considered an emerging topic in literature, the last decade has seen a number of articles studying individual evaluation and adoption of smart products. Although they vary in their objectives and use different types of smart products in their research of consumer behaviour, the majority of the contributions are rooted in the seminal theories of adoption described above.

Rijsdijk and Hultink (2009) tested several products with differing smart capabilities against the innovation characteristics in Rogers' diffusion theory and found that higher levels of product smartness had various positive and negative effects on consumer evaluations across the measured parameters and product categories. While the ambiguous results of the study underlined the methodological difficulties in measuring the isolated effects of product smartness on consumer intention to adopt (it requires a fixed interpretation of product smartness and is heavily influenced by context), they served as a basis for discussing some of the early managerial implications related to smart product design.

Several studies have approached the field of smart product adoption with the viewpoint that existing frameworks need to be adapted or extended for the purpose. Mayer et al. (2011) attempted to fit UTAUT to consumer adoption decisions related to smart home environments by introducing three new moderating factors; importance of the task, personal relevance of the task and the IT innovativeness of the user. The researchers tested the suggested model by putting participants into a smart kitchen environment. They found that of the three suggested moderators, only task importance had a significant effect on the positive relationship between performance expectancy and behavioural intention. Kim and Shin (2015) identified several psychological determinants of smartwatch adoption such as emotional affect, subcultural appeal and costs, and integrated them as antecedents of attitudes and behavioural intention in an extension of TAM. Mani and Chouk (2017) also used smartwatches to test the underlying drivers of consumer resistance to smart products. Using reversed constructs from the existing adoption models in addition to other variables, they found that perceived uselessness, price, novelty and intrusiveness of the product as well as the self-efficacy of the user had positive relationships with resistance to adopt smartwatches.

3.2.1 Reflections on use of existing research models

Most research done on smart product adoption has to varying extents been based on the theories from adoption and diffusion literature described earlier in this chapter. The innovation characteristics in diffusion theory as well as TAM and UTAUT have been utilized to provide theoretical foundations for studies of smart product evaluation and adoption. However, while these models constitute relatively simple explanatory models, their parsimoniousness also contribute to limitations in perspective. These limitations relate to the following points:

Existing models look at individual rationality rather than the sources of this rationalization

While several of the frameworks include social aspects as a determinant of adoption decisions (i.e. subjective norm in TRA and TAM2, social influence in UTAUT), this is mostly related to a view of social influences as either a constraint or a force on the individual decision maker originating from the people whose opinions are important to them. Although such interpersonal norms can have an important effect on decision making, they are not the only social influence processes that guide adoption and usage decisions (Bagozzi, 2007). The adoption frameworks therefore use a limited perspective on social pressures, while applying

an extensive focus on the personal evaluations of the individual (Shi, Shambare, & Wang, 2008). The innovation characteristics, TAM and UTAUT rely on the rational considerations of individuals in relation to constructs like relative advantage or perceived usefulness, but do not elaborate sufficiently on the social structures that create the boundaries for this rationality. As social actors, consumers will ultimately act out of socially constructed ideas of what is beneficial. For example, there may be socially constructed arguments for perceiving a product as relatively advantageous or useful. A perspective putting further emphasis on the social and cultural pressures that influence consumer behaviour can therefore provide valuable insights into the rationales behind their adoption decisions.

Do not consider the importance of immediate context

Context plays an important role when consumers evaluate whether to adopt a product. While potential adopters may find a product to be useful or relatively advantageous in certain contexts, this is likely to change depending on circumstance. By testing smart products against alterations of the established frameworks of adoption theory, the existing research implicitly assumes that adopters are able to determine a fixed evaluation of a product or practice across all usage situations. This ignores the possibility of evaluations differing according to the context of use. For example, a smart autonomous vacuum cleaner may be regarded as useful in situations involving light housekeeping, but not in scenarios where one has to hurriedly prepare the house for dinner guests. Another example is a smart autonomous car which may be considered a better alternative during rush hour on the daily commute to work but will not provide the pleasure associated with a Sunday drive in the countryside. The assumption that a new product or practice will be evaluated consistently regardless of context does not adequately reflect reality. A product may thus be considered smart in one situation, but not in others, and a lack of attention to the influence of usage context therefore limits the explanatory power of the existing research done on the adoption of smart products and the practices enabled by them.

This paper will attempt to explore the influences of social structures and context on the adoption of practices introduced by smart products. To do this, we will apply an institutional perspective involving the concepts of legitimacy and institutional logics.

3.3 Institutional theory

Institutional theory concerns the understanding of the deeper social structures, or institutions, which govern the behaviour of individuals and organisations. Institutions are defined by Scott (1995) as *"*social structures that have attained a high degree of resilience*"*. Once established, institutions become authoritative guidelines for attitudes, beliefs and behaviours of the actors within them. These guidelines are taken for granted by actors, who may not even realise that their behaviours are partly influenced by the social structures surrounding them. Institutions are composed of schemes, norms, rules and practices which provide stability and meaning to social life (Scott, 1995).

3.3.1 Sources of legitimacy and rationalization

To survive and thrive, actors seek to obtain legitimacy within the given institutional framework. Legitimacy is achieved when the actions of a social actor are perceived as appropriate according to the formal and informal rules of the institution (Suchman, 1995). As a result of the emphasis on gaining legitimacy, isomorphic pressures arise, often leading to conformity among actors. A university, for example, tends to resemble other universities, while developed democratic nations tend to follow the same normative and regulatory requirements. Scott (1995) suggests that social actors face three types of isomorphic pressure, commonly known as the three pillars of institutionalism:

- *Coercive pressure* refers to the formal and informal pressures exerted on social actors to adopt the same attitudes, behaviours and practices by more powerful actors. This can for example be the pressure to adhere to national laws and regulations.
- *Normative pressure* refers to when social actors voluntarily, but unconsciously copy the attitudes, behaviours and practices of other actors in order to gain legitimacy. A social actor will be more likely to imitate an action if that action has been taken by a large number of other actors. This process creates norms and values which describe the established way of acting within the institution.
- *Mimetic pressure* refers to how social actors seek examples of established practices and behaviours of other social actors and copy these to avoid uncertainty. They consciously mimic the actions of other successful actors believing that it will produce the same positive outcomes.

Social actors may therefore rationalise their decisions based on what is considered legitimate within institutions. In other words, depending on the sources of legitimacy within institutions, social actors are driven towards conforming to the isomorphic pressures that arise. Meyer and Scott (1983) categorised influencers of legitimacy in two basic groups: (1) those who have standing and license, derived from the organisation's legitimating account of itself (most commonly the state); and (2) those who have collective authority over what is acceptable theory. For example, on an organisational level, the University of Oslo would bear more authority than the Norwegian Football Association on academic practices. This implies the authoritative hierarchies of such influencers are based on context (i.e. in this case, academic practices). In Suchman (1995) view, legitimacy implies congruence with some socially constructed system of norms, values, beliefs, and definitions. However, it is also argued that there are no fixed gatekeepers of legitimacy. This view holds that legitimacy arises from a collective agreement in society regarding what is considered legitimate, and that no single influencer possess authority over this collective. Various other research have refined these ideas and contributed to the discussion of over time. Greenwood, Oliver, Lawrence, and Meyer (2017) sums up three interrelated perspectives on what influences sources of legitimacy:

- *Legitimacy-granting authorities*, which reflect Meyer and Scott´s (1983) two groups and encompasses both individuals and organisations who have collective authority over what is acceptable theory.
- *The media* comprise all produced media. While a news media outlet or Hollywood studio may be categorised as legitimacy-granting authorities in their own rights, the media is a unique entity which both reflect and influence legitimation in society. It is therefore sensible to treat it as a separate entity.
- *Society-at-large* is often treated in institutional studies of diffusion as a source of legitimacy. This view argues that the more numerous the adopters of a practice, the more widespread its acceptance and the greater its legitimacy.

While social actors within an institution seek to achieve legitimacy based on its rules, norms and values and the pressures they create, institutions seem to operate under some defining *logics* which dictate their content. Sources of legitimacy in any given institution are thus dependent on the inherent logics governing the behaviours in the institution.

3.3.2 Institutional logics

Institutional logics define the content and meaning of institutions. The concept was introduced by Friedland and Alford (1991) who defined society as an interinstitutional system comprised of multiple institutional orders each representing a different set of expectations for social relations and behaviour. They argued that the most important institutional orders of Western societies, such as the capitalistic market, the democratic state, the Christian religion or the nuclear family, each possess a distinct central logic which constitute the institution's organising principles and help actors make sense of the world and construct their actions and identities. To provide examples, they summarise the logic of the capitalistic market as *"*accumulation and the commodification of human activity*"* and that of democracy as *"*participation and the extension of popular control over human activity*"*. According to Friedland and Alford, institutional logics constitute the *"*sets of material practices and symbolic constructions*"* in which an institution is rooted. By engaging in ritual behaviours through tangible *material practices* connected to their lives and needs, actors can concretize and elaborate upon the *symbols* of a given institution. (Johansen & Waldorff, 2017) Democracy, for example, is concretized through voting, while love is concretized through marriage and sexual stimulation. The material practices and symbolic constructions underlying the logic of an institution are available to organisations and individuals to elaborate upon and use to their advantage (Friedland & Alford, 1991).

Thornton and Ocasio (1999) further elaborated upon the concept of institutional logics to comprise *"*the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality*"*. This definition emphasises that the interests, assumptions, values and identities of individuals are entirely embedded within the prevailing institutional logics. While social actors are perceived as at least partially autonomous, their actions are decided in the interplay between their individual agency and the institutional structures in place. Although actors may chase goals like power, status or wealth, the means and ends of their interests are defined by the prevailing institutional logics, as the meaning provided by these both guides and constraints their decision-making. This phenomenon, known as embedded agency, is an underlying assumption of institutional logics. It pertains to the institutional view that the behaviour and cognition of individuals and organisations is ultimately bounded by social structures which

constitute the source of their rationality. Thornton, Ocasio, and Lounsbury (2012) also rejected the idea of Friedland and Alford that institutions possess one central logic. Instead, they argued that different types of logic can co-exist within the same institution. Because of this, frictions between competing logics can instigate agency as individual actors seek to reconcile the different perceptions of their social reality, which can ultimately cause institutional change (Johansen & Waldorff, 2017).

3.3.3 An institutional perspective on adoption of smart products

This paper will leverage institutional theory to address the mentioned shortcomings of the established adoption frameworks and explore consumer adoption of the practices introduced by smart products. This will be done by taking the following measures.

1. Institutions are associated with stable social structures influencing the behaviour of social actors. However, the practices in which social actors engage and the symbols which they consequently reproduce and elaborate upon nevertheless change over time. This can be caused by frictions between established practices and new practices, which can challenge the existing logics and potentially create new ones. In this perspective, smart products can be considered catalysts for change. They introduce new practices, often through a system of complementary services and product ecosystems, that, if adopted, threaten the established material practices and symbolic constructions that make up current institutional logics. The use of such products can thus alter the cognitive maps and belief systems that provide meaning to our social reality. This paper will focus on the adoption of the practices introduced by smart products. It is our hope that using this perspective will allow us to gain more general insight into why and how the adoption of new practices of using smart products takes place.

2. To understand the adoption decisions of consumers, they must be placed within the social contexts that inform them. Institutional theory posits that institutional orders determine the sources of rationalisation. The boundaries of rational choice are thus defined by social constructions. To explain adoption, it is therefore not sufficient to look at individual decision making in isolation. It is also needed to investigate the socially constructed beliefs, rules, norms, assumptions and practices - or institutional

logics - that shape the rationales behind this decision-making. That will be the approach of this paper.

3. Finally, the paper will consider the influence of context on the meaning attached to practices and how this affects the transition between practices. Depending on the context in which it is performed, a practice can be attributed with different meanings. For example, the practice of cooking can on some occasions be performed out of interest and enjoyment, and other times for purely practical reasons. Consequently, context determines the interplay between material practices and the symbolic constructions which they reproduce or elaborate. While using smart products to change the current practices involved in cooking may align with the meaning attached to cooking in certain contexts, this might not be the case in others. Hence, the context with which a practice is associated influences the likelihood that it will be replaced.

4 Method

The purpose of this research project is to explore consumer adoption of new practices through the acquisition of smart products. Since this study focuses on the influence of social structures and pressures in the adoption process, which is not sufficiently covered in existing theory, we deemed the personal reflections of consumers an essential source of data. We have therefore chosen to gain insights from consumer perspectives through individual interviews in addition to participant observation and relevant secondary data sources. The methodological choices made in this paper are based on an interpretivist philosophy which entails valuing and acknowledging the subjective meanings of interviewees and the interpretations made by the researchers (Saunders, Lewis, & Thornhill, 2012).

In an interpretivist view, it is the role of the researcher to adopt an empathetic stance in order to enter the social world of the research subjects and understand the world from their point of view (ibid.). The research project applied an inductive approach seeking to provide new insight, and an exploratory design which consisted of three consecutive, but partly overlapping phases (illustrated in Figure 4). The first phase involved an educative, foundation building stage, where the researchers approached various academic and professional experts. The second phase consisted of a qualitative pre-study, outlining broad themes within the context of smart products and adoption. The third and final phase was a qualitative study seeking to delve deeper into themes discovered in the previous phases. All participants across the three phases can be found in Table 4.

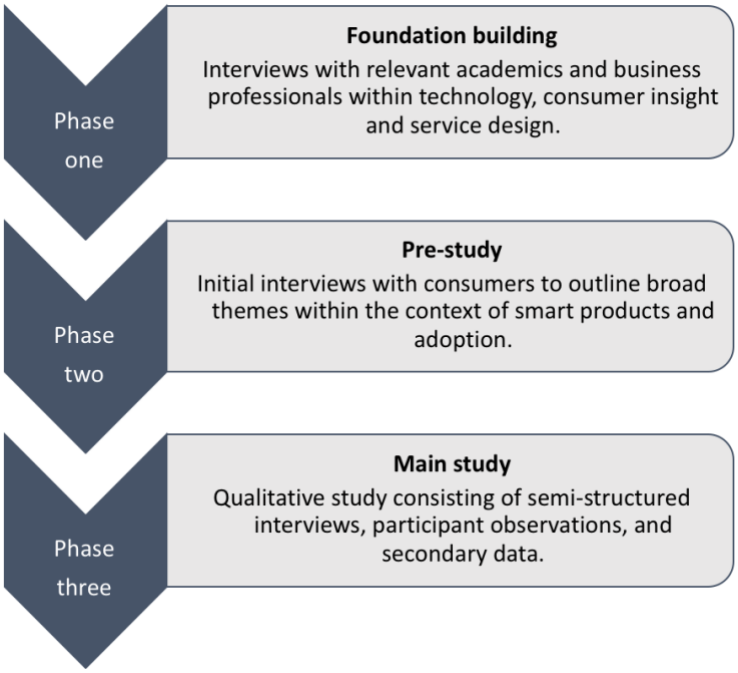

Figure 4: The methodological process

Number	Age	Gender	Occupation	Type	Context	Phase
1	45	Male	Service design professional	Semi-structured interview	Planned, in his office	1
2	31	Male	Product developer (IoT)	Semi-structured interview	Planned, in his office	1
3	60	Male	Professor (digitalisation)	Semi-structured interview	Planned, in his office	1
4	52	Female	Product developer (IoT)	Semi-structured interview	Video chat	1
5	52	Female	Healthcare worker	Semi-structured interview	Planned, in her home	2
6	29	Male	Unemployed	Semi-structured interview	Video chat	2
7	30	Male	Banker	Semi-structured interview	Video chat	2
8	79	Female	Retired accountant	Semi-structured interview	Planned, in her home	2
9	86	Male	Retired farmer	Semi-structured interview	Planned, in his home	2
10	52	Male	Recruitment	Semi-structured interview	Planned, in his home	2
11	22	Male	Student (bachelor, economics)	Semi-structured interview	Planned, group room	2
12	24	Male	Student (master, economics)	Participant observation	Unplanned	3
13	55	Female	Teacher	Semi-structured interview	Video chat	3
14	24	Male	PR Consultant	Semi-structured interview	Video chat	3
15	26	Male	Student (master, finance)	Semi-structured interview	Planned, group room	3

16	24	Male	Student (master, marketing)	Semi-structured interview	Planned, group room	3
17	25	Male	Freelance photographer	Semi-structured interview	Unplanned, over lunch	3
18	28	Female	Leader in sports organisation	Semi-structured interview	Video chat	3
19	40	Male	Hi-fi employee	Participant observation	Unplanned, in store	3
20	25	Male	e-commerce professional (electronics)	Semi-structured interview	Video chat	3
21	32	Female	Manager of a clothing store	Semi-structured interview	Video chat	3
22	35	Female	Stewardess	Semi-structured interview	Video chat	3
23	14	Male	Student (elementary school)	Participant observation	Unplanned	3
24	24	Female	Student (bachelor, management)	Participant observation	Unplanned, in store	3
25	80	Female	Artist (painter)	Semi-structured interview	Video chat	3
26	26	Male	Student (master, accounting)	Semi-structured interview	Video chat	3
27	34	Female	Unemployed	Semi-structured interview	Video chat	3
28	25	Female	Student (bachelor, marketing)	Semi-structured interview	Planned, group room	3
29	25	Male	Customer service	Semi-structured interview	Planned, in his house	3
30	40	Male	Consumer insight expert	Semi-structured interview	Video chat	3

Table 4: List of participants

4.1 Interpretation of concepts

Blumer (1954) argued against the use of definitive concepts in social research, which is characterised by the notion that concepts become fixed through the elaboration of indicators. This is the typical approach to concepts in quantitative research. In qualitative research, however, such an approach may put clear limitations on the social world because the concept in question is seen exclusively in terms of the indicators that have been developed for it (Bryman, 2012). Blumer suggested that social researchers should think about concepts as general senses of reference and guidance in approaching empirical instances. This view is not without flaws, as too general formulations of concepts will likely fail to provide a purposeful starting point (Bryman, 2012). For this reason, the concept of smart products has been covered in this paper's theory section. However, these definitions are used as a point of reference for the project's direction. In our studies, we have let participants express their own meanings and interpretations of concepts without giving detailed definitions in advance, since we believe them to be too vague and diverse. However, when participants have been

incapable of conceptualising what a smart product is, we have referred them to our perspective presented in the theory chapter. In order to understand responses in the context in which they were intended, we would ask the participant to elaborate on certain descriptions and opinions where this was unclear.

In the following sections, the methodological choices made within each phase are described.

4.2 Phase one: Foundation building

When delving into the fields of research encompassing smart products it became clear that, while there is a considerable amount written, there is little consensus regarding how to define concepts and particularly the relationships between them. We decided it would be valuable to our study to investigate the thoughts and opinions among professionals and academics who have experience working with technology in settings like product development and consumer behavioural studies. These investigations took the form of semi-structured, informal interviews following some predefined topics on which the participants were asked their opinions (see Appendix 9.1). Topics included consumer and technology trends, innovation and product development, and consumer adoption and acceptance (in the context of smart products). We conducted interviews with a professor in the field of digitalization and entrepreneurship, a senior employee in a service design consultancy firm, and two product developers in IT and Telecom firms. These participants (1-4 in Table 4) were picked on the basis of several years of experience within their fields. We chose a mixture of backgrounds in order to uncover different viewpoints.

According to Cohen (2006), semi-structured interviews are often preceded by informal, unstructured interviewing in order for the researchers to gain a solid understanding of the topic of interest necessary to create meaningful interview questions. Phase one can therefore be seen as foundation building, which guided the design of our research question and the interview guides used in phase two and three.

4.3 Phase two: Pre-study

We conducted a qualitative pre-study in order to outline broad themes and concepts that consumers associated with smart products and their user experiences. The purpose was to

better understand the underlying feelings and thought processes that individuals go through when evaluating and experiencing practices introduced by smart products.

4.3.1 Semi-structured interviews

The main function of an interview is for the respondents to express their thoughts in their own words (Brewer & Miller, 2003). In order to gain purposeful insights, we chose to conduct one-on-one semi-structured interviews with some predefined themes and key questions, leaving room for exploration and spontaneity. This form of interviewing is useful when attempting to understand the reasons for attitudes and opinions (Saunders et al., 2012). We used an interview guide (Appendix 9.2) in order to remind ourselves of the key topics and questions. In a qualitative interview, the questions asked should be open-ended in order to gain the richest information about attitudes and behaviour. It is therefore discursive, allowing respondents to develop answers in their own terms, length and depth (Brewer & Miller, 2003). The interviews were conducted in isolated environments in order to minimise distractions, either in the subject's own home, in meeting rooms at the Norwegian School of Economics, or through video chats such as Skype and Facetime. Video chats were conducted where practical constraints prohibited a physical meeting. The conversations were audio recorded with consent from the participants, accompanied by thorough note taking.

The interview guide in this pre-study was organised in two subjects: (1) thoughts, interpretations and perceptions of smart things; and (2) the value of products being smart and the distinction between smart and non-smart products. The questions within both subjects were designed with the purpose of letting participants come up with their own examples and attach their own meanings to goals and usage purposes. They also directed special attention towards products that the participant owned or had personal experience with. For example, the following line of questioning seeks to uncover the types of products and functions the participant considered to be related to smart products, and subsequently, towards what purpose or goal he or she would use them, thereby uncovering the context of the relevant practice.

- *Can you think of any examples of things or products you think are smart products or that has smart functions?*
- *Do you own any of these examples?*
- *To what purpose or goals to you use them/it?*

In cases where the participant could not think of examples or did not own any of the examples, it required the interviewer to rephrase or provide another angle for the question. For instance, when participants claimed to not own any smart products, we encouraged them to imagine using one and, consequently, why or why not they would use them. In such cases, we often allowed them to elaborate upon hypothetical situations, where they debated personal and social issues linked to the topic. These discussions often allowed participants to more easily relate and respond to our questions. Once initial understandings of smart products were established, we challenged participants to elaborate further:

- *Can you name examples of things you use that are not smart products?*
- *Why are these not smart products?*
- *What would it take for it to become a smart product?*
- *How would this change the way you use it?*

This required the participant to make the distinction between smart and dumb products by his or her own means. The exploratory nature of these questions allowed us to ask for further elaborations, which again would instigate new discussions revealing relevant and often unexpected information.

4.3.2 Sampling

We were interested in participants who did not work in or study areas such as IT, electronics, engineering, or other fields that would influence their responses with regards to the context of smart products. Our population may therefore be described as Norwegian consumers with no significant occupational knowledge about the subjects being studied. Those who have such experiences have been explicitly marked as "experts" throughout this project and have been treated separately in the analysis.

In qualitative research, purposive sampling methods are often used because the research question gives an indication of what specific types of units need to be sampled (Bryman, 2012). The selection of units in this study was based on the occupational restrictions mentioned earlier, as well as the scope of our research question and practical concerns with regards to our time limit. Our research question specifies consumers as the units of interest and their personal experiences, intentions, and influences as the desired data. The participants

were chosen based on a non-probability, purposive sampling method. This solution enabled us to gather a diverse group of participants in a short period of time and ensure diversity in age, gender and occupational background. Furthermore, the purposive sampling took the form of a snowball technique. Snowballing is a form of purposive sampling where an initial group of participants are used to establish contact with additional participants. An initial group of four participants were asked if they could refer us to others who might participate.

We conducted seven independent one-on-one interviews with participants from different demographics and backgrounds. Additional information on participant characteristics can be found in Table 4 (number 5-11).

4.3.3 Analysis

A common data analysis technique in qualitative research is coding; the process of breaking data into component parts and labelling with appropriate names. In contrast to methods in quantitative analyses, which requires data to fit into preconceived standardised codes, coding in qualitative research means the researcher will allow his or her own interpretations shape the codes that emerge (Bryman, 2012). Traditional coding practices are most commonly found in grounded theory research, where Strauss and Corbin´s (1990) three types of coding practices (i.e. open, axial and selective coding) are the most prominent. Critics of coding practices, however, claim that the approach may lose the context of what is said or observed (Bryman, 2012). Due to the importance of context in this research, our analysis can be better described as thematic analysis. The search for themes is a process found in many qualitative approaches, and while thematic analysis has been criticised for being hard to define, it has seen a significant surge of usage and support in the 21st century (ibid.). A strategy used in thematic analysis is *Framework*, an approach developed by the National Centre for Social Research. This approach is described by Ritchie, Lewis, McNaughton Nicholls, and Ormston (2014) as *"*a matrix based method for ordering and synthesising data." Essentially, after thoroughly examining transcripts and field notes, themes and subthemes are identified (i.e. recurring motifs found in the text). These are then represented along with the participants' answers in a matrix table. Our interview results were organised in transcript summaries based on our notes and recordings. We used a matrix inspired by *Framework* in order to categorise the data into themes arising from our interviews. These themes guided our interview guide for phase three.

4.4 Phase three: Main study

Following the two previous phases, the main study was conducted. Similar to the pre-study, this was a qualitative study based on semi-structured interviewing. However, in addition to interviews, participant observation was conducted, and several secondary data sources was included. Furthermore, this study was more comprehensive, consisting of a significantly larger pool of data. The purpose of the main study was to pursue and delve deeper into the themes discovered in the previous study.

4.4.1 Semi-structured interviews

The semi-structured interviews conducted in this study was assisted by a refined version of our original interview guide (appendix 9.3). The interviews based themselves on the same principles described by Brewer and Miller (2003) and Saunders et al. (2012) that was used in the pre-study. The second interview guide included four subjects, each containing some key questions relating to (1) distinctions between smart and non-smart products and practices; (2) connotations and experiences with smart products; (3) risk and trust issues related to smart product practices; and (4) social influences. These topics emerged as especially interesting as we analysed the results from the previous study.

The purpose of the new opening subject (1) was to investigate how practices change in between transitioning from non-smart to smart. The second topic (2) related to positive and negative connotations and sought to reveal various contexts in which smart products evoked these. The third topic (3) investigated participants' confidence in smart products on different levels. These levels ranged from beliefs about the durability of smart versus non-smart products to how comfortable they were with autonomous products and practices such as self-driving cars. Furthermore, it was investigated what must be in place for participants to trust smart products in different situations. The final topic (4) was included to reveal how social pressures and attitudes affected the participant in adoption processes. As with our previous interviews, the semi-structure format allowed for multiple directions and topics to be developed and discussed.

4.4.2 Participant observation

Observation in social research is generally categorised on two parameters: the degree of participation by the researcher in what is being studied, and the level of awareness subjects

have of being studied (Brewer & Miller, 2003). Overt unobtrusive observation is when the subjects are aware of the researcher who will not interfere in whatever is being observed. Covert observation happens when the researcher observes the subject without revealing that the observation takes place. In our research, we conducted two observational field research instances where we visited electronics stores in the local area. The researcher engaged in conversations with employees and customers. The conversations were unstructured, informal inquiries about certain products and recommendations. For example, an employee was asked what smart products they had in the store, if any, and in what situations they were useful. A customer was asked why she was purchasing a specific product, and whether she had heard good things about it. We did not inform the subjects about our research until the end of the conversation. The observational method can thus be described as partly covert, up until the point where the purpose of our inquiries was revealed. This allowed us to gather data from unaware subjects, and then later observe their change in behaviour and response when aware of our intentions.

4.4.3 Secondary data

A variety of secondary data have been collected and applied in this research. Such data has been used to either exemplify, strengthen, or supplement arguments and interpretations made in relation to our primary data. Our secondary data is mainly sourced from the internet and includes articles from academic journals and news media, virtual documents from public sector organisations, and images from product manufacturers, advertisers and Google search results.

4.4.4 Sampling

Non-probability purposive sampling and snowball sampling was used during the main study similarly to the pre-study. The snowball technique was used during the pre-study, in order to gather an acceptable pool of participants in a reasonable timeframe for the main study. We conducted fifteen one to one semi-structured interviews and four cases of participant observation. Demographics and further information about our sample can be found in Table 4 (number 12-30). Due to the relevance of their professions we have highlighted participant #20 and #30 whenever their quotes are used in the findings.

4.4.5 Analysis

Similarly to the pre-study, we conducted a thematic analysis using Framework when analysing the interviews and observations in the main study. After initial read throughs, the themes outlined in the pre-study developed into several subthemes. All data collected across the three phases of this research was then analysed with these new themes in mind. From this we developed 11 propositions which are presented in the findings.

4.5 Quality of research design

There has been debate among researchers concerning the relevance of traditional criteria, such as reliability and validity, in qualitative research. Even those who maintain their relevance often find themselves altering their meaning from traditional usage in quantitative research (Bryman, 2012). For example, Mason (1996) explains that validity in qualitative research refers to "whether you are observing, identifying, or measuring what you say you are", while Kirk, Miller, and Miller (1986) describes it as "whether there is a good match between researchers' observations and the theoretical ideas they develop". Others suggest that qualitative studies should be evaluated according to other criteria than those of quantitative research (Bryman, 2012). (Guba & Lincoln, 1994, pp. author-year) proposed an alternative to the traditional measurements of research quality where trustworthiness replaces validity and reliability. Trustworthiness resembles reliability and validity but addresses the criticism that these presuppose a single absolute account of social reality. Due to the exploratory nature of this project we will evaluate the quality of research based on trustworthiness. (Bryman, 2012).

4.5.1 Trustworthiness

Trustworthiness concerns four criteria of quality assessment: credibility, transferability, dependability, and confirmability.

Credibility

Establishing the credibility of findings involves ensuring that the research is carried out according to what is considered good practice and submitting research findings to the members of the social world who were studied for confirmation (Bryman, 2012). This project has followed methodological guidelines of qualitative research found in the educational works of Saunders et al. (2012), (Bryman, 2012) and (Brewer & Miller, 2003). The

procedures taken in constructing interview guides, conducting interviews, gathering observations, and analysing our data have all been grounded in guidelines presented by these authors. Furthermore, maintaining the anonymity of participants ensured that responses were as truthful as possible. In order to reduce the probability of misinterpreting responses, the semi-structured interview format allowed the interviewers to ask for clarifications and elaborations during the interview.

Transferability

Since qualitative research often involves the study of a small group or individuals sharing certain characteristics, qualitative findings tend to be related to the contextual uniqueness and significance of the aspect of the social world being studied (Bryman, 2012). Our contextual uniqueness is clearly defined as the adoption of practices through smart products, and our study describes Norwegian consumers with no occupational relationship to IT, electronics or engineering fields as the restrictions for participating (with the exception of field experts). This may pose a problem for the transferability of our research, since the social group studied is of a broad and diverse nature. We have therefore used triangulation with secondary data in order to strengthen the transferability of the findings. Demographic details on the participants have been included so that other researchers may investigate from who the findings were extracted.

Dependability

Dependability relates to consistency and the extent to which the researchers have done sufficient documentation and the quality of this material. (Guba & Lincoln, 1994) suggests such assessment such be done through auditing, where documentation is made available for peers and other researchers to investigate. We have kept documentation in all the steps taken in this project, such as field research notes, transcript notes, and thematic analyses. The interview guides used have been included in the appendix and interviewing style described in the method chapter so that they may be reviewed by other researchers.

Confirmability

Confirmability relates to neutrality and whether the researchers have acted in good faith, and not overtly allowed personal values or theoretical inclinations sway the conduct of the research and the findings deriving from it (Bryman, 2012). The semi-structured format may have allowed the interviewer to influence the direction of the interviews. However, we stress

that the findings presented are based on responses in their original form (translated from Norwegian). Quotes from our interviews are therefore presented in our findings, so that other researchers may assess our interpretations. Where we have been uncertain on the context and meaning of responses, we have contacted participants to ask for elaboration and confirmation.

4.5.2 Ethics

Ethical responsibility is important in all stages of the research process, from designing the study, to recruiting participants, to how they are treated, and to the consequences of their participation (Brewer & Miller, 2003). While differences in opinions have prohibited a single set of ethical rules or prescriptions, they usually tend to revolve around similar issues (ibid.). Firstly, there is the issue of voluntary and informed consent. In our interviews, we have been careful to make interviewees fully aware of what they are participating in. This meant sending them general information on the purpose of our research and what will happen to the data collected from them. This was further emphasised in person before the interview started, where we also asked permission for any sound recordings made in these studies. At the end of the interviews we informed the interviewees that they could request to exit the study and have their data erased at any time. Regarding our participant observations, which were conducted without informing the participants in advance, we stress that the same information was given as soon as the initial conversation was over. They were especially informed about the university we came from, who we were, and how they could contact us in order to exit the study. In these cases, no recordings were made, and no notes were taken until the participant agreed to be included in the study.

The second issue regards anonymity and confidentiality. Throughout our studies we have chosen to anonymise all participants. However, we considered certain demographic information as valuable to the presentation of our findings. We thus asked explicitly for permission to disclose age, gender, and occupation. All data, such as recordings and notes from interviews, details on demographics, and contact information were stored internally on computers with password protection.

One final issue to note on this subject is related to dishonesty and biases. As we conducted our studies and debated among ourselves, we have had many personal hypotheses and theories on what might be going on. Most of these were proven wrong, or we found too little

data in our findings to support them. We have been very careful in not letting personal assumptions get in the way for what is explicitly said in our data, regardless of how exciting they may be. In the end, only those propositions which we could sufficiently support with our data were included in the findings.

5 Findings

The findings will be presented in four parts. An overview is illustrated in Figure 5.

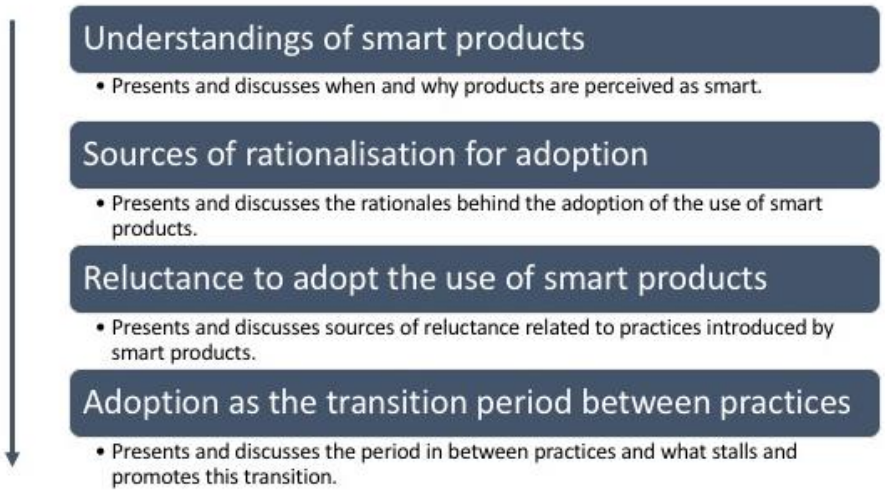

Figure 5: Overview of findings

5.1 Understandings of smart products

Most people base their understanding of smart products on the smartphone. The shift from early mobile phones to smartphones triggered a significant change to many existing practices. The touch screen replaced physical keyboard navigation, while its computational capabilities made it a viable platform for media consumption. In addition, the constant development of new software applications (apps) has allowed smartphones to change or substitute many previously established practices (e.g. buying a ticket for the bus, checking your bank account). As a consequence of their considerable impact on practices, interviewees find it difficult to imagine a life without them.

"I did not think that I needed a smartphone for the first few years it was out, but now I can't imagine life without it." - **#24**

As the widespread adoption of smartphones gained momentum, the practices of the non-smart mobile phones were left behind. Users became accustomed to the practices of the smartphone and abandoned the ways of old, considering them outdated and inefficient.

"I liked my Nokia 3310. But things have evolved, and new functions are needed. I want to be able to do more stuff with my phone, and when I look back upon how happy we were with the limited functionality of the old dumb phones, it kind of feels ridiculous. I would never want to go back to that." **- #18**

As articulated by #18, we have come to expect more from our phones. Although she was previously happy with the practices related to her Nokia 3310, she now considers them dumb and ridiculous. Hence, while early mobile phones were once considered useful and technologically advanced, they are now viewed as relics made obsolete by the introduction of a better alternative. In contrast, smartphones are seen as crucial to modern life.

While the smartphone has effectively changed many of our established practices, this does not explain what exactly constitutes product smartness. What characterises the practices introduced by smart products and how do they differ from their non-smart counterparts? When asked to make this distinction, interviewees often focus on the technological advancements being embedded into products.

"When I hear about a smart product I automatically think it must be some sort of technological upgrade or advancement in that product area." **- #16**

As reflected by #16, a smart product leverages technology to advance certain practices. In order to comprehend what this means, we must break down the concept *technological advancement* and investigate what it means from the perspective of consumers. In the following sections we will therefore examine *technology* and *advancements* separately, to provide a detailed description of the consumer perspective on smart products.

5.1.1 Technology

The literal definition of technology may be formulated as "a manner of accomplishing a task especially using technical processes, methods, or knowledge" (Merriam-Webster, n.d). While present day understandings of the term are often linked to the most recent of humankind's achievements, its connection to ideas of progress, advancement and increased efficiency transcends contemporary society. The term did not appear in the English language until the

17th century, where it was initially used in discussions of applied arts (Buchanan, 2018). However, it can just as conveniently be applied to the sticks-and-stone activities of Stone Age societies as to the means by which Neil Armstrong set foot on the moon. What is particularly relevant in this discussion, however, is the significance of the era preceding the conception of the term - the Renaissance. The Renaissance saw new waves of forward-thinking societies emerge. The development in technology and science, particularly from the 19th century and onwards, showcases the impact of this change in attitude. Consequently, technology has become the foremost tool in the human pursuit of increased productivity and economic growth (Mowery & Rosenberg, 1991). This has been justified by a vast amount of research confirming the correlation between technological development and economic growth (e.g. Carlaw & Lipsey, 2003; Malecki, 1997; Pohjola, 2001; Stiroh, 2001).

In order to understand our interviewees' perspective on technology, however, we must also comprehend the term in its current mainstream interpretation. This interpretation, it seems, differs from the definition of the term presented earlier.

"A smart product is something technological and digital." - **#6**

The above quote from #6 highlights an interesting presentation of smart products as something "technological and digital". When talking to our interviewees, it became clear that when using the term technology, they were referring to modern day computer science techniques and processes, such as digital software and the physical hardware enabling it.

"When I think of smart products I think of things with electricity and software. Things that have technology in them." - **#21**

#21 implies smart products are things which "have technology in them". For her, technology represents the tangible embodiment of modern science. This understanding is not exclusively found in our primary data. Indeed, this view can be found in a variety of other sources. Table 5 and Figure 6 are snapshots of the Western popular media landscape at a specific point in time and do not capture variations over time. However, we argue they serve as reflections of the 21st century zeitgeist and how present day discussions of technology most commonly revolve around solutions, processes and possibilities involving modern computer science.

Table 5 highlights the usage of the word technology in various news articles (i.e. the top five Google news search results).

Source	**Quote**	**Interpretation**
Jones, 2018	Digitisation of the energy sector is a matter of when not if, but with so many new solutions available where do companies start? ... In technology, we speak to the company behind the smart grid inspired by the internet of things which has already connected 900,000 meters to the system	Technology is linked to smart grids, digitisation and the internet of things.
Morgan, 2018	Customer experience is at the root of that trust, and a large part of today's experience comes from technology. However, only 15% of customers say they are satisfied with their insurer's digital experience.	Technology linked to *digital* experiences.
Cheng, 2018	"Internet and Software are pushing Tech capex to 5-year highs," Credit Suisse's Jonathan Golub and his team said in a Monday report that looked at the 55 percent of S&P 500 quarterly reports. They said Google parent Alphabet and Microsoft accounted for much of the increase, along with spending related to cloud computing and semiconductors.	In the context of "technology companies", technology is indirectly linked to cloud computing and semiconductors.
Wong, 2018	As Chinese researchers and chipmakers strive to catch up, the technology is evolving, with new materials transforming the future landscape of the electronics industry. The latest advanced chips are highly complex to make because of their increasingly tiny "nodes," measured in nanometers, that make them faster and more power-efficient.	"Evolving technology" linked to the transformation of the electronics industry and computer chips. This evolution is also assumed to make chips *faster* and more power-*efficient*.
Beavis, 2018	Seattle services sales engineer Chris Connors was fielding inquiries from farmers looking for	Technology in agriculture linked to smartphone "app" integration.

	labour-saving technology. He's selling a satellite-enabled irrigator control panel that can be synchronised with a smart phone app.	

Table 5: Top five Google news stories on search for "technology" on May 3, 2018

Figure 6 provides a visual representation of the Google Image algorithm's response to a search for technology. Computer hardware, ones and zeros, digital interfaces, laptops and tablets. The theme of these images is quite consistent: they all relate to the *bits and data* which contemporary Westerners associate with technology.

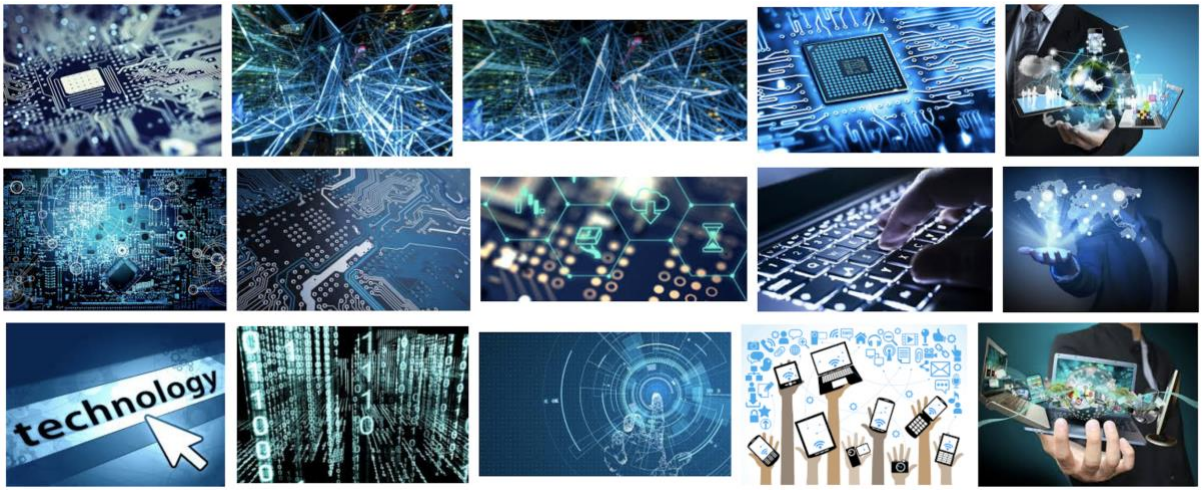

Figure 6: Top Google images on search for "technology" on May 3, 2018

The previous quotes by #6 and #21 highlight the association between smart products and technology in its present mainstream understanding. This understanding is what our interviewees refer to when explaining how technology is integrated into traditional products.

"Smart products put technology in normal things" - **#21**

As evident in the above quote, when discussing smart products, interviewees see technology as something being "put in normal things". From this perspective, infusing products with technology means integrating them with modern science in tangible forms, such as computing hardware. Since technology is inherently associated with increased productivity and progress, consumers may assume this represents an "upgrade" or advancement.

Understanding the nature of such advancements, however, is also essential for explaining the concept of smart products.

5.1.2 Advancements

Smart products offer technological advancements which build on existing practices or create new ones. While some smart products seek to substitute either parts of or entire practices, others provide add-ons on top of existing practices. We propose that the technological advancements offered by smart products may therefore be divided into two categories: technological add-ons and technological substitutions.

Technological add-ons

"Smart fridges can have different lighting at different times of the day and measure what you have left in stock." - **#14**

#14 uses the example of smart fridges to illustrate his understanding of smart products. Smart fridges provide technological add-ons to the established practice related to non-smart fridges. In this case, the add-on takes the form of sensor technology which can, for example, inform the user on the current supply of eggs and alert them when it is time to restock. This provides an additional aspect to traditional usage of fridges but does not remove existing parts of the practice. The smart fridge still requires the consumer to put in and extract their food and beverages, which are kept cool in the same way. Thus, the add-on only offers increased functionality on top of the original practice. However, not all add-ons are necessarily considered beneficial.

"I usually assume a product that becomes smart has had some sort of technical upgrade. But when I think about it now, I guess it depends on the product. Some upgrades make sense, others don't." - **#17**

An important reflection made by #17 is the fact that some upgrades do not make sense to him. A product may be promoted as a smart product as long as it showcases some sort of technical upgrade. However, it is not likely to be perceived as such unless this upgrade proves meaningful to the consumer. Some interviewees alluded to the idea that technological add-ons should be congruent with the practices they are related to.

"Some of these smart things are just stupid. Why would you make a smart toilet or smart water bottle? A smart TV and smartphone make sense because a TV and phone are already technical things." **#27**

While watching TV and using a phone already had "technical" elements before these products became smart, the use of toilets and water bottles are not associated with technology. This may cause scepticism to potential technological add-ons because they are incongruent with the practices associated with these products. However, this does not mean that such products can never come to be considered smart. For example, while the practice of checking the time by looking at your wrist had little to do with the technology currently embedded in smartwatches, traditional watches went through many technological iterations before the introduction of today's smartwatches (exemplified in Figure 7).

Figure 7: Evolution of digital watches (created by authors)

The first digital watch displayed time in a slightly different way than a traditional watch. Over time, additional functionalities were introduced through technological add-ons. In this way, the modern smartwatch was perceived as congruent with the practice of using wearable watches. When #17 stated earlier that "some upgrades make sense, others don't*",* we asked him to elaborate *when* an upgrade makes sense.

"When the product has gone through some natural progression from having no technology into full on smartness" **- #17**

Here, #17 identified "natural progression" as important for a technological add-on to make sense. In his view, an established practice should go through incremental steps, where technology is implemented over time. In the case of smartwatches, for example, the evolution of digital watches had already integrated many of the functions found in smartwatches today over time (e.g. calculators, alarms, digital displays). Due to this "natural progression", the introduction of modern smartwatches felt congruent with what consumers now viewed as established practices related to use of wearable watches. Hence, if the established practice is not associated with technology in some way, it may not make sense to integrate highly technological add-ons right at once.

"If my purse became smart, maybe I could ask it where my lipstick is? But that would just be ridiculous. It would require me to completely change the way I use it. It doesn't make sense."
- #21

Although it constitutes an extreme example, the absurdity of a voice-controlled purse emphasises the importance of congruence between established practices and the technological add-ons being implemented. This discussion results in our first proposition:

Proposition 1: Products which offer technological add-ons that consumers perceive as congruent with established practices are more likely to be considered as smart.

Technological substitutions

"It [a smart vacuum cleaner] *can be automated and adapted to situations."* **- #14**

Based on the description provided by #14, we may say that technology enables a smart vacuum cleaner to automate the practice of vacuuming. In this case, the smart product substitutes the existing practice of manually vacuuming floors by fully automatizing the activity. Where technological add-ons benefit from being congruent with established practices, the success of technological substitutions of practices (i.e. where parts of, or entire practices are substituted by technology) depends the degree of increased efficiency. Before elaborating on how these relationships were uncovered in our interviews, we must first understand the significance of *efficiency* in modern societies.

Today, the pre-eminence of capitalist thinking is so ingrained in most societies that we take the pursuit of increased efficiency for granted. "Modern economics is not a scientific discipline but the rigorous elaboration of a very specific social theory, which has become so deeply embedded in Western thought as to have established itself as no more than common sense" (Clarke, 2005). Thornton et al. (2012) describes the accumulation of profits as a core strategy fostered in the institutional order of the capitalist market. Individual social actors are influenced by the logics of the capitalist market in the same way as organisations. Similar to how industry actors seek to increase economic profits, individuals seek ways to increase personal wealth and quality of life. In order to do so, organisations and individuals look for ways to increase the efficiency of the practices they engage in. Smart products which introduce new practices through technological substitution are therefore likely to be evaluated by consumers based on their ability to increase efficiency relative to existing practices. This was reflected in our interviews, however, the importance of increased efficiency varied with the context in which our interviewees were engaging in the practice.

"Some products are upgraded to smart products, but at the expense of quality. You can get much better sounding non-smart speakers for less money than most smart speakers, like Sonos [smart speaker brand]. *You pay extra for the smartness. I had a sound system which sounded better than the smart speakers I have now. The problem was that it was too complicated for my partner to use. The smart speakers were much more intuitive for her."* - **#20 (e-commerce professional)**

The quote by #20 tells a story of how technological advancements introduced in smart speakers came at the expense of sound quality. While these advancements included several add-ons (e.g. bluetooth connectivity, mobile app integration, voice command functionality, touch screen display), together they substituted the parts of the practice related to starting up and navigating the system. For his partner, the sound quality was deemed less important than the user friendliness provided by the technological advancements.

"The smart speakers were much more user friendly. Especially for young people who are used to controlling things through mobile apps and voice control." - **#20 (e-commerce professional)**

The technological advancements provided by mobile app integration and voice control substituted tiresome, inefficient parts of the practice related to the non-smart stereo system. Rather than navigating the stereo receiver, choosing the right in and outputs, the smart speaker enabled #20 and his partner to simply tell the speaker what to play, or use a familiar interface on their mobile phones. Although #20 would likely have kept his existing stereo speaker had it not been for his partner, he was willing to sacrifice sound quality in order to substitute a part of the practice which was considered inefficient in this context. If #20 was single, he may not have deemed the complicated procedures of analogue stereo speakers as an essential negative to the practice. In other words, the inefficiency of this part of the practice would not be significant enough for him to sacrifice sound quality. However, when living with his significant other, the context is very different. In this context, both of them need to be able to easily navigate and control the system. The old practice is therefore deemed inefficient in this context. This leads us to our second proposition:

Proposition 2: Products which substitute inefficient parts of existing practices with more efficient ones are more likely to be considered as smart.

In our findings, smart products are understood as products which offer technological advancements which either builds on existing practices (i.e. add-ons) and/or replace parts of, or entire existing practices (i.e. substitutions). Add-ons benefit from being congruent with the existing practice, while substitutions are more likely to be considered as smart when they replace inefficient parts of practices with more efficient ones. This view is summarised in Figure 8.

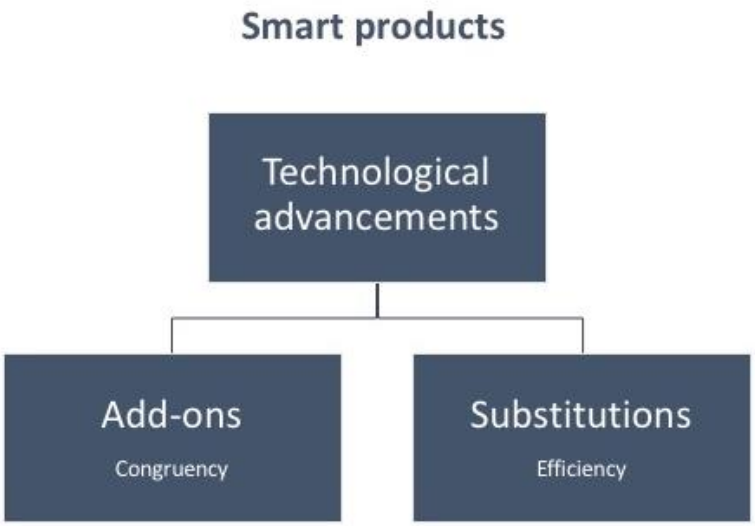

Figure 8: Smart products as technological advancements

5.2 Sources of rationalisation for adoption

Our data suggests that the use of smart products can signal technological competence and wealth, which may be a source of rationalisation for adoption decisions.

5.2.1 Technological competence

Many of our interviewees expressed that smart products made them feel more competent, either by increasing their capabilities or making them more efficient.

"My smartphone makes me as smart as the internet" - **#7**

"My smartwatch saves me time and makes me more efficient" - **#18**

#7 went as far as to say having access to the internet through his smartphone effectively made him as smart as the internet itself. #18 focus on her smartwatch, which saves her time and makes her feel more efficient. Others alluded to some sort of technical barrier, which prohibited them from engaging in practices related to smart products.

"I don't own smart products. I am not technical enough to start learning to use all these things. I feel that it requires some form of technical ability to use them." - **#18**

#18 felt she was "not technical enough" and that it required "technical ability" to use smart products. Indeed, lacking sufficient technical competence seems to make people uncomfortable as they feel unqualified to engage in certain practices. This is illustrated by the following quote.

"There are things I am not comfortable in using. When it becomes too sci-fi I keep my distance. I am not technical enough." - **#21**

There are two points to be made here: (1) some consumers feel smart products increase their competence as efficient or capable actors, and (2) some consumers perceive a technical barrier to adopting the use of smart products. The first point implies that using smart products may make the individual user feel more personally competent, and the second implies others will perceive users of smart products as more technologically competent. As we will uncover throughout this section, technological competence has become an increasingly valuable skill in modern societies. Not only is this expertise valued by employers in the job market, it is also becoming an increasingly admired personal skill in society-at-large as reflected in popular media.

Glorification in popular media

The media's role is twofold since it not only reflects, but also influences society-at-large (Greenwood et al., 2017). In modern Western societies, technological gurus like Elon Musk and Mark Zuckerberg have become global celebrities with their achievements heavily covered in mainstream media. In Figure 9, scenes from the film "The Social Network" (Fincher, 2010) and the television series "Silicon Valley" (McDowell, 2016) shows central characters demonstrating their technological competence on computers in front of audiences. There are certainly similarities between these scenes and the adjacent photographs in which the famous magician, David Blaine, performs a card trick and a street performer juggles in front of excited crowds. All audiences pay close attention as they attempt to follow *the magic* happening in front of them. In every example, a person is showcasing his competence to others.

Figure 9: Comparison between fictional characters and real-life performers in media

(Docklands Festival, n.d.; Fincher, 2010; Gilmour, 2009; Mcdowell, 2016).

In mainstream Western media, the technologically competent are subject to glorification and often depicted in scenes where their competence is on display. While the geeky stereotype of technologically competent people (i.e. introverted personalities with awkward demeanours) still prevail in the productions on the left in Figure 9, they are depicted with admiration rather than something odd. Although it is difficult to assert the level of influence of popular media, we nonetheless argue it is a good reflection of the modern zeitgeist, where technological competence is admired and respected. The increased exposure to tales of success achieved by people possessing such competence is likely to put mimetic pressure on audiences to acquire similar skills if they want to be successful in today's society.

Valuation in the job market

Technological competence is also increasingly valued in job markets. In Table 6, we have listed a range of Norwegian public sector initiatives which illustrate how this trend is influencing, and being influenced by, governmental policies.

Source	Organisation	Practice
Norwegian Labour and Welfare Administration, 2017	Norwegian Labour and Welfare Administration	The digitisation of public services in labour welfare brings mobile and internet applications to citizens, so that they can access applications and other financial services on their smartphones and tablets.
Søviknes, 2017	The Norwegian Government	The implementation of smart meters in Norwegian households marks the beginning of the country's smart grid initiatives.
Bærum kommune (municipality), 2018	Bærum kommune (municipality)	Employees and students in 15 schools throughout Bærum was given smart tablets as part of their education. By the end of 2017 all schools in the municipality was to be included in the project. Projects like these are now initiated in several parts of Norway.
The Norwegian Directorate for Health, 2018	The Norwegian Directorate for Health	The digitisation of the Norwegian healthcare sector brings smart devices like electronic door locks and GPS-enabled safety alarms to the elderly and those responsible for their care.
Bølgan, 2006	Norwegian Ministry of Education and Research	Information and communication technologies are becoming a part of both the employees' and children's activities in Norwegian kindergartens.

Table 6: Public sector "smart initiatives"

Among these initiatives, we find the implementation of smart tablets in the Norwegian educational system at grade school level. The intention to implement smart tablet use in schools nationwide is an example of regulation signalling a commitment by legislators to ensure a technological competent future workforce. We already see some of the effects of this development in our interviews.

"[...] *kids who become familiar with technology early probably have an advantage. I do hear some people say they think it is dangerous for kids to spend too much time on them* [tablets], *but most of my friends my age* [34] *think it's fine, at least in reasonable amounts. So, it's becoming normal and when the schools are using it, it becomes more accepted. I don't want my children to lag behind"* - **#27**

In the above quote, #27 says she "doesn't want her children to lag behind", fearing that they might have less future opportunities if they are not technologically proficient enough. The legislation to integrate tablets in schools creates coercive pressure to develop technological competence. Regardless of whether #27 considers this competence an essential skill, she does not want her children to be at a disadvantage relative to their peers.

The growing integration of new technologies in industry practices has created strong demand for technologically capable workers. Private sector organisations are continuously implementing the use of technology in their activities to greater extents. If not explicitly enforced (e.g. mail carriers and delivery personnel using electronic signature devices), such measures are often imposed through normative pressures. For example, in many professions it is taken for granted that the employee is familiar with the practices of smartphone and tablet use. This is illustrated by this comment from one of our interviewees:

"I could not have the job that I do without a smartphone. I need to be reachable all the time." - **#25**

People identify themselves and others, at least partly, on the basis of their profession and competence (Beijaard, Verloop, & Vermunt, 2000; Fagermoen, 1997; Jesús & Gómez, 2001). The institutional order of *Profession*, as described by Thornton et al. (2012), emphasises personal expertise as the source of legitimacy. It is reasonable to conclude that technological expertise is becoming an increasingly respected trait and source of legitimacy within our social structures, as it becomes increasingly valued in the job market.

As mentioned earlier, interviewees expressed that they thought technical ability was required to use smart products. This implies that users of smart products are to some degree perceived to be technological competent. Consumers may therefore rationalise the adoption of the use of smart products based on their value in signalling such competence. This leads us to our third proposition:

Proposition 3: Consumers who adopt the use of smart products are more likely to be seen as technologically competent. The higher the need to signal technological competence the higher the likelihood of adoption.

5.2.2 Wealth

"You pay extra for the smartness" - **#20 (e-commerce professional)**

As indicated by #20, our findings imply that smart products are seen as inherently more valuable, in monetary terms, compared to non-smart products. This notion is echoed by other interviewees as well.

"I think smart products are more expensive than other things. The more technical it is, the better job it does and the more it costs" - **#18**

"Smart products can do more stuff. The more and better the technology, the more it's worth" **- #24**

#18 explains a higher price for smart products with her perception that they are naturally more "technical", and consequently do a better job. #24 has a similar explanation, where "more and better technology" equals more value. The sentiment seems to be that the more technologically advanced a product is, the more it elevates the practice, which justifies a higher price. Furthermore, interviewees believed that smart products were mostly owned by wealthy people.

"I don't think people who have it [smart products] *have wasted their money, but that there are mostly people with money who buy them"* - **#24**

"The first who gets them [smart products] *are people who think technical things are cool and have money"* - **#20**

Both #24 and #20 have the impression that it is mostly "people with money" who own smart products. Of course, the use of some smart products, such as smartphones, have taken over as the established practice and effectively removed the non-smart alternative from even being considered. In such cases, we may in fact see non-smart alternatives have negative effect on perceived wealth.

"If I had an old Nokia and took it out of my pocket, people would think it was weird. I would be stigmatised. Maybe people might think I don't have money." **- #18**

As reflected in #18's answer, using a non-smart Nokia phone in a time where using smartphones have become standard can have a negative effect on the perception of one's wealth. When the use of smart products becomes established in practices, they may therefore serve as a way of preserving perceptions of one's wealth. For example, smartphones' ability to express wealth is now based on branding instead of its smart label, while non-smart mobile phones may negatively express wealth for the average consumer. In this case, owning a smartphone may simply be required in order to preserve current perceptions of wealth.

As smart products are associated with wealth and higher monetary value than non-smart products, users are able to increase or preserve perceptions of their wealth. This leads us to the following proposition:

Proposition 4: Consumers who adopt the use of smart products are more likely to be seen as wealthy. The higher the need to express wealth the higher the likelihood of adoption.

5.2.3 Social status

Socioeconomic status is usually measured by determining income, education and occupation (Winkleby, Jatulis, Frank, & Fortmann, 1992). Social actors strive to increase their social status and signal this to others through displaying indications of these determinants. Research has found that such display are often done through the possession of expensive products (Gintis, Smith, & Bowles, 2001; Nelissen & Meijers, 2011) and showcasing personal competence (Anderson & Kilduff, 2009). For example, Nelissen and Meijers (2011) found that the display of luxury products enhanced status and produced benefits in social interactions, while Anderson and Kilduff (2009) found individuals compete for status by behaving in ways that suggests high level of competence. The adoption of the use of smart products may therefore be rationalised through consumers' desire to preserve or increase their social status. According to our findings, this is because the use of smart products can signal technological competence and wealth.

- *Technological competence*. The use of smart products can make the user feel more competent as capable and/or efficient social actors, and usage is perceived as requiring technical ability. This enables users of smart products to signal technological competence, a skill glorified in media and valued in an increasing number of occupations, which can influence perceptions of their social status.
- *Wealth*. Smart products are seen as more valuable, in monetary terms, than non-smart products and users are perceived to be people of wealth. Since the accumulation of wealth is a fundamental aspect of the capitalist market logic and a prime indicator of socioeconomic status, using products with higher perceived monetary value can be used to signal social status.

This view is summarised in Figure 10 and results in our fifth proposition:

Proposition 5: By adopting the use of smart products, consumers can preserve or achieve higher social status.

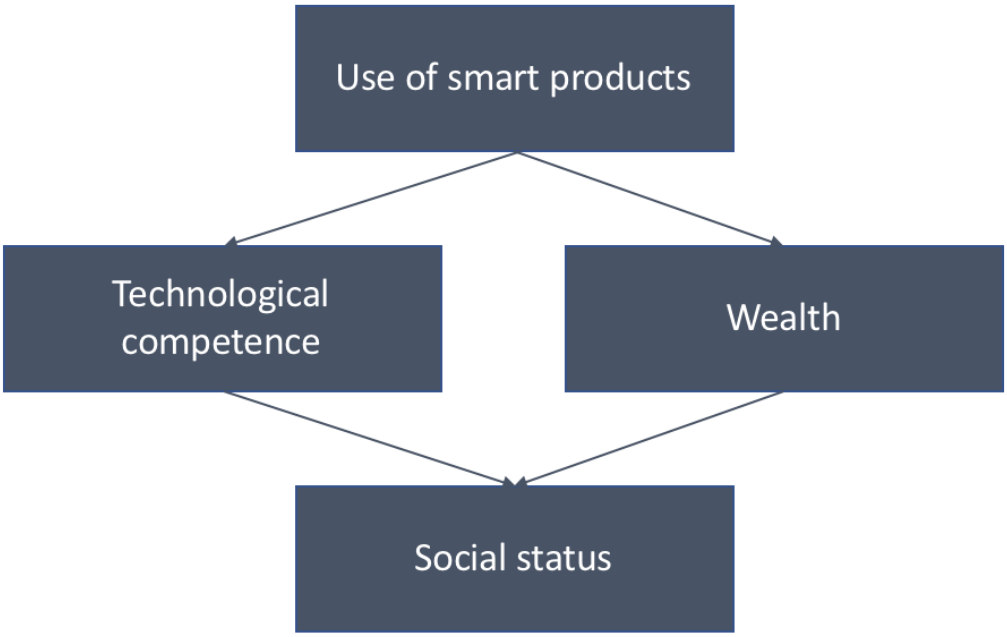

Figure 10: Sources of rationalisation for adopting the use of smart products

5.3 Reluctance to adopt the use of smart products

Smart products represent the use of technology to add to or substitute parts of existing practices. While we have found that consumers may rationalise their adoption of practices related to smart products based on the implications for their perceived social status, it also became evident from the interviews that some contexts trigger a reluctance to adopt these practices.

5.3.1 Five factors of reluctance

We have identified five factors related to consumer reluctance to adopt practices related to smart products; control, empathy/relatedness, ethics, competence and enjoyment.

Control

Some of the most discernible expressions of resistance were related to situations in which consumers were hesitant towards giving up the elements of human control in established practices. This was especially evident when they felt that their safety was at stake. When confronted with the idea of smart passenger planes being able to fly on their own, interviewees articulated a strong uneasiness with the prospect of software replacing humans in the cockpit.

"Smart planes? Forget it. I will never get into a plane without human pilots. It's okay to put on autopilot as long as the pilots can intervene when necessary. But I don't trust it." **- #13**

"I would not have flown in a smart plane. I don't trust the technology. If the task is too important, I don't want to leave it solely to technology." **- #18**

With these remarks, #13 and #18 express deep distrust in the ability of technology to ensure their safety onboard an aircraft. They feel that planes should ultimately be controlled by humans. While autopilot is considered useful, its role must be limited to that of a helpful tool under constant human supervision and control. There should always be the opportunity for pilots to intervene when required. Similar patterns of trust can be identified in respondents' reactions to self-driving cars.

"You want a certain amount of control on the important decisions. You have to be able to intervene and take control of the device if needed. It can't be left completely to its own devices. What if it crashes?" **- #14**

"I am not comfortable with self-driving cars, because I don't trust them. I have seen news articles about them crashing into innocent bystanders, so I don't consider it safe." **- #15**

While commercial airline pilots are required to go through rigorous training to ensure their competence, it requires considerably less effort for a person to obtain a driver's license. In addition, traffic accidents are a much more regular occurrence than plane crashes (and driving is statistically more dangerous than flying), which suggests that human drivers have room for improvement. Still, interviewees #14 and #15 both express a need for retaining a feeling of control when driving. They trust themselves more than a machine to safely navigate in traffic and are therefore sceptical towards a new practice limiting their ability to control the situation at all times.

Flying and driving are examples of contexts in which human control is deemed important. This importance can come from a fundamental distrust in machines to perform crucial tasks (such as ensuring the safety of passengers or navigating traffic), at which humans are perceived more competent. In such situations, consumers react negatively to new practices where human control is reduced and machines are given more autonomy. This suggests the following proposition:

Proposition 6: In contexts where human control is considered central to established practices, consumers are less likely to adopt the use of smart products that reduce this control.

Empathy/relatedness

A reluctance to adopt new practices based on technological advancements was also identified in situations requiring empathy or relatedness. In an op-ed on the future automation of jobs, Anders Kofod-Petersen, a researcher in artificial intelligence at NTNU, describes the inability of machines to exhibit the uniquely human trait of empathy.

"It will not be practical for us to do jobs which machines do better than us. Rather, we should focus on doing the jobs which machines cannot do […] *The human doctor might be worse at providing patients with correct diagnoses than the IBM Watson computer, but the machine is completely helpless in providing human explanations and showing empathy. Similarly, a home care worker may be partly replaced by a robotic vacuum cleaner which is able to clean on its own. Then, the home care worker can focus on talking and empathising with the person, which the robot cannot do."* (Kofod-Petersen, 2015)

While Kofod-Petersen acknowledges that machines can effectively execute tasks like vacuuming and even outperform human doctors in diagnosing patients, he emphasises that they are completely helpless when it comes to showing empathy and creating meaningful connections with people. Therefore, humans should continue to be trusted with tasks that involve empathy, while technology substitutes other parts of practices. This view was echoed and elaborated upon by one of our interviewees, when addressing automation of professions:

"I would not have automated the nursing profession or really anything that has to do with taking care of people. I would not like to lie in a hospital bed and only be looked after by machines - even if that was possible. In those cases, you need the human factor. Even in customer service situations I like talking to humans rather than an automated machine. I want that comfort of knowing that there is a human on the other side." - **#14**

With his first example, #14 expresses a scepticism towards being cared for by technological solutions rather than by human nursing staff. Even if it was possible for machines to replace humans in the physical care of patients, they would still be missing "the human factor" and therefore be considered poor caretakers. This feeling also translates to other situations, as #14 draws comfort from speaking to a human customer service employee rather than to an automatic answering machine. This implies that humans, because of their ability to express empathy and connect with other people, are attributed with a benevolence not associated with machines. In situations where empathy and relatedness are important, such as health care, customer service or teaching, technology is therefore considered a poor substitution for humans. Consequently, consumers are reluctant to adopt new practices in which technology limits or replaces human interaction. This leads to the following proposition:

Proposition 7: In contexts where empathy and relatedness are considered central in established practices, consumers are less likely to adopt the use of smart products that limit or replace human interaction.

Ethics

Machines make decisions based on the instructions in their programming. They depend on a fixed set of rules for acting and reacting in different situations which relinquishes them from the intuitive emotion that often drives human decision-making. This constitutes a reasonable argument for saying that computers would be superior to humans in tackling moral dilemmas as, unlike human beings, machines are not lead astray by cognitive biases or personal feelings. Despite this, the notion that machines might be given free reign over moral decision-making seems to evoke distress for some people. *The Campaign to Stop Killer Robots*, a campaign created by a coalition of international human rights organisations led by the Human Rights Watch, describe their opposition to the development and use of autonomous weapons, capable of selecting and engaging target without human intervention, as a matter of morality.

"Allowing life or death decisions to be made by machines crosses a fundamental moral line. Autonomous robots would lack human judgment and the ability to understand context. These qualities are necessary to make complex ethical choices on a dynamic battlefield, to distinguish adequately between soldiers and civilians, and to evaluate the proportionality of an attack. As a result, fully autonomous weapons would not meet the requirements of the laws of war." (The Campaign To Stop Killer Robots, 2018)

While relating to an extreme scenario, this quote encapsulates the distrust in the ability of machines to tackle ethical dilemmas. They do not possess the human judgment required to make decisions that affect the life and death of human beings. Although "killer robots" are programmed by humans and can be to instructed take action based on careful calculations of the consequences, their autonomy in deciding who lives and who dies is considered fundamentally wrong. Similar deliberations were made by one of our interviewees in relation to autonomous vehicles.

"What if the car loses control and decides to crash into a kindergarten instead of a person on the road? I would not be comfortable with it making its own judgments on who it is best to kill. It seems really weird to leave that to a machine" - **#22**

Like the organisations behind the campaign against autonomous weapons, #22 is dubious of the idea of leaving decisions of who to save, and whom not to save, solely to a machine. She questions the moral authority of the artificial intelligence installed in a self-driving car, which implies that she places more trust in humans to make such decisions. Although an autonomous vehicle will be programmed by human engineers, it is not accepted as an agent capable of making important moral decisions. The reason for this lack of trust may be the method with which the car makes its decision. Everett, Pizarro, and Crockett (2016) have found that people who base their decisions on moral absolutes guided by social emotions like guilt and empathy are deemed more trustworthy. In contrast, engaging in calculations about the costs and benefits of different moral choices is seen as untrustworthy (Jordan, Hoffman, Nowak, & Rand, 2016). For example, a person steadfastly sticking to the principle that killing is wrong, no matter the positive consequences, is more trusted than a person carefully evaluating the costs and benefits of killing one person to save others. Even if an autonomous vehicle would be able to perfectly mimic the ethical decisions of human beings, it would do so through careful calculations rather than a moral intuition following a fixed set of rules about what is right or wrong. It would therefore base its morality on calculus instead of any natural inhibition to kill or hurt human beings, which makes it less trustworthy.

Humans are thus more trusted to make ethical judgments than machines, which makes consumers reluctant to adopt new practices in which such decisions are left to technology. This leads to the following proposition:

Proposition 8: In contexts where established practices require ethical judgements, consumers are less likely to adopt the use of smart products that leave such decisions to technology.

Competence

Another source of opposition towards the use of smart products related to situations in which interviewees felt that the relevance of their acquired competence in performing the existing practice was threatened. This is exemplified by the following quote from a 52-year-old man reflecting on his feelings towards using electronic navigational systems.

"I was not originally a fan of the GPS as part of the sport for me was in navigating by myself. Of course, now that GPS has become so precise and reliable, I would not want to go back to maps and compass. I can ask myself if that has diminished my navigating abilities. Does all the help I get make me less able to find the way on my own? Like, what would happen if someone took the GPS from me now?" **- #10**

#10 took personal pride in being able to navigate by himself and placed a special value on this competence. When electronic navigational systems became available, he was therefore hesitant to adopt the new practice, as it seemed to render his own navigational abilities surplus to requirements. With GPS, and now smartphones, being far more efficient than humans at locating destinations and calculating travel time, the skills required to navigate without technological assistance suddenly became less necessary and relevant. #10 even acknowledges that, after having adopted the use of such devices, he would never want to go back to relying on maps and his own sense of direction. However, he still appears to grieve the loss of personal pride caused by his transition to the new practice.

While #10's story related to a past transition between practices, similar emotional reactions can be found in current contexts. This is illustrated by the following response from a 24-year-old man when asked about his willingness to adopt a hypothetical smart device able to cook meals for him.

"Having a robot cooking for you for you would be nice. But I would not use it always, as I also like being able to cook for my girlfriend and myself. Learning how to make new dishes and becoming better at it. I guess with a cooking robot that would no longer be as necessary" **- #16**

Although he recognizes the convenience of having a machine cook for him, #16 also places value on the process of acquiring his own competence in cooking. He actively seeks to increase his abilities and seems to pride himself on being able to demonstrate these to himself and his girlfriend. Like the man in the previous example, he therefore expresses a degree of hesitance towards fully adopting a practice which he believes would make his own cooking skills surplus to requirements.

These examples illustrate that in contexts where value is placed on specific abilities, reluctance towards adopting new practices that threaten the relevance of these abilities is likely to occur. The perceived value of a competence is the deciding factor in whether such resistance materialises or not. While the interviewees in the above examples were hesitant to adopt new practices out of an attachment to their own skills in navigation and cooking, other people do not place such worth on these skills and are therefore less reluctant to adopt practices making them redundant. This results in the following proposition:

Proposition 9: In contexts where value is placed on a competence tied to an established practice, consumers are less likely to adopt the use of smart products threatening the relevance of this competence.

Enjoyment

When conducting the interviews, it became clear that there were many tasks which people were happy to leave to technology. Vacuuming, toothbrushing, dishwashing, trash collecting, cooking, getting dressed, bill paying, exercising and even shoelace tying were some of the jobs that were mentioned in this regard. Although this comprises a diverse list of activities, the recurring theme was that interviewees were comfortable with, and sometimes even eager to, give up activities which they perceived as necessary but fundamentally uninteresting. While they felt a responsibility to do these chores, the processes involved provided them no inherent intellectual stimulation or enjoyment and were therefore seen as taking away time which could be spent on more interesting activities.

"I hate my vacuum cleaner. It is annoying and wastes my time. I can see the point of it as a way of cleaning the house, but I hate spending time doing it. I would much rather have either a device or a person doing it for me." - **#5**

As #5, a 29-year-old man, talks about the practice of vacuuming, he perfectly illustrates the pattern described above. Although chores hold instrumental value as means to desirable ends (e.g. the act of cleaning the house provides a clean house, toothbrushing provides good dental hygiene), people are not particularly attached to the practices associated with them. #5 would thus be willing to bestow the job of vacuuming upon either another human or a piece of technology, as long as his extrinsic goal of a tidy floor was met. This would release him from the obligation of doing it himself and provide him with more time for other activities.

In contrast to their willingness to give up activities perceived as chores, interviewees were more protective of practices providing them with enjoyment.

"I would never have a machine do my painting for me, that removes the whole point of it. I do it because I get something out of it. I think it is fun. I would not want to paint on an iPad, I have to use a pencil. I want to feel that I made the picture myself. - **#13**

Here #13, a 55-year-old teacher, describes her reluctance to incorporate technology into her hobby of painting. Unlike with chores, her impetus for painting is not the instrumental value of the activity. Rather, she paints because of an interest in the process and the enjoyment that she gets from it. #13's motivations can thus be described as intrinsically founded. Ryan and Deci (2000) define intrinsic motivation as "the doing of an activity for its inherent satisfactions rather than for some separable consequence." When intrinsically motivated, a person acts for the fun or challenge of an activity rather than because of external pressures or rewards. As the source of #13's motivation is the practice itself, she finds that changing it with technology would "remove the whole point" of it. Her attachment to the existing practice is so significant, that she even reacts negatively to the prospect of using an iPad instead of a pencil. She feels that doing so would serve to distance her from the process (i.e. "I want to feel that I have made the picture myself"), which would diminish her enjoyment of the practice.

Interviewees often differed in the activities for which they were intrinsically motivated, as shown by the following quotes.

"I would not be a fan of self-driving cars. It is fine if other people want to use it, but not me. I am a car girl who likes to drive. It makes me happy and I don't want to give up something which enjoy doing." - **#21**

"I would not mind giving up driving [to self-driving cars]*, as there are many other activities that I get enjoyment from. I like cooking, for example, and it would be sad if, in the future, some smart device did it for me, so that I would not get to do it myself."* - **#20 (e-commerce professional)**

#21's enthusiasm for driving is so strong that it seems to be part of her self-image (i.e. "a car girl"). Like with #13 and her painting, #21's interest signals an attachment to the existing practice of driving which makes her reluctant to substitute it with the practice of autonomous vehicles. A self-driving car would thus relegate her from being a driver to being a passenger, thereby removing her from the activity that provides her with enjoyment. In contrast to #21, #20 does not perceive driving as particularly interesting or fun, and "would not mind" substituting it with a better alternative. Instead, he mentions cooking as an activity in which he takes pleasure and, as a result, does not want automatized by technology. According to Ryan and Deci (2000), intrinsic motivation exists in the relation between individuals and activities. People are thus "intrinsically motivated for some activities and not others, and not everyone is intrinsically motivated for any particular task". Because #21 enjoys driving, she reacts negatively to the thought of substituting or changing the current practice in a way that would decrease her enjoyment. #20, however, does not harbour such enthusiasm towards the activity and is therefore more open to the idea of self-driving cars. This illustrates that people are more resistant towards change or substitution of the practices which they enjoy, but also that people enjoy different practices. Resistance towards new practices thus depends on the relation between the individual and the existing practice.

The identified consumer reluctance to change or replace practices that provide them with enjoyment results in the following proposition:

Proposition 10: In contexts where established practices are motivated by enjoyment, consumers are less likely to adopt the use of smart products that threaten this enjoyment.

5.3.2 Sacredness of established practices

The five factors described above represent different contexts in which parts of established practices can become regarded as sacred and, as a consequence of this, are more resistant to change or substitution by smart products. In these situations, consumers react negatively when confronted with new practices that are perceived as threatening the sacred parts of current rituals. When interviewees express uneasiness with the prospect of flying in smart planes, it is because they feel that this practice, by limiting or eliminating the role of human pilots, infringes upon the sacredness of human control found in this context. Similarly,

consumers will be reluctant to adopt new practices that reduce human interaction in contexts where empathy and relatedness are considered sacred. This pattern of consumer reluctance can be identified across all five factors of reluctance.

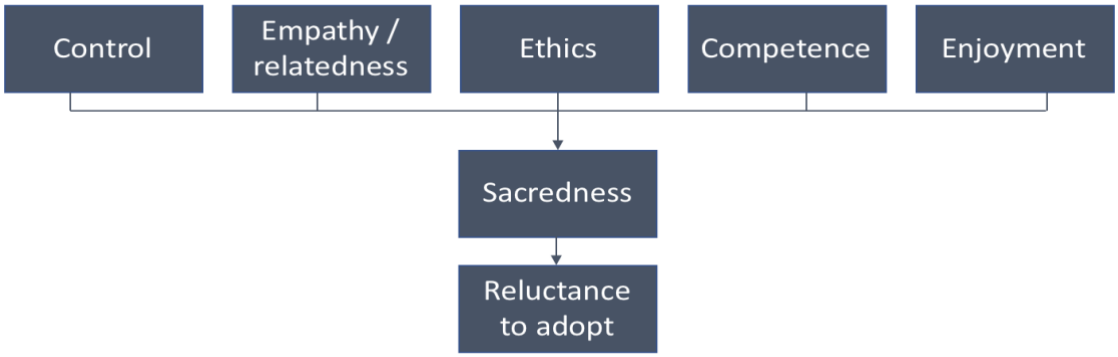

Figure 11: Sources of reluctance to adopt the use of smart products

5.4 Adoption as the transition period between practices

An argument can be made that the 20th century equivalent of smart products were *automatic products*. Like smart products, automatic products also promised to increase efficiency of old practices by technological advancements. Both the automatic and smart dishwasher, illustrated in Figure 12, leverages technology of their respective time periods to justify the labels put on them by marketers. The automatic dishwasher highlights increased efficiency - "completely automatic - just turn one simple control!", "saves time… saves work.... saves water!". The video ad presenting the smart dishwasher argues that "it is designed to keep you connected to your home wherever you go, from the palm of your hand", emphasising ease-of-use and availability. This theme is also reflected in the following ads presented in Figure 13 and 14. The automatic toothbrush is "proved effective" and "cordless", while Kodak's camera has an "electronic eye" which "makes the lens setting for you". The difference worth noting here is the type of technology integrated into these two types of products. While automatic products achieved efficiency through *cogs and wheels*, their smart descendants rely on *bits and data*. However, the adoption process of the automatic age and the current wave of smart product adoption share the same key driver: the pursuit of increased efficiency.

Figure 12: Comparison between ads – 1

Automatic dishwasher (General Electric, 1950), smart dishwasher (Sears Brands, 2018).

Figure 13: Comparison between ads - 2

Automatic toothbrush (General Electric, n.d), smart toothbrush (Procter & Gamble, n.d).

Figure 14: Comparison between ads - 3

Automatic camera (Eastman Kodak Company, n.d), smart camera (Samsung Electronics, n.d).

By drawing these similarities between automatic products and smart products, we attempt to illustrate a perspective on the adoption of new practices as cyclical transition periods. The pursuit of efficiency is an important driver for these periods. As technological breakthroughs offer more productive ways of living shifts in practices are triggered. Because the pursuit of efficiency has become so ingrained in society, even practices considered sacred are likely to eventually be replaced with more efficient ones. With this perspective, the smart product revolution appears inevitable as, similarly to the automatic products of the past, smart products are perceived as making practices more efficient. Over time, as new practices become widely established, consumers seem to take the new standard of efficiency for granted.

"I was born with the internet. I am used to it. The fact that I can buy a ticket with a touch of my finger is just natural to me. Getting my shopping list on my phone and when things communicate with other things. It just limits the time you spend doing unnecessary stuff." - **#11**

At 22 years old, #11 has no time for "unnecessary stuff". Buying tickets "with a touch of his finger" is taken for granted as a natural aspect of his everyday life. When speaking to participants from older generations, we found lingering sentiments for the sacredness of the old practices that preceded such convenience.

"Something was lost when online banking and washing machines came along. I have fond memories of going to the bank, talking to people, getting to know them, and washing clothes with my sisters." **- *#8***

"I used to go to the other farmers in the area to borrow tools and equipment. Every day, we talked with our neighbours. Today all of it happens on phones and the internet" **- *#9***

The sacredness in human interaction (i.e. relatedness/empathy), as pointed out by the 79 and 86-year-old participants in the above quotes, lost out to the efficiency demanded by modern society. There was little they could do about it. Both of them now use online banking and modern smartphones due to its convenience and because family members "pushed them to".

"Now that I'm used to it, online banking is of course a lot more convenient and saves me time. My niece taught me to and pushed me a little in the beginning. When everyone else does it, I don't really see the point of resisting" **- #8**

The sentiment of #8 illustrates the existence of social pressures to conform to modern standards of efficiency. #8 may have lost practices which she considered sacred, but over time has come to appreciate the benefits of her new practices. As pointed out by the following quote from a consumer insight expert, humans have a unique ability to find meaning in their current surroundings.

"It's human nature to find meaning in life. Everything around us is just a frame in which we find meaning. Those who found that meaning twenty years ago feel threatened because they don't fit in today's world, where new meanings have emerged" **- #30 (consumer insight expert)**

The above quote seems to fit with what we have found in our data. Younger consumers who have had less time to establish sacredness in their practices may be less reluctant to adopt new ones. Over time, however, sacredness is eventually altered and applied to new practices as they become established. The smartphone, for example, has produced many new practices which younger generations have applied sacred value.

"My smartphone makes my life easier and I also find much joy in it. It's the way I keep in touch with people and take pictures to preserve good memories" - **#29**

The use of smartphones has become an established practice in society and has managed to attain sacredness, such as the way #29 communicates with others and preserve long lasting memories. There is a pattern emerging from this discussion. The pursuit of efficiency drives people to replace old practices, but over time, sacred value is applied as the new practices become established. These sources of sacredness - be it the need for control, value of personal competence or the sense of enjoyment - subsequently create resistance when new, more efficient practices are eventually offered. This cyclical pattern of adoption repeats itself at the individual practice level (e.g. the transition from using landline telephones, to mobile phones, to smartphones) and at aggregate levels (e.g. the transition from practices related to automatic products to practices related to smart products). Adoption can thus be seen as the transition period between practices. This leads us to our final proposition:

Proposition 11: Adoption is the transition period between practices. The sacredness applied to existing practices stalls transition, while the efficiency of new practices promotes transition.

The view of adoption as cyclical transition periods between practices is illustrated in Figure 15.

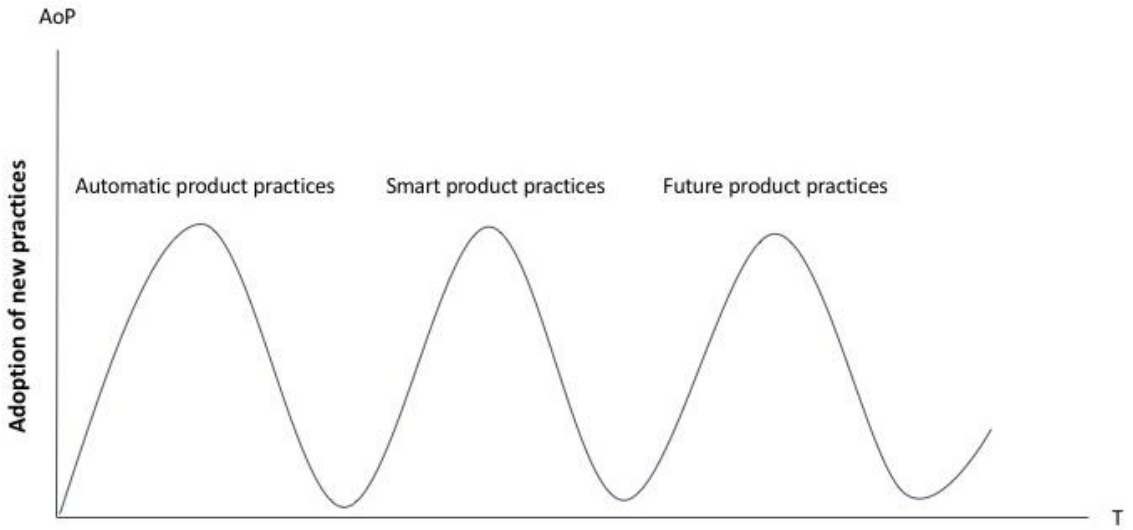

Figure 15: Cyclical transition periods between practices

5.4.1 Becoming the standard

"It [smart products] will probably become the standard." **- #24**

While not all practices introduced by smart products are widely adopted, our findings concur with #24's view that product smartness will eventually become standard in established practices. The pursuit of efficiency will, over time, outcompete the reluctance to change sacred practices. Consequently, smart products will become taken for granted in the practices of modern life.

"I don't really think about the term smart products anymore. They're just natural things now" **- #21**

#21 already considers the use of smart products "natural" and no longer think about them as something new. As this transition continues, the old practices related to non-smart products are likely to become perceived as inefficient and consumers will therefore find it undesirable to persist with these.

"I think that when something becomes the norm, it becomes difficult to go back. If our children never experience cooking food themselves, due to some smart cooking device, they will not see the value of doing it yourself." **- #20 (e-commerce professional)**

When a practice becomes established to the point where normative pressures are put on social actors to conform (e.g. the smartphone), it becomes difficult to maintain old practices. However, while new generations might, as #20 puts it, struggle to see the value of old practices which they never had the chance to experience, these practices might survive in new contexts. Streaming digital music and driving technologically advanced cars are establishing themselves as mainstream practices, but music and car enthusiasts have nevertheless created niche markets for vinyl records and vintage cars. Other practices related to non-smart products may perhaps find similar environments. That being said, they are unlikely to find themselves coming back as widely established practices.

"I listen to vinyl and CDs, but only on special occasions. With digital music you have everything available to you on your smartphone wherever you go. It's just way more convenient." - **#10**

Even #10, who considers himself a music enthusiast, cannot deny the efficiency of digital music and the convenience offered by using smartphones. He has held on to old practices, but only engage in them on "special occasions". However, #10 is old enough (52) to have experienced a time when listening to vinyl and CDs were widely established practices. As articulated by #20, people who have never experienced such a time are less likely to see the value of these practices.

As the practices of automatic products are replaced with those of smart products, so will smart product practices eventually be replaced as technological development instigates further change. The pursuit of efficiency is likely to be an important facilitator for this eventual shift and the sacredness attributed to our established practices will then once again be tested.

6 Conclusions

In this paper, we have attempted to answer the question of why and how consumers adopt new practices introduced by smart products by approaching the subject through an institutional lens. In order to achieve this goal, we have also investigated consumer perceptions of smart products.

Consumers perceive smart products as technological advancements and therefore tie them to current understandings of technology as a tangible embodiment of modern computer science. Smart products are seen as physical products leveraging technology to advance existing practices either by providing add-ons or substituting parts of them. Products are more likely to be perceived as smart when their provided add-ons are congruent with the existing practices or when they substitute parts of existing practices that are considered inefficient.

Decisions to adopt practices related to smart products can be justified through social rationales. Consumers who adopt the use of smart products are more likely to be perceived as technologically competent and wealthy. By using smart products they can thus either preserve or enhance their social status. There are some situations, however, in which consumers express reluctance towards adopting practices related to smart products. Resistance arises in contexts where sacredness is attributed to parts of established practices. This sacredness can relate to factors such as control, empathy, ethics, competence and enjoyment. Consumers are less likely to adopt new practices introduced by smart products when they violate the sacred parts of established practices.

The shift towards the use of smart products shares similarities with the earlier transition towards practices introduced by automatic products. This provides credence to a perspective of adoption as cyclical transition periods between practices. Technological development gives way to waves of new types of practices that will eventually replace existing ones. Driven by a pursuit of efficiency ingrained in the capitalist market logic, consumers will eventually adopt these practices and take them for granted. However, over time, these will also be replaced as future technologies instigate further shifts in established practices. While the sacredness attributed to existing practices can serve to stall these transitions, it seems that consumers will inevitably conform to adopt practices that are considered more efficient.

Number	Proposition
1	Products which offer technological add-ons that consumers perceive as congruent with established practices are more likely to be considered as smart.
2	Products which substitute inefficient parts of existing practices with more efficient ones are more likely to be considered as smart.
3	Consumers who adopt the use of smart products are more likely to be seen as technologically competent. The higher the need to signal technological competence the higher the likelihood of adoption
4	Consumers who adopt the use of smart products are more likely to be seen as wealthy. The higher the need to express wealth the higher the likelihood of adoption.
5	By adopting the use of smart products, consumers can preserve or achieve higher social status.
6	In contexts where human control is considered central to established practices, consumers are less likely to adopt the use of smart products that reduce this control.
7	In contexts where empathy and relatedness are considered central in established practices, consumers are less likely to adopt the use of smart products that limit or replace human interaction.
8	In contexts where established practices require ethical judgements, consumers are less likely to adopt the use of smart products that leave such decisions to technology.
9	In contexts where value is placed on a competence tied to an established practice, consumers are less likely to adopt the use of smart products threatening the relevance of this competence.
10	In contexts where established practices are motivated by enjoyment, consumers are less likely to adopt the use of smart products that threaten this enjoyment.
11	Adoption is the transition period between practices. The sacredness applied to existing practices stalls transition, while the efficiency of new practices promotes transition.

Table 7: List of propositions

6.1 Theoretical contributions

Seminal adoption models - such as the innovation characteristics, TAM and UTAUT - apply an extensive focus on individual decision making. The adoption decisions of consumers are mainly explained by their isolated evaluations according to constructs such as the perceived usefulness and ease-of-use of an innovation. This approach leaves the interpretation of constructs to the individual and does not further examine the underlying rationales behind the assessment of a new product or practice. Additionally, while the models recognise the influence of norms on individual decision-making, they do not put much emphasis on the extent or nature of social influence on adoption. By employing the institutional view that the rationality of social actors is bounded by their surrounding social structures, we have sought to address these shortcomings and contribute to the understanding of consumer adoption. As we link the capitalist market logic to the consumer's strive for increasing efficiency in established practices, we provide an example of how predominant institutional logics affect the adoption decisions of the individual. In addition, our exploration of potential sources of rationalisation inciting consumers to adopt the practices related to smart products (i.e. signalling technological competence and wealth, preserving or enhancing social status) illustrates how adoption decisions can ultimately be based on arguments of social legitimacy. This also contributes to existing perspectives on how new practices are diffused within a social system. As we investigated consumer resistance towards the adoption of smart product practices, we found that, in certain contexts, consumers imbue existing practices with a sacredness that guards them from change or substitution. The concept of sacredness serves as an explanation for consumer reluctance to give up their established practices even when faced with more efficient alternatives. Finally, by introducing the view of adoption as the transition period between practices, we contribute with a new perspective to adoption literature, which considers the cyclical manner in which practices are adopted and replaced.

6.2 Managerial implications

Consumers perceive offerings as smart by assessing the technological advancement (i.e. add-ons and substitutions) they provide to existing practices. Offerings which provide technological add-ons congruent with the existing practice are more likely to be considered smart by consumers. Market researchers and developers should therefore identify the natural next step, in terms of technological advancement, for the given practice. Depending on the

degree of technological integration in the existing practice, technological add-ons should be added in incremental phases. Marketers of smart products designed to substitute existing practices also need to identify the contexts in which target customers apply these practices, as these determine in which parts of the practice the consumer prioritises increased efficiency. This was exemplified by an interviewee and his partner, who replaced stereo speakers with smart speakers. The interviewee preferred the better sounding stereo speakers, but when living with his girlfriend, user friendliness became more important. Marketers should research target segments in order to produce customer personas which captures the needs and wants of these consumers, and the likely context in which they engage in the practice. Contexts should then be tied to the relevant parts of the practice (e.g. in the practice of listening to music: sound quality, user friendliness, compatibility, design). Those parts which are important to the majority of personas should be targeted for increased efficiency through technological substitution.

When developing smart products for the consumer market, firms should be aware of potential resistance among consumers to adopt new practices that leverage technology. Consumers thus apply sacredness to some established practices, which fosters reluctance to replace them. Sacredness can be attributed to practices in situations where: (1) humans are deemed more trustworthy or capable than technology in performing certain tasks, (2) human interaction is an essential part of the practice, (3) ethical judgements are required, (4) value is placed on a competence related to an existing practice, or (5) the practice is intrinsically motivated. Offerings which can offer technological advancement to practices without violating their potential sacredness are more likely to be adopted.

With regards to (1) and (3), sacredness may be respected by maintaining human control and interaction in key decision areas of practices (e.g. the human driver maintaining certain control in self-driving cars). Another approach to addressing potential consumer scepticism can be to demonstrate to them that the technology is capable of solving the given task (e.g. marketing communication showcasing the abilities of an autonomous vehicle). This could potentially serve to alter consumer perceptions of what technology is capable of and limit the sacredness related to human control. In relation to (2), offerings should maintain a level of human interaction in situations where this is considered important (e.g. being able to talk to a person in customer service). However, one may attempt to justify the absence of such interaction by providing sufficiently increased efficiency (e.g. artificially intelligent chatbots

which deals with customers' problems more efficiently than humans). In relation to (4), offerings should preserve parts of practices which require human competence that are valued by consumers (e.g. smart cooking equipment which still require consumer participation). Alternatively, one may focus on providing new practices which the consumers can feel competent in (e.g. graphic design applications on smart tablets which make the consumer feel both creatively and technologically competent). Finally, with regards to (5), new offerings should focus on what parts of the existing practice are intrinsically motivated and make sure not to violate these (e.g. the feeling of satisfaction gained through cooking a good meal).

6.3 Limitations and future research

While we attempted to diversify our group of interviewees according to age, gender and occupation in order to gather insights from different viewpoints, the study does not to any great extent explore possible differences between these social groups. Furthermore, the diversity of participants poses a threat to the generalisability of our findings where secondary data has not been used to support them. Future research should therefore more effectively explore differences between the social groups being studied. Alternatively, researchers may study homogeneous participants in order to find similarities which can be generalised.

We propose both quantitative and qualitative studies may be done to test or further elaborate the criteria and effects of smartness. Quantitative studies may test how smart labels effect price premiums, whether congruent technological add-ons are more likely to be adopted, and which parts of practices produce higher satisfaction levels when made more efficient (e.g. an experiment manipulating sound quality, user interface and design of a smart speaker system). Qualitative studies may further investigate the sacredness of practices, as the five factors found in our data may not be an exhaustive list. Such studies may also look into the expressional power of smart products. While elaborating on their ability to signal technological competence and wealth, future research may find other types of expressions not found in this study.

With regards to the institutional perspective on consumer adoption, future research may adopt similar perspectives in order to provide a more comprehensive view of this field. We therefore propose more research exploring the themes presented in this paper.

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8 Appendix

8.1 Interview guide, phase one

Personal/professional experience

- Can you tell us about your experiences and career?
    - *Note to interviewer: what is relevant for smart products.*

Trends in technology and consumer behaviour

- Is there any field or topic within smart products you find particularly interesting?
    - Why do you think others might be interested in this?
- How do you see technology develop in everyday life in the foreseeable future?
    - Do you think Norwegians are confident in using technology?
        - Why/why not?
- What are the biggest reasons people adopt such technology?

- What are questions you would like to ask consumers about, in relation to technology and smart products?

Innovation and product development

- Thinking about the trends you mentioned earlier, how do you see this affect the development of new products and services in the foreseeable future?
- To what extent do you think businesses should let consumer trends impact their innovation processes?
    - *Note to interviewer: Do consumers know best?*
- How will businesses make money on smart products?
    - *Note to interviewer: New business models?*

Adoption intentions and acceptance

- What do you think will define the successful smart products going forward?
- What are the most obvious tasks/practices you think technology will solve in a better way in the nearest future?
    - Is there something you feel we would have to give up in order to enjoy this?

8.2 Interview guide, phase two

Thoughts, interpretations and perceptions of smart things

- Can you think of any examples of things or products you think are smart products or that has smart functions?
    - *Note to interviewer: let subject speak freely but give examples if he/she struggles to understand or deviates from the context.*
- Do you own any of these examples?
    - *Note to interviewer: direct attention towards products the subject uses the most.*
- To what purpose or goals to you use them/it?
- Can you describe a typical situation you would use them/it in?

The value of products being smart and the distinction between smart and non-smart products

- Can you recall if you ever solved similar situations or problems without the smart product or function in the past?
    - *Note to interviewer: attempt to uncover the core problem that is being solved by the smart function.*
- If so, how did you solve it then?
- Do you believe it is solved better or worse now that you have the smart function and in either case, why?
- Is there anything in your life that you would not be able to do without smart things?
    - *Note to interviewer: direct attention towards everyday routines and important functions these products provide that could not be done without "smartness".*
- Can you name some examples of things you use that are not smart products?
- Why are these not smart products?
- What would it take for it to become a smart product?
- How would this change the way you use it?

8.3 Interview guide, phase three

Distinctions between smart and non-smart product and practices

- Can you think of any examples of smart products?
- Do you own any smart products, if so, what are they?
- What makes them smart?
- Can you describe a situation where you use a smart product?
- Can you think of what your end goal is in this situation?
- Could you achieve the same goal without the things that make the product smart?
- How would not having the smart aspects change the way you achieve this goal?
- What non-smart products do you own?
- What would it take to make them smart?

Connotations and experiences with smart products

- What do you use smart products for?
    - Are these important tasks, if so, why?
- Could you achieve the same goals without "smartness"?
    - Why/why not?
- Can you think of smart products you like or enjoy?
    - Why do you like them?
- Can you think of smart products you do not like or do not enjoy?
    - Why don't you like them?
- In what situations do you consider smart products as better than non-smart products?
    - Are there any situations you would not consider using smart products?

Risk and trust related to smart product practices

- Can you think of any smart products you would not consider using, if so, why?
- Do you generally believe a smart product will perform the way you expect them to?
    - Why/why not?
    - Can you think of examples?
- What does it take for you to trust a smart product?

Social influences

- How do you think your friends or family members feel about smart products?

- Do you notice when you see others using smart products?
    - Can you recall what you thought in a certain situation?
- Do you ever feel pressure to acquire smart products because someone you know have shown it to you?

8.4 High resolution versions of automatic ads

8.4.1 Automatic dishwasher

8.4.2 Automatic toothbrush

8.4.3 Automatic camera