Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Humanities
Department of Interdisciplinary Studies of Culture

Gro Anita Sørskogen Stovner

Automation in grocery stores:

Domestication of self-checkout counters

Master's thesis in Science and Technology Studies
Supervisor: Roger Andre Søraa
Co-supervisor: Ida Marie Henriksen
May 2022

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Kunnskap for en bedre verden

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LÆRINGSUTBYTTE

Denne masteroppgaven inngår i masterprogrammet Studier av kunnskap, teknologi og samfunn (STS) ved institutt for tverrfaglige kulturstudier ved NTNU.

Kunnskap
Kandidaten har

- avansert kunnskap om hvordan vitenskap og teknologi utvikles, brukes og implementeres i samfunnet med spesielt fokus på RRI (Responsible Research and Innovation), dvs. samfunnsetisk tenking omkring dette
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- utføre avansert kunnskapsmekling i forbindelse med tverrfaglige prosjekter og prosesser

ABSTRACT

This dissertation explores grocery store workers' and customers' use of self-checkout counters. The study takes place in Trondheim, Norway, at different grocery stores and it aims to figure out how automation has influenced the sale and service sector. The main research question in this thesis is: *How can self-checkout counters in grocery stores be understood through a user-perspective?*

The empirical material is based on three qualitative research methods: interviews, observations, and spontaneous focus interviews. The data material was gathered from June to October 2021. Grounded Theory has inspired the analysis of the data material, subsequently based on Science and Technology Studies (STS) approaches of domestication theory and non-users.

My analysis showcases three overlapping aspects of self-checkouts. Control is the first aspect where the management controls the grocery store workers, and the store and workers control the customers. Trust is the second aspect. The management trusts the workers to do the right thing and follow the guidelines. Additionally, the store has implemented customer precautions because more customers started to steal after introducing self-checkouts. Efficiency is the last aspect. Self-checkouts brought efficiency to the stores because of the decreased waiting time. Some customers loved the self-checkouts, while others stated that the efficiency did not impact their choice between self-checkouts and regular registers. Furthermore, through the analysis, it became apparent how grocery store workers and customers understand the technology differently. I thus argue that to get a fuller picture of the technology of self-checkouts, it is essential to include both a user- and non-user perspective.

SAMMENDRAG

Denne oppgaven utforsker hvordan butikkmedarbeiderne og kunder benytter seg av selvbetjeningskasser. Studien tar utgangspunkt i ulike matbutikker i Trondheim, Norge. Målet med masteroppgaven er å finne ut hvordan automatisering har påvirket salg- og servicesektoren. Problemstillingen til oppgaven er: *Hvordan kan selvbetjeningskasser i matbutikker bli forstått gjennom et brukerperspektiv?*

Det empiriske grunnlaget er basert på tre ulike kvalitative forskningsmetoder: intervjuer, observasjoner og spontane fokusintervjuer. Datainnsamlingen skjedde mellom juni og oktober 2021. Dataanalysen er inspirert av Grounded Theory, deretter basert på Studier av kunnskap, teknologi og samfunn (STS) sine tilnærminger til domestiseringsteori og ikke-brukere.

Min analyse viser at det fremkommer tre overlappende aspekt i lys av selvbetjeningskasser. Kontroll er det første aspektet. Ledelsen i butikken kontrollerer butikkmedarbeiderne, men butikken og butikkmedarbeiderne kontrollerer også kundene. Tillit er det andre aspektet. Ledelsen stoler på at arbeiderne gjør det riktige og følger retningslinjene. I tillegg har butikken innført forholdsregler overfor kundene sine fordi etter implementeringen av selvbetjeningskasser har flere kunder begynt å stjele. Effektivitet er det siste aspektet. Selvbetjeningskasser bringer effektivitet til butikken og ventetiden har minket sammenlignet med tidligere. Noen kunder liker selvbetjening grunnet dette, men andre mente effektivitet ikke hadde en innvirkning på deres valg mellom selvbetjeningskasser og vanlige kasser. Gjennom analysen ble det åpenbart at ulike brukergrupper forstår teknologi forskjellig. Jeg argumenterer dermed for å få en større forståelse av teknologien selvbetjeningskasser, så er det viktig å inkludere perspektivene fra både brukere og ikke-brukere.

ACKNOWLEDGEMENTS

Wow, after five years, I have finished a master's degree. Remembering starting my academic journey without really knowing what I wanted to be or do, I did not expect to end up in Trondheim and be an author of a dissertation. Another thing I did not expect was writing about self-checkouts and grocery stores. It is funny because I started working in a grocery store when I was 18 and now ended up writing about life in such workplaces. Now I am here, engulfed with self-checkouts and automation of work, and ready to turn in my dissertation. Therefore, thank you, AUTOWORK, for the opportunity to embark on such an interesting topic. I have experienced a vast interest in this project within and outside of AUTOWORK.

Writing this thesis has been challenging and exciting at the same time. I can genuinely say I would not be here without my two amazing supervisors, Roger A. Søraa and Ida Marie Henriksen. They have encouraged me throughout this year and helped with my motivation whenever it was needed. Having worked on this with two people that are so knowledgeable have been enriching. They have read through drafts on drafts and came up with feedback and tips on exciting perspectives that would lift the thesis. I would have never been here if it was not for those two – thank you!

I want to thank all of my informants! Thank you to everyone that took time out of a busy day to let me interview and observe them. Without you, this dissertation would not be what it is. Thank you to my amazing classmates for giving me tips and tricks. Thank you to Marte and Åsta for making the past two years bearable! Thank you for all the laughs, complaining, and just being there. Thank you, Karoline, for keeping me company at the library. Thank you, Jens, for always believing in me, encouraging me to move to Trondheim to pursue a master's degree, and letting me visit you in the desert. Thank you to my other friends and family for the support. The most enormous thank you goes out to my best friend Siri, who has been my therapist, proofreader, and support system. Thank you for everything!

Trondheim, May 2022.

Anita Stovner

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CHAPTER 1 - INTRODUCTION

The sale and service sector has been around for millennia. Trade can be traced back to about 9000 BC, with markets developing (Meyer, n.d.). Retail is an essential part of the sale and service sector, especially markets that sell groceries to people. It began with grocers who sold dry goods such as spices, coffee, and sugar. In the 17th century in Europe came stores that are more familiar to the modern shoppers (Meyer, n.d.).[1] After a modernization period, the grocers dealt with other types of food like dairy products, produce, and meats (Skallerud, 2020), which in time developed to the grocery stores as we know them today. Stores like these are something that the majority of us encounter daily or weekly. It can be seen as a social and essential activity to go grocery shopping, and the retail sector provides jobs. We can buy our groceries either in person or online. For instance, 27.6% of the 7.74 billion people in the world shopped online in 2020 (Statista, 2021). Divided into regions, in North America, 79,8% of the population are online buyers, then comes Europe with 72%, with the UK and Sweden at the top. Afterward comes Asia and Oceania, South America, and Africa with 43% (Moñoz, 2021). And the number of online buyers is increasing. Most shoppers, however, still choose to do their shopping in person (Berthiaume, 2021), but also in the physical grocery stores, we can see prominent digitalization trends. *Digitalization* is a term that often occurs in different situations, and it "describes the social and technological changes linked to the change as well as the introduction and/or use of digital technology"[2] (Ask & Søraa, 2021, p. 33). Over the years, grocery stores have introduced new cashier technology. The first semi-automated cashiers with computers were introduced in the early 1990s (Hautemanière, 2015), while self-checkouts grew in prominence in the 2000s. With self-checkouts, the customers could scan the items themselves. This change in everyday shopping practice with self-checkouts is the topic of this master's thesis. I explore how the phenomenon of self-checkouts changes the sale and service sector through new ways to work in the grocery store and how work is transferred to customers who now do what was previously done by cashiers. This thesis will focus on what workers and customers do with self-checkouts and how they perceive, feel, interpret, and learn from them. In this first chapter, I will contextualize and introduce what self-checkouts are and the research questions that I have chosen in order to investigate them.

PROJECT SCOPE AND RESEARCH QUESTIONS

Self-checkouts in grocery stores are the key actor of visible automation for both the workers and customers. Those user groups are responsible for interpreting the automation and digitalization processes that self-checkouts present in the sale and service sector. The analysis of this thesis focuses on how workers and customers understand, interpret and learn from self-checkouts, with the aim of contributing to a better understanding of a self-service technology that people often encounter. My main research question is thus:

[1] This is an abridged history of grocery retail because the history is more comprehensive. For more history: read Meyer's research here.
[2] My translation.

- How can self-checkout counters in grocery stores be understood through a user-perspective?

To answer the main research question, I also deploy the following sub-research questions:

- How do grocery store workers and customers practice self-checkouts? This is the focus of chapter 4.
- How do self-checkouts influence workers' and customers' interpretation of the technology? This is the focus of chapter 5.
- How can different users learn from self-checkouts? This is the focus of chapter 6.

Before starting to investigate these questions, it is important to understand the Norwegian food retail business, to see why self-checkout counters became popular exactly there.

THE NORWEGIAN FOOD RETAIL BUSINESS

The sale and service sector is the largest private sector in Norway (and the second-largest overall, after public healthcare), with over 132 000 people employed in retail (SSB, 2021a). Within this sector, around 66 000 are employed in food retail. The Norwegian food retail market consists of several types of stores. All these share similarities in that they sell (primarily) food items to a consumer. *Grocery stores* can be defined as "any retail establishment, the business of which sells food, food products, or beverages for consumption off the premises" (Law Insider, n.d.). Supermarkets on the other hand are larger than grocery stores, and they devote more space on the shelves to other items such as deli meats, fresh seafood, and small kitchen appliances (Lagroue, 2021). For instance, a supermarket in Norway could be Coop Mega due to the wide variety of everyday products offered there. At the same time, a store like Rema 1000 is considered a grocery store as it primarily provides food and drink products, but seldom has fresh food counter. A step up in size, we find so-called hypermarkets, like Obs!, comparable to the largest retail company in the world; Walmart. Obs! sells just about anything, with a primary focus on food. However, the terms to describe the different retail store types are often used interchangeably in daily life, but for clarity, I will use "grocery store" consistently in my thesis unless otherwise specified. In Norwegian, one would most often just say, "I am going to the food store (NO: "matbutikken"), or the name of the store one is going to. On the smaller end of the food retail spectrum, we also find convenience stores, which are smaller than grocery stores. They are often open longer than regular stores and have limited items at a higher price, like the international franchise 7-eleven and the Norwegian Narvesen.

In this thesis, I chose to focus on grocery stores because they provide a better starting point for self-checkouts than convenience stores. People usually just pop into for grab-and-go in convenience stores, buying a hot dog or lottery tickets. With grocery stores, customers go into to do shopping most of the time. Self-checkouts are more common in grocery stores than in convenience stores due to the number of customers and size. Supermarkets and hypermarkets are often more popular for weekly or monthly shopping of larger quantity, where customers are less likely to use self-checkouts, so a

good middle-way was then to focus on grocery stores as they can be seen as the forefront of self-checkout practices.

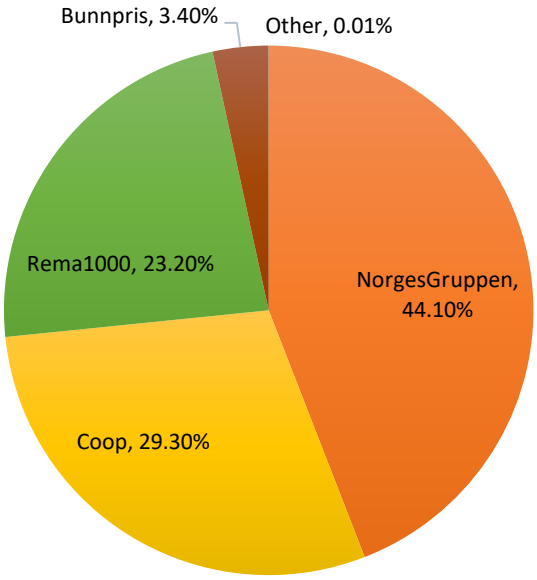


FIGURE 1: OVERVIEW OF THE LARGEST CHAINS IN NORWAY *(SOURCE: DAGLIGVAREHANDELEN, N.D.)*

Figure 1 above illustrate the largest chains in Norway. Norway has mainly four big chains that consist of different stores. The country's largest food retail store chain is NorgesGruppen, Coop, Rema1000, and Bunnpris. NorgesGruppen and Coop are divided into around seven different store types that cover the segments of the grocery trade. The largest stores within NorgesGruppen are Kiwi, Meny, Spar/Eurospar, and Joker, while the largest in Coop is Extra, Obs!, Prix, and Mega. Bunnpris and Rema1000 is the only store within their franchise. The stores with the most significant market shares in each chain in Norway are Rema1000, Extra from Coop, and Kiwi from NorgesGruppen (Dagligvarehandelen, n.d.). The "other" category includes independent stores that, for instance, focus on produce, fish, or items from countries outside of Norway.

SELF-CHECKOUTS AND AUTOMATION

Within self-service technology comes several types of technologies where the purpose is to bring efficiency and let things go effortlessly. The term and phenomenon of self-checkouts was designed and patented in the middle of the 1990s by the American David R. Humble (Justia, n.d.). It did not grow in prominence before the 2000s. The first wholly automated grocery store in Norway was opened by Bunnpris in 2011 at Blindern in Oslo (Heckendorn, 2011). The technology can also be referred to as a self-scanner or self-checkouts and a self-service checkout (Qikserve, 2018). However, the terms are often used interchangeably in the vernacular, but for clarity, I will use "self-checkouts" in my thesis unless otherwise specified. In Norwegian, the self-checkout counters are often referred to as "selvbetjeningen."

What is a self-checkout? It is an automated system that permits the customer to scan, pack and pay without assistance from a worker. The customer often uses a touchscreen to "communicate" with the technology. After scanning each item, the customer can often pay with cash or a card. The majority of the self-checkouts are card-only in many stores. Self-

checkouts have some in-built mechanisms, e.g., an alarm system when the customer scans an item that requires an ID check. If the customer does not trigger the alarm system, the customer can enter and exit the store without any social interaction with the staff. In some stores, they have to scan their receipt to be allowed to exit.

PREVIOUS RESEARCH

New inventions for work have always been in the making and with technologies like self-checkouts, we are entering a new type of work for the retail industry. The technological leaps of work, or revolutions, include robots and artificial intelligence (AI) and is by Wald (2020, p. xiv) described as a continuation of the first three industrial revolutions which were:

1. Mechanization, which began during the Industrial Revolution.
2. Electrification. The power that stormed through the machines.
3. Computerization. It is seen as the beginning of the digital area.

Although self-checkouts have not been around for that long, much research has been conducted on automation and self-service technology. In several automation books, the term "self-service machines" is used as an example in the bigger context of automation of work. For instance, Susskind (2020, p. 27) considers self-service machines a technology that corresponds with the purpose of replacing humans but ends up endorsing humans. E.g., ATM is a similar technology to self-checkouts. The implementation of the technology had the intention to replace bank tellers but ended up freeing the workers for other things. However, this resulted in a 20% rise in working load during that period because the bank thought it would save them money, resulting in them hiring more workers. According to Susskind (2020), the discourse about automation is not a new idea, but it has not always been explained clearly because of the complexity and nuances of technology. This strand of research argues that there will always be work for humans, but that the workers would do something else.

Cameron (2017), on the other hand, criticizes automation and sees it as a treat. He points out that humans always will find new jobs, but different factors affect the transition to a more technology-deterministic society. Economy and education are two examples of this. Cameron (2017, p. 106) argues that automation and digitalization create social differences if an individual stays unemployed after the automation transition. In this treatise, he explains why humans are treated by robots and automation taking out jobs because not everyone can adapt to the new automation practices. Additionally, Cameron (2018) describes that automation and robots do not design our future, but humans do.

Benanav (2020, p. 6) argues over recurring fears with automation in the future. He brings forward how self-checkouts have not made the employee lose their job, somewhat adjusting the working routines to something different. Instead of the cashier standing by one register, the same cashier is now responsible for several simultaneously. Benanav (2020) describes the debate around workplace automation because workers can be left without jobs regardless of the technical change. This makes it harder when unemployment is an issue, which got highlighted during the 2020 pandemic. His book focuses on doubting the automation theorists' approaches to a post-scarcity future because it allows others to create a new way of thinking.

Pettersen (2018), on the other hand, explains the potential unintended societal consequences of digitalization. Self-checkouts were introduced to have the purpose of improving the services given to the citizens and reducing costs. Pettersen (2018) argues that Norwegians shop less in-store than earlier, and the social interactions can create negative emotions for some. In this treatise, she explains how important it is to find a middle ground between the "virtual" and "real" world. Technological progress catalyzes the changes we make and how it affects how we think. Another Norwegian research (Anderson, 2019) emphasizes that the challenges of digitalization in retail may take years due to the need to change customers' habits. Additionally, Anderson (2019) stated that competition between stores is a reason for the rise of the implementation of digital solutions like self-checkouts. It will only increase more in the future.

Other perspectives on self-checkouts in grocery stores argue that it seems like the workers and customers share similar thoughts about the self-service technology options, primarily focusing on the lack of interpersonal interactions. However, the majority of the consumers were dissatisfied with certain aspects of self-service technology, which made it harder to adapt to the technology. Similarly, Curran & Meuter (2005) look at self-service technology and how people adapt, noting how by focusing on three different technologies within the self-service technology, they argue that the adaption process to the technologies is different due to the different implementation stages. The scholars Beck and Hopkins (2015) explore the potential impact of loss prevention in the retail sector due to the implementation of mobile scanning technology. They argue that implementing self-checkout encourages people to steal that usually did not and argue that the increase in stealing is the smaller chance of getting caught than having only regular registers (Beck and Hopkins (2015, p. 16).

THESIS STRUCTURE

In this first chapter, I have introduced the Norwegian food retail sector, then contextualized it to automation in work and self-service technology. I explained the composition of stores for the Norwegian market, before introducing previous research on automation and self-service technology. In the next chapter, I will present an overview of the theoretical framework I use from Science and Technology Studies, with theories and other analytical approaches used for my analysis. Chapter 3 will include methods and the empirical data material. I then delve into three analysis chapters, which I connect with the theoretical framework to contextualize the self-checkouts. Chapter 4 is the first analysis chapter, where I will discuss the practices around self-checkouts. This affects the feelings and interpretations of the technology, which I discuss in chapter 5. In chapter 6, I shift perspective to how user groups learn from technology. Here it becomes apparent how someone can or cannot learn from a self-service technology. It draws attention that people learn from various factors and learn differently. In the final chapter, I summarize the analysis chapters with further discussions on what this implies for the food retail sector at large.

CHAPTER 2 - USER-PERSPECTIVES FOR UNDERSTANDING SELF-CHECKOUTS: DOMESTICATION AND NON-USERS

> "Every time you want to know what a nonhuman does, simply imagine what other humans or other nonhumans would have to do were this character not present"
>
> (Latour, 1992, p. 229)

To understand the topic of self-checkouts, we need to understand the role of nonhumans – as the quote above says – in food retail. The Science and Technology Studies (STS)-scholar Bruno Latour's quote above illustrates how someone can better understand nonhumans as part of a larger sociotechnical networks. It is essential to think about what humans and nonhumans would do if other nonhumans were not around. As for the theme of this dissertation, self-checkout, I define them as the nonhumans, while the workers and customers are the humans that deal with this nonhuman, in this relation.

This chapter gives an overview of the theoretical approaches I will use in this thesis. These will help the understanding of the complexity of automation and self-checkouts in grocery stores. The accompanying viewpoints might explain a few interpretative adaptable sides to them, which are significant to answering the research questions. Before getting into that, I will introduce the field of Science and Technology Studies (STS), and why a user perspective is a fitting focus for my analysis.

SCIENCE AND TECHNOLOGY STUDIES (STS)

STS is, in many ways, a relatively new field originating in the 1960s. The discipline started as a response to that time's research on technology development. Since then, the field has evolved significantly. A common denominator of the field is the rejection of *technological determinism*, which means that technology in some way controls the development of society (Wyatt, 2008, p. 169). STS engages in understanding what role technology and science play in past, present and future societies. Skjølsvold (2015, p. 168) portrays the STS field of how society, culture, and politics affect scientific research and technological innovation, then how this influences the culture, politics, and society. However, in STS it is important to understand that technological processes and social dimensions cannot be considered separate. Latour (1991, p. 103) stated that it must be recognized as a socio-technical network where human and non-human actors influence each other.

Some approaches within the STS field are theories like Actor-Network Theory (ANT) (Latour, 1996), Large Technological Systems (LTS) (Hughes, 2012), and Social Construction of Technology (SCOT) (Bijker & Pinch, 2012). There are also several other theories, that to some extent draw on e.g., ANT and SCOT. In this dissertation, I want to focus on the users of the technology in question; therefore, I have chosen to deep dive into studies about users. The theories mentioned above do not focus specifically on the individual, rather the individuals in a larger context. E.g., ANT explains how actors in a network behave and influence each other. I rather want to focus on how individuals

understand a technology. Therefore, to explore how self-checkouts can be understood, it is essential to go down to the individual level and have a more bottom-up approach. I will first explain and elaborate on the domestication theory – which although drawing on ANT, provides a more user-centered focus. And, similar to SCOT, focuses on the interpretative flexibility of that technology. Secondly, I will add four classifications for non-users. These approaches will help to illuminate this thesis research questions.

DOMESTICATION THEORY

As humans in contemporary society, we are surrounded by technology in our everyday lives. Some technologies have internalized so much that we do not ever think about them, e.g., our stove that cooks our dinner or the water heater that makes it possible for you to take a hot shower. However, not all technology gets internalized to the point where they are "invisible." *Domestication theory* is an approach that can give an understanding of how technology can go from being new and bizarre to just being a part of the user's routine. User-perspective is fundamental in domestication. To pursue a domestication analysis, it is crucial to understand how humans and non-humans correlate with each other and figure out what knowledge, interpretations, and practices are required to be able to use it (Ask & Søraa, 2021, p. 63).

Domestication theory focuses on the user and the relations between the encounter of actors and the artifact. It has a vital function in analyzing technology. Silverstone et al. (1992) introduced the domestication theory. The authors distinguished four phases or elements to better understand the transactional system of commodity and media relations (Silverstone et al., 1992, p. 20). They aimed to understand the integration of new and foreign media technologies in the household. Since then, the theory has been redefined many times. I will be using the approach developed by Sørensen and Lie (1996), referred to as the *dimensional model of domestication* (sometimes referred to as the Trondheim model). In the dimensional model, the main focus went from media technologies in households to technologies in general and in everyday life. Having the concept of technology in everyday life gives a better understanding of the complexity of modern technology (Sørensen & Lie, 1996, p. 17). Sørensen (2006, p. 46-47) implies domestication is a co-production of the social and the technical. To pursue this further, he introduces three dimensions to pinpoint this, which are:

> - Practical dimension. Focus on how practices and routines are related to the artifact. It is essential to see how, where, and when the artifact is used and who uses it.
>
> - Symbolic dimension. This dimension is about constructing meaning and identity the user has to the artifact.
>
> - Cognitive dimension. It evolves when learning and knowledge are transferred according to the practices of the artifact.
>
> (Sørensen, 2006, p. 47; Ask & Søraa, 2021, p. 65)

Technology can be seen as something foreign and exciting. It can be transformed into something "natural" when the user is "taming" the technology, it gives it meaning, and they start using it (Hartmann, 2020). That process gets described by Lie and Sørensen (1996, p. 8) as:

> "In everyday settings, we consume technologies – or, more precisely, technical artifacts – by integrating and using them. We are also consumed by the artefacts when they gain our attention and have us react to them and become occupied by their abilities, function, and forms."

The quote emphasizes the dual relationship between technology and humans. People affect technology and vice versa. This is equivalated to the technology that we face in our everyday life. The dimensions that Sørensen (2006) presents give the impression that to understand an artifact or a technology thoroughly, it is essential to consider the user of the artifact, as well as the life situation the actor is in. What life situation the actor is in affects how a user views a technology. For instance, to get a complete overview of self-checkouts in grocery stores, it is crucial to understand that it is a co-production between the technology and the actor. They both have an essential role in domestication because it transforms them both. This model highlights the users, but to fully comprehend a technology, it is vital to include the non-users, which I will describe below.

THE NON-USER APPROACH

To every technology, it will always be someone that does not use it. In the STS field, many scholars focus on the users to understand technology. However, to get a complete picture of an artifact, it is evident that non-users need to be included. Wyatt (2003, p. 78) developed an approach highlighting that non-users matter and how **"***acknowledging the existence of non-users accentuates certain methodological problems for analyzing socio-technical change*." One key aspect of this approach is distinguishing between the "have nots" and "want nots." All in all, four different types of non-users:

i. "Resisters." They never used the technology because they did not want to.
ii. "Rejecters." Stopped using the technology voluntarily.
iii. "Excluded." Never used the technology due to the lack of access.
iv. "Expelled." Stopped using the technology involuntarily.

Wyatt (2003, p. 76) argues that including "former users," "current users," and "never a user," it will be hard to differentiate the term "user." Connecting the various users is essential to shaping their history with the technology. Eventually, the technology hopefully will end up normalized as well as stabilized. The term non-users is however not a new term. It shows up in research from the 1930s regarding the users and non-users of a public library (Ridgway, 1936). The term non-users is relevant to discuss why someone goes away from something "mainstream" for that specific time period. In the 1990s, the term often described non-users of information technology, then Wyatt (2003) came up with her approach to users and non-users of the internet. Some researchers have taken Wyatt's research one step further and compared the approach to other technologies, e.g., healthcare technology or smart houses. Neven (2010) has examined a robot on elders and used terms from Wyatt (2003) to describe how some elderly people do not necessarily "reject" all technology. Hargreaves et al. (2018) emphasize how non-users are relevant when discussing smart houses, specifically how they create understanding over other user groups. Due to the installation of certain products, some households are described as non-users or extremely partial users. These are examples of where Wyatt's approach can help illustrate how non-users can be used materially. In addition, to explain that and get a complete overview of the technology, it is essential to include more user groups. Wyatt's

different terms to categorize non-users give a better comprehension of why some consumers will be portrayed as non-users. The ways Neven (2010) and Hargreaves et al. (2018) have used Wyatt is a similar approach I will use throughout this dissertation. Self-checkouts are a technology that many people use. However, non-users of self-checkouts exist because not everyone perceive the technology similarly.

SUMMARY AND RELEVANCE

Through Sørensen's (2006) dimensional model of domestication, we can pinpoint more critical aspects of technology as seen through user perspectives. Doing a domestication analysis will help map the factors that shaped the use of technology, such as self-checkouts. Additionally, exploring how the users feel, interpret, and learn from the technology says something about capturing the interpretative flexibility of that technology. Wyatt's (2003) approach of non-users is also relevant when discussing technology. The various terms that Wyatt used to categorize the different non-users and "former users" are relevant to comprehend the complexity of how many user groups are needed to have in mind when considering and understanding technology.

These theoretical approaches can together give insight into how customers and workers perceive self-checkouts by showing how users domesticate specific dimensions of the technology. In addition, understanding different non-users, also elevate how self-service technology in the retail sector is impacting store-life. This theoretical framework has thus been chosen to get a better perspective of the technology by highlighting what the users and non-users think about the self-checkout. In the following chapter, I describe how I set about investigating this topic.

CHAPTER 3 - METHODOLOGICAL CONSIDERATIONS

The first chapter introduced context and background on self-checkouts with previous research and my research questions on understanding self-checkout counters in grocery stores through a user perspective, which the theoretical framework from the previous chapter will help answer. This chapter will discuss how I set about exploring this through my chosen methodological approaches and what data material I collected. Subsequently, I shall interpret the process of analyzing the data and reflect on the choices that have been made.

The topic of grocery stores piqued my interest because I have worked in a grocery store for over five years, so I had some insight into everyday life in a grocery store – an exciting setting that I wanted to analyze from a scholarly perspective. Additionally, I enjoyed working in a grocery store, and I thought it would be interesting to see how others experienced it. However, I did not fully experience the power of automation during my time as a grocery store worker because I worked in another area of the store. Automation of work has been disputed. Since self-checkouts are one aspect of automation of work, it would be interesting to explore how they influence both the grocery store workers and the customers. Therefore, choosing this topic, I can dive deep down into how automation the work has transformed the "new" grocery store experience. Furthermore, figure out what challenges this brought and what opinions workers and customers had regarding this.

DEFINING THE RESEARCH QUESTIONS

As mentioned in my acknowledgement, this thesis collaborates with the Norwegian Research Council funded project "AUTOWORK" which investigates automation in the sale and service sector. This larger project aims to formulate possible strategies to handle the increase of automation in the work setting, which my thesis sought to add to by highlighting workers' perspectives in the grocery stores that experience automation. The topic of self-checkouts got introduced to me through one of the researchers on the project. The research questions were not decided beforehand; therefore, I could choose what I wanted to focus on. However, I knew I wanted to focus on how customers and workers portray self-checkouts in grocery stores.

When working on figuring out the research questions, that points to "problem-oriented empiricism." The research must have, in some sense, a practical relevance. E.g., highlighting vital issues in specific societies (Auberg, 1969 quoted in Thagaard, 2018, p. 49). However, the researcher must not take over specific issues because, in qualitative research, it is vital to be critical and reflective of the questions we ask during the interviews. This can include getting a new understanding of the problem and giving insights (Thagaard, 2018, p. 49). These interviews could also help find research questions.

INITIAL MAPPING

To get into the immersion of the field, and I searched for literature about the automation of work and self-checkouts and constantly walked around browsing self-checkouts in every store I entered in the summer of 2021. To get an overview of what grocery stores in

Trondheim had self-checkouts, I mapped some of the grocery stores throughout the city. In the end, I ended up with twenty-seven different grocery stores. Figure 2 below shows the mapping of the different grocery stores in Trondheim.

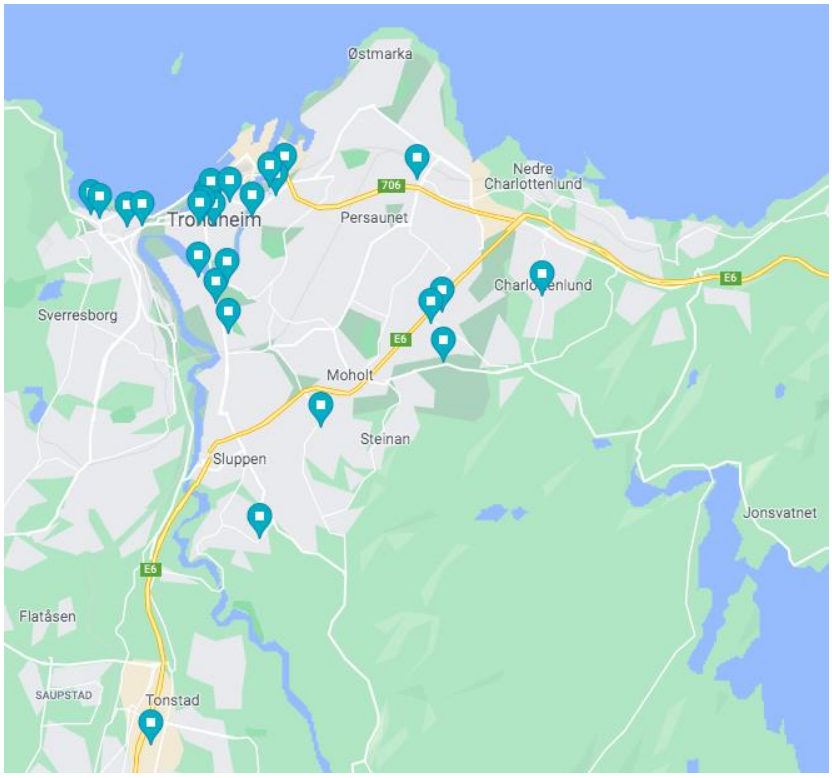


FIGURE 2: MAPPING OF SELF-CHECKOUTS IN TRONDHEIM DONE SUMMER 2021.

I realized that I wanted to choose stores within the same chain while mapping grocery stores. Choosing stores within the same chain because they share similar guidelines, standards, and systems. Therefore, I chose two grocery stores in the same chain. One is more outside the city center of Trondheim, and the other is located in the city center. Doing this will get a better understanding of the different customer groups. The owners of both stores were happy to be a part of this project, which made finding informants much easier.

I interviewed two different user groups, grocery store workers and customers, who interact with self-checkouts, combining this with observations at the grocery stores. My data material is based on qualitative research. It consists of interviews with workers as well as observations in the field and smaller interviews of customers. The interviews were conducted with people that interacted with self-checkouts regularly. Qualitative interviews aim to capture abundant and comprehensive information about the informant's relationship to self-checkouts. It develops people's perceptions and how they reflect on particular situations, while observations give an insight into how people deal with something specific (Thagaard, 2018, p. 11).

RECRUITMENT OF INFORMANTS

Finding informants was easier than expected. Before summer break in 2021, I walked into some grocery stores and asked for permission to conduct interviews. I asked three different stores located in various parts of Trondheim, and all of them said yes. This resulted in choosing two of them. Thagaard (2018, p. 56) calls this *a convenience sample* when the research is based on self-selection. The informants can see it as a strategic representation

of the qualities needed to answer the research question. After getting the first interview in each store, the *snowball method* helped get additional informants. That method consists of asking the first informant for the name of others that share the same qualities or are in a similar situation.

My first informant came after presenting my dissertation topic to one of my classmates. He introduced me to his friend who worked with self-checkouts for several years in the same chain I wanted to focus on. My second interview came straight after I formally introduced the project to the manager of one of the stores. The same happened with my first two interviews in the other store. After those, the snowball method got involved and helped find the rest of the informants.

COLLECTION OF THE DATA MATERIAL

I had three different ways of collecting the data material, but each method had various approaches. This can be described as triangulation because mixing data and methods can shed new light on a topic (Olsen, 2004, p. 3). Charmaz (2006, p. 15) points out that the flexibility surrounding qualitative research gives the flexibility to use the material, but it is first and foremost a tool to understand a specific topic. The table 1 underneath shows that the time spent on each method varied. The observations took the longest but were highly informative. I wanted at least two to three observations at each store so that I could compare the notes from each day to see if there were some similarities.

Method	How many?	Average time spent
Focus interviews - workers	8	10 – 20 minutes
Observations	7	1 – 2 hours
Spontaneous focus interviews - customers	17	Around 1 minute

TABLE 1: OVERVIEW OF METHOD, HOW MANY INFORMANTS AND THE AVERAGE TIME SPENT

FOCUS INTERVIEWS

I ended up having eight interviews. Three of the interviews were in what I named the "hybrid store," because they have a combination of self-checkouts and regular registers. I had four interviews in a store located in the city center of Trondheim, which I have named the "automated store" because they only have self-checkouts. Additionally, I have one interview from a discontinued store outside of Trondheim, thereby naming it the "discontinued" store. This store got discontinued at the end of 2020. Due to economic reasons, it was no longer beneficial for them to be open. Therefore, this interview will be an addition to the interviews from the "hybrid" and "automated" stores and will be seen as a supplementary interview to my data material. Table 2 underneath shows the list of my informants, then their age, what day and time I interviewed them, and what store they belonged to. I have included the weekday and time since it impacts the busyness of the store.

	"Name"	Age	When	Time	Store
1	Daniel	20s	Friday	10:00	Discontinued Store
2	Henrik	50s	Friday	11:15	Hybrid Store
3	Harald	20s	Tuesday	13:00	Hybrid Store
4	Hannah	20s	Friday	15:00	Hybrid Store
5	Adam	30s	Thursday	10:15	Automated Store
6	Aleksander	30s	Thursday	10:45	Automated Store
7	Anna	20s	Saturday	12:00	Automated Store
8	Amanda	20s	Saturday	12:30	Automated Store

TABLE 2: LIST OF INFORMANTS IN THE FOCUS INTERVIEWS

The informant from the discontinued store got the name Daniel. Since the store Daniel worked at got discontinued, we met at a café in the center of Trondheim. Each informant from the hybrid store has a name starting with an H, while the informants from the automated store have a name that starts with the letter A. Each interview was held in person, whereas the hybrid and automated store interviews were conducted in particular stores. All interviews were transcribed by me ad verbatim. The qualitative interviews were recorded and transcribed via a recording device called Olympus Digital Voice Recorder DS-3300. I am the only one with access to the recordings as they are saved on NICE-1, which is NTNU's file storage area. They are protected with two-factor authentication.

As mentioned earlier, each of the interviews was held in person. However, it varied from informant to informant. I met Daniel at a café in the center of Trondheim, so the noise from the surroundings influenced the interview. The rest of the interviews were conducted in each of the stores. Three out of four of the interviews in the automated store were conducted in the store's break room. However, the last interview was conducted in-store while the informant had to help customers when needed. Each time a customer came up, we paused the interview so the informant could help them. Similar things happened in the hybrid store. One of the interviews was held in an office, then another in the staircase, so we did not get interrupted. The last interview happened while the informant was preparing items for the store. Since all of these informants took time out of their workday to answer my questions, I had to adapt to whatever was most convenient for the informant. For the scheduled interviews, I made sure to come at a time when the store would not be too busy, cf., interviewing Anna and Amanda on a Saturday. This adaptability on my side was highly appreciated by my informants, and I learned to be very efficient with my interviews, since this informant group was very busy with their workdays. However, the strength of interviewing them at location where they worked weighed up for this, as it gave unique insight into their working lives.

I chose focus interviews, which are a variant of in-depth interviews, but they are within a shorter time frame. In-depth interviews are the most common method in qualitative research. As in-depth interviews implicitly expect the researcher to build trust with the informant, the interview lasts around an hour or more (Tjora, 2021, p. 141). As mentioned above, the workers took time out of their workday to answer my questions. I used focus interviews because I knew time with each informant was limited, and the topic was not person sensitive. Additionally, I had an idea of what I was interested in. Therefore, focus interviews were the better choice because the topic was narrowed down enough, and trust

gets quickly built. I developed trust by expressing several years of experience in grocery stores early on, making the conversation easier since it is more like explaining to a co-worker. The focus interviews were based on my interview guide, which concluded on three specific topics: self-checkouts, covid-19, and digitalization and technology. An overview of the interview guide with the specific question can be found in the appendix 1.

OBSERVATIONS

Each of the managers at the store permitted me to do observations in the store. The observations were conducted in two stores, the hybrid and the automated store. I completed seven observations that lasted from one to two hours each. The observation type I chose was interactive, as I combined interaction with participants and observe what they are doing (Thagaard, 2018, p. 63). Without joining the environment, the participants helped get insight into what the people are doing and how they relate to others. I stood next to the grocery store worker responsible for the self-checkouts and took notes on a clipboard. The first time I conducted an observation, I wore clothes similar to the workers' uniforms. I did this to "blend" into the environment and not disturb the customers. But I blended in too much, so they mistook me for someone working there. Customers came up to me to ask for help, but I did not know how to help them. However, it turned out the customers did not find me standing there disturbing. The majority did not even acknowledge me. Another factor was the weather outside whenever I conducted observations. It was super rainy the majority of the time, which resulted in fewer customers.

Standing next to a worker, let us have an informal conversation about self-checkouts, which brought different perspectives than the focus interviews. In the focus interviews, the worker might have forgotten the small things that could occur while watching the self-checkout. Watching over the self-checkouts with a worker made it easier for the worker to speak more truthfully about the self-checkouts and the store. The informal interviews were more relaxed, and the worker was not "put on the spot" as the informants in the focus interviews. The things that were said got written down on a clipboard because it was not my intention to do these interviews. I included these informal interviews as a part of my data material because some of the workers brought up different perspectives and opinions than the informants in the focus interviews.

SPONTANEOUS FOCUS INTERVIEWS

After finishing up my observations and focus interviews with the workers, I felt I did not have enough data material to answer my research questions well enough. Therefore, I had seventeen *spontaneous focus interviews* (Henriksen & Tøndel, 2017) with customers, asking them one to two questions. The first question was: "why did you choose regular registers and not self-checkouts today?" I chose that question because it will give me a reason why they chose one over the other. If the customer had time, I asked if they had experienced any challenges with the technology.

Since these interviews were so short, I took notes on a clipboard. The interviews were spontaneous, and I knew they probably did not want to speak to me more than necessary. Therefore, I quickly introduced myself and then asked them the question. I chose to write them down while they talked so they would not feel uncomfortable or disturb them more than necessary. Thagaard (2018, p. 85) stated that having an audio recorder can be disturbing. Table 3 below shows an estimate over the seventeen interviews. I divided it into gender and guessed their age group based on their appearance.

	Gender	"Age"	Opinion on self-checkouts
1	Female	50s	✅
2	Female	50s	✅
3	Male	60s	❌
4	Female	20s	✅
5	Female	60s	❌
6	Male	60s	❌
7	Female	80s	❌
8	Male	50s	✅
9	Female	50s	❌
10	Male	50s	✅
11	Male	20s	✅
12	Female	40s	✅
13	Male	40s	❌
14	Male	30s	✅
15	Male	70s	❌
16	Female	30s	✅
17	Male	80s	❌

TABLE 3: LIST OF INFORMANTS IN THE SPONTANEOUS FOCUS INTERVIEWS

The informants were quite gender-balanced, with seven women and eight men. Their age group varied, but the majority were middle-aged. In addition, I added their opinion on self-checkouts based on the interviews. The simplicity of the table's column on "opinion on self-checkout" contains deeper variation, which I will return to in my analysis. First, I will describe how the analysis took place.

ANALYZING THE DATA

I have chosen to write my thesis in English because the AUTOWORK project collaborates with researchers in Australia, and I did not want to limit my work to Norwegian readers. Nevertheless, the qualitative interviews were conducted in Norwegian, so a translation of the quotes was needed. Every quote included in this dissertation is *my* translation from Norwegian to English. Josselson (1996, p. 62) wrote, "language can never contain a whole person, so every act of writing a person's life is inevitably a violation." That quote indicates that translating something from one language to another will violate them because I might interpret something they do not mean. However, I did not directly translate the quotes word-for-word because the English translation would have lost much meaning.

I analyzed my data material with the qualitative methods inspired by Grounded Theory. Grounded Theory can be described as a methodology "with systematic guidelines for gathering and analyzing data to generate middle-range theory" (Charmaz & Belgrave, 2015). I chose to code my data material by dividing the data material into sections with code words. I did this by using a software named NVivo, which is designed to help a researcher that conducts qualitative and mixed-method research organize and analyze data material (NTNU, n.d.). Early on in the data analysis, I was inspired by memo-writing.

Charmaz (2006, p. 72) argues that memo-writing is a crucial method because it helps the researcher analyze the data and codes early in the research process. I made a mind map on colorful paper and hung it over my desk with the themes that I discovered by reading the transcribed focus interviews. A digitalized and translated version can be found in appendix 2. This was a motivating process because I could explicitly see what ideas came forward in the memo-writing. Charmaz (2006, p. 72) stated that writing down on paper makes the work more concrete and manageable.

After the memo-writing, I mainly focused on the topics: routines and challenges. This was a guideline to figure out what theoretical framework that would complement my data material. That resulted in another coding process where I coded with a theory—indicting that the coding process was divided into the three dimensions from *the dimensional model of domestication* as mentioned in the previous chapter (cf. Sørensen 2006). That coding shared similarities to abductive reasoning "because it seeks a situational fit between observed facts and rules" (Timmermans & Tavory, 2012, p. 171). Afterward, I started coding my focus interviews with the different dimensions. This was done with speed and spontaneity as they would inspire a new way of thinking and create a new view of the data material (Charmaz, 2006, p. 48). In the third round of coding, I was inspired by the line-to-line coding common in grounded theory (Charmaz, 2006, p. 50). I divided each line into one of the three coding categories: practical-, symbolic or cognitive dimension.

The coding process helped me find similarities and dissimilarities in the data material, making it easier to decide what to include in my dissertation. After coding the focus interviews and observations, I realized that I had some gaps in my data material. Therefore, I chose to do spontaneous focus interviews to lift the data material. Charmaz (2006, p.48) highlights that using grounded theory coding can help the researcher detect if it is a lack of data because having holes in the data material is a part of the analytic process.

ETHICAL CONSIDERATIONS

A characteristic of qualitative research is close contact between the researcher and the informants. Especially in interviews and observations, the researcher obtains knowledge that could be connected to the informants participating. Before starting the project, the researcher has to apply to NSD – Norwegian Centre for Research Data. This is done to make sure the data is safe and legal, and it follows guidelines in the General Data Protection Regulation (GDPR). The researcher must be clear about consent. This has to be explicitly informed and made sure that being a part of the project is voluntary (Thagaard, 2018, p. 23). Before interviewing the informants, I handed out an information sheet regarding the project and contact information if they were no longer interested in participating in the project.

It is essential to reflect on what giving consent involves. Qualitative research consists of flexibility; therefore, the researcher might not know what insight the data material might bring (Thagaard, 2018, p. 23). Additionally, when observing, people being observed might not have gotten the information about the project. Some might not be aware that they are being observed. The researcher needs to have ethical considerations in mind at all times, regardless if they have given their consent in the start phase of the project. Since my project collaborates with AUTOWORK, some of the anonymized information will be a part

of another research project. This project also got approved by NSD, and it was a part of my information sheet that was given to the informants before conducting interviews. Having so much information on the project participants, the information must be kept safe. Thagaard (2018, p. 24) argues that if the researcher has information, it can cause the informant to be recognized. Therefore, anonymization and confidentiality are essential.

ANONYMIZATION AND CONFIDENTIALITY

Confidentiality is an essential aspect of the ethical framework. This project handles information regarding the informants, such as workplace and profession. Thagaard (2018, p. 24) emphasize that the researcher needs to anonymize the information gathered. This has to be done when presenting the results. One way that I have anonymized the workplace and the names of the informants was by giving them fictive names. This makes the reader turn their attention to the patterns rather than understand the specific person or place (Lofland, 2006, quoted in Thagaard, 2018, p. 24). However, since the informants in the hybrid store and the automated store share a workplace, it is possible that they have discussed their participation in the project and can also recognize themselves when reading the thesis. Nevertheless, the take into account the confidentiality aspect, the researcher has to be careful regarding how the data is saved. It has to be done to make it inaccessible to unauthorized people (Thagaard, 2018, p. 26). Therefore, the material is saved on NICE-1, which is NTNU's file storage area, and I am the only one with access to it as it is protected with two-factor authentication.

METHODOLOGICAL CHALLENGES

The chosen methodological tools have some limits. The methods were helpful to answer the research question, but the methods influence what might be found and influence what I see. "Qualitative research of all sorts relies on those who conduct it" (Charmaz, 2006, p. 16). Having over five years of experience working in grocery stores, I had some insight into the dynamics of a grocery store. This helped get the conversation started and made them feel like I did not judge them, but it was challenging to stay objective and neutral throughout the interviewing process.

Regarding the interviews, I believe having more short interviews with the customers would be helpful. As Charmaz (2006, p. 16) stated, questions might arise when collecting the data material. One of the last things I did during that period was conducted these interviews. They were spontaneous because I wanted to ask customers why they chose regular registers over self-checkouts. Therefore, due to the time frame I had set up for myself, I did not get as many informants as I wanted to indicate better what different customer groups thought of the technology. To find similar results on a larger scale, one would use quantitative research to determine what customers think about self-checkout.

This entire project was done during the covid-19 pandemic. The national guidelines constantly changed; therefore, it was essential to follow the national guidelines at the time, which meant keeping a distance from the informants and using a face mask if necessary. During my collection of the data material, a face mask was only recommended by the municipality, but it was not a demand. However, when encountering some of the informants, I wore a face mask for the first time, and they stated that I did not need to if I did not want to. In contrast, others appreciated that I kept my distance and wore a face mask.

THE PROJECT'S RELIABILITY AND VALIDITY

Self-checkouts are one aspect of automation; therefore, the validity and transferability of this dissertation can help capture the variety of that technology and be compared to other sales and service technologies. The representation of the workers and customers can indicate how some understand a technology. In this thesis, I have used three different qualitative methods. Driscoll et al. (2007, p. 22) argue that it can be challenging to secure the validity when using a mixed-method approach because the data material can be hard to compare. This dissertation consists of focus interviews, observations, and spontaneous focus interviews, which I have analyzed inspired by Grounded Theory, and especially memo-writing. Using memo-writing was essential because it helped to have an open-minded approach, which assisted me with distinguishing themes I saw as fascinating and pertinent to seek after when considering the research question. The spontaneous focus interviews were analyzed after the pointed tendencies presented in the analysis of the previous methods. This was crucial in understanding how customers understood self-checkouts. Thus, one of my project's strength lies in its methodological choices. The inclusion of different methods can increase the thesis reliability because of the focus on customers and workers. The representation captures the variety of dimension of self-checkouts. Another considerable strength is that the data material is obtained directly from the informants. This is a strength in the reliability as the informants are highly relevant, both with knowledge and experience with grocery stores. Following Norwegian ethical guidelines for the research, such as reporting the project to NSD, receiving informed consent, and anonymizing the informants, along with the methodological choices I have made, ensures the dissertation's reliability and validity.

SUMMARY

In this chapter, I have described how I worked with collecting the data material based on focus interviews, observations, and spontaneous focus interviews. These methods are the base of my dissertation. The empirical material has been analyzed and inspired by Charmaz's version of Grounded Theory. Memo-writing, where I made a mind map, was a crucial part of analyzing the data material. In the last coding round, I was inspired by Sørensen's dimensions and coded through the practical-, symbolic- and cognitive dimensions. When a researcher collects data material, it is essential to be upfront to the informant about anonymization and confidentially about participating in the project. Additionally, adding that participating voluntarily. Lastly, I explained the methodological challenges in this thesis. Staying objective in the interviewing process and the covid-19 pandemic were some of the challenges. In the following chapters, I will analyze the collected data material and discuss the findings using the domestication theory and different categorized terms for non-users.

CHAPTER 4 - ROUTINES AND CONTROL WITH SELF-CHECKOUTS

How do grocery store workers and customers use self-checkouts in practice? Shopping is, for most customers, a normalized activity in their weekly life, but using self-checkouts for some is not normalized. This is what I want to explore in this chapter. As described in the introduction, self-checkouts are part of an automation transformation in the sale and service sector. In this chapter, grocery store workers and customers use self-checkouts differently, so I will see how they practice self-checkouts.

Starting with looking into the different aspects of self-checkouts, it is crucial to look at how the workers and customers practice the technology. As explained in my theoretical chapter, the practical dimension of technology domestication focuses on the human-technology interaction. The dimension showcases the routines that Sørensen (2006, p. 47) portrayed as being created when the artifact is used. *An artifact* is defined here as "an object that a person makes, especially something of historical or cultural interest" (Oxford University Press, n.d.). Taking this further, artifacts can, in an STS analytical context, also be described as having biographies, i.e., having "different states of existence connected to social relations wherein they become to feature" (Hyysalo, Pollock, & Williams, 2019). Waltz (2004, s. 157) uses artifacts to describe the relationship between humans and nonhumans, accordingly how that can give artifacts a voice in technology. In this context, the term artifact refers to self-checkout counters. In this analytical chapter, I will explore: how domesticating self-checkouts can help us understand how grocery store workers and customers practice using this artifact?

As described in previous chapter about methodological considerations, I have selected two stores, (1) the hybrid store and (2) the automated store, with different layouts and customer approaches. The most significant difference between the hybrid store and the automated store is the layout and size of each store. On one side, the hybrid store is one of the chain's most prominent stores by turnover in 2020 (Sættem, 2021). They are located just outside the city center. They have around 6 or 7 employees on each shift, especially during the dayshift. They are a larger grocery store and have an extensive selection of items than the automated store. In the hybrid store, the customer will see the fruit and vegetables, pastries, and self-checkouts as they progress further into the store. On the other hand, the automated store has two or three employees the entire day and is located in the city center. One of the workers in the store stated that the customers that choose to enter this store either come in to grab and go or have a regular shopping experience. When the customer first walks into the automated store, they will see the multiple self-checkouts before seeing shelves of chocolate, then pastries and fruit and vegetables. This makes the shopping experience quite different in the two stores. In this chapter, I will first describe what a typical day in a grocery store consists of before exploring how customers and grocery store workers practice self-checkouts.

A TYPICAL DAY IN A GROCERY STORE

For a grocery store, the layout is significant for how customer approaches the store. The automated and hybrid store's layout is based on their locations in Trondheim, primarily regarding how much time the customers have. The layout in the automated store is based on the fact that customers could be in a hurry, and its layout is smaller than the hybrid

store. The layout in the hybrid store makes it easier to make a more extensive shopping trip. They have large enough space between the shelves that lets the customers pass each other with a shopping cart. Geographical location will imply what would be convenient for their store to increase their sale (Dorismond, 2016). For instance, the automated store is located in the city center, attracting different customer groups like tourists and others who just want to grab and go. The hybrid store has a different customer group that often consists of older adults, students, and others who want to do their weekly shopping. The geographical location is relevant because it indicates the size of the store and the selection of items. For the grocery store workers, the routines are central to the day-to-day work in the store. Their routines get established through the practices they perform. The routines in the hybrid store and the automated store are somewhat similar. The managers from both stores emphasize that the primary purpose of the workers is to help customers and let the self-checkout experience be enjoyable.

The typical grocery shopping experience affects the workers and customers differently. While customers spend a small amount of time in the stores, the grocery store workers usually spend five to eight hours in the store each shift. How often they work depends on whether they are full-time or part-time workers. A typical day in a grocery store usually starts with the workers opening the store and getting stuff ready before opening hours. Norwegian grocery stores are often open from 7-23 on weekdays and 9-21 on Saturdays, with some smaller stores being open even on Sundays. Once it is open, the customers can come into the store. A regular customer planning to buy a couple of items usually takes a shopping cart or basket before walking through the store. The workers can continue what they are doing. For instance, taking orders for the next day, cleaning or filling in new groceries to the shelves; however, only if the customer does not need assistance with the shopping. A Danish research stated that some of the shelf arrangements are well-established principles for retail stores (Juel-Jacobsen, 2014, p. 162). E.g., candy is on the lowest shelves so children can see them and ask their parents to buy it. Around 80% of purchase decisions happen in-store; therefore, store design can influence the shopper (Ebster, 2011). Once the customer has collected their items, they are ready to check out. The customer can choose between regular registers or self-checkouts in the hybrid store. In the automated store, customers do not have this choice. The workers observe the choice, and they are available if needed. If the customers choose self-checkouts, they do everything themselves, which means they can pack and pay for the items without assistance. However, if the customer does need help, for instance, with weighing items, or if they cannot find the correct item on the screen or get picked out to random check - the grocery store worker should be nearby to assist. Choosing regular registers, the worker scans the items while the customers can start packing the items before paying for the groceries. Afterward, if the customer chooses self-checkouts, the customer leaves with the potential of not having interacted with another human (cashier) at all. The employees, however, remain at the store until the end of their shift.

ROUTINES OF THE WORKERS AND CUSTOMERS

Routines can be described as something done in a usual order (Cambridge Dictionary, n.d.). E.g., taking a shower every day before going to bed or learning a dancing routine. Both workers and customers experience different routines when entering a store. Sørensen (2006, p. 47) mentions that the practical dimension focuses on how routines are related

to an artifact. Therefore, this section will explore some specific routines those user groups encounter.

The routines for the workers usually have some specific things they have to do each day. Those informants who worked part-time usually got a to-do list or a verbal message of what they should do that day. Otherwise, just do the same routines as they always do. Some routines that grocery workers have is pursuing a sale, customer service, handling orders and shipments, and having the responsibility to keep the store clean and tidy (Hkdir, 2020). Part-time workers usually work during the evening shift, where they have to prepare the grocery store to close for the night. Therefore, they did not share the same practices as the workers, who mostly only worked in the daytime. Concerning their routines in the grocery store and how the self-checkouts might change them, Adam, one of the interviewees at the automated store, stated:

> "For me, is it primarily that we get freed to do other things. We are a city center store, which means that we have to keep watching the self-checkouts all the time. Then, you can have one employee to keep track of 5 self-checkouts, instead of 2 regular registers, where it is usually a queue."

That quote from Adam showcases that he can do other stuff instead of sitting behind a cashier desk and registering the customers' groceries (cf. Benanav, 2020). One of Adam's colleagues confirms what he said. The colleague adds that he can refill new groceries, take orders for the next couple of days, and increase the presentation of the grocery store. The manager at the automated store said, "we more and less liberate an employee, but again, we do need someone to stand and watch over the self-checkout area. The efficiency for that employee will increase around 50% because they can do other things." That employee could refill new groceries, front the items on the shelves or increase customer service. The manager continues to say how this works; having good security cameras in the store makes it possible to do so. In the automated store, they are usually only two people working simultaneously. However, from a time gap between 13.00-18.00, a third employee comes to help out during the rush hours.

The sounds and lights from the self-checkouts give the worker an insight into what to do next. Each of the self-checkouts is installed with a traffic light mechanism. The technology makes much noise, for instance, when a customer scans an item or if the customer needs an assistant. The self-checkout will make a loud noise and start blinking red. The workers from the observations addressed this and said it made different sounds based on the problem. The noises and lights indicate the worker's ability to recognize what they need to do, which was helpful for the workers that had used the self-checkouts for a long time—helping them create a practice every time the self-checkouts make a noise.

Customers experience routines differently. The shopping routines changed for some of the customers in the hybrid store. Customers can choose to use cash or card in the regular registers or card in the self-checkouts. It seemed like every time the customer realized that the self-checkout did not take cash, they went to queue in the regular cashier line. The automated store does have self-checkouts that take cash, making it more convenient for customers who do not have a bank card. Moreover, Norwegian stores are required by law to accept cash (Norges Bank, 2020). However, the automated store did have some challenges with this transaction. Sometimes the machine did not accept the bill, and the customer tried multiple times and got more and more frustrated. This does not happen as

often with regular registers. Rinta-Kahila et al. (2021, p. 4) state that the efficiency goes down when using cash, and it can decrease their conventional means of service. Using different payment methods can decrease efficiency because a customer can, for instance, struggle to find their wallet or do not have enough cash, resulting in not being able to pay. This will increase the waiting time for others in line to use the register. Comparing regular registers to self-checkouts, a customer in line usually has more self-checkouts to choose from when someone is struggling than in regular registers. Additionally, when using cash in regular registers, it is the cashier who deals with the bills. While in the self-checkouts, the customers deal with the cash. The efficiency is different because paying with a card is usually just tapping the card on the card reader. However, suppose the customers have a negative experience with the automated store while trying to use cash in self-checkouts. In that case, it can affect their future routines so that they do not use cash later or go to another store later on.

Having too many items is one of the factors why some customers choose regular registers over self-checkouts. While interviewing some customers, two explicitly stated that they usually use self-checkouts. However, when having a full cart of items was more convenient than having someone else do it. A male student in his 20s chose regular checkouts when he had tons of groceries but usually chose self-checkouts. He said: "I usually go there [self-checkouts] because you have more freedom and do not need to queue and do not need to stress to the same extent if someone is behind you," which shows that how many groceries the customer buys have influenced the decisions and routines regarding self-checkouts. A study published in *the Journal of Retailing and Customer Service* stated that how many items the customer has in their basket indicates how much they enjoy using self-checkouts (Rinta-Kahila et al., 2021, p. 6). As the male student emphasized above, the number of items indicates whether he should choose regular registers or self-checkouts. More of the customers that were interviewed stated similar things. Regardless of how much they enjoyed using self-checkouts, it was more convenient to use regular registers when having too many items due to the lack of space at the self-checkout counters.

NEW TECHNOLOGY AND EFFICIENCY

The store manager in the automated store expressed how the head office pushed on new technology to try. He stated that they give them extra work in terms of implementation of the new technology and training the workers to be able to use it. The manager stated that they get compensated, making it up for them. Trying new technologies on behalf of the chain's head office shows that they are implementing new digital solutions. Furthermore, see how the grocery store workers adjust and tackle it. Testing new technology before implementing it in other stores can give guidelines and let others know how to adjust to the artifact.

The new technology will influence the practices in grocery stores. Automation has made the workload more demanding. A worker from the automated store stated: "The store earns more having fewer employees, but that results in having a larger workload." This showcases how a store justifies needing fewer workers, but the workload for the remaining workers is increasing because they have to take over the other workers' tasks. E.g., if one worker was responsible for the refill of the groceries and the other was responsible for the self-checkouts. Having fewer workers indicate that one worker has to do both tasks.

Susskind (2020, p. 215) expresses in his book, *A World Without Work*: "The threat of technological unemployment has another face to it. It will deprive people of income and significance; it will hollow out not just the labor market, but also the sense of purpose in many people's lives." Taking this further, working in a grocery store is significant for the majority of the informants. Only the part-time workers expressed they were only there to make money while studying. Therefore, new technology and having fewer workers can be challenging because the workers can become burnt out due to the work overload.

New technology and efficiency have been central throughout the history of grocery stores. The manager from the hybrid store has worked in the chain since 1978. Routines will get renewed with new technology and automation. This has already happened with all automated grocery stores like Amazon Go, which opened in 2018 and has stores in 30 different locations in the US and the UK. An article in Forbes stated that if the automation in grocery stores, like Amazon Go, continues, around 2.3 million cashiers will lose their job (Stevenson, 2018). In Norway, around 34% of all workers employed within sale and service worked in grocery stores, convenience stores, or gas stations (SSB, 2019). That percentage translates to 132 722 individuals. Suppose automation takes over and leaves these individuals unemployed. In that case, they need to find a new job, which can be challenging for those who have worked in grocery stores majority of their life.

CHALLENGES

Technological challenges are the main issue with self-checkouts for some of the informants. Some of these problems have arisen with the implementation of self-checkouts. A worker from the automated store mentions that difficulties with the touchscreen make the job arduous, but the customers get frustrated. She emphasizes that it starts to face more complications when the artifact gets older. Another worker stated: "It was always something technical that did not work properly." Technical complications are inevitable, and sometimes it is nothing the grocery store worker can do before a person comes and fixes it. For instance, while doing the last observations in the automated store, one self-checkout had a malfunction. In this situation, the solution was to use the other machines while that one was out of order. In one way, the routines for the workers change when facing technological complications is how to maneuver around it.

Age control is an example of a challenge that customers face in self-checkouts. Age control is needed when a customer buys ID-required items, like alcohol, cigarettes, or painkillers. Age control can quickly get done by going to regular registers, but this has not stopped several customers from choosing self-checkouts due to several reasons. For instance, the wait time to get help from an employer to double-check the customers' age or that the customer does not find the product on the screen has increased. The self-checkouts are designed to check the customers' age if they bought items that require the customer to be a certain age. Nasal spray, snuff (NO:"snus"), and lighters are other examples that have an age limit. The self-checkouts are installed with a scanner that confirms the customer's age, trying to make this process more smooth. In the hybrid store, all the checkouts have a fingerprint scanner. In contrast, four out of five self-checkout counters have a fingerprint scanner in the automated store. The last one has a handprint scanner. The latter scanner is a new technology the main office experiment with. Pursuing the age control further, if the customers have not registered their fingerprint, they need to get an employee to check their ID before confirming with the machine. Therefore, some customers choose regular

registers instead if they have not registered their fingerprints. A male customer in his 60s, e.g., stated: "I came here [regular registers] because of the beer; otherwise, I had to wait so long." Another customer, a man in his 50s, says the same thing, but he wanted some tobacco instead. This showcases that some customers change their routines due to certain groceries. A common denominator for the customers choosing regular registers over self-checkouts is buying age-limited groceries. The wait time decreases, and it is easy to let someone else do it. A customer can show the grocery store worker their ID instead of waiting for a worker to help them.

Customers' frustration regarding self-checkouts affects the workers. The frustration usually comes from wrongdoings, either the customer or the artifact's fault (cf. Pettersen, 2018). For instance, being taken out in random control triggers some customers. Amanda, a worker from the automated store, stated: "I experience that more people get frustrated and offended if they do something wrong." She says she is trying hard to be respectful, but it is challenging to help customers who get frustrated at her. This showcases how the routine gets established (cf. Sørensen, 2006). The transition from regular registers to self-checkouts is laborious for some. Especially when using new technology and now standing in a position where the shopper does not know what to do. In her book *Atlas of AI*, Crawford (2021, p. 56-57) mentions how humans treat other humans as robots and what this means for the role of labor. From a practical dimension and self-checkout perspective, customers get mad at the machine and take it out on the worker as if it was their fault. The worker still has to continue pursuing their role and routine to help the customer regardless of how they get treated. A middle-aged male customer confirmed that he got frustrated and stated: "it is because I have no idea what I am supposed to do."

Customers with vision impairment have different practices and routines than the general population. The digitalization of self-checkout registers has not been facilitated for all customer groups. Customers with visual impairment are an example. The World Health Organization (2019) stated in their report "World report on the vision" that around one billion people worldwide have vision impairment. The self-checkouts do not have braille or read aloud what is on the screen, which means the customer needs assistance – either from the worker or someone else. They are "excluded," as Wyatt (2003, p. 78) explains it. These customers have access to the self-checkout counters but cannot access the technology without assistance. Having regular registers means the customer can put the items on the checkout counter belts and give the money to the cashier. A research article stated that individuals with visual impairment strongly believe that they can cope with challenges. However, the facilitation needs to be improved (Brunes, Hansen, & Heir, 2021). For instance, Virginia Eubanks' book *Automating Inequality* (2018, p. 68) gave an example of how automation of the health care system discriminated against individuals who had a mental illness, visual impairment, deaf or disabled. Customers with vision impairment practice self-checkouts differently because they need the technology to facilitate their usage. If the end goal for some grocery stores is to become an entire automated grocery store, re-designing the artifact is needed to include more customer groups.

Help to scanning and double scanning are two challenges that customers face in self-checkouts. Both of them are easily solved by going to regular registers, and for a middle-aged customer stated: "it is so much there, so I do not know what I am supposed to do." His reaction emphasizes how some customers find it overwhelming to do something on their own that they are not used to doing. During the observations, I witnessed how respectful and patient the grocery store workers were while helping customers—in the automated store, helping to scan happened more frequently than in the hybrid store. One

of the reasons for this is that most products without a barcode had to be weighted on another scale, not on the self-checkout themselves. While in the hybrid store, all of the registers have a scale on the machine. Two out of five have this in the automated store. Double scanning is another challenge. Customers cannot delete an item, so the employee has to do it, and the wait time is again the issue. A customer in his 30s stated that this is a challenge: "when you scan something wrong (…), you need help to delete it, but it makes sense why it is this way." This showcases that getting help when the shopper usually can get through the shopping experience without talking to anyone is a challenge. However, these challenges have created new work assignments for the workers. Earlier, these customer-worker-machine challenges were not as obvious. In the regular registers, these challenges were between the worker and machine. The workers had different protocols to follow to solve the problem themselves. Implementing self-checkouts has new challenges risen, but workers can now help the customers solve the problem.

CONTROL OF EMPLOYEES

Control of the workers' practices is more prominent in the hybrid store than in the automated store. They share some parallels in how the workdays are structured. For instance, both of them have self-checkout counters. The hybrid store had regular registers and self-checkouts, while the automated store only had self-checkouts. Their approach to self-checkouts is quite similar. It requires a grocery store worker to confirm the customer's age, double-check if they have scanned all of the items, and be accessible if they have any questions. One disparity is that workers in the hybrid store are not "allowed" to leave the self-checkout area – which was decided by management. They were responsible for watching over the self-checkouts, being what I will term a "machine observer." The interaction between humans and machines, or nonhumans, as Latour calls it, is an essential part of using self-checkouts. Being a "machine observer" is an element of the control aspect. The workers control self-checkouts and work the way they should or watch customers use them and help when necessary. With self-checkouts the workers are responsible and can observe several registers simultaneously rather than standing behind one regular register (cf. Benanav, 2020).

Mainly, the workers stated that they did not like to spend their whole shift watching over the self-checkouts. A shift can last from five to eight hours, which is a long time standing in just one area. During the interviews, all the workers expressed that one employee has to stay by self-checkouts. During the informal interviews, when pursuing the observations, a worker expressed how boring it was to stand there the entire day. One of their jobs is to help customers, but she stated: "you cannot trust that people can do anything themselves." Therefore, it was necessary to be a "machine observer." The workers are always advised to do something at work like fronting items, but it is hard when someone always has to stand and watch over the self-checkouts. The management had stated that the worker should always be accessible whenever the customer might need it there. The worker from the informal interview stated that she did not think it was that strict in other stores compared to the grocery store she worked at before. In contrast, during some downtime in the automated store, one worker stated that "you get more time to do other stuff." Some of the workers had more time to do were to front the groceries or take orders, ergo, preparing the store to be pleasant for the customers.

The management influences the workers' routines. Each store has particular standards for how they want to be portrayed. To maintain the standards given by the management, the

workers must fulfill their duties. When the employment contract is signed, the worker has specific guidelines—for instance, meeting up on time, being polite to the customers, and representing the chain in an exemplary manner. The routines are based on guidelines coming from the management. The manager from the hybrid store says: "some routines do not have a to-do list because it is common sense." However, he rarely works with the customer to the same extent as the other workers in the hybrid store, but the manager gives out instructions. The other workers from the same store stated that the management is why the store has self-checkouts. When the management decided that they wanted to implement self-checkout counters, they established new routines and practices. Some of the workers did not like self-checkouts because it took away some of the elements they enjoyed about working in grocery stores, which was the social interaction with the customers. The decision that was made by the management, the store started regulating and supporting it, even though the implementation happened because of the competition with another store across the street. This being the main reason for the implementation can competition between stores is reasonable for why the hybrid store chose to use self-checkouts. A Norwegian report from Menon Economics stated that when grocery stores open close to each other, it opens for competition to capture the customers (Wifstad et al., 2018, p. 28). Another Norwegian research (Anderson, 2019) confirms this and adds that competition is one reason for the rise of implementation of digital solutions, like self-checkouts.

FREEDOM AND FRUSTRATIONS

The automated store encounters different customer groups due to being a city center grocery store than the hybrid store. The workers in the automated store explicitly mentioned how being located in the city center brings many people inside the store and how they portray their layout showcases this. Some people ran into the store to grab and go or asked for directions. In the automated store, efficiency is the key. All of the workers mention the freedom the customer gets while using self-checkouts. As mentioned earlier, the manager from the automated stated that with self-checkouts, they liberate an employee. Having fewer workers in a store leaves more things to do, but the lack of a cashier behind a counter still brings more freedom because they are not placed behind a counter. The worker is allowed to move around. That freedom can indicate that those customers who actively choose self-checkouts want that independent feeling.

During the observations, I scrutinized how customers reacted if something interrupted them during their checkout. E.g., some got surprised, annoyed, or confused. The majority look confused and look for an employee to help them. Sometimes a customer gets frustrated or offended if something is wrong with the self-checkout and might need some assistance. Two of the informants in the automated store did explicitly mention this. They added that it was challenging to maintain efficiency if several customers needed help simultaneously. Being only two people on the job majority of the time makes it even harder. However, the efficiency brings some customers to choose self-checkouts (Rinta-Kahila et al., 2021, p. 6). The practical dimension does not necessarily change the routines when using the artifact but adjusting to the customers' behavior regarding self-checkouts can make it a bit more challenging.

SUMMARY

In this chapter I have explored how grocery store workers and customers practice self-checkouts. Sørensen's (2006) practical dimension on technology domestication focuses on how routines and practices are essential to understand to see how, where, and when an artifact is used. Self-checkouts are an alternative checkout option for the customers in the hybrid store while being the only option in the automated store. Throughout my studies, it became apparent how control and routines correspond with self-checkouts. The management has certain control over the employers. This consisted of telling them what to do at every given time. E.g., in the hybrid store, the workers had shifts where the worker had to watch over the self-checkouts the entire shift. Being a so-called "machine observer". This was more remarkable in the hybrid store than in the automated store. They were "allowed" to leave the self-checkout area to do other stuff in the latter store to do other stuff if needed – with top-down narratives of "liberating" the worker from the cashier chair.

In comparison, several of the workers in the hybrid store were not allowed to leave. The only excuse to leave the area was either to clean up the baskets or help another customer. This chapter explored what routines the workers and customers faced in a grocery store. Some workers could do other things than watch over the self-checkouts, indicating that their routines were based on front items or cleaning the store. It was different for the customers in the hybrid and automated stores.

Customers in the hybrid store could choose between self-checkouts or regular registers. From my observations, it became evident that some customer groups chose regular registers due to the many items in their cart. However, some customers chose regular registers regardless of how many items they had. With every technology, it faces some challenges; even self-checkouts do. Some customer groups get excluded due to the lack of facilitation of the self-checkouts. Also, some customers were frustrated while using the self-checkout, which made it challenging for both parties, the customer and the worker. The next chapter will analyze how and why the grocery store workers and customers had various feelings and interpretations regarding self-checkouts.

CHAPTER 5 - THE INTERPRETATIONS OF SELF-CHECKOUTS

What do grocery store workers and customers think about self-checkouts? Self-checkouts bring different emotions and perceptions, which I will further explore in this chapter. The previous chapter explained the practical dimension of self-checkouts and how actors like customers and workers used the artifact. Self-checkouts brought new routines, new control of the employers, and new challenges. It is not given that everyone has the same perception of innovation or technological artifacts. People have a meaning and have interpretations against technology, even if they find the artifact essential or not. This chapter will explore the symbolic dimension of the artifact self-checkout. The symbolic dimension focuses on the user's meaning and identity toward a technology (Sørensen, 2006, p. 47; Ask & Søraa, 2021, p. 65). This chapter engages this to see how self-checkouts make workers and customers feel and think and how the artifact can be considered essential or not for them. Therefore, how self-checkouts influence their interpretation of the technology.

To highlight this, I will explore the symbolic dimension of self-checkouts by asking how the workers and customers feel about the artifact. During the interviews, I asked the informants upfront about their opinion and hoped they would give informative answers. In combination with conducting several observations, I could witness how customers and workers felt about self-checkouts. Observing gave me a more anonymous placement where I could witness customers use self-checkouts as they usually would. This was fundamental to better understanding how some customers were feeling. Choosing self-checkouts could signal that the customer did not want to be disturbed or wanted the shopping to go more efficiently.

This chapter will first explore how time and efficiency influence users' interpretations, and secondly, discuss how routines get understood. Subsequently, analyze if it is a particular like or dislike of self-checkouts among the informants and if it is a clear distinction between the customers and grocery store workers. Lastly, I will discuss one user group that usually gets underrepresented when discussing technology – the non-users.

TIME AND EFFICIENCY

Time and efficiency are two elements that can influence what users think and interpret regarding a technology. In today's society, saving time often occurs in the headlines of newspapers. Companies have been created to make the grocery store experience faster, e.g., conducting the grocery shop online and delivering it at home. Time and efficiency are becoming more critical, and newspapers often have headlines regarding strategies to maximize your time efficiency (Kaplan, n.d.). This section will explore how time and efficiency correlate with self-checkouts and if that is essential for the workers' and customers' interpretation of the technology.

Observing customers' behavior when using self-checkouts indicates whether they like or dislike the artifact. The freedom to use self-checkouts is why they have become more popular. When conducting the customers' interviews, some informants stated that they chose to use self-checkouts because the line is usually shorter, and you can take your time and not get stressed. The common denominator was that it was more convenient for the

majority of the customers. A study conducted by Collier and Kimes (2012) expresses how convenience positively affects accuracy and speed. That study indicates how liking and using self-checkouts can decrease the waiting time between customers at the register, influencing the artifact's meaning. Witnessing the decreasing waiting time makes the grocery shopping experience faster. This is one reason why people use them in the first place. People liked them, caused repercussions, and more stores installed them. Not only in grocery stores but also in other service areas, e.g., more and more airports have check-in machines, and the person drops off their bag instead of letting a worker do the entire process. Furthermore, the symbolic dimension in this example clarifies that most people highly value self-service machines. It has become a norm to have them and unconventional not to, which results in more people using them due to convenience.

Self-checkouts are essential for the automated store because being located in the city center. They are based on being convenient. The manager from this store express how self-checkout may not be the answer for all grocery stores, and it is essential to ask: "Does this store suit to have self-checkouts?". Customers usually just come into pick-and-go, and their turnover is based on this. However, this goes up and down due to challenges like moving the bus stops and living through a pandemic. This results in fewer people being out and about, influencing how many people stop by the store, however, getting mail-in-store (NO: "Post i butikk") helped. The weather is also an indicator of how many people will stop by. During all of the observations at the store, which were conducted during the fall season. It was unfortunately always raining and windy, typical fall Trondheim weather. Compared to the hybrid store, the weather had a more negligible impact due to having parking spaces outside. That made the weekly shop easier for some. Additionally, the hybrid store maintained regular registers, and got new self-checkout counters to contribute to new customer groups. The weather can indicate what grocery store a customer would choose and like. People still need groceries, regardless of the weather. Therefore, having accessible parking spaces makes the decision easier for some. For others, used the grocery stores to hide from the weather. This happened in the automated store during the observations, and it resulted in the customer usually buying something, even though it was not their intention.

TECHNOLOGICAL FRUSTRATIONS

Some technologies are being created to increase efficiency and free workers from doing something else (Susskind, 2020). When technological challenges appear, it can be frustrating. In the last chapter became evident what challenges customers and workers face when using self-checkouts. This chapter will highlight how the actors sense challenges with their encounter with the artifact (Sørensen, 2006, p. 47). "It is always something technical that does not work," a worker from the automated stated after I asked the question about challenges surrounding self-checkouts. He added that it was aggravating when stuff did not function because he had to spend more time repairing the matter than assisting customers or stacking the shelves. The other workers in the automated store expressed similar thoughts. Their self-checkouts are starting to get worn out, which results in having to pay someone to fix them and decreasing the efficiency. One of the workers explicitly stated that some customers get enraged when the machine does not operate correctly. The customers are used to having someone else doing the job and can feel confused when something pops up on the screen, and they do not know what to do. With technology, people expect it to work the majority of the time. This is not always the case.

The worker expressed that the customers got frustrated whenever the touchscreen did not work or did not find the correct item on the screen. Customers expect a certain standard when entering a store, e.g., getting service from the worker and not executing the checkouts themselves. "Customer expectations are beliefs about service delivery that function as standards or reference points against which performance is judged" (Zeithaml & Bitner, 1996, p. 76). That quote showcases how customers have expectations for each service group and do not uphold the same standards to bankers as grocery store workers. Bankers often are portrayed as someone of a higher standard than workers in grocery stores. After the self-service approach reached the grocery store, expectations were transferred from the regular registers to the self-checkouts.

Technology is unpredictable; therefore, frustration appears when the machine declines (cf. Pettersen, 2018). A customer in his 60s affirms that struggling with self-checkouts made him feel annoyed. Therefore, he chose to use the regular registers instead. The workers' expectations and self-checkouts can affect what the customer will do in the future. They can end up choosing another store and not coming back. This customer experience could showcase different things. New technology brings certain expectations, and when those expectations are not being met, it brings forward feelings of frustration and annoyance.

Are self-checkouts criticized in similar ways as we see other technologies? Throughout my studies, I witnessed self-checkouts get criticized in multiple ways. Self-checkouts get criticized by some because it takes away jobs and makes the shift more boring. Workers and customers that were interviewed conveyed their thoughts regarding the artifact. On one side, all of the workers from the automated store, articulated that their store appreciated the idea of having self-checkouts. They agreed on the efficiency aspect of the technology. By implementing self-checkouts, the worker was responsible for multiple registers simultaneously instead of standing behind one (cf. Benanav, 2020). On the other side, most hybrid store workers used self-checkouts themselves but disliked them while being at work. A worker in the hybrid store stated: "they [the self-checkouts] are supposed to be a good thing in theory." The workers did not like it in a work setting. One reason for this could be that they installed self-checkouts around six months prior, meaning that their interpretations of self-checkouts may not have changed. However, they agreed that self-checkouts are more convenient during rush hour, but it did not make it "worth it" because of the lack of interpersonal interactions. The lack of interpersonal interactions has been studied have come apparent in similar studies regarding self-service technology (McWilliams et al., 2016).

THE MEANING BEHIND ROUTINES

The new routines that self-checkouts brought constructed new meaning around daily life at the grocery stores. Adapting to new technology can be a draining process and cause the workers to feel uncomfortable. Self-checkouts are beneficial for the store, but the workers' dissatisfaction can put a toil on that, e.g., when the workers are antagonistic, self-checkouts can influence the work environment. Also, from the informal interviews, some workers felt inefficient, and the days became monotonous compared to earlier. The workers did find it challenging to keep an overview of the customers during rush hour, which caused them to feel stressed and overwhelmed. It was more straightforward than regular registers because one person controlled that each item got scanned, and the worker emphasized that it was less stressful during rush hour. However, the majority of the workers in the

hybrid store used self-checkouts themselves when they were grocery shopping. This is interesting when they know how much they disrelish and feel while working.

Nevertheless, the workers appreciated the efficiency around self-checkouts, but changing routines brings challenges. Having routines bring safety and pushing yourself out of a comfort zone in a work setting can be uncomfortable but bring growth. Self-checkouts get criticized. This is important to understand the domestication of the artifact portrayed through the informants. For the grocery store, it is indispensable to know what challenges the self-checkouts have that get highlighted because it implies how to fix them. Furthermore, learning the routines can make the customers feel better about using the artifact.

For the workers, the majority of the routines have been internalized. However, some of the workers at the automated store state that self-checkouts can be both boring and overwhelming. When the store has many customers, a lot happens simultaneously. For instance, all five registers are beeping because the customer needs help, one needs help to find something in the store, and a few people want to pick up their packages. With only two or three employers during the opening hours, it is challenging to make everything go smoothly. Anna, a worker from the automated store, stated: "if we do not have that many customers, it can be boring because it is little to do.", but it still gives her more freedom to keep the store in order rather than constantly machine observes the self-checkouts.

In the previous chapter regarding the practical dimension, I explained about how new routines get established with new technology. Some informants expressed how routines and self-checkouts made them feel (cf. Sørensen, 2006). Installing the artifact made some of the workers feel like the days were monotonous, while others complained of the noise pollution. When technology brings convenience, can it also bring a feeling of "what now?". Having particular stuff to do at work fulfills the workday. Having that taken away can make the workers feel lazy or bored. A worker from the informal interview stated that she was waiting for the time to go. It can be boring to wait around because you "have" to; since it is the worker's job, it is impossible to leave before the shift ends. Having constantly doing things increases the internal clock to go faster (Simen & Matell, 2016). However, the transition period of being used to technology and having those feelings can be transformed into gratitude for some. Workers have now time to do something else, as some of the workers already stated in the interviews. For some customers, they can finish the grocery store shopping faster. However, the informants' emotions about self-checkouts can cause a love-hate relationship.

Cost

Introducing self-checkouts to a grocery store can impact the customer base. Technologies like self-checkouts help reduce labor costs for the store (Pettersen, 2018), but customers have to be convinced to see the value, which is vital to see how the symbolic dimension influences the users of self-checkouts. Workers from the hybrid store stated they did not want self-checkout but had to do it due to competition from another store across the street. On the one side, the younger generation. Trondheim has many students, and the hybrid store needed to attract these students. The younger generations often seek convenience (Lee & Leonas, 2020). The observations and interviews confirmed it. On the other side is the older generation. The manager from the hybrid store emphasized how customers came to their store because other stores had done like the automated store, switching all regular

registers to all automated self-checkouts. Even though none of my customers' interviews certified this, it became clear that the store had many customers belonging to the older generation.

LIKE OR DISLIKE?

Technology brings different perceptions. Some people have an opinion on whether they like or dislike technology. Sometimes it is not always a clear distinction. During the interviews, it became somewhat distinct what the informant felt regarding self-checkouts. The answers were informative but also contradictive. The purpose of self-checkouts suddenly became more motley (Sørensen, 2006, p. 47). E.g., during my observations in the automated store, one customer stated that he liked the self-checkouts because he was able to spend a long time talking to the worker that machine observing the checkouts. That day he wanted to brag that he won millions of kroner in the lottery, then pointed at his sleeve where he hid several 1000 kroner bills. The customer wanted a response from the worker, and he knew he would get it by talking the worker by the self-checkouts.

In the hybrid store, some of the workers stated they disliked self-checkouts, but they still used them when not working. It became a love-hate relationship, and this got confirmed by some of the customers as well. The workers knew the practical benefits of getting self-checkouts, that it becomes less stressful, and let them provide service to the customers. From the informal interviews, a worker stated she liked them during rush hour but watching over them gave her back pain. Later she emphasizes that the other workers made it all worth it again. An exciting aspect of this is how the younger Norwegian generation handles and adapts to new technology. In Norway are 37% of the population under 30 years old (SSB, 2022). Therefore, efficiency and convenience are two terms that come up. However, it seems like it is a division between the generation. On the one side, it seems like most of the younger generation knows what to do and can use the artifact from time to time. If the line in the regular registers is long, they like that self-checkouts are an option

On the other hand, if the regular registers do not have a line, most choose that over self-checkouts. This got confirmed by the interviews as well. A male student stated it was more manageable if the cashier did it and felt lazy. Afterward, he points out that he usually chooses self-checkouts, but now it is more convenient. By my observations, his statement got confirmed. The customers who usually chose self-checkouts agreed that their choice influenced how many items they had. It was easier to let the cashier do it because the self-checkout was not designed to make big shopping trips. Another example from a customer in his 50s when I asked him why he chose the regular registers that day: "it was only because of those paper bags. I have earlier made a mistake using them [self-checkouts]". Later he explained how much he liked using them and had not met any other challenges. Even though customers' comfort with technology can showcase how they feel when using self-checkouts, it does not mean that they will always choose it over regular registers.

In the earlier chapter about the practical dimension, I mentioned how frustration from customers could be challenging. Through a symbolic dimension, the same customer was confident in using the self-checkout but felt anger when he did not know what to do and took it out on the worker. Customers are usually ego-involved in service processes (Mills & Moberg, 1982, p. 469). Them using self-checkouts makes the artifact theirs in a way that gives an understanding of how they feel when something goes wrong. The customer yelling at the worker knows it is not their fault, but sometimes it is easier to blame others

than yourself. From the worker's perspective, installing the self-checkouts created more tension between the customers and them. A worker from the automated store mentions that customers get more stressed and frustrated than before the installation. This can imply that the lack of social interaction and *forcing* customers to do the scanning can distance themselves. Further development in that aspect can make the worker despise their work. It is not motivating to work in an environment where customers are constantly disregarded. That can result in a feeling of resentment towards self-checkouts.

This love-hate relationship portrayed by the users of self-checkouts showcases how someone can both like and dislike technology (Sørensen, 2006, p. 47). The symbolic dimension accentuates how the user feels concerning technology and is vital to understanding it. When users have a love-hate relationship, it acknowledges that it is possible to use technology, but when something happens, they still use it but can feel anger or frustration. Therefore, self-checkouts can be portrayed as necessary but can bring forward different emotions. For the automated store, they are dependent on self-checkout counters, so their customers and workers have no other choice than to use the artifact. The customers who enter have to use it if they like it. However, yelling at self-checkouts can make customers feel better afterward because expressing your emotions can eliminate the power of the feeling.

NOISE POLLUTION

The noise pollution increased after the installation of self-checkouts. During the observations, I noticed how the self-checkouts were installed with a traffic light mechanism that makes noises. It indicates what the customer needs help with. The figure 3 underneath illustrates the traffic light system.

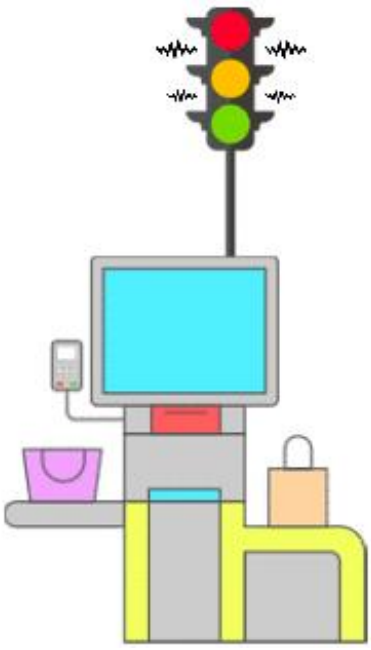


FIGURE 3: ILLUSTRATION OF THE TRAFFIC LIGHT SYSTEM (ILLUSTRATIONS BY CANVA, ASSEMBLED BY ME)

During the informal interviews, one worker stated how it helps to know what to expect when walking over to the customer. However, one worker at the same store and some customers disliked the sounds. One customer asked if it was possible to turn down the noise because everything was loud, and he could not think straight due to the noise. The machine starts making noise and forces a social interaction between the worker and the

customer, creating tension between the actors. The customers are involved in their production of wants, while the workers are employed to pursue service to the customer (Mills & Moberg, 1982, s. 470). Customers have certain expectations when entering a store. E.g., wanting workers to solve a problem if one occurs or responding to them quickly. The workers are employed to serve the customers and help them if necessary. Those actors actively affected by noise pollution share a symbolic dimension because of their shared impact on the noises from the self-checkouts. They do not share the traffic light mechanism's same purpose as the worker who liked the different sounds.

THE ANNOYANCE ASPECT OF STOLEN MERCHANDISE

One disadvantage of the self-checkouts, which almost all the workers at both stores agreed on, is the stolen merchandise that occurs when no third party is involved in the transaction. They felt that could not happen to the same extent with regular registers. Stealing happens regardless, but when the customer is in charge of scanning each item themselves – it is easier *not* to scan one item. The automated store had one solution: more camera coverage. When entering the store, it is evident that you are filmed. In the hybrid store, one employee has to watch over the self-checkouts at all times, but stealing does still happen. For instance, during the observations, I witnessed a couple of times people stealing an item regardless of whether someone was looking at them or not. This indicates that stealing is inevitable regardless of the surveillance in the store. Beck and Hopkins (2015, p. 15) stated that stealing has become more common after implementing self-checkouts. Stealing has become more common as Beck and Hopkins (2015) accentuated above. Stealing be a thrilling experience for some customers because of the feeling of "am I going to get caught"? It gives an adrenalin kick. Stolen merchandise being the most significant disadvantage indicates how the workers feel about self-checkouts. On one side, a worker from the automated store accentuates that it was not that bad since they had fewer workers. Therefore, comparing the stolen merchandise to a non-existing cashier made it worth it. On the other side, customers can steal easier can become a more significant problem in the long run. Since all of the workers I interviewed stated how stolen merchandise is a huge problem, highlights how large this issue is. However, the symbolic value that stealing has on self-checkouts can be how the system is based on trust. The feelings that the workers feel regarding the stolen merchandise indicate how they generally believe that people do the right thing. Therefore, it is disappointing when it does not occur that way.

FORMER USERS

Self-checkouts have become more widespread over a couple of decades. The first wholly automated grocery store was opened by Bunnpris in 2011 at Blindern in Oslo (Heckendorn, 2011). The goal for this store was to reduce the stress point for the workers and give more service to the customers. When technology first comes along, excitement follows. However, over a decade later, it does not seem the excitement has followed to the same extent. During the observations, the children enjoyed using the self-checkout to scan each item themselves and helping their parents. However, users of an artifact can change their minds. Wyatt (2003, p. 74) draws attention to this and focuses on how actors can become "former users." She accentuates that forms and degrees of participation can change. As the practical dimension mentions what the customers do when using an artifact, the symbolic dimension showcases their meaning. My fieldwork had confirmed that some customers used self-checkouts when they first came but have now switched back. A customer in his 40s stated that he tried to use self-checkouts but realized that he enjoyed the regular register instead because he liked the social interaction with the cashier instead

of looking at a screen. While another customer said she enjoyed not scanning each item herself. It is interesting to see more grocery stores switch over to self-checkouts if this is the case. After the mapping of grocery stores in Trondheim, as mentioned in the chapter about methodological considerations, so far has, two of the stores switched from all regular registers to a combination. Similar to the layout of the hybrid store. Introducing self-checkouts, people will start to use them (Hoffmann & Novak, 1998, p. 9). This is also the case for the hybrid store; they caved and got self-checkouts in the spring 2021 after years of not wanting them. Workers and some customers at the store dislike them, but self-checkouts were the most popular during the observations. It would not affect their grocery store experience that much for some customers because they usually use them. Those who used to use the artifact can be forced to go back to use them. It can be a new transition period where they have to adjust to them again. This can make them feel irritated because they had previously made up their mind. They tried it but did not like it, so they went back to regular registers. Therefore, if they dislike the artifact so much that they do not want to go back to use them, they might try to find another store that does not have them. This does happen, according to the manager from the hybrid store.

Having used self-checkout earlier can change some of the customers' symbolic dimensions. The meaning of the artifact has changed as time went on. In the beginning, being excited over something new entering the grocery store but realized they liked regular registers instead. The point of the symbolic dimension is how users interpret and feel about technology. In this case, the feelings were constantly changing. It went from liking something to disliking it. This showcases how it is possible to change your decision over time. Realizing that sometimes it was better beforehand, they learn by their preferences.

"I DO NOT WANT TO TAKE THEIR JOBS."

Some customers have a different meaning of self-checkout counters. These customers dislike the self-checkouts because they fear that the grocery store workers will lose their jobs. This is opposite to the informants I have mentioned earlier in this chapter. This is relevant for the symbolic dimension because it helps to better understands one actor group's interpretations of self-checkouts. Adapting to new technology can be challenging for some individuals because of the fear of the unknown, lack of communication and training, or technology being overly complicated (Barillas, 2020). Grocery stores have been around for a long time. The first store opened in Norway in 1867 outside of Bergen, and since then, it has been a salesperson behind the counter (COOP, n.d.). During the customer interviews, a couple in their 60s stated that they felt safer using regular registers. Growing up with similar technology can make it easier to adapt to new technology, like self-checkouts, as they were invented in the 1990s and grew in prominence in the 2000s (QikServe, 2018). After my observations, the majority of the customers that actively took to the choice to use self-checkouts were under 30. While conducting the customers' interviews, three of the informants, all 50+, stated they *NEVER* would use a self-checkout. Wyatt (2003, p. 76) draws attention to this actor group of non-users, referred to as the "resisters." This accentuates the complexity of self-checkouts. These *resisters* do not "follow the actors" because they portray the self-checkout counters as unnecessary. Why use them when regular registers exist? Another reason can be that they are intrusive, especially seeing how grocery stores rapidly change and self-checkouts are becoming more common. That one group of non-users share a similar symbolic dimension because of their

opinion regarding self-checkouts. Actively choosing not to use it accentuates how unimportant they feel the artifact is (Sørensen, 2006, p. 47; Ask & Søraa, 2021, p. 65).

Some of the customers I interviewed emphasized that they did not want the grocery store workers to lose their jobs. This became accentuated during both the interviews and observations. One worker stated that during the transition period from regular registers to self-checkouts, the store had to put many resources into making it popular. They ran a promo to customers who got a 10% discount if they used the self-service technology, and the process of getting customers to use the self-checkouts was long.

It became apparent to some customers that fewer workers were in the store. Therefore, the active choice to not *take* the workers' jobs became evident. That idea has been portrayed in several books regarding the automation of the job market (Cameron, 2017; Susskind, 2020; Wald, 2020). In one way, the informants' age may be why they stated that the grocery store workers might lose their job. We often see how the service sector has become more automated and digitalized lately—for instance, ordering food on QR-codes instead of having a waiter come and take the order. Having self-checkouts, the customer sees fewer people than they might have if the grocery store only had regular cashiers. On the other side, even though it is not as many people on the "floor," their job might have been replaced with something else. For instance, they are helping out in the back of the store or in the mail-in-store section of the store since it has replaced many Norwegian post offices. Cameron (2017, p. 77) confirms that a job can be replaced with something else. He stated that this had happened before. Technology has replaced human labor for centuries, e.g., from hunter/gatherer, to freehold farmer. What will be next?

How the customers feel regarding self-checkouts taking over the workers' jobs can influence the social aspect of going to a grocery store and changing the grocery store's entire concept. It has been someone behind the counter since the late 1860s. It can be challenging to accept and adapt to the new technology for some, as Curran and Meuter (2015) mention in their study of self-service technology. Customers expect service and understand what the grocery store experience should be like (Ask & Søraa, 2021, p. 65). Therefore, it can be problematic not to experience service the same way anymore. Implementation of self-checkouts makes the customers do the work, changing the main element of paying in a grocery store. Their interpretation of self-checkouts gives a result as something negative for the future. As Cameron (2017) drew attention to, workers can find new places to work because it has happened for centuries. Customers may not like that during this automation transition, and because of that will, some will blame the self-checkouts.

"Service" is a term that often comes up during interviews with customers and workers. The saying "I do not want to take their jobs" becomes relevant. A lady in her 50s stated why she never would use a self-checkout:

> "I think it is impersonal. I think those things have become more common than the regular registers. I think people will lose their jobs. Soon will we be replaced by those in the doctor's office … THAT would be bad!"

Her statement can indicate how she is feeling regarding the future. Doctor's offices at the moment have automated paying machines so the patient can pay after their visit. The customer concerns can imply that soon machines will take over the doctors' jobs, which will show devastating results because of the lack of patient-doctor interaction. Even though automation has become popular in the medical field, it does not indicate that robots are

replacing doctors *yet* (Balasubramanian, 2021). Moreover, are people losing their job because the customers are now doing the work for free? Are we taking someone else job? Some tasks may not be automated, which the Autor-Levy-Murnane (ALM) hypothesis encourages. The latter term came from a group of MIT economists, and it was built upon two realizations. It quickly described that some part of the labor market would never be automated, and it will always be provided enough work for humans to do (Susskind, 2020, p. 44). Some customers feel like they are taking over the workers' jobs, but it does not indicate an issue in the automated store. In one way, it will be workers in the grocery stores for a long time. They might no longer be behind the register, but their job gets transferred to other areas in the store. E.g., they can stock the shelves or help customers throughout the store instead. In addition, this can increase productivity and communication between the workers and customers (Pettersen, 2018). In another way, how the customers, who stated this, felt can be genuine. Looking at wholly automated grocery stores where it is not even self-checkouts gives an insight into what is to come. In the US, Amazon Go and the newly developed Amazon Fresh give the customer option to just walk out of the store when they are done (Amazon, n.d.). Some customers do not want that to happen here in Norway, and when they witness people no longer being employed, it is hard not to comprehend what will happen to the workers or what the future will look like.

SUMMARY

In this chapter I have analyzed what grocery store workers and customers feel about self-checkouts. The symbolic dimension portrays what meaning and values self-checkouts have for their users. Firstly, I analyzed how time and efficiency made self-checkouts more convenient when being in a hurry—afterward, discussing how routines and self-checkouts made the workday more boring and how noise pollution became more prominent after the installation. Then I analyzed if it was a clear distinction between the likes or dislikes of the self-checkouts. On one side, the convenience of self-checkouts was central, but on the other side, it resulted in a ton of frustration when something went wrong. Lastly, I focused on the user groups that were not fond of self-checkouts. These user groups could be described as formers users, then those users that would *never* use self-checkout counters because they felt they took the worker's job.

Throughout this chapter, I have analyzed different symbolic interpretations of self-checkouts between customers and grocery store workers. On the one hand, it symbolized how the loss of workplaces. On the other hand, efficiency and time saving are favorable for some informants. How the user, either customer or worker, interpreted self-checkouts varied from informant to informant, but the common denominator is that everyone had an opinion and expressed their feeling regarding the artifact. Even if it was positive or negative, it is vital to include everyone's interpretations of self-checkouts to better understand how individuals feel about something.

The workers have a somewhat split perception of self-checkouts. In fact, the majority in this study do like them, even though it can cause boredom or freedom. The minority of the informants disliked the self-checkouts in a work setting. This analysis shows that the younger generation in Norway shows tendencies to understand and be comfortable using new technology automatically. However, this does not mean that they always choose self-checkouts over regular registers. Some of the older generations are skeptical about adapting to new technology. Some customers start shopping at the hybrid store because

they have not fully automated like the automated store. Does this mean they are a hundred percent opposed to learning to use self-checkouts? Do they have the knowledge that they need to use it? I will go more into depth in the next chapter.

CHAPTER 6 - THE LEARNING ASPECTS OF SELF-CHECKOUTS

How do grocery store workers and customers learn to use new technological artifacts like self-checkout counters? Do their learning abilities while using self-checkouts affect their everyday shopping? This chapter will explore how customers and grocery store workers learn from self-checkouts and some challenges that test some of the workers' accumulated knowledge. Learning comes in different ways and forms. People learn from others and by themselves. *Learning* can be defined as: "functionally as changing behavior that results from experience" (De Houwer et al., 2013, p. 631). Thus, learning new technology can be challenging; it can end up with a feeling of achievement or unfulfillment regarding the outcome of the learning process.

In the previous chapter, I explained the symbolic dimension of self-checkouts and analyzed grocery store workers' and customers' interpretations of this artifact. My analysis showed how efficiency in the shopping experience and trust in self-checkouts were essential for the informants. While using technological artifacts, a user develops knowledge about them. This chapter will explore the learning processes of the users by looking at self-checkouts through the cognitive dimension of technology domestication, which indicates learning processes and knowledge acquisition between non-users and users (Sørensen, 2015, p. 47). This chapter will focus on what the informants associate with trying, failing, and exploring the self-checkouts, then how learning has proceeded in the user's context. I interpret the cognitive dimension of domestication as consisting of knowledge development and learning processes. This indicates what the workers and customers learn while using the self-checkouts and that they can transfer this knowledge from the technology or others. How and what the informants have learned will be critical points throughout this chapter.

I asked the informants how their knowledge has changed while using self-checkouts to explore this. During the interviews, some informants had more knowledge about the artifacts than others. It became apparent that the workers had more expertise than customers. Some customers explicitly stated that they had limited knowledge of using it, and some that can be described as non-users because they were not interested in acquiring it either. This gave an insight into how different actors react, feel, and think about self-checkouts, resulting in not adapting to the technological solutions that have become more common in their everyday lives.

This chapter will analyze different user groups and how they learn according to what the cognitive dimension of domestication suggests. The chapter will be divided into three sections. Firstly, I will focus on what impact the implementation of self-checkouts had on the workers, which I analyze with two examples of using what they learned from the self-checkouts. Secondly, I will focus on the different customer groups. This section will explore three different customer user groups. Lastly, combine the previous sections and analyze what that meant.

LEARNING TO USE SELF-CHECKOUTS IN A PROFESSIONAL CAPACITY

Grocery store workers deal with self-checkouts for the majority of their workday shifts. Whenever the technological changes are needed for the grocery store or if the workers need to adapt and learn from the artifact. Adapting to new technology can be arduous

(Cameron, 2017, p. 102). Being able to adapt to technology can be an advantage in the work setting due to maintaining the efficiency that the company requires. This can entail easier, faster, more communication, and more efficiency for the workers. Nevertheless, the disadvantages that may occur if the workers are unwilling to adapt and learn about self-checkouts can result in job cuts.

THE BEGINNING OF SELF-CHECKOUTS

Daniel from the discontinued store stated that the self-checkout adaptability came from customers who wanted to use it. As mentioned in chapter 3 about *methodological considerations*, Daniel's interview is a supplementary interview to the other interviews from the other two stores. Anyhow, self-checkouts got introduced to Norway in 2011 (Heckendorn, 2011). That was the starting point of the digitalization process for self-checkouts in Norwegian grocery stores; consequently, workers and customers had to acclimate to self-checkouts. This indicates how Norwegian society is driven against a more technological culture. Believe that technology can be the solution to all of our problems. Therefore, the demand for new technological implementations *forces* the users to be accustomed to the technology if they want to continue their jobs. An example of this could be using an operating system that you have never used before. The worker had to log the hours in an app but earlier used a piece of paper and handed it in manually. If the worker does not do this on the app, the worker will not be paid. Then the worker is *forced* to learn the technology.

The manager from the hybrid store had two main ideas for what would improve the self-checkout counter in the store. Firstly, he accentuated the collaboration between different sections of the store chain needs to improve. This indicates some of the challenges that users of the self-checkouts face. E.g., a wrong scan code, that the manufacturers of the product need to improve the quality, and that the communication flow needs to be enhanced. Secondly, making changes to the self-checkouts that make customers and workers satisfied. Adopting new technology in the service sector and grocery stores "indicate that adaptability is a characteristic which extends beyond interpersonal interaction" (Keillor, Pettijohn, & d'Amico, 2001, s. 33). The hybrid store has had the self-checkouts installed since spring 2021 and has learned some of the challenges self-checkouts stand up against. For instance, some customers emphasized the lack of face-to-face interaction. The manager of the hybrid store confirmed this when I asked how self-checkouts influenced the grocery store experience. Adaptability has gone beyond interpersonal interaction. The customer does not need to interact with anyone during their grocery shopping, which means the workers can be in another part of the store than machine observing the self-checkouts. Therefore, that is one aspect where customers and workers learn what knowledge is acquired by learning about technological artifacts, like self-checkouts.

From the discontinued store, Daniel stated that the store went through a transition from having only regular registers to implementing a 10% discount to hand scanner self-checkouts in 2015. The hand scanner shares a similar concept to the "regular" self-checkout counters; the difference is that instead of taking each item up to the machine to scan it, the machine had a hand scanner so the customer could scan each item in the shopping basket or cart. The discontinued store encouraged customers to use the artifact while checking out. As Malombeke et al. (2014, p. 54) described, telling customers that they could have a discount is essential to influence customers buying behavior. The study emphasizes that this impacts customers, and they are more attracted to these promotions,

which is why they are so common. However, the campaign lasted from one to two years because it never became a hit. After that, they switched to the "regular" self-checkouts. Giving customers a discount can be described as a tool that incentivizes customers to use it because they get rewarded with spending less money afterward. Daniel describes how the hand scanner self-checkouts were not that popular in the beginning and that working during that period was like:

> "Running the campaign made us need more employers. It was an insane period with a lot of action; just a lot happened. In the beginning, we had two workers by the self-checkouts where one of them just stood there and said, 'Hey, do you want to try the self-checkouts?'"

The need for more employers at the beginning of implementing the hand scanner self-checkouts meant that the store wanted to succeed and convince customers to choose their store over someone else. The store needed to make the self-checkouts a safe place, meaning workers around to be with them every step of the way. Therefore, it was essential to be a "machine observer", because then the worker is placed in a position to help the customer use the self-checkouts, so after a while, hopefully, the customer ends up liking and using the artifact. As Schneider & Bowen (1993, p. 39) points out in their study of Social Organizations, customers are more open to being convinced when someone is approaching them. Dabholkar (1996, p. 33) shares a similar approach but emphasizes that it is two factors that affect the customer's choice between regular registers versus self-checkouts:

i. The attitude towards technological artifacts
ii. The need for interaction with workers

Therefore, the mentioned researches emphasize how employers bring face-to-face service, which means that they produce and consume service simultaneously. It becomes apparent that for the store to *convince* customers to use the hand scanner self-checkouts, having an extra worker to greet customers is favorable. The workers were also introduced to the self-checkouts simultaneously and did not internalize the routines. In addition, the campaign in the discontinued store brought many customers to visit the store in the beginning. Daniel emphasized that he had to work more during that period. Being a part-time worker who usually worked every second weekend, he had to work four times a week. However, as exemplified by: "where one of them just stood there," that does not imply much learning, but it was more for the customers having a friendly face incentive them to use self-checkouts. Being greeted by a worker can push the customers to try self-checkouts. Moreover, being informed of a campaign where the customer can save some money is usually well appreciated because most people like to save whenever they can (York et al., 2015). From a learning perspective, that worker is placed to help and encourage the customer and see how efficient it could be to encourage someone before the customer has even thought of choosing between self-checkouts and regular registers.

During this time, more workers were on the job to help with the campaign. Eventually, the workers and customers learned how to undertake the artifact, which needed fewer workers. Daniel said that they were only two people at the job after a while because most customers knew how to use self-checkouts. It became evident that the more users learned about self-checkouts, the store could change the routines. To embrace self-checkouts, the users need to learn how to use them. Workers transfer their knowledge of the artifact over

to the customer after obtaining that knowledge so they can handle the self-checkout a bit better the next time.

LEARNING FROM THE STEALING – WHAT CHANGES WERE MADE?

"Stolen merchandise" had increased after installing self-checkouts in the different grocery stores. I analyzed how the stolen merchandise was considered a problem in the previous chapter. Some of the workers were annoyed and tried different measurements to avoid this. The discontinued- and hybrid stores used the same tactic, including having a gate at the end of the self-checkout area where the customers needed to scan their receipts to exit the store. The automated store chose camera surveillance. The stores' reactions to how to adapt to the challenge regarding stolen merchandise suggest the contrasting interpretations actors take when facing a challenge. Each store has an approach that best fits them, which correlates with how Sørensen (2015, p.47) describes the cognitive dimension. Employing surveillance has been prevalent in other grocery stores across the country. For example, a grocery store in a small village in Telemark county became an experimental subject for a wholly new project in Norway, a 24/7 open grocery store where customers tap their bank card on a card reader to let themselves into the store do their shopping. To avoid theft, they installed surveillance systems, which positively impacted the store and expanded to other small municipalities in the country (Frimand, 2020). This example showcases how some grocery stores handle challenges similarly because they learned what would be the most convenient. The comparison between the automated store and the store from the example is that none had many workers. The difference is that the store in the example is open 24/7, so the worker goes home after doing the necessary routines, such as ordering new items and stacking the shelves. Therefore, the installation of a surveillance system would be profitable for them.

THE LIGHT AND NOISES FROM THE SELF-CHECKOUT COUNTERS

Routines create knowledge for the worker. It allows the workers to quickly accomplish tasks the store manager requires (Kaser, n.d., p. 1). The knowledge the workers have gathered from the routines they have been presented with gives them the expertise to handle the self-checkouts. Routines are a recurrent topic to understand self-checkout counters and their users better. It became apparent in the previous chapters regarding the practical- and symbolic dimension. The cognitive dimension is more about how the user's routines are established and what knowledge they have acquired while using. The majority of the workers have been working in the store for quite some time, which indicates that their routines are internalized over time. They have learned how to handle everyday life in the grocery store as well as self-checkouts.

In the past chapter, I analyzed how the traffic light mechanism of the self-checkout counters was helpful for the workers. During the informal interviews, while observing, a worker stated she learned the different sounds and lights. The worker did not learn this from other workers but by constantly observing what caused the self-checkouts to generate the various sounds. Learning while using an artifact on your own could be a sign of making the workday a bit more efficient and becoming aware of a situation before entering it. Being able to learn by yourself shows how you are the one that needs to step up to make your life easier. However, learning for others is essential to see how others use an artifact. The learning process is faster because you are introduced to using it. In addition, it is easier to ask for help if someone already has the needed expertise.

Observing someone using self-checkouts can give a feeling of relief, and it could be easier to learn it. This makes the transition period easier. The fact that the worker did not learn the various sounds and noises from the machine from others but established the knowledge on its own can be an advantage for future workers because that worker could teach them. The noises that come from the machines indicate the workers' situation when facing customers. It can make them more prepared and ready with the equipment to solve the issue. E.g., when the machine indicates that the customer needs to be ID-checked, the worker has to scan their card, which gives a popup screen, where the worker confirms or denies the customer the item in question. These noises also indicate that everyone nearby hears it, which is not everyone's cup of tea. However, others would not be able to recognize the noises if they were not trained in learning the differences.

THE AUTOMATED STORE AS A "GUINEA PIG."

Digitalization is a term that often occurs in different situations, and it "describes the social and technological changes linked to change as well as the introduction and/or use of digital technology"[3] (Ask & Søraa, 2021, p. 33). Some grocery stores stand across digitalization. The automated store, for instance, is trying out new technological artifacts. A worker from the store stated: "We have been guinea pigs on much stuff, and with that comes many errors." A store like that helps the chain's central office determine what knowledge is required to use the artifact. This store is one of few that has hand scanning as a method of ID check. In most of the stores I visited while mapping grocery stores in Trondheim, customers had to scan their fingertips. In contrast, the others did not have any other option than getting a worker to check the customer manually. Being a guinea pig for the main office lets them map what expertise is needed to expand the technology to other grocery stores. This is time- and money efficient for the chain (cf. Pettersen, 2018). However, since it seemed like the automated store was the only store in Trondheim to try new technological artifacts on behalf of the main office can bring some disadvantages. The store has the same workers who try these technologies, which means they are prepared to use something new. The majority of the workers were under 35, giving a different perspective and knowledge regarding the artifact than older people. Therefore, the chain gets knowledge from people in the younger age group than more senior, which can be challenging because most of the population in Norway is over 35 years old (SSB, 2021b). The main office cognitive dimension is emphasized by asking stores to observe and use the new technological artifacts. In that way, they get an overview of how successful it will be for them in the long run.

CUSTOMERS' LEARNING EXPERIENCES

Customers have many different opinions on how things should be. Compared to the workers, they do not spend hours and hours with self-checkouts but can encounter them at the end of their grocery shopping when they are checking out.

MAJORITY OF THE CUSTOMERS

The majority of the customers usually have no significant issues with self-checkouts. The observations showed a constant flow of customers that barely talked with the cashier. If someone needed help, it was usually for ID-check or double scanning because a worker had to intervene. From the customer interviews, the majority of the informants said they

[3] My translation.

usually chose self-checkouts. However, as my findings suggest, it depended on how many items they had or if they had items that required an ID-check. They have learned when it is best to use self-checkouts and not because of their experiences with the artifact. Several of the customers said it was often due to convenience. In the previous chapters, efficiency and convenience are two concepts that reoccur because some customers have learned when self-checkouts work best.

FIGURE 4: ILLUSTRATION OF CUSTOMERS WAITING IN LINE (ILLUSTRATION FROM CANVA).

After the installation of self-checkouts, the routines in the stores changed. The workers had to learn different demeanor to approach and help customers, while customers had to adjust to using the artifact. Some customers found it relatively easy to use the self-checkouts, and it went smoothly. During the observation of the customers, it was barely a line, but the waiting time increased a bit during rush hours. However, it cannot be compared to regular registers' customers in the queue. From these observations, it became noticeable that the majority of the customers did adapt to self-checkouts. They became more independent, which frustrated some when workers assisted them with certain things like ID-check or double-scanning. This could be that they could almost completed the transaction without getting help. Then needing assistance at the end, when they do not *really* need help, could bring forward annoyance. Self-checkouts made them more self-efficient, and they could finish the shopping without interference from the worker. However, now the whole process got delayed how the customers approach the self-checkouts showcases their routines and adaptability regarding self-checkouts.

AGE MATTERS

The customers' age is prominent in understanding technological artifacts. Some older adults can face "technology anxiety," which can be explained as a feeling of fear when using technology (Venkatesh, 2000, p. 349). This anxiety can lead to resistance to change, especially among that age group (Guo et al., 2013). During the interviews, most of the people in the older generation were not interested in self-checkouts. An older man stated that he "did not know what to do, and it felt safer using regular registers." He emphasized that a regular register was safer, confirming that adapting to new technology can be challenging, especially when an actor lacks the correct expertise. That customer's

experience and knowledge regarding self-checkout counters are limited. This shows parallels with the cognitive dimension. Ask & Søraa (2021, p. 65) confirms that all technology demand knowledge to use it. Fear of using some technologies can negatively be associated with usability. Experiencing unfavorable situations when using self-checkouts can be enough for never wanting to use the artifact again.

In a blog post on *Senior Norge*, a retired man stated that older people struggle with anxiety about doing something wrong when using technology (Johnsbråten, 2019). At the end of the article, he accentuated that if more stores get self-checkouts, it is not far away to travel to a store with a fresh produce counter where it is people behind the counter. In his late 50s, the manager of the hybrid store stated similar sentiment as the retired man from the newspaper. His comprehension accentuated that the older generation does not always like the new technologies. He noticed how customers from nearby stores came to the hybrid store because they still had regular registers. Their upbringing can elucidate their insight regarding the differentiation between self-checkouts and regular registers and if they have faced similar things beforehand. However, most of the customers I interviewed did not like self-checkouts. Some of them even stated that they had never tried. They never acquired the knowledge and expertise to use the artifact. Furthermore, during the observations, several people categorized as older adults use self-checkouts. This became apparent at the automated store due to them not having any other options.

Daniel explains how they tried to teach customers in the older generation to use self-checkouts counters in the discontinued store, and some of them were adaptable. They were located near an apartment complex where most citizens were old. An old woman in her 80s, when I asked why she chose regular register over self-checkouts, stated:

> "I am so old that I am too stubborn to learn it [self-checkouts]. One time I stood there and a worker, a lady, she was not that young said, 'come here, and I will show you,' and I said back, 'but I do not know,' then she said, 'I will show you.' I said, 'it does not matter because I will have forgot it until next time anyway.'"

For this customer, she knew she would have forgotten how to use the self-checkouts until the next time she entered the store. It was not that she disliked the self-checkouts. Instead, she blamed her memory. Later she emphasized that not everyone was in their 20s anymore. In one way, downplaying your abilities can be a defense mechanism because maybe the individual does not have the skillset to maintain knowledge or are too lazy to learn it. Nevertheless, taking the customer from the quote into account. She explicitly stated that she tried to obtain knowledge to use self-checkouts. Therefore, a customer's age can indicate cognitive abilities, which often decline with age (Murman, 2015). Adapting to new technology can be difficult for the older generation because of their age. Some willingly try to obtain knowledge to use, e.g., self-checkouts, while others do not even bother. One reason for this can be because they know what works, so the point of learning something new does not seem relevant to them.

STEALING FROM THE MACHINES

Stealing has a general definition as taking something without permission (Cambridge Dictionary, n.d.). In a grocery store setting, this can be explained as taking something with the intention not to pay the total price or not paying at all. Stolen merchandise is a constant problem for workers in grocery stores. Self-checkouts have created another way of stealing compared to the *usual* way. Some customers choose to scan each item, but for weight

items or items without a scan code, the customer can choose a cheaper item instead. E.g., buying nuts from Nøttefabrikken that costs 249 kroner per kg but scan it as cabbage head for 8 kroner per kg. This is one of many examples. Several stores have shared stories with the media and stated that the problem is more significant in middle- and high schools (Dalseg, 2018). The majority of my informants stated that stolen merchandise is a substantial issue, but customers do not seem to stop doing it.

Have customers learned to steal? Stealing has always been around for centuries, and it can be traced back to the 4th century (ASSA ABLOY, n.d.) It is not a new concept, but the recent method of stealing has increased with self-checkouts, as Beck and Hopkins (2015, p. 49) stated in their study. That study concludes that self-checkouts encourage those customers that usually do not steal, to do it. On the one hand, some customers consequently choose self-checkouts because of the smaller chance of getting caught. Alternatively, if they think they deserve a discount or think, "no one will notice if I scan this item for an item that costs less." On the other hand, mistakes can occur, and customers do not steal on purpose. However, customers that knowingly steal cognitive adapt to self-checkouts. Successfully stealing gives an adrenaline rush, making it harder to stop (Nemko, 2016). These customers may not stop before they get caught. Some might never stop and just continue in other stores. Self-checkouts have made it more accessible. The implementation of the artifact makes people more anonymous, which can result in the workers not noticing before it is too late. In crowded stores, a customer can quickly just scan an item for a smaller price than intended because the worker is busy with others. Seeing how easy it is for customers to steal can discourage the workers, but it increases their learning ability to handle this further. Some workers might even find it uncomfortable confronting the customers due to not knowing how the customer would react. During my observations, I witnessed someone stealing. The workers stated that they are not supposed to run after the customers but rather make sure they actually did steal, file a police report, and ban the person from the store.

LEARNING FROM SELF-CHECKOUTS

Introducing and implementing new technological artifacts impact various user groups. Self-checkouts affect aspects and approaches for people, which could be negative or positive for the artifact. Learning while using becomes apparent. Therefore, it is essential to ask: "what does this mean?" because the learning aspect of self-checkouts is various and can mean different things. This section will explore three different aspects of disparate user groups.

WORKERS' AND CUSTOMERS LEARNING ASPECTS

Learning experiences from both workers and customers means that both user groups have distinctive approaches to adapting to self-checkouts. However, due to the different user groups within workers and customers, everyone has a different adaptation level. People need disparate approaches to learning self-checkouts. Their knowledge differs from their usage of the artifact. Some like it and know exactly how to use it. Others dislike it and are not even interested in trying. Every approach and interpretation influence their learning aspect.

The workers' learning aspect is established in their training and daily encounters with self-checkouts. This is based on what the cognitive model suggests. At the beginning of the implementation of the artifact, the workers get to try it so they can learn the required

knowledge to help customers. Therefore, being able to operate the self-checkouts, they must have specific expertise to be comfortable teaching others. They can work with a technological artifact every day at work, which is an advantage. Since the learning comes from usage, they have a favored position compared to the customer that uses the artifact maybe once or twice a week. The knowledge workers have regarding self-checkouts is typical for most of the workers in grocery stores that work in the register area of the store.

With the implementation of self-checkouts, Alexsander from the automated store shared some thoughts regarding how he thought digitalization would affect life in the grocery store. As self-checkouts could seem like the starting point of a more extensive automation process in the sector, he explained:

> "Jobs will be removed, but new will appear in that regard. I think that will be the biggest difference. Also, it will be a little cumbersome for those who are not technically minded, but you do not need to be that. Some solutions have come, and I look over the data every day. We have constant control. (…) I am very keen to try new solutions, and I am down to try everything."

Alexsander can be described as a technological enthusiast. He acknowledged that adapting to new technology could give him advantages in running a grocery store. Furthermore, he was aware that trying these technologies in the future meant that he needed to acquire new knowledge to use them, which cf. with Sørensen's cognitive dimension. By professing the positive effects of new technology, Alexsander was aware of the negative consequences. The solution would be communication between different actors to decrease the errors during the testing period. On the other side of the scale of Alexsander is several customers. Multiple customers were unsure what the future had on hold for workers in grocery stores. Some never actively used self-checkouts to protest digitalization and what it might develop in the future.

For the customers, the learning aspects are more different than the workers that I interviewed. The hybrid store customers can choose between regular- and self-checkouts. Having the opportunity to choose will influence the customers learning aspect. They know they do not need to learn to use self-checkouts because the regular registers still exist. This learning aspect differs from the customers in the automated store. The main difference would be that the majority of the workers are willingly trying to use self-checkouts because they do not have another choice if they want to shop there. The hybrid store has customers like the automated store that choose their self-checkouts. However, from the observations, it became apparent that some customers chose regular registers when they bought ID-required products. This may be because they have learned that it takes more time to use the self-checkouts if they have to wait for the worker to help them. Others might think it is embarrassing or do not want to disturb the worker if they are busy with something else. What the customers have learned from self-checkouts influences if they want to use it or when it is best not to. For some, their interpretation is enough of an excuse to never try to learn the artifact in the first place, but this is still vital to understand why they feel like that in the first place. One example could be that some think the workers would lose their jobs if they had more automated technology like the self-checkout counters.

THE STORE

The store itself is one actor group that learns things on behalf of the workers and customers. Its adaption levels differ but share similarities. When it came to the stolen

merchandise, the different stores had a solution to decrease it. On one side, the discontinued- and hybrid stores agreed to have a gate where the customer needed to scan their receipt and have a worker standing by the area. On the other side, the automated store had an extensive surveillance system. All stores had surveillance systems, but it was more evident in the latter store. However, while observing the hybrid store, the workers checked the cameras when they suspected someone was stealing.

The discontinued store went through different processes with self-checkouts. In the beginning, they had the hand-scanner, where they proceeded with a 10% discount for everyone using it. They started with six hand scanner self-checkouts; then, when the discount campaign did not attract enough customers, the store switched to three regular self-checkouts in 2016/2017. Daniel stated that that transition period was natural and went smoothly. The store experienced over six months that the campaign was popular initially, but it was not enough to continue with the hand scanner self-checkouts. This can indicate how it takes time to learn from technological artifacts. Customers' and workers' opinions can explain what users think and mean about the artifact, which the importance of that was mentioned in the previous chapter. However, those opinions, in combination with statistics, make it more straightforward for the store if the implementation of self-checkouts were beneficial or not.

Self-checkouts give different learning aspects for the various stores. This is because they have cases that the other stores do not relate to. The discontinued store got discontinued at the end of 2020 due to economic reasons. It was no longer beneficial to have the store open; therefore, the 11 workers there lost their jobs. For the automated store, the self-checkouts brought more freedom for the workers to improve the overall impression of the store. As for the hybrid store, the self-checkout brought some discomfort for some workers. The management from that store said the benefits were not that different before implementing the self-checkouts but acknowledged that they had to implement it to compete with the store across the street. Money can be a way to learn for the store. The following section will explore this.

Learning comes in different ways and forms, and for some workers and stores, this could be about saving money. As mentioned in the section above, a store can make a profit, which can be a success factor. After eight years, the discontinued store got discontinued because continuing to be open meant they lost more money than they were earning. Implementing self-checkouts helped the automated store; Alexsander stated that they could liberate an employee where the efficiency for that worker increased up to 50%. Considering this, the automated store is located in the city center. They are aware they are not a store where customers usually come to do their weekend shopping, which causes them to share similarities with convenience stores. The store does not need that many workers. They are 2-3 throughout the day, compared to the hybrid store, which usually has 7-10 workers. Implementing self-checkouts release an employer and indicate less need for workers in the store. Another worker from the automated store confirmed that it was favorable to implement the artifact. Self-checkouts do not need to get paid for their work compared to humans. Needing fewer workers but being able to make a profit is beneficial. Tendencies like this are seen in other industries, as Cameron (2017, p. 67) stated in his book. E.g., booking flight tickets. Earlier, a clerk at a travel agency was responsible, and now it can be done on your phone while you sit on the couch.

What someone learns about saving money can vary. The store can learn from saving money because they control the statistics and numbers and see the development over

time. Therefore, those numbers determine if implementing self-checkouts was a good idea. This can, over time, result in needing even fewer employers and saving more money there. If saving money is the ultimate goal for a store and can choose to go wholly automated like Amazon Go. More workers will lose their job and need to find something else. It does not seem like that will happen in the hybrid- and automated store yet. Other factors than the implementation of the self-checkouts caused the closing of the discontinued store.

SUMMARY

In this chapter, I analyzed the different learning aspects of self-checkout counters for grocery store workers and customers. Workers share similar viewpoints. A common denominator for them is the annoyance of the customers that have learned to steal in new ways. Self-checkouts being an accomplice to the customers that stole. Stolen merchandise became an example of how grocery stores learn as time went by and formulate a plan to solve an ongoing problem. The discontinued- and the hybrid store shared the same approach, while the automated store chose another solution. In addition, some of the workers learned from the self-checkout counters. A worker learned what to do when the machine showed specific colors or made certain noises.

As for the customers, it became apparent that age to some extent for could affect an individual's cognitive abilities and their desire to use or not use self-checkouts. However, this could also be a defensive mechanism and excuse to not attempt new technologies in grocery stores. Moreover, be a factor regarding learning to use self-checkouts. Since stolen merchandise was an annoyance aspect for the workers, it was vital to analyze what some customers learned by stealing from self-checkouts. However, that self-checkouts indirectly encouraged those that did not usually steal to start because it was not as easy to get caught.

The majority of the workers shared the same problems, especially regarding the challenges. In this case, the stolen merchandise. Some of the customers found self-checkouts more efficient, and when they had acquired the knowledge to use the artifact, it became easier. On the other side of that scale, those who did not want to obtain that knowledge did not acquire the relevant expertise to use self-checkouts. Actors have different starting points. The gap may indicate how much work there is to create the perfect self-checkout and that grocery stores need to take a wider stance than they are now to establish a broader customer group.

CHAPTER 7 - SELF-CHECKOUTS: TRUST, EFFICIENCY, AND CONTROL

This thesis has investigated how self-checkout counters can be understood through grocery stores workers and customers in grocery stores. Self-checkouts are a technology that most people in Norway encounter every day or weekly. Norwegian grocery store workers and customers have different prerequisites regarding self-checkouts. Therefore, this dissertation tried to give a more nuanced picture of how different users and non-users think about, use, and learn new ways of shopping with self-checkouts. To understand why and how different user groups understood self-checkouts, it was first essential to understand the automation of work; therefore, chapter 1 focuses on the correlation between automation of work and self-checkouts, providing an overview of previous research and background information on the topic. Automation of work has been around for a long time, as we have been passing through different working leaps; mechanization, electrification, computerization and now robot and artificial intelligence (Wald, 2020, p. xiv).

In chapter 2 on the theoretical framework, I explained how my theoretical choice of *domestication theory* and *non-users* from the STS field are tools to help unpack and understand technology and the sociotechnical interactions that take place in this setting. Therefore, I have examined how self-checkouts are domesticated among Norwegian workers and customers, with a narrowing down to the city of Trondheim. This consisted of interpretations of the self-checkout in grocery stores and approaches and practices associated with the technology. The dimensions used to explore domestication were practical, symbolic, and cognitive. The practical dimension focuses on grocery store workers and customers *practices* related to self-checkouts. The symbolic dimension looks at how the different interpretations of workers and customers *think of* self-checkouts, while the cognitive dimension emphasizes what they *learn from* and by using the technology. In chapter 3, I discussed the methodological considerations. This thesis results from a triangulated method (Olsen, 2004, p. 3), where I used focus interviews, observations as well as spontaneous focus interviews to map the case. I have done this to capture a broad perspective on self-checkouts. Through all of these chapters combined, I saw how self-checkouts can be understood as something efficient for the majority of the informants. It got linked to time, money, and freedom. The customer felt like they saved time, while the workers had time to do other things. The automated store stated that earned more money because more customers could complete a purchase simultaneously than one-by-one in the regular register. Additionally, customers had more freedom since they could explicitly choose if they wanted to interact with the workers or not.

Through the work of this thesis, it became clear how self-checkouts gave different perspectives to different users. Changing someone's grocery shopping practices bring challenges. The introduction of self-checkouts has been around since the early 2010s in Norway, but an informant stated that getting people to use the technology is a slow process. Today the grocery store sector comprises around 66 000 workers and mainly consists of four different chains (NorgesGruppen, Coop, Rema1000, and Bunnpris). Many grocery stores throughout the country have a combination between regular registers and self-checkouts, as my hybrid store case is a good example of, but the tendencies are showing growth in implementing self-checkouts – all the way to a fully automated store, which was my second case. Several stores have, for example, remodeled and implemented

self-checkouts in the last year since I mapped the different grocery stores in Trondheim in the summer of 2021 when I started my thesis work.

The different stores that I chose to focus on in this thesis have been what I termed the "automated store" and the "hybrid store." Additionally, having the interview from the "discontinued" store as a supplementary interview. As the hybrid store implemented self-checkouts in spring 2021 is just one example of how some workers have not gone through that transition period. Looking closer at customers' practices linked to routines and feeling safe when using regular registers makes it hard to change someone's interpretations about self-checkouts. Technology implementation does not always bring the change that someone is hoping for. It requires that the artifact negotiates with existing knowledge, understandings and practices, through the domestication process. However, throughout this dissertation, it became apparent that the informants domesticated self-checkouts in various manners – showing that the different domestication dimensions overlap. This overlap is what I will explore in this last chapter because having some aspects of self-checkouts overlapping gives a holistic view of the technology, showing the complexity of a seemingly mundane everyday technology. Domestication of technology is not a yes/no question; instead, why and how it gets domesticated (Ask & Søraa, 2021, p. 64). Domesticating self-checkouts visualize how different user groups domesticate the technology.

THE OVERLAPPING

Throughout the thesis, I have focused on two main actor groups: grocery store workers and customers. These actor groups can again be placed in smaller groups because everyone having a different perception of the artifact. Using the three dimensions of domestication introduced in chapter 2 of the *theoretical framework*, illustrate how self-checkouts get used, how it establishes meaning around the artifact, and what knowledge is needed to use the self-checkouts. Now that these three dimensions have been carefully laid out and analyzed, seeing how they overlap can give an even deeper understanding of self-checkouts on a higher level. Therefore, it is vital to look at the most critical ways these dimensions overlap. The practical aspect of self-checkouts highlighted how routines and how to use the artifact were relevant for both the workers and customers. Routines bring emotions, and that affects the user's learning curve. The symbolic and cognitive domestication became evident in how feelings and learning about self-checkouts intertwined. How a user feels affects their learning process because they create new associations about the artifact.

As mentioned above, the various domestication approaches overlap throughout this thesis. I will underneath discuss some presented topics and discuss how those examples will showcase the overlapping. As grocery store workers and customers domesticate self-checkouts differently, these three topics where they overlap most interestingly were, after careful deliberation, seen as *control, trust,* and *efficiency*.

CONTROL

In chapter 4, *routines and control with self-checkout*, I explored the control of employees. Routines get established by the management to have control over the workers. It also pinpoints what workers need to do throughout the day. The hybrid store and the automated store had different approaches. In the latter store, the workers had more flexibility than in the hybrid store because they were allowed to leave the self-checkout area, while the

hybrid store workers had to stand and watch constantly and be a "machine observer." Even though, in practice, the liberation of a worker in the automated store increased the freedom, so are the store routines adding an instruction to the workers.

The controlling aspect is evident in chapter 5, *the interpretations of self-checkouts*. Customers' and workers' feelings and interpretations regarding self-checkouts became apparent. Some workers in the hybrid store stated that having a gate where the customers need to scan their receipts is an extra safety precaution. ID-check is one example where the workers have executed control of customers. Some customers can feel scared or stressed when the self-checkouts start making noise and blinking because they can draw attention to them that they do not want. This can be an intimidation element, as they *scare* the customers to do the right thing. The majority of the workers do not necessarily feel anything against customers needing help. However, they are aware of the consequences of not doing the control properly. E.g., getting yelled at if the management catches them doing something wrong.

Both the workers and customers learn what can happen while using self-checkouts. Having used self-checkouts over time, the ID-check does not come as a surprise anymore because the ID-check becomes an integrated part of the interaction between self-checkouts and workers. Some customers can also choose the fingerprint scanner if they do not want help from the worker. The customer has to show their ID to the cashier in the regular registers. This is a requirement for human assessment and not automation. Moreover, customers getting scared or ashamed can influence their decision to pick regular registers over self-checkouts. Nevertheless, due to the convenience, the majority of the customers continue to choose self-checkouts. Regardless of the several control aspects, it brings along.

TRUST

Trust is another critical aspect where the domestication dimensions overlap. Norwegian society is generally considered a trusting culture where we genuinely believe people are "good" (Kleven, 2016; Jacobsen, 2021). Trust was also a topic that appeared when talking about self-checkouts. The workers trust that people are supposed to do the right thing. Scan each item and do not try to "cheat" the system by scanning an item for another price or not scanning it at all. Having routines and creating practices affect the user, and from the beginning, workers hope and expect the customers to do the right thing.

Additionally, the management expects the workers to do the right thing. E.g., the management expects and trusts that the workers are doing what they are supposed to do. Otherwise, they might lose their job. However, sometimes the trust that someone expects does not always work out. It can create frustration when someone does not maintain the accumulated trust that can be seen as a norm in Norwegian society. The workers got upset when customers stole items when using self-checkouts. Stolen merchandise can create distrust for the workers. They learned that they could not trust everyone, implementing solutions to fix the problems, like implementing surveillance and a gate.

Not everyone shares the trust aspect regarding self-checkouts. For some customers that dislike technology, it can be crucial to create trust between them and self-checkouts. This can be difficult because the feelings they have are valid. Learning to use something utterly foreign to yourself can be challenging. The majority of the people in Norway are exposed to self-checkouts; therefore, gaining trust between them and the technology has to be done through the help of the worker.

EFFICIENCY

Customers had different approaches to self-checkouts. Some could be categorized as "former users" and "refusers," as Wyatt (2003) describes them, and others as neutral or ecstatic. Some customers categorized as refusers were scared that going wholly automatic would conclude in the workers losing their jobs. Other customers had no specific opinion about self-checkouts and chose whatever was most convenient when checking out. E.g., how many items they had in their cart influenced their choice. Efficiency for the older generation of customers was of a different character than what the majority of the workers expressed. Some customers did not find self-checkouts efficient and thought going to regular registers would be faster.

The majority of workers agreed on how convenient and efficient self-checkouts are. They were aware of what challenges they faced after the implementation. Not all of the workers agreed on the efficiency aspect of self-checkouts. Some of the workers in the hybrid store, for example, outright disliked the self-checkouts. It was due to the monotonous routines or the lack of social interactions with the customers. Furthermore, the self-checkouts take away some of the elements that the workers enjoyed about working in a grocery store, including social interactions with customers. However, some stores implemented self-checkouts for effectiveness and hopefully save some money.

The efficiency aspect can correlate with time. In chapter 4, workers from the automated store address how "efficiency is key" because self-checkouts help the customer shopping experience go more smoothly. Being a store that focuses on grab-and-go, the efficiency aspect is essential for them. The majority of the workers in all of the stores stated they liked how fast it went. The queue was smaller, which made some customers happier. As some technologies increase efficiency, the challenges make customers and workers more stressed. Customers can get confused or annoyed if something does not work the way they are used to, and workers have to adapt to this to make the best out of the situation, with the motto "the customer is always right." Having routines for using self-checkouts and liking to use them will increase the user's efficiency in using the technology. Some workers stated that self-checkouts bring efficiency because they can do other things. After all, one worker is now responsible for several registers simultaneously, rather than just one (cf. Benanav, 2020). The customers who like self-checkouts agreed on the efficiency of the technology.

A NEW WAY TO WORK BY NEGOTIATING CONTROL, TRUST, AND EFFICIENCY

As self-checkouts are technology and phenomenon that has given the sale and service industry a new way to work. E.g., workers can stack the shelves instead of standing by the register. The self-checkouts throughout this dissertation brought new aspects like control, trust, and efficiency. These affect grocery store workers and customers. These aspects are relevant to understanding how self-checkouts can be domesticated. In the control and trust aspects, the different user groups: the management, workers, and customers intertwine. The management controls the grocery store workers because they have guidelines that they want their workers to follow. They decide if the store implements self-checkouts or not, then "force" the workers to follow the new practices. They have a control aspect as the base, while trust is on the next level. The management trust that the workers follow these guidelines.

Additionally, the management also decides if the store needs to take precautions to have control over the customers. E.g., implementing a gate where the customers had to scan their receipt or having a surveillance system. The management thus controls the workers, but they also control the customers. They check if the customers are of a certain age when buying ID-required items or contact the police if the customers do not follow the norms, e.g., by stealing or causing others harm. Both the management and workers trust that the customers will do the right thing but need to take precautions for those that do not. Some customers distrust self-checkouts because they think it is more of a step forward to a wholly automated store, where there will no longer be any grocery store workers.

The efficiency aspect builds on the previous two aspects because being able to have efficiency in the store, and the store needs to have good practices on control and trust. This is not the only answer to having efficiency in the store, but it could help. The majority of the workers did like self-checkouts because it decreased the queue line, indicating that they could have more customers go through the registers simultaneously. Some customers enjoyed the self-checkouts for the same reason, while others did not care how efficient the technology was because they would *NEVER* use it. After all, it could take away the worker's job.

PATHWAYS FORWARD FOR THE SECTOR

The overlapping topics indicate how self-checkout users domesticate the technology from a user perspective on how control, trust, and efficiency are connected with self-checkouts. Control can be understood as a fundamental element in the sector. Everyone controls each other in a certain way. The self-checkouts give a sign to the worker that the customer needs to receive a human control. Additionally, being able to use self-checkouts is based on trust. Stolen merchandise is a common problem with self-checkouts; regardless of how much workers trust the customer to do the "right" thing, they cannot expect them to do so. Both of the stores explicitly stated that self-checkout counters brought efficiency. However, not all customers agreed on this. Self-checkouts can be understood as something efficient because it lets customers shop simultaneously, and the majority of the workers like that aspect of the technology. This can indicate that regardless of how efficient technology is, not everyone agrees on ways of using it. Technology has supporters, opponents, and someone that do not care.

The pathway ahead for the sector is unsure. One of my informants stated that grocery stores would feel like a "warehouse" in the future. Others think Norwegian grocery stores will never be fully automated because we are too far from that technology. The majority of the informants have learned how automation and digitalization have influenced their sector. This warehouse feeling can be legitimate. Looking at how wholly automated grocery stores are becoming more popular, we see tendencies in smaller municipalities (Frimand, 2020) for increased automation. Can we control and trust that self-checkouts will always be efficient for us? As individuals, we can choose to use technology to a certain extent – but in some cases, like the stores I explored, we are left with no choice but to use the self-checkout counter. We can still choose our adaptability towards self-checkouts; however, where a user perspective that I have argued for throughout this thesis can help better understand the technology.

FURTHER RESEARCH AND AFTERTHOUGHTS

While conducting interviews and the fieldwork for this thesis and researching automation and how it affects jobs, some topics were brought to my attention that could be interesting to do further research on. Firstly, the social interaction between the customer and worker. Grocery stores are a more significant social arena than we give them credit for (Grønning, 2008). Therefore, researching how removing workers from the store would affect customers would be fascinating. What happens if all the workers disappear? Do self-checkouts bring loneliness for those customers that do not have other social interactions? This can be seen as the backside of self-checkouts. Secondly, researching self-checkout technologies on a larger group of informants that indulge more in the customers' aspect cross-cultural and between countries. For example, in some places in the US, having other people pack your groceries is common, while in other stores like Amazon Go, you just grab and go. Thirdly, I am curious to explore other worker groups in the sales and service sector, investigate how automation and robotization have influenced their job, and research their opinion if they lose their job due to automation, as several books about automation have stated. These socio-technical changes in how we do everyday practices like shopping significantly impact society and the individual. I hope my thesis has added another piece of the puzzle in understanding that exciting change better.

8. REFERENCES

Amazon. (n.d.). *Amazon Go*. Retrieved February 3, 2022 from https://www.amazon.com/b?ie=UTF8&node=16008589011

Anderson, J., & Rainie, L. (2018, April 17). *THE FUTURE OF WELL-BEING IN A TECH-SATURATED WORLD*. Pew Research Center. https://assets.pewresearch.org/wp-content/uploads/sites/14/2018/04/14154552/PI_2018.04.17_Future-of-Well-Being_FINAL.pdf

Anderson, T. (2019). *Digitalisering i norsk dagligvarehandel*. [Master's Thesis, Universitetet i Sørøst-Norge]. USN Open Archive. http://hdl.handle.net/11250/2617551

Ask, K., & Søraa, R. (2021). *Digitalisering. Samfunnsendring, brukerperspektiv og kritisk tenkning.* Bergen: Fagbokforlaget.

ASSA ABLOY. (n.d.). *Theft and punishment*. Retrieved March 8, 2022 from Historical Locks. https://www.historicallocks.com/en/site/h/articles/theft-and-punishment/

Balasubramanian, S. (2021, September 22). Can Doctors Truly Be Replaced By Technology? *Forbes.* https://www.forbes.com/sites/saibala/2021/09/22/can-doctors-truly-be-replaced-by-technology/

Barillas, U. (2020, December 2). Helping Your Employees Adapt To New Technology. *Forbes*. https://www.forbes.com/sites/forbestechcouncil/2020/12/02/helping-your-employees-adapt-to-new-technology/

Beck, A., & Hopkins, M. (2015). *Developments in Retail Mobile Scanning Technologies: Understanding the Potential Impact on Shrinkage & Loss Prevention.* Leicester. http://www.jard.me/source/brochure/11_1509469025.pdf: Department of Criminology.

Benanav, A. (2020). *Automation and the future of work.* London & New York: Verso.

Berthiaume, D. (2021, August 26). *Nearly half of consumers prefer to shop in-person — here's why*. Chain Storeage. https://chainstoreage.com/nearly-half-consumers-prefer-shop-person-heres-why

Brunes, A., Hansen, M., & Heir, T. (2021). *General self-efficacy in individuals with visual impairment compared with the general population*. PLOS ONE, 16(7): https://doi.org/10.1371/journal.pone.0254043

Cambridge Dictionary. (n.d.). *Routine*. Retrieved May 5, 2022 from https://dictionary.cambridge.org/dictionary/english/routine

Cambridge Dictionary. (n.d.). *Steal*. Retrieved March 10, 2022 from https://dictionary.cambridge.org/dictionary/english/steal

Cameron, N. d. (2017). *Will robots take your jobs.* Cambridge & Malden: Polity Press.

Charmaz, K. (2006). *Constructing Grounded Theory: A practical guide through qualitative analysis .* London/Thousand Oaks/New Delhi: Sage Publications.

Charmaz, K., & Belgrave, L. L. (2015, October 26). *Grounded Theory*. The Blackwell Encyclopedia of Sociology: https://doi.org/10.1002/9781405165518.wbeosg070.pub2

Collier, J. E., & Kimes, S. E. (2012, September 3). *Only If It Is Convenient: Understanding How Convenience Influences Self-Service Technology Evaluation*. Journal of Service Research, 16(1), 39-51: https://doi.org/10.1177/1094670512458454

COOP. (n.d.). *Den første butikken*. Retrieved January 11, 2022 from https://coop.no/om-coop/virksomheten/coop-norge-sa/historie/den-forste-butikken/#

Crawford, K. (2021). *Atlas of AI.* New Haven & London: Yale University Press.
Curran, J., & Meuter, M. (2005). *Self-service technology adoption: comparing three technologies.* Journal of services marketing: https://www.emerald.com/insight/content/doi/10.1108/08876040510591411/full/pdf?title=selfservice-technology-adoption-comparing-three-technologies
Dabholkar, P. A. (1996). *Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality*. International Journal of research in Marketing, 13(1), 29-51: https://doi.org/10.1016/0167-8116(95)00027-5
Dagligvarehandelen. (n.d.). *Dagligvarefasiten 2021*. Retrieved March 29, 2022 from https://dagligvarehandelen.no/sites/default/files/dagligvarefasiten_2021_0.pdf
Dalland, O. (2017). *Metode og oppgaveskriving* (6th ed.). Oslo: Gyldendal Akademisk.
Dalseg, E. (2018, December 18). Svindel i selvbetjeningskassene: Lurer butikkene med bolletrikset: - Det verste jeg har sett. *Dagbladet.* https://www.dagbladet.no/mat/lurer-butikkene-med-bolletrikset---det-verste-jeg-har-sett/70472440

De Houwer, J., Barnes-Holmes, D., & Moors, A. (2013). *What is learning? On the nature and merits of a functional definition of learning*. Psychonomic bulletin & review, 20(4), 631-642: https://doi.org/10.3758/s13423-013-0386-3
Dorismond, J. (2016). *Supermarket optimization: Simulation modeling and analysis of a grocery store layout*. 2016 Winter Simulation Conference (WSC): 10.1109/WSC.2016.7822385
Driscoll, D., Appiah-Yeboah, A., Salib, P., & Rupert, D. (2007). *Merging Qualitative and Quantitative Data in Mixed Methods Research: How To and Why Not*. Hentet fra Ecological and Environmental Anthropology (University of Georgia), 3(1), 19-28: https://digitalcommons.unl.edu/icwdmeea/18/
Ebster, C. (2011). *Store design and visual merchandising: Creating store space that encourages buying.* New York: Business Expert Press.

Eubanks, V. (2018). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor.* New York: St. Martin's Press.
Frimand, M. (2020, May 21). Nå kommer døgnåpne selvbetjente dagligvarebutikker til Norge. *Sosialnytt.* https://sosialnytt.com/na-kommer-dognapne-selvbetjente-dagligvarebutikker-til-norge/
Grønning, I. (2008, Desember). *Rom for fellesskap? En kvalitativ studie av sosiale og fysiske aspekter ved bomiljø i Ilsvika Garden*. https://docplayer.me/4968662-Rom-for-fellesskap-ingeborg-gronning-en-kvalitativ-studie-av-sosiale-og-fysiske-aspekter-ved-bomiljo-i-ilsvika-garden.html
Guo, X., Yongqiang, S., Wang, N., Peng, Z., & Yan, Z. (2013). *The dark side of elderly acceptance of preventive mobile health services in China*. Electronic Markets, 23(1), 49-61: https://doi.org/10.1007/s12525-012-0112-4
Hargreaves, T., Wilson, C., & Hauxwell-Baldwin, R. (2018). *Learning to live in a smart home*. Building Research & Information, 47(1), 127-139: https://doi.org/10.1080/09613218.2017.1286882
Hartmann, M. (2020). *(The domestication of) Nordic domestication?* Nordic Journal of Media Studies, 2, 47-57. https://www.doi.org/10.2478/njms-2020-0005
Hautemanière, M. (2015, November 8). *Kassaapparater og POS-systemer fra 1800-tallet til i dag*. Mobile Transaction. https://no.mobiletransaction.org/historien-kassaapparater/

Heckendorn, L. (2011, June 23). Selvbetjent på Bunnpris. *Dagligvarehandelen.* https://dagligvarehandelen.no/2011/selvbetjent-p%C3%A5-bunnpris

Henriksen, I. M., & Tøndel, G. (2017, May 29). *Spontane dybdeintervjuer: Strategisk interaksjon som sosiologisk forskningsmetode*. Norsk sosiologisk tidsskrift, 1(3), 216-232: https://doi.org/10.18261/issn.2535-2512-2017-03-02

Hkdir. (2020). *Butikkmedarbeider*. Utdanning. https://utdanning.no/yrker/beskrivelse/butikkmedarbeider

Hoffmann, D. L., & Novak, T. P. (1998, February 2). *Bridging the Digital Divide: The Impact of Race on Computer Access and Internet Use.* https://files.eric.ed.gov/fulltext/ED421563.pdf

Hughes, T. P. (2012). The Evolution of Large Technological Systems. In W. E. Bijker, T. B. Hughes, & T. Pinch, *The Social Construction of Technological Systems* (p. 45-76). London & Cambridge: The MIT press.

Hyysalo, S., Pollock, N., & Williams, R. A. (2019, September 14). *Method Matters in the Social Study of Technology: Investigating the Biographies of Artifacts and Practices*. Science & Technology Studies, 32(3), 2-25. https://doi.org/10.23987/sts.65532

Jacobsen, S. E. (2021, May 2). Er «den norske» måten å være fotturist på truet? *Forskning.* https://forskning.no/turisme/er-den-norske-maten-a-vaere-fotturist-pa-truet/1853173

Josselson, R. (1996). On writing other people's lives: Self-analytic reflections of a narrative researcher. In R. Josselson, *Ethics and process in the narrative study of lives* (ss. 60-71). Sage Publications .

Juel-Jacobsen, L. G. (2014). *Aisles of life: outline of a customer-centric approach to retail space management*. The International Review of Retail, Distribution and Consumer Research, 25(2), 162-180. https://doi.org/10.1080/09593969.2014.951676

Justia. (n.d.). *Patents by Inventor David R. Humble*. Retrieved March 29, 2022 from https://patents.justia.com/inventor/david-r-humble

Kaplan, Z. (n.d.). *5 Impactful Habits Of The Most Time-Efficient People*. Retrieved April 18, 2022 from FairyGoodBoss: https://fairygodboss.com/career-topics/time-efficient

Kaser, C. H. (n.d.). *Use of Classroom Routines to Support the Learning Process*. Retrieved February 22, 2022 from Old Dominion University: https://www.odu.edu/content/dam/odu/col-dept/cdse/docs/4-classroom-routines.pdf

Keillor, B. D., Pettijohn, C. E., & d'Amico, M. (2001, October 1). *The relationship between attitudes toward technology, adaptability, and customer orientation among professional salespeople*. Journal of Applied Business Research (JABR). 17(4): https://doi.org/10.19030/jabr.v17i4.2090

Kleven, Ø. (2016). *Nordmenn på tillitstoppen i Europa*. SSB, Samfunnsspeilet 2/2016: https://www.ssb.no/kultur-og-fritid/artikler-og-publikasjoner/_attachment/269579?_ts=1555305a1f0

Lagroue, M. C. (2021, August 4). *Here's the Difference Between a Supermarket and a Grocery Store — and What That Means for Your Budget*. All Recipes. https://www.allrecipes.com/article/difference-between-grocery-store-supermarket/

Latour, B. (1991). Technology is society made durable. In J. L. (Ed.), *A Sociology of Monsters Essays in Power, Technology and Domination* (p. 103-132). Sociological Review Monograph No. 38.

Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. In W. E. Bijker, *Shaping Technology/Building Society: Studies in Sociotechnical Change* (p. 225-258). Cambridge, MA: MIT Press.

Latour, B. (1996). *On actor-network theory: A few clarifications*. Soziale welt, 47(4), 369-381: http://www.jstor.org/stable/40878163

Law Insider. (n.d.). *Grocery Store Definition*. Retrieved March 28, 2022 from Lawinsider: https://www.lawinsider.com/dictionary/grocery-store

Lee, H., & Leonas, K. K. (2020, May 19). *Millennials' Intention to Use Self-Checkout Technology in Different Fashion Retail Formats: Perceived Benefits and Risks*. Clothing and Textiles Research Journal, 39(4), 264-280: https://doi.org/10.1177/0887302X20926577

Malombeke, S., Saerang, D. P., & Pangemanan, S. S. (2014). *The Impact of Promotional Tools on Consumer Buying Behavior at Matahari Department Store Manado Town Square*. Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi. 2(1). 48-56: https://doi.org/10.35794/emba.2.1.2014.3526

McWilliams, A., Anitsal, I., & Anitsal, M. (2016). *Customer versus employee perceptions: a review of self-service technology options as illustrated in self-checkouts in US retail industry*. Academy of marketing studies journal, 20(1), 79-98.

Meyer, S. (n.d.). *The History and Evolution of Retail Stores: From Mom and Pop to Online Shops*. Retrieved April 11, 2022 from Big Commerce: https://www.bigcommerce.com/blog/retail/#the-history-and-evolution-of-retail-stores

Mills, P. K., & Moberg, D. J. (1982). *Perspectives on the Technology of Service Operations*. The Academy of Management Review, 7(3), 467–478: https://doi.org/10.2307/257339

Muñoz, A. (2021, December 29). *Countries with the most opportunities for online sales in 2022*. Sales Layer: https://blog.saleslayer.com/countries-with-most-opportunities-for-online-sales

Murman, D. L. (2015, August). *The Impact of Age on Cognition*. Seminars in hearing, 36(3), 111-21. https://doi.org/10.1055/s-0035-1555115

Nemko, M. (2016, May 12). *Adrenaline Addiction*. Psychology Today: https://www.psychologytoday.com/us/blog/how-do-life/201605/adrenaline-addiction

Neven, L. (2010, February 19). *'But obviously not for me': robots, laboratories and the defiant identity of elder test users*. Sociology of health & illness, 32(2), 335-347: https://doi.org/10.1111/j.1467-9566.2009.01218.x

Norges Bank. (2020, August 27). *Om retten til å betale med kontanter*. https://www.norges-bank.no/tema/Sedler-og-mynter/retten-til-kontantbetaling/

NTNU. (n.d.). *NVivo*. Retrieved April 14, 2022 from https://i.ntnu.no/wiki/-/wiki/English/NVivo

Olsen, W. (2004). Triangulation in Social Research: Qualitative and Quantitative Methods Can Really Be Mixed. I M. Haralambos, & M. Holborn, *Developments in sociology.* Ormskirk: Causeway Press Ltd.

Oxford University Press. (n.d.). *Artifact*. Retrieved December 15, 2021 from Oxford Learner's Dictionaries: https://www.oxfordlearnersdictionaries.com/definition/english/artifact

Pettersen, L. (2018). *Digitalisering: Modernitetens flyttebyrå*. Norsk medietidsskrift, 25(4), 1-17. https://doi.org/10.18261/ISSN.0805-9535-2018-04-03

QikServe. (2018, August 6). *The evolution of self-service technology*. https://qikserve.com/self-service-tech-a-history/

Ridgway, H. (1936). *Community studies in reading. III. Reading habits of adult non-users of the public library*. The Library Quarterly, 6(1), 1-33: https://doi.org/10.1086/613773

Rinta-Kahila, T., Penttinen, E., Kumar, A., & Janakiraman, R. (2021, July). *Customer reactions to self-checkout discontinuance*. Journal of Retailing and Consumer Services: https://doi.org/10.1016/j.jretconser.2021.102498

Simen, P., & Matell, M. (2016). *Why does time seem to fly when we're having fun?* Science (New York, N.Y.), 354(6317), 1231-1232. https://doi.org/10.1126/science.aal4021

Sørensen, K. (2006). Domestication: The enactment of technology. I T. Berker, M. Hartmann, Y. Punie, & K. Ward, *Domestication of media and technology* (p. 40-61). New York: Open University Press.

Sørensen, K., & Lie, M. (1996). Making Technology Our Own? Domestication Technology into Everyday Life. In K. Sørensen, & M. Lie, *Making Technology Our Own?* (pp. 1-30). Oslo: Scandinavian University Press.

Schneider, B., & Bowen, D. E. (1993). *The service organization: Human resources management is crucial*. Organizational dynamics, 21(4), 39-52: https://doi.org/10.1016/0090-2616(93)90032-V

Sættem, S. (2021, July 29). Trondhjemmere vil ha kvalitetsmat. *Midtnorsk Næringsliv.* https://www.mn24.no/nyheter/i/Kz6okX/snuoperasjon-for-bunnpris-sine-gourmetbutikker-trondhjemmere-vil-ha-kvalitetsmat

Silverstone, R., Hirsch, E., & Morley, D. (1992). Information and communication technologies and the moral economy of the household. I R. Silverstone, & E. Hirsch, *Consuming Technologies: Media and information in domestic spaces* (ss. 15-31). London & New York: Routledge.

Skallerud, K. (2020, juli 28). *Grossist*. Store Norske Leksikon: https://snl.no/grossist

Skjølsvold, T. M. (2015). *Vitenskap, teknologi og samfunn: En introduksjon til STS.* Oslo: Cappelen Damm Akademisk .

SSB. (2019, April 11). *Varehandel, strukturstatistikk*. https://www.ssb.no/varehandel-og-tjenesteyting/statistikker/stvareh/aar

SSB. (2021b, November 18). *Fakta om Befolkningen*. https://www.ssb.no/befolkning/faktaside/befolkningen

SSB. (2021a, October 26). *Næringenes økonomiske utvikling*. https://www.ssb.no/virksomheter-foretak-og-regnskap/virksomheter-og-foretak/statistikk/naeringenes-okonomiske-utvikling

SSB. (2022, February 24). *Befolkning*. https://www.ssb.no/befolkning/folketall/statistikk/befolkning

Statista. (2021, October 13). *Number of digital buyers worldwide from 2014 to 2021 (in billions)*. https://www.statista.com/statistics/251666/number-of-digital-buyers-worldwide/

Stevenson, A. (2018, February 1). Amazon Go And The 2.3 Million Cashiers It Could Leave Behind. *Forbes.* https://www.forbes.com/sites/justcapital/2018/02/01/amazon-go-and-the-2-3-million-cashiers-it-could-leave-behind/

Susskind, D. (2020). *A World Without Work: Technology, Automation, and How We Should Respond.* New York: Metropolitan books.

Thagaard, T. (2018). *Systematikk og innlevelse: en innføring i kvalitative metoder .* Bergen: Fagbokforlaget.

Timmermans, S., & Tavory, I. (2012, September 10). *Theory construction in qualitative research: From grounded theory to abductive analysis*. Sociological theory, 30(3), 167-186: https://doi.org/10.1177/0735275112457914

Tjora, A. (2017). *Kvalitative forskningsmetoder i praksis .* Oslo: Gyldendal Akademisk.

Venkatesh, V. (2000, December 1). *Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model*. Information Systems Research. 11(4): https://doi.org/10.1287/isre.11.4.342.11872

Wald, J. (2020). *The end of jobs.* New York/Nashville: Post Hill Press.

Waltz, S. (2004, April 30). *Giving Artifacts a Voice? Bringing into Account Technology in Educational Analysis*. Educational Theory: https://doi.org/10.1111/j.1741-5446.2004.00012.x

Wifstad, K., Jenssen, T. B., Eide, L. S., & Skogli, E. (2018). *Konkurranse i dagligvaremarkedet - konkurranse i alle ledd.* Oslo: Menon Economics.

World Health Organization. (2019, October 9). *World Report on Vision*. https://www.who.int/publications/i/item/9789241516570

Wyatt, S. (2008). *Technological determinism is dead; long live technological determinism*. The handbook of science and technology studies, 3, 165-180. https://www.dhi.ac.uk/san/waysofbeing/data/data-crone-wyatt-2007b.pdf#page=181

Wyatt, S. E. (2003). *Non-users also matter: The construction of users and non-users of the Internet*. Now users matter: The co-construction of users and technology. 67-79: https://www.researchgate.net/publication/254769192_Non-users_also_matter_The_construction_of_users_and_non-users_of_the_Internet

York, D., Neubauer, M., Nowak, S., & Molina, M. (2015). *Expanding the energy efficiency pie: Serving more customers, saving more energy through high program participation*. American Council for an Energy-Efficient Economy: https://c2e2.unepdtu.org/wp-content/uploads/sites/3/2016/03/u1501.pdf

Zeithaml, V., & Bitner, M. J. (1996). *Services Marketing.* New York: McGraw-Hill.

9. APPENDIX

APPENDIX 1: INTERVIEW GUIDE FOR THE GROCERY STORE WORKERS

Bakgrunn:

1. Hva er stillingsbeskrivelsen din? (Eks. Sitter i kassa, er på gulvet, frukt og grønt)
2. Hvor lenge har du jobbet i dagligvarehandelen?
3. Hvorfor jobber du i butikk?
    - Hvorfor startet du?
4. Er du medlem av en fagforening?
5. Hvordan er det sosiale aspektet på jobb?
6. Hvordan legger du opp din arbeidsdag?
    - Får du en to-do list?
    - Hva er rutinene dine?

Selvbetjeningskasser:

1. Hva er en selvbetjeningskasse?
    - Kan du beskrive en selvbetjeningskasse for meg?
2. Hvor mange er på jobb akkurat nå?
    - Hvor mange er på jobb på en vanlig arbeidsdag?
    - Hvor mange ansatte er ansatt til å passe på kassa/selvbetjeningskassen?
3. Hva synes du om selvbetjeningskasser?
    - På hvilket tidspunkt fikk dere de første selvbetjeningskassene?
    - Begynte du før eller etter det kom selvbetjeningskasser?
4. Hvis kunder kunne velge mellom selvbetjeningskasser eller betjente kasser, hva tror du folk velger? Hvorfor?
    - Velger du selvbetjeningskasser selv?
5. Hvordan vil du beskrive arbeidshverdagen med selvbetjeningskasser?
    - Er det noen store forskjeller sammenlignet med før det kom selvbetjeningskasser?
    - Tror du effektiviteten har gått opp? Hvordan da?
        - Hvis ja, til hvilken grad?
        - Hvis nei, hvorfor ikke?
    - Har arbeidsmengden økt eller minket etter innføringen av selvbetjeningskasser?
6. Opplever du noen utfordringer med selvbetjeningskasser? Eventuelt, hvilke?
7. Hvordan har selvbetjeningskasser påvirket ditt forhold med kundene?
    - Har kundeinteraksjon endret seg de siste årene?
8. Kan du si noe om hvordan du tror arbeidet i dagligvarehandelen vil være i fremtiden?
    - Ville du anbefalt dine barn?
    - Tror du det vil bli flere eller færre selvbetjeningskasser i fremtiden? Utdyp gjerne.

Covid-19:

1. Tror du pandemien har påvirket butikkopplevelsen? Hvorfor?
    - Hvordan har pandemien påvirket deg som ansatt?
    - Hvordan tror du pandemien har preget kundene?

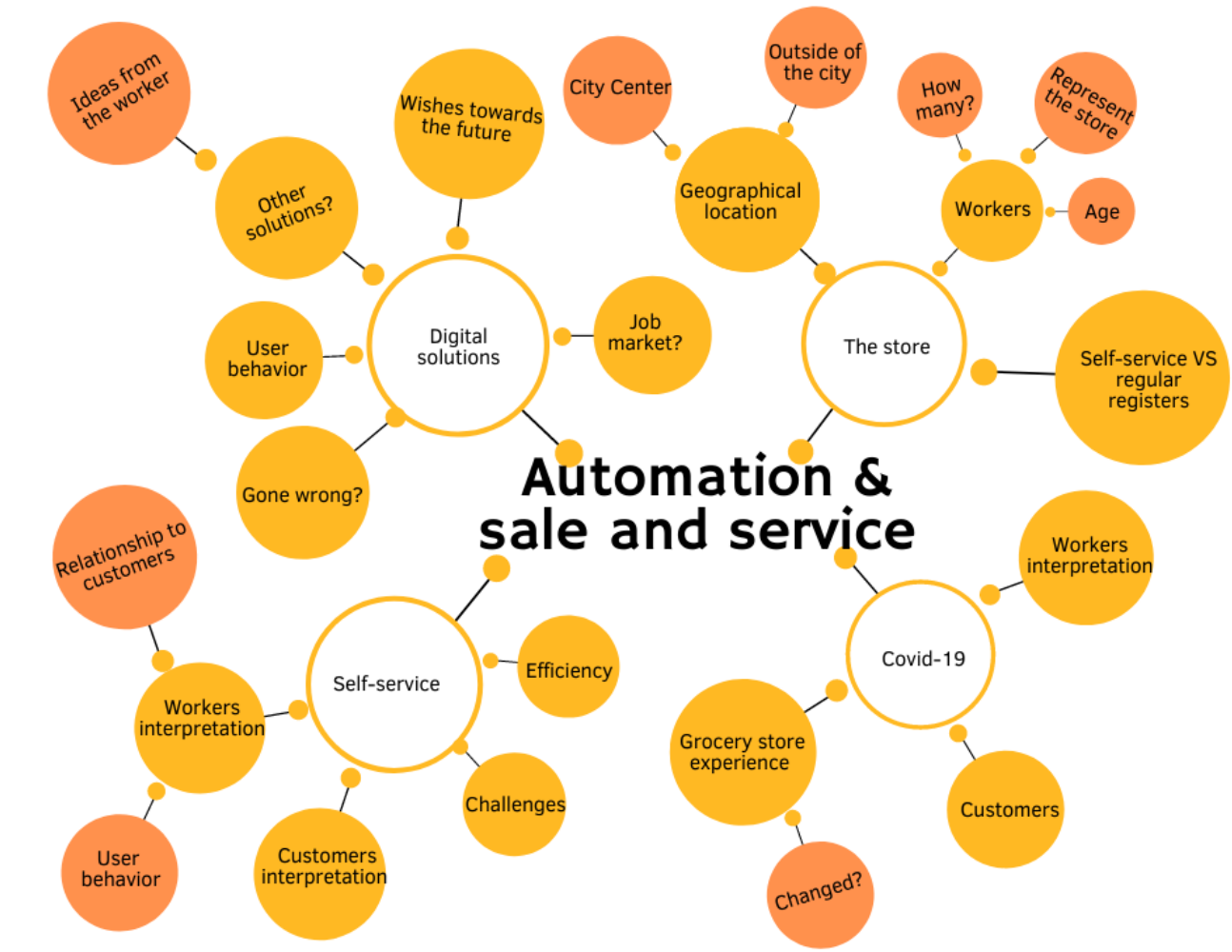
Digitalisering og teknologi:

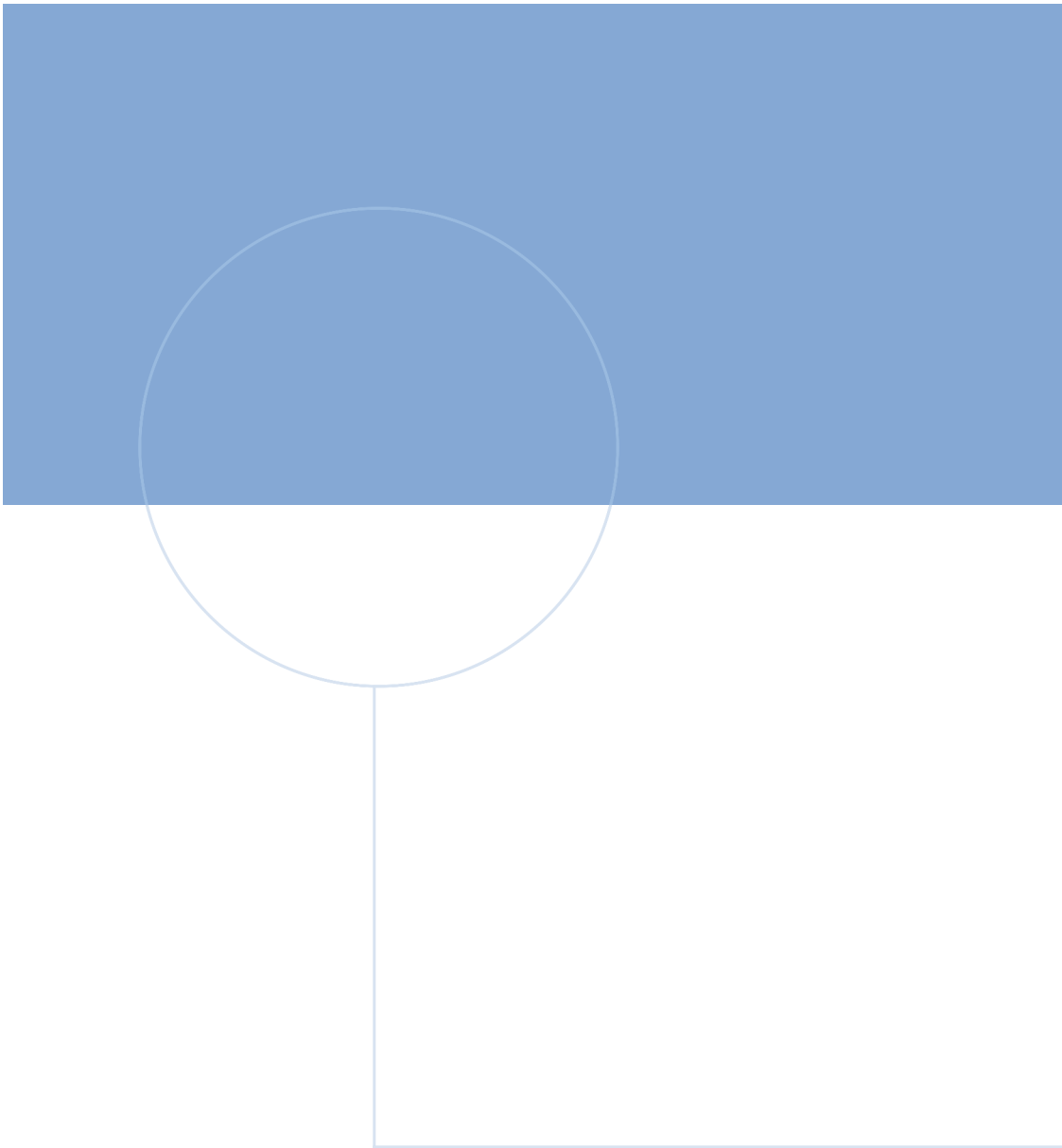
1. Hvordan tror du digitaliseringen påvirket jobbmarkedet?
    - Hvordan tror du digitalisering av dagligvarehandelen har påvirket livet i butikk?
    - Har andre områder blitt påvirket av digitaliseringen?
2. Hvorfor tror du det kommer flere digitale løsninger inn i dagligvarehandelen?
    - Har det noen gang gått galt med disse digitale løsningene?
    - Ønsker du deg noen digitale løsninger som hadde gjort livet i dagligvarehandelen bedre? Kom gjerne med eksempler.
3. Hvordan synes du brukeratferden til kunder har endret seg siden etter digitaliseringen av dagligvarehandelen?
    - Hva er din beste opplevelse?
    - Hva er din verste opplevelse?

Avslutningsspørsmål:

1. Hvor gammel er du?

APPENDIX 2: MEMO-WRITING MIND MAP (DIGITALIZED AND TRANSLATED VERSION)





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Kunnskap for en bedre verden