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Exploring the Emergent Servicescape of Unmanned Stores:

A Constructivist Analysis of Unmanned Stores in the Age of Digitalization

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Abstract

Unmanned stores are increasing in popularity as the prominence of digitalization is changing not only the customer-retailer interface but also the servicescapes of the stores.

The current stakeholders within the industry are (1) tech-positive entrepreneurs that want to innovate the industry or (2) convenience-focused retailers adopting technological solutions to ease the workload. These innovations may cause a belief that this is a step towards the interconnectedness of the physical and digital aspects of the servicescapes. Previous studies have addressed unmanned stores' acceptance rates of technologically advanced solutions. But, very few papers address the futile discrepancies and need for connectivity between the physical and digital spheres of the stores. The authors have yet to find any academic research addressing strategies currently used to enhance sales or motivate customers to return.

The findings of this research through autoethnographies and interviews display a physical and technological integration level not previously mentioned. At the same time, there are apparent discrepancies between the customer and employee interactions and how these interactions balance what is supposed to be redundant and what is required to support the customer experience.

Keywords: Unmanned stores, Unmanned solutions, Servicescape, Customer-retailer interface, Digital strategies; Phygital strategies, Customer engagement.

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1.0 Introduction

The world of retailing is undergoing a paradigm shift, where digital technology is integrated into the customer experience (Hagberg et al., 2016). Self-service in retailing is not new. Prior to the digital applications of services, researchers addressed the notion of complete self-service, with only people at the check-out as opposed to each shop owner, finding and collecting the products for the customer and handing them to the customer (Du Gay, 2004; Bailey et al., 2010). Self-service in retailing incentivized retailers to consider the environment where they performed services, hinting at what is later known as servicescapes (Shostack, 1977; Bitner, 1992). In servicescapes, customer behavior is crucial to influence (Shostack, 1977; Parasuraman et al., 1985; Bitner, 1992; Aubert-Gamet & Cova, 1999; Azza & Norchene, 2017; Nyrhinen et al., 2022). Whether it is the product choices, services, or the stores' physical environment, these impact the customer.

Nevertheless, with the rise of information and communication technology (ICT), the dimensions have been changing as more retailers started to integrate touch-screen displays and self-serve kiosk monitors into their stores to speed up the customer journey, as well as guide and monitor the customer behavior (Willems et al., 2017). According to Ballantyne & Nilsson (2017) and Nyrhinen et al. (2022), influencing customer behavior has been seen to be affected in both the physical sphere and digital sphere by digital developments. These developments have led consumers to become self-governing in their shopping experience in both physical and digital stores. The Covid-19 crisis has made it even more apparent, according to Fuentes et al. (2022), to the extent that the self-service technologies for check-out services and unmanned stores are making their shopping experience virtually and physically autonomous. The smartphone's increased usage in retailing further assists customers' behavior as it can replace certain tasks that front-line employees once had (Fuentes et al., 2017).

The literature on servicescapes has loosely addressed the intermixing of the physical and digital servicescapes but mostly kept them separate and only recently combined the forces (Del Vecchio et al., 2023). Roy et al. (2017) described the increased usage of new technologies as smart retailing, consisting of Radio frequency identification (RFID) and the Internet-of-Things (IoT). Others incorporated Artificial intelligence (AI) (Guo et al., 2020; Sun et al., 2020; Wang et al., 2021). These technologies integrate the physical and the digital spheres leading to benefits in both, which Del Vecchio et al. (2023) defines as phygitality.

Connecting different physical products and digital devices became a peak interest for large and small IT companies, entering retail with innovations and their take on phygital stores. Amazon created an Amazon GO concept store in 2018 with AI integration (Matzner et al., 2018). This influenced the growth of many more concept stores that are similar and different to the Amazon

GO under the umbrella term unmanned store. Unmanned stores have been on the rise for the past five years across different countries, including the United States, Sweden, China, and Taiwan (Matzner et al., 2018; Polacco & Backes, 2018; Davidsson, 2022; Wang et al., 2021; Sun et al., 2020). The main aim of these unmanned stores, according to Denuwara et al. (2021), is to have fewer people working there, to optimize and automate the processes in the store, hence influencing the settings of the servicescape. On the other hand, consumers' initial reactions to the concept were to compare it to a glorified vending machine due to the rigid designs they entail and the lack of services offered (Denuwara et al., 2021).

1.1 Problem Statement

The research on the topic of unmanned stores is mainly limited to conducting feasibility studies, focusing on acceptance models such as Technology Acceptance Models (TAM) and the upgraded version of the Unified Theory of Acceptance and Use of Technology (UTAUT) (See Wang et al., 2021; Wu et al., 2021; Lin, 2022). As mentioned above, the conducted research is geographically dispersed across the world from Taiwan (Wang et al., 2019; Lin, 2022) to China (Wu et al., 2021) and the United States (Polacco & Backes, 2018). This dispersion makes it difficult to make general assumptions about how well the different cultures accept the new store technologies. Because the difference between how digitalized different countries are and how much they trust the stores' technology (Lin, 2022) will determine to what extent the unmanned solutions impact the customer experience. A common belief surrounding the implementation of technologies such as RFID, IoT, and AI (Polacco & Backes, 2018; Sun et al., 2020; Guo et al., 2020; Wang et al., 2021), big data (Denuwara et al., 2021) and maybe more importantly, how prominent these technologies are within these stores. Another widely held belief is that unmanned stores are more resilient than the manned stores due to their small logistical footprint and low fixed cost because they are unmanned (Sun et al., 2020; Denuwara et al., 2021).

Concerning how the technology comes into play in the physical servicescapes, Denuwara et al. (2021) argue that the unmanned stores should fundamentally create a strong digital infrastructure that would create a more streamlined process, both inside and outside the unmanned store, considering the reliance on the expensive technology (Sun et al., 2020; Denuwara et al., 2021). Nevertheless, Polacco & Backes (2018) and Denuwara et al. (2021) are not addressing the physical space within which all of these digital infrastructures are going to reside with the minimal nuance of physical arenas mentioned in these papers regarding sizes of stores notably referred to small 7-Eleven stores and the AmazonGO brand (Wang et al., 2021; Lin, 2022; Polacco & Backes, 2018). What they have in common is that they all talk about how big or small the stores are and how streamlined their technological integrations are. However, none of them talk about the quality of the servicescape and how this affects the service encounter.

There seems to be a consensus among scholars that unmanned stores are going to have an impact on the retail landscape in the future (Matzner et al., 2018; Polacco & Backes, 2018; Sun et al., 2020; Wang et al., 2021; Wu et al., 2021; Denuwara et al., 2021; Lin, 2022), though to what extent or how deep remains to be seen. Hagberg et al. (2016) suggested that research should examine retailing from the inside due to the continuous transformational process that occurs, compared to an outside perspective looking into the effects or impacts. Problematically, none has conducted an in-depth qualitative study on the servicescape of unmanned stores. Furthermore, there has been very little to no mention of technology integration in the servicescapes of the unmanned store solutions.

To summarize, the relevance of this study is based on the discrepancy between the cost of integrating expensive technology and consumers' perception of service quality. whereas researchers on unmanned retail stores claim ease of implementation without considering other factors that may influence consumers' engagement with the store.

1.2 Research aim and question

The paper aims to explore the physical and digital servicescape characteristics of unmanned stores, and how the stores integrate these characteristics to drive customer engagement. This exploration will better understand the unmanned store as a novel phenomenon.

Thus, our research aim leads to the following questions;

Research question 1: Which physical and digital characteristics do the servicescapes of unmanned stores address?

Research question 2: In which ways do unmanned stores' phygital infrastructure enhance customer engagement?

1.3 Disposition

As the initial chapter of the paper presented, the second chapter will dive into a literature review on the topic consisting of Retail dynamics, servicescapes, social servicescapes, E-servicescapes, and smart retailing, which transforms self-service into the hybridization of phygital servicescapes. Lastly, this paper will present the Customer-retailer interface. The third chapter will incorporate the philosophical anchoring in social constructivism and interpretivism, the modes of semi-structured interviews, and autoethnography as data collection, using thematic analysis as data analysis. Moreover, the chapter will also discuss the trustworthiness and ethical considerations of the study. The fourth chapter will present the findings according to the thematic analysis. The fifth chapter will present the concluding discussion, academic contributions, limitations, and future research recommendations.

2.0 Literature Review

This section describes the literature relevant to the paper, starting with the theoretical lens on the physical servicescapes. Thereafter, digital servicescapes followed by the Customer-retail interface, and lastly, retail dynamics.

2.1 Servicescapes

Shostack (1977) points out slight differences between tangible and intangible objects. She was trying to change the outlook on what was a contemporary product-oriented marketing ideal by promoting the intangible aspects of products, namely services. These services are bound to a broader spectrum, as certain services are physically dominant. Meanwhile, others are more ethereal and ungraspable (Shostack, 1977). Furthermore, the services as described are integral and embedded within the physical arena and can be controlled and distributed. Managerial implications suggested were adhering to the surroundings and being able to manage for possible outcomes (Shostack, 1977). Multiple researchers have addressed the necessity to manage the surrounding environment to influence consumers' behavior. This influence becomes paramount the more intangible the service is (Shostack, 1977; Bitner, 1992; Aubert-Gamet & Cova, 1999; Willems et al., 2017; Nyrhinrn et al., 2022; Azza & Norchene, 2017; Parasuraman et al., 1985).

Nonetheless, Bitner (1992) expressed that certain physical spatial stimulants can influence whether consumers get attracted or pushed away. Contrarily, Aubert-Gamet & Cova (1999) question whether the emphasis on servicescapes, their functional use-value, and their impact on behavioral approaches merits its prevalence in the service management literature. Alternatively, service managers ought to look at postmodernity, emphasizing the linking value of the servicescape and how consumers go there to get a sense of community, strengthening the argument by Wu et al. (2019), who argue that the servicescapes coupled with experiential marketing can affect not just how customers behave, but also how loyal they are going to be towards that specific retailer due to their sense of belonging.

Augé's (1992) definition of non-places contextualizes compounds as areas where consumers can participate while still being anonymous. Areas such as railway stations, highways, and malls as they have no specific meaning attached to them. These places attract a large number of fluid visitors and brands. The places lose their meaning in the broader context since the definition of a place is a use-place for someone, like a home. Hence, the non-place is a communal area designated for everyone, alone, only linked by symbols such as a train ticket or a supermarket trolley (Augé, 1992; Aubert-Gamet & Cova, 1999). The servicescape, as a social construct and a non-place, makes the individual customer leave their identities at the entrance and seek their community needs, where there is a service setting (Aubert-Gamet & Cova, 1999). Consequently, retail stores

strongly depend on customers returning to their servicescape to utilize their services for increased profitability and social linkage (Aubert-gamet & Cova, 1999; Wu et al., 2019).

Solomon et al. (1985) define service encounters early when they refer to them as interactions in proximity to customers, usually face-to-face. Successful and positive service encounters with customers in the servicescape are crucial for business profitability and the communal linking value of the business (Aubert-Gamet & Cova, 1999). The customers' interlinking of identities in the non-place setting and the interpersonal communication within the servicescape between the customers and organizations create a reciprocal relationship between the two (Bitner, 1992; Azza & Norchene, 2017; Aubert-Gamet & Cova, 1999; Pine II, 2019). They extend Bitner's (1992) argument that it is the "*nature and quality of the social interaction between and among customers and employees*" (P: 58). Hence, The social servicescape that can facilitate quality interactions between the employees and the customers is an important prerequisite for any service organization seeking to improve their service quality (Parasuraman et al., 1985).

The social dimension in servicescapes is not new (Bitner, 1992; Aubert-Gamet & Cova, 1999). Edvardsson et al. (2010) argued that allowing customers to socialize with service personnel when engaged in service activities proved that social interactions in showrooms and conferences are likely to impact the decision-making of purchases in physical arenas even though there is a preset customer journey already imbedded in the servicescape (Norton & Pine II, 2013). The caveat is that the service personnel do not have tasks other than performing the typical service associated with the work, otherwise, they will be preoccupied with something once the customers need it (Hübner et al., 2022). Therefore, if the employees engage in a friendly manner, which could lead to building mutual bonds and trust with customers, in turn influencing purchase behavior. (Azza & Norchene, 2017; Pine II, 2019).

However, as individual organizations strive to become unique and attract certain customers to their stores, an example by Thompson & Arsel's (2004) discussion on retail servicescapes refers to coffee shop culture, denoting how Starbucks revolutionized the perception of coffee shops and in what kind of cultural and social spaces they operate. Arguably, newly developed variants of social servicescapes entail certain elements that do not change us as individuals, but also how individuals progress alongside the new servicescapes. Simply put, Aubert-Gamet & Cova (1999) argue that new development of services does not change individuals' preferences, but how individuals engage with them.

Problematically, there are difficulties with some of these modern types of social servicescapes, E.g., with the rise of digital servicescapes. These are evolving quickly and influencing customers' behavior in hitherto unseen ways (Sheth, 2021; Wang et al., 2007). The digitalization of servicescapes causes certain generations to refrain from participating due to digital illiteracy (Banik & Gao, 2023), lack of confidence, and ineptitude toward the technology (Peine, 2019).

Service professionals have a big task integrating these people into the digital servicescape. They have been helped in the past couple of years since, due to the recent pandemic, people have been exposed to new modes of shopping to avoid interactions. Digital and technological developments have made frictionless shopping easier. Which will be elaborated further in the next section.

2.2 Digital servicescapes

Torkzasdeh et al. (2021) & Nyrhinen et al. (2022) argue that it is possible to find a lot of the physical servicescape features in the digital as well. Social factors between customers and the shop availability and efficiency are equally important in the digital servicescape (Torkzasdeh et al., 2021). Torkzadeh et al. (2021), though they call it virtual instead of digital, find strong support for how virtual servicescape quality (VSQ) is a predictor for “*customer loyalty and behavioral intentions*” (P:3). They find that “*people are unlikely to engage and perform well in environments that do not supply them with personally engaging conditions*” (P: 11). This is also supported by Ballantyne & Nilsson (2017) who argue that implementing the digital sphere does give quality to the relationships between consumers and employees in the servicescape, as it focuses on co-creation. The new focus on digital servicescapes leads to market research focused on understanding the habits and behaviors of customers (Ballantyne & Nilsson, 2017), which is a competitive parameter for service professionals to consider. The higher the quality of the VSQ, the higher the incentives for customer engagement. Nevertheless, these digital servicescapes are not merely limited to the stores themselves. Forums and social media are perfect platforms for existing customers to discuss their positive and negative experiences with the company. Forums do not only become a place for customers to interact, but also a place in which users can transition to different platforms without being bound to make any transaction, making it similar to the physical non-place, but maybe a more accurate description should be that they are digital non-places (Ballantyne & Nilsson, 2017).

Separating the digital and physical servicescapes is a consistent feature in the literature. However, as this paper has presented so far, there are presented with two distinct spheres that slowly merge. Hagberg et al. (2016) present a framework for merging the elements of digital and physical servicescapes. They suggest that digitalization helps transition physical objects to digital services. They even link the online servicescape with offline purchasing (Hagberg et al., 2016). This next section will dive deeper into how self-service has evolved with the help of digitalization.

2.3 Self-service to Phygital servicescapes

Du Gay (2004) points out that speed and efficiency are some of the drivers for the physical servicescapes and argument backed by Bailey et al. (2010), who also found that the social aspect of self-service was an important quality in the transformation towards self-service stores.

Moreover, Bailey et al. (2010) are supported by Liverant (2019) when they note that it makes customers buy more diverse products, leading to greater competition between brands of the same product category and in higher quantities because they can browse the shop in their tempo, instead of having their shopping experience rushed through by a busy store clerk.

With the shifting tides in the industry, it was important to rethink the servicescape and accommodate both the employees and the customers (Bitner, 1992), with a strong emphasis on the customers. Suddenly, the retailer can use the servicescape for marketing certain products or strategies (Bitner, 1992). Bailey et al. (2010) reinforce this state by arguing that a customer's purchase decisions generally reflect their life. Elaborating on what the authors have discovered for so far, it is possible to see that by opening up for self-service, it became possible for customers to make their own purchase decisions. The retailer can use this data to understand their customer segment and plan hence being able to plan purchases and marketing strategies to match the needs of their customers.

More recently, Del Vecchio et al. (2023) defined the term phygital as a combination of both physical and digital “ [...]to take the best aspects from each space to create a much more complete and satisfying customer experience” (P:2). For them, the discussion on phygitality is vital for the modern servicescape to give the customers a frictionless experience. Bitner (1992) argues about lean environments, referring to the easy, simple, and straightforward servicescapes. Thus, digital components in retail have the potential to alter the physical customer journey, making them even more frictionless. Digital developments have also allowed new types of IT-related enterprises to arise within the retail sector. They bring innovative technologies to challenge established organizations (Matzner et al., 2018). These have created a new unmanned retail store category (Denuwara et al., 2021). On the macro level, they aim to be cheaper and more efficient than their manned competitors. On the micro level, certain small changes to simpler tasks seek to replace employees by incorporating a higher degree of digital technologies such as AI (Matzner et al., 2018), or reducing language barriers for customers with Augmented Reality (AR) in interactive retail services (Butt et al., 2023).

Willems et al. (2017) advocated for *touch-screen displays/ in-store totems, Mobile apps, and Hybrid in-store systems* as three digital aspects that will have a particular impact on retailers in the future. They have found that the purchase phase is the most technologically supported of all the shopping phases in current retail solutions, as they influence customers at the end of their shopping cycle, and no focus being before and during stages (Willems et al., 2017). Nevertheless, this leaves

out the difficulty of integrating the digital servicescape with the early stages of the customer journey to create a more phygital experience.

Thus, there might be some strategic potential in technologies that can influence customers in the “*The earlier stages of the shopping cycle (i.e. pre-purchase stages [...]*” (Willems et al., 2017, P: 235). Wang et al. (2021) found through the Technology Acceptance Model (TAM) that the ease of use and convenience of the technology, and hence also the stores, greatly increase the customers' attitude toward the digital elements and the shopping experience in general, thus supporting the findings of Willems et al. (2017). In contrast, Lin, 2022 argues that, by using the theory of acceptance and use of technology (UTAUT), he found that there is a cultural aspect to the acceptance; thus, if there are no economic or otherwise physical benefits, it is difficult to get people to accept the technology in Taiwan, because they culturally tend to be skeptical towards new retail systems, which is a discovery Wang et al. (2021) also made. They have found solutions to the trust issues in other parts of the world. One might look at Amazon Go as an example in the USA and the UK, where customers already have a high degree of trust in the Amazon brand and ecosystem (Polacco & Backes, 2018; Maztner et al., 2018). Not all companies can garner the same trust as an already-established brand can. Thus, in Europe, an attempt to standardize online banking and transaction service was implemented with the Electronic identification, authentication, and trust service (eIDAS), using biometrics to give individuals the possibility to identify themselves with the help of personal electronic identification (E-id) to make safe purchases (Buchmann et al., 2014). Moreover, governmental bodies being the only suppliers to the e-ids ensures trustworthiness. The E-id allows companies to become trusted by the eIDAS system to make safer customer transactions, a feature that is promoted to use in unmanned stores in, e.g., Sweden (E-identitet.se, 2023).

Moreover, Willems et al. (2017) find that more than 50% of the technologies are for in-store efficiency highlighting the focus on time as a very tangible value that retailers should focus on. Conversely, this moves resources and focus away from the in-store shopping experience and focuses on forming social capital across a physical-digital servicescape (Wu et al., 2019). Nyrhinen et al. (2022) argue that there are many similarities between the two different servicescapes. Humans will go to physical retail stores to experience “*Human contact and provide a sense of belonging*” (P:3), something Bailey et al. (2010) also noticed. These similarities beg a comparison between the digital world, where customers influence each other and discuss experiences and products online, often with people they might not have any physical contact with but still in a social atmosphere. What is interesting between the shift towards self-service shops and now a more digitalized and potentially unmanned shopping experience is that both transitions were towards less human-to-human service, but neither has affected the social aspect of shopping (Aubert-Gamet & Cova, 1999; Du Gay, 2004; Bailey et al., 2010; Hagberg et al., 2016; Denuwara et al., 2021; Nyrhinen et al., 2021; Torkzadeh et al., 2021). Thus, just like a customer is co-creating value in a physical servicescape, they are in a digital one (Nyrhinen et al., 2022).

The literature shows that phygitality can be practically difficult to achieve. However, it seems like it is the next frontier within this section of the retail ecosystem (Willems et al., 2017; Ballantyne & Nilsson, 2017; Hagberg et al., 2016). Furthermore, Pine II (2019) argues that marketing as it used to be practiced should be abandoned due to the advancements within ICT and digitalization, which makes it possible to customize offerings to the individual consumer, even in the physical environment. Offerings are no longer about targeting mass markets but individuals, thus the aim is *“to create a customized offering that meets the individual wants, needs and desires of each particular customer, both at a specific moment in time and on into a future relationship”* (P:2).

In light of the increasingly digitalized and phygital servicescapes, Hagberg et al. (2016) devised a model, namely the customer-retailer interface which helps explore and evaluate digitalization in retailing. In the next section, this model will be explored more thoroughly.

2.4. Customer-retailer interface

Hagberg et al. (2016) thought about encapsulating the effect digitalization has on retailing by elaborating on the work of Ritzer (2001) and Lehdonvirta (2012). They accordingly adopt the concepts of *setting, actor, exchange, and offerings* instead of *process, sites, subjects, and objects*. Digitalization of the settings refers to the transformation that occurs in the traditional B&M store and the e-commerce on the internet. These occur mainly for two reasons, firstly to increase integration of information searches via mobile devices, and secondly, ease of access to retailing when not in a traditional setting (Hagberg et al., 2016). From this paper's point-of-view, the most interesting aspect is RFID tags that allow retailers and customers to know what products are in the basket, digital shopping baskets, pick-up and drop-off points, which are all examples of how it can affect the physical settings of retailing.

The actors are characterized as more than just humans, because humans are omnipotent with the help of digitalization, which helps them receive information on a different scale than seen before. Thus, regardless of human presence, retailers and customers can communicate through these digital devices. However, it also presents the opportunity to connect the retailer with the customers on a new level, at different times and in more channels. Furthermore, digitalization makes humans become a numbers game, not individuals with attributes or, as Cluley & Brown (2015 in Hagberg et al., 2016) call them, *“dividuals”*(P:701) instead of individuals. The digitalization of retailing makes customers data points that can be analyzed and interpreted to enhance the service experience. In the end, they envision that customers co-create or act as working consumers, which

not just creates a new balance of power between the consumers and retailers. However, it also opens the possibility of creating retail concepts like unmanned stores (Hagberg et al., 2016).

The reason why they choose to go with the concept of exchanges is that digitalization increases how humans experience processes. Not only have the retail community moved from multi-channel to omnichannel retail. i.e., the ability for customers to move between different commercial channels of the retailer instead of simply presenting these channels for them (Hagberg et al., 2016; Verhoef et al., 2015). But it also incorporates nuanced and recent developments in communication, transactions, and distributions, all separate spheres in exchanges that can occur within. Whether it regards information transferring, payment methods and ownership trades, or creative ways of distribution consisting of mediums to encroach and simplify behavior (Hagberg et al., 2016). In this case, smartphones have been a medium that has simplified behavior, and it has been considered to, metaphorically, be an extended arm (Mieli, 2022) as the processes go unnoticed due to the multifaceted nature of the smartphone in its ability to support the user in multiple ways. In other cases, the customers become too indulged in the smartphones and become non-responsive (Fuentes et al., 2017).

The last concept mentioned is offerings, which is interesting because digitalization makes it possible to not only offer the same products and services throughout all channels but also making it possible to target individual consumers with personal offerings tailored to their needs (Hagberg et al., 2016; Pine II 2019). Whether these are physical or economic via apps on their smartphones or links offered in their emails, prices of the offerings can easily be adjusted based on the criteria of the stores. As unmanned stores are volatile in how they are operating their assortment, physical products will be the prominent offer, and ensuring that products are sold prior to expiry dates or discounting deals for holidays could be a choice to be made.

Hagberg et al. (2016) argue that by making use of creative and collaborative efforts of mobile devices and digital technologies in the retail industry, it has allowed retailers to integrate the technologies into the physical servicescapes' offering possibilities to track and communicate with the customers (Roy et al., 2017; Del Vecchio et al., 2023). This requires the authors to critically look into what is happening with unmanned stores and unmanned solutions from a servicescape perspective, whether these are permanent changes or temporary solutions to certain issues. The next section addresses the dynamics of retail and potential trends within the retail landscape, which may help disclose potential trends seen later in the analysis.

2.5 Retail dynamics

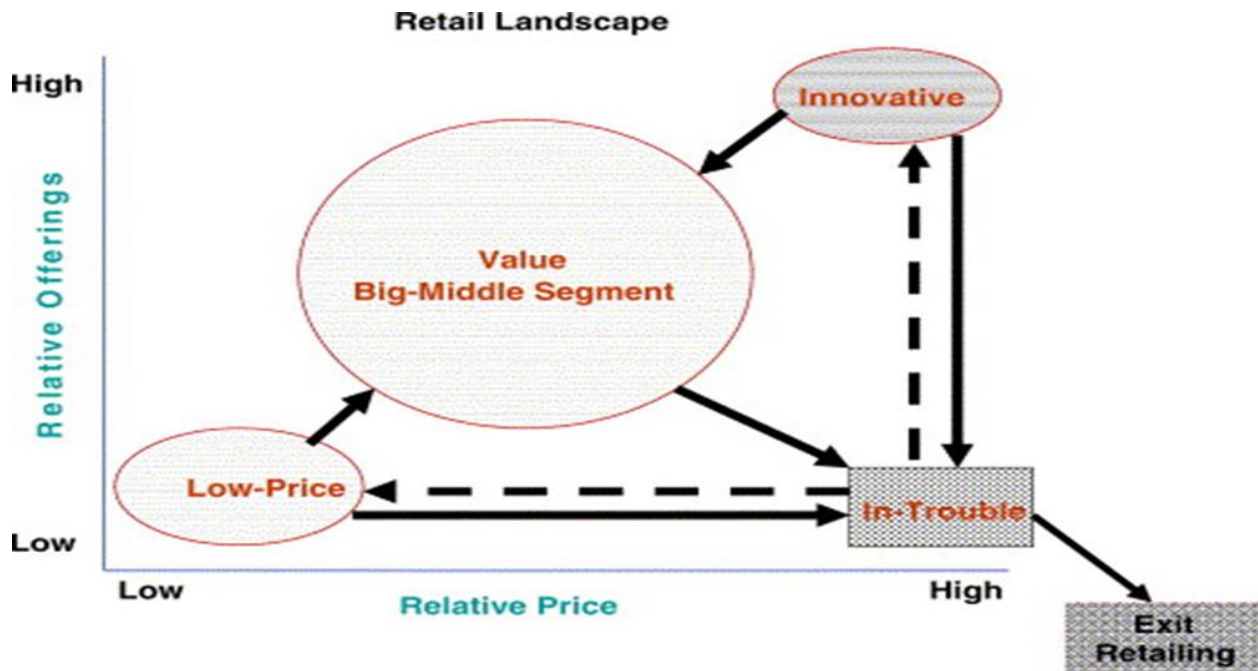
Trying to explain the dynamics of retail theories can seem very complex, which is why several scholars try to explain it by using metaphors. Hollander used the “wheel of retailing” (1960) and

“notes on the retail accordion” (1966), and Levy et al. talks about “the big middle” (2005). In the following, the paper will bring forth the highlights of these and see where these converge.

The Wheel of Retailing, as proposed by McNair in a speech in 1957 (Hollander, 1960 & Levy et al., 2005), hypothesizes that early entrants in any retail market start as “*Low-status, Low-margin & Low-price operators*” (Hollander, 1960, P: 37) when they mature they gain a better foothold in the market, and are thus able to afford a better venue and can charge higher prices. In the end, they become “*High-cost, high-price merchants*” (Hollander, 1960, P: 37). At the last stage, they become susceptible to new entrants that compete with lower prices and lower margins; hence, the wheel has come full circle.

The Retail Accordion Hollander proposed in 1966 was in addition to the Wheel of Retailing. However, instead of a wheel, the accordion *expands* to loosen up on some very rigid specialization and take in new “*related activities[...]/or[...]/diversification of products*” (Howard in Hollander, 1966, p: 29) and “*contracts*” to specialize in said activities or products (Howard in Hollander, 1960, P: 29). In many ways the accordion is thus, a more general description of the retail arena, where the Wheel describes the life cycle of a retailer.

Levy et al. (2005) proposed a theory of the dynamics of retail called the Big Middle. They argue that with any retail community, there is a big middle among the big established players with a mass market appeal, such as Amazon (Matzner et al., 2018; Polacco & Backes, 2018). On the contrary, new retailers come to the market with either a low-value alternative to the big middle or innovative solutions. Although the initial market segment provides certain power and profitability, but it is financially unsustainable in the long run. Thus, they are gravitating towards the big middle in search of bigger market segments and more profit. This move requires them to expand their offerings, deepen their supply chain and become less specialized. Those retailers that cannot follow the new trends in the big middle will move out of the big middle and towards what is called In-Trouble, where they will have to innovate their business or offer low enough prices to stay in business and if they do not succeed, they will go out of business. (Levy et al., 2005).



Model 1. Retail landscape (Levy et al., 2005. P:85).

It seems like there is an evolution of detailed descriptions with these theories. All three theories have the same in common, that there are entrants into the retail arena, but where The Wheel of Retailing argues that these are Low-cost, Low-margin, and Low-status entrants, The Accordion goes a bit deeper to state that these entrants are bringing diversified products or new activities with them towards the next contraction of the accordion. The big middle furthers this trend by dividing these entrants into two specific categories. This trend is passed through into the maturity stage and towards the vulnerability stage. What is interesting about all of these theories is that the authors can see that there is a specific rhythm with retailing. Levy et al. (2005) proposed that with the age of digitalization, e-commerce seems to be the next innovative and low-cost push into the retail arena, a proposal supported by both Wang et al. (2007) and Sheth (2021).

3.0 Methodology

In this section, the authors will discuss the methodological choices made for this paper, it starts by presenting the research philosophy of the paper rooted in the ontological and epistemological stances. Afterward, the modes of data collection will be presented, consisting of semi-structured interviews and autoethnography, to move into the data analysis and thematic analysis describing how the authors analyzed their data. Afterwards, the authors touch upon the trustworthiness and quality of the paper. Lastly, describing the ethical considerations taken into account.

3.1 Research philosophy

Unmanned stores in their current state are evolving and maturing. Some technologies are rendered irrelevant, and others are becoming more generally accepted. The authors acknowledge these types of development of the phenomenon to be subjective as each organization interprets the concept of unmanned stores in their own and ascribes their meaning to the characteristic of the phenomenon. Based on the aforementioned and the paper's aim, the authors decided to embrace the constructivist ontology in their philosophical grounding for the paper, as this is supported by Bryman (2016), which describes constructivism's ontological reasoning to adhere to the stakeholders continuously constructing and revising the meaning of social phenomena, based on their knowledge and world view. The authors justify this by the examined literature in the problem statement as the researchers writing about unmanned stores claim that unmanned stores adhere to certain technological characteristics in the stores. This type of social construction requires a strategy to interpret the meanings behind the social construction. Therefore, an interpretivism epistemology was employed to dig deeper into stakeholders' subjective meanings of the characteristics to understand why they are opting for different characteristics of unmanned stores. This helps the authors learn about the phenomenon and question why the phenomenon is portrayed the way it is. This leaves openness for the authors to uncover further the hidden meanings that are behind their decision regarding the characteristics of the unmanned stores (Alvesson & Sköldbberg, 2018). The authors also followed inductive reasoning as it allows the researchers to depart from the previous theory and interlink the collected data with the theory to supply the research field with new knowledge of a certain scope (Bryman, 2016). These efforts were matched with method triangulation to collect data, consisting of the semi-structured interviews and the autoethnographic method. It is imperative to strengthen objectivity by having a variety of data and using it to support a new and social phenomenon with multiple methods (Bryman, 2016). This would give insight into multiple levels of the phenomenon.

3.2. Data collection

3.2.1. Semi-structured interviews

The first method to collect data for this paper is with the help of semi-structured interviews. It manifests itself in the ontological and epistemological views of the paper. Diving deeper into a subject allows the researchers to find patterns and ask follow-up questions. This often leads to in-depth and clarifying responses that would otherwise not be possible in a structured interview format. These do not allow the interviewee to go freely down the road they associate with the question asked, thus not giving any rich results (Alvesson, 2011; Flick, 2014). To attest that the paper follows a certain structure, an interview guide was utilized to follow a redlining throughout the research process (Bryman, 2016). Further, it required the interviewer to study the literature associated with the paper before making their interview guide. This was done to move the conversation in the right direction and question the matter of the subject in focus (Longhurst, 2009; Boyce & Neale, 2006).

The authors contacted various retail experts in unmanned stores by exploring websites and companies offering unmanned solutions or operating unmanned store solutions. The authors started the search for informants after finalizing the literature review and interview guide relevant to the interviews. Thus, it was to ensure that the authors were updated on as much information in the field as possible so that the informants would recognize them to know the different features of the field of research (Flick, 2014). Furthermore, the basis for the selection criterion on experts in the retailing field operating fully unmanned stores from an operational or management perspective. Thus, a purposive and non-probable sampling method was employed, described by Bryman (2016) as adhering to the participant's relevancy regarding the research questions presented in the study. The participants are experts in their own right, as they understand running an unmanned store differently than somebody who has never visited an unmanned store or is a customer (Flick, 2014).

The authors' initial two interviews were pilot studies conducted in two different languages, in English and Swedish. They were trials to see if the interview guide aligned with the paper's aim or questions. Therefore the authors adjusted the interview guide questions that were deemed leading or did not yield responses to support the paper's aim or questions, as suggested by both Flick (2014) and Bryman (2016). Therefore, the authors created a more comprehensive interview guide with the themes in the interview guide named following: “the phenomenon of unmanned stores, physical & digital servicescape, service encounters, customer understanding, and lastly, customer influences.”. These topics and initial ideas were intentionally open (See Appendix 1), which helped the researchers understand the informants and their operational work with unmanned stores as the different informants perceived the unmanned stores differently. In some instances, the interview guide was supplied with additional questions for people that actively work with unmanned stores

and those involved in the technology enabling this kind of store. This aligns with McGrath et al. (2018) suggestion to tweak further and make improvements to the interview guide to yield results relevant to the study.

After the first contact with the informants, a date was set shortly after for the interviews. The online platform Zoom was used to perform the interviews because it allowed the authors to bypass the geographical, temporal, and financial constraints of research (Bryman, 2016). However, utilizing a digital medium has both advantages and disadvantages. The advantages were better audio recording (Bryman, 2016). The disadvantages are that certain issues became prevalent during the interviews such as connection issues causing hiccups in the recording. Both Archibald et al. (2019) and Bryman (2016) argue that it is to be expected when utilizing a digital medium to communicate compared to conducting interviews in person.

The authors conducted eight semi-structured interviews, each lasting between 35-60 minutes, and most of the interviews were conducted in English. In contrast, two of the interviews were conducted in Swedish and Danish. These interviews were immediately transcribed and translated into English to give the researcher unfamiliar with the Swedish or Danish colloquial language a clean version of the transcripts to read for the next stages of the study. Below is a table presenting the informant list.

Table 1. Informant list

| Informant | Country | Date of interview | Interview duration |
|------------------------------|---------|-------------------|--------------------|
| Informant 1- Pilot interview | Sweden | 2023-03-20 | 35 Minutes |
| Informant 2 Pilot interview | Sweden | 2023-03-20 | 52 Minutes |
| Informant 3 | Sweden | 2023-03-22 | 42 Minutes |
| Informant 4 | Denmark | 2023-03-29 | 45 Minutes |
| Informant 5 | Denmark | 2023-03-30 | 40 Minutes |
| Informant 6 | Finland | 2023-03-31 | 60 Minutes |
| Informant 7 | Sweden | 2023-04-03 | 38 Minutes |
| Informant 8 | Sweden | 2023-04-18 | 38 Minutes |

In the next section, the authors will clarify the second method used for this paper.

3.2.2 Autoethnography

The authors agreed that the paper needed more dimensions on the topic than just the one presented by the professionals through a single-handed method. While the phenomenon is still new and not fully accessible to everyone due to geographical distance and the nature of the stores, where its customers often are in no time to participate in an interview. The authors decided not to waste valuable time trying to conduct lengthy customer interviews. Instead, the authors contrasted what the industry professionals were talking about by engaging themselves in the research by producing autoethnographic material of their trips to unmanned stores in various regions in Scandinavia. An autoethnography is a way of doing scientific research where the author places him or herself as a part of the research by interpreting and analyzing their own cultural experiences to showcase cultural practices to cultural outsiders (Adams et al., 2017; Ellis et al., 2011; Reed-Danahay, 2017; Bohonos, 2021; Ellingson, 2006; Bochner & Ellis, 1992).

Critics have argued that autoethnography is not a valid scientific method because of its lack of methodological rigidity and openly subjective approach. Thus, to them, it is simply a fancy version of a biography, and it would be best to just keep up with the rigidity of ordinary ethnography (Ellis et al., 2011). The authors of this paper argue that what sets autoethnographies apart from other biographies is the reflexive analysis the authors as researchers use on the autoethnography to put up against the literature and interviews to create a methodological framework. This is true whether the primary source is subjective or not. This argumentation is not only backed up by Ellis et al. (2011), Reed-Danahay (2017), and Adams et al. (2017) but the proliferation of the method into other research areas such as gender studies in healthcare (Ellingson, 2006), Psychology (Ellis & Adams, 2020), Social science, organization research (Bohonos, 2021), communication (Ellis et al., 2011; Bochner & Ellis, 1992 Adams et al., 2017), Teaching (Raza et al., 2021), and marketing (Holbrook, 2005) among others, are visible testimonies of the strength this method brings into qualitative research.

Retroactive writing is typical for the autobiographical method. It is from the author's selective memory of their experiences and impressions. It is normal to support these memories with photographs, literature, recordings, interviews, and research on the same experiences (Ellis et al., 2011; Poulos, 2021). The retroactive perspective often brings epiphanies or curiosities to the table, moments that change the author's way of looking at themselves, a given concept, or how they would deal with a given situation (Bochner & Ellis, 1992).

The authors were thorough and detailed when they were writing their autoethnographies. Ellingson (2006, P:304) and Ellis et al. (2011, P:277) argue for the importance of a “*thick description*” as this contains the foundation for an in-depth analysis. It is important to keep readers engaged with

the author's experiences, thoughts, and feelings in the given situations by framing them in a way that creates persuasive storytelling. For them, as outsiders, to understand how an insider views and handles the experience. Thus, the author considered the autoethnographic method equivalent to the semi-structured interview method to explore the characteristics of unmanned stores.

For this paper, the sampling criteria was the condition of the unmanned solutions to be strictly unmanned to narrow the scope of the existing variants of unmanned stores, such as semi-unmanned or hybrid stores. Unlike ethnographic studies, pilot testing for autoethnographic material becomes more difficult to grasp. The consideration towards the object studied is different because the cultural experience is the author's own, as the author is experiencing the store, taking photos, field notes, audio recordings, and talking to customers. Hence, the authors must be aware of their presence's effect on their environment so they do not disturb the natural order of things (Ellis & Adams, 2020). Thus, the pilot testing of autoethnography was in Malmö. This developed into a larger framework to explore the stores more sufficiently (Appendix 2). After that, the authors visited stores in Västra götaland county, the Greater Copenhagen Area, and in Helsinki. The shops chosen were to test the different technologies and physical layouts and if there was a difference in the characteristics, as seen in Table 2. The authors visited the unmanned stores during the daytime in March and April 2023. Therefore, this paper cannot address nighttime characteristics in the different shops. In each shop, the visiting authors lingered longer than a normal visitor would do. The visit was performed this way to grasp the shop's atmosphere, take pictures of different interesting observations and field notes, make audio recordings, and have interceptive conversations with customers in the stores. Once the authors returned home, they wrote autoethnographies to distill the memories and impressions of the visit. These autoethnographies were revisited up until the initial coding started on the 4th of April, 2023.

| Store visit | Location | Technology |
|-------------|----------------------------------|---|
| 1 | Malmö, Skåne, Sweden (Pilot) | QR, Cameras, door technology |
| 2 | Copenhagen (Pilot) | QR, Cameras, door technology |
| 3 | Grimsås, Västra götaland, Sweden | Application (App), Cameras, door technology |
| 4 | Uvelse, Greater Copenhagen Area | QR + Cameras + door technology |
| 5 | Helsinki, Finland | App, Cameras, open door policy |
| 6 | Copenhagen | Bank card scan, scale-based solution, Cameras |

Table 2. Stores and locations for autoethnography

In the following section, the coding process will be presented.

3.3 Data analysis

3.3.1 Thematic analysis

For the data analysis, this paper relied on the work of Virginia Braun and Victoria Clarke (2006 & 2022) on thematic analysis (TA). Braun and Clarke first outlined the theory in 2006. Before the TA, the researchers claimed qualitative research was poorly explained. TA is a method for finding patterns within a given qualitative data set that can be used to organize and find meaning that goes deeper than what is seen at first glance (Braun & Clarke, 2006; 2022). The depth of analysis is decided by doing either semantic or latent coding. In the former, the coding rarely goes deeper than the face value of the data. While the latter goes deeper into the subject in conjunction with the semantic coding. While this paper is constructivist in nature, the coding done for the interviews has followed a semantic approach. The thought behind this method has been that interviews were with experts who are explicit in how they communicate about unmanned stores. With latent coding, the authors try to dig deeper and find underlying patterns, ideas, and concepts. Often latent coding is used in constructivist studies, where the goal is to find patterns and causalities that go deeper than the more shallow semantic approach (Braun & Clarke, 2006; 2022). With the autoethnographies, the authors chose to conduct latent coding because they will be used as a counterweight to the semi-structured interviews alongside the literature. Thus, the deeper an analysis, the more useful they will be to measure up against the interviews. Further, the authors used latent coding to find underlying concepts and ideas through store visitations, pictures, notes, and small conversations with locals, contrasting these with the interviews and existing literature on servicescapes and unmanned stores.

Furthermore, Braun & Clarke (2006) describes a step-by-step approach to conducting thematic analysis. The steps included are: *1. Familiarizing yourself with the data, 2. Generating initial codes, 3. Searching for themes, 4. Reviewing themes, 5. Defining and naming themes, and 6. Producing the report* (Braun & Clarke, 2006, P:87).

3.3.2 Semi-structured interviews semantic analysis.

The informants consented to participate and allowed the author to proceed to record the sessions, which simplified the transcription process for the study. While working with the recorded tapes of the interviews, the authors utilized an artificial intelligence transcription tool named “Otter.ai” to transcribe the audio. Once the audio files were fully transcribed and reviewed to ensure the transcribed scripts were aligned with the audio file. An additional step in the process was to clean the transcription text to make it more coherent by removing double words and certain filler words that would not contribute anything to the conversations (Bryman, 2016). Once the transcribed material was done, the authors went through the audio files and transcripts. They compared the transcriptions a few times to ensure they had been correctly transcribed and to get closer to the transcripts, as suggested by Bryman (2016). Afterward, the authors named the informants seen in Table 1, and the identities were placed in hard drives for both authors to identify the informants amongst themselves. Shortly after, audio files got deleted.

The clean transcripts of the interviews allowed the authors to follow the first step for Braun & Clarke (2006; 2022), which was to familiarize themselves with the data further. This helped to understand the depth and width through the authors immersing themselves and taking notes on important parts and highlighting passages with colors related to different themes or patterns, which helped to proceed into the second step of the TA (Braun & Clarke, 2006; 2022). In the second step of the thematic analysis, the authors started coding the interviews in a digital software named “Taguette”. Which enables coding of transcription material and has tools to develop categories along the way. These categories are visually presented making it easier to navigate through text and to re-iterate back to sections as all documents are placed in once space. Therefore, the first step taken was the initial coding to see the relevance of the collected data, and once this entire coding process was finished, the authors started visualizing the initial coding, and the codes presented 17 different categories. By visualizing the data, the authors realized there might have been certain connections between the subjects. Henceforth, the authors decided to re-code the entire data set to make new and coherent patterns and themes based connections made in the initial coding process and with specific themes in mind, also known as theory-driven coding (Braun & Clarke, 2006). The authors tried to code the relevant sections that might be useful for the paper. Moreover, in the third step in the coding, the researchers started visualizing and making

connections between the data towards the thematic creation, allowing the researchers to connect and collapse themes and categories into main themes and subthemes. As for the fourth step of Braun & Clarke (2006), the authors reviewed the themes and subthemes continuously and utilized a two-level review method, which incorporates reviews of the first round of data, and whether there is enough data to support and strengthen the subtheme, and when the data was not suitable the second step is to create a suitable theme for the specific data. The second level review occurs to look through the themes and note the relevancy and validity of the themes concerning the entirety of the paper. This step led to the next step in the TA process, in which our data set was divided into four main themes, which is presented in Table 3. An interesting aspect that occurred in the idea of producing the report, the themes created a pattern in the coding, which fit well in with the Customer-retailer interface framework by Hagberg et al. (2016). Thus, the authors present the findings similarly to the Customer-retailer interface outline.

3.3.3 Autoethnography latent analysis

The authors had, in the previous data analysis, engaged with the interview dataset enough to create the boundaries for the autoethnographic dataset, making the authors more efficient and more concise with the autoethnographic data set when it came to the initial coding process. The coding of the interviews provided a framed outline, within which the autoethnographic latent analysis could fill the gaps. Firstly, because the autoethnographic *raison d'être* is to apply the thorough analytical methodology and deep analysis to grasp the underlying themes of the bibliographical part of it and, in doing so, be able to characterize certain traits in the topic as well as contrasting them to existing literature and in the case of this paper also the interceptive interviews, fieldnotes, and photos taken during the fieldwork (e.g., Ellis et al., 2011). Secondly, because the initial rounds of coding in the first dataset were semantic, it also made sense from a thematic analytical point of view to see if this paper was able to move down through the layers of meaning to find the ideas, assumptions, and concepts that might not have been apparent in the first data set (Braun & Clarke, 2006; 2022).

As mentioned, the semantic and latent codes will be presented in section 4.0 following the Customer retailer interface model (Hagberg et al., 2016). Moreover, to not make enhanced discrepancies between the datasets and create unproportional amount of themes, the semantic and latent codes for the autoethnography were fitted into four main themes, as mentioned in 3.3.2.

| | |
|-----------|---|
| | 4.0 Findings and analysis |
| | 4.1. Introduction of stores |
| Settings | 4.2. The phygital settings of unmanned stores |
| Actor | 4.3. The actors of the store |
| Exchanges | 4.4. Remaining in the exchange |
| Offers | 4.5 Phygital offerings or just normal offers? |

Table 3. Main themes

3.4 Trustworthiness and quality assurance

To ensure the quality and trustworthiness of the study, unlike quantitative research, which focuses more on whether instruments are appropriate to measure the right thing to make generalizations (Bryman, 2016), qualitative research requires different sets of quality assurances. Bryman (2016) points out the trustworthiness of the paper through four criteria credibility, transferability, dependability, and confirmability. In order to ensure the credibility of the paper, the authors garnered multiple accounts of socially constructed reality (Bryman, 2016). The authors employed a triangulation of methods (as seen in sections 3.2.1 & 3.2.2) to ensure the data collected comes from different methodological sources for the paper to be as objective as possible. The semi-structured interviews assisted the authors in gaining more information on how the informants perceived the characteristics and by utilizing the autoethnographic method to experience the phenomenon themselves. Metaphorically, a three-legged stool needs all of its legs to stand, just like this paper. The transferability of the paper and whether it applies to other contexts is based on the knowledge retrieved on the current state of the unmanned stores. The authors believe that if a similar study were to be conducted in the future, that would yield results that might be different from the results presented in this paper due to the nature of technology, which is constantly changing and developing and thus may incorporate even more or less technology. As for the dependability criteria, the two authors worked together, kept track of all data collected throughout the process, and ensured that all procedures were followed accordingly (Bryman, 2016). Lastly, by the confirmability criteria, the paper's authors have not received any personal gain or remuneration in the course of writing the paper, and the authors had no relationship with informants for it to influence this paper.

3.5 Ethical considerations

To follow the ethical considerations that are highly important and consider them to protect the informants' participation in the paper (Bryman, 2016; Flick, 2014). Furthermore, Bryman (2016) addresses four important points that need to be considered: informant safety from any harm, privacy concerns, retrieving informed consent, and that there is no deception involved in the study. In order to ensure these four criteria were followed, How the authors followed these measures for this paper was to send each informant an email containing information about the study, without any financial or private incentives attached to the participation in the paper. Moreover, once the participant engaged in the video calls, the authors informed the informants of the papers contents and that their participation will not cause them any harm. Afterwards the importance of following the European Union's General Data Protection Regulation (EU GDPR) was explained. As were their rights as participants in the study, and that they could withdraw their participation at any time of the process, even after the interview. The authors also briefed the informants on the importance of anonymity. Readers cannot trace any data connected to the companies or individuals in the paper. Although the informants participating in the paper did permit the authors to market the organizations directly in the paper, in the case of autoethnographic methods, the authors took pictures but blurred parts of the pictures of consisting of brand names to maintain anonymity. Lastly, the authors orally requested informed consent during the interviews to ensure the information the informants received was understood. The informants confirmed and gave their consent to the authors. Therefore, the next chapter will consist of the findings related to the interviews and autoethnography.

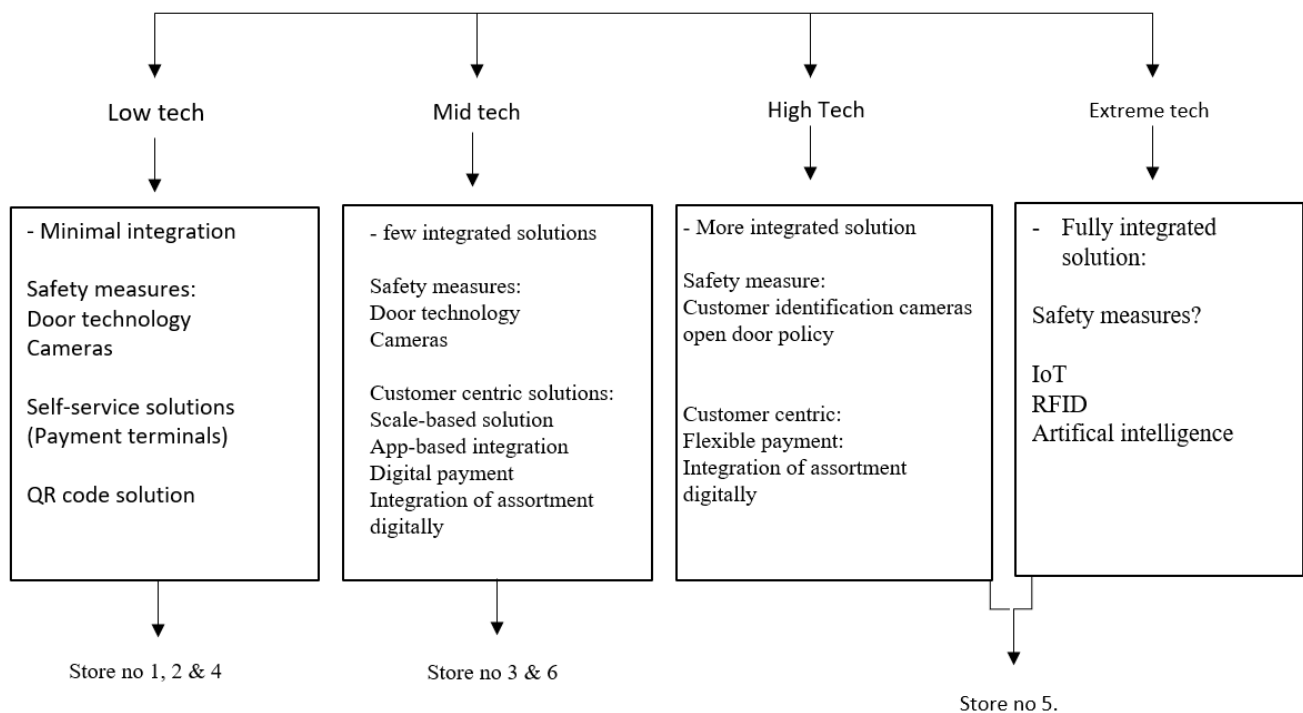
4.0 Findings and Analysis

This section presents the findings from the semi-structured interviews and autoethnographic method. It is analyzed through servicescape theory, Customer-retailer interface, and retail dynamics. This part is divided into five parts, one introduction and four themes covering the Customer-retail interface model. The first section introduces the stores that were involved in the autoethnography. The first theme addresses the physical and digital characteristics of the unmanned stores settings, the second theme presents the different actors involved in the unmanned stores. The third theme displays the exchanges that occur between customers and unmanned stores. Lastly, the fourth theme presents the offerings made for customers.

4.1- Introduction of the stores

In this section, the authors introduce the five stores involved in this paper. As the point of data collection, the authors visited five stores across Scandinavia, as seen in Table 2. These stores encompassed specific characteristics that are deemed to be relevant for the paper. Store no. 1 physical attributes presented features similar to a small convenience store. The focus on the digital aspects was placed on cameras, door technology and a QR code connected to e-id or phone number to gain access to the store and a physical till for payment. Store no. 2 presented similar traits as store no. 1. Store no. 3 the physical arena and digital attributes were more interconnected, as they utilized an app connected to e-id for access to the door technology and to make payments and it also had cameras overlooking the physical servicescape. Store nr. 4 encompassed similar characteristics as store no. 1 and 2. Store no 5. had an open door policy meaning the door was open. Inside the stores were intelligent cabinets equipped and connected RFID, and cameras to support it. One of the cruxes the authors found were physical payment tills being placed onto each cabinet (similarly to vending machines). Lastly, store no. 6 looks like an oversized cabinet people can step into. The door technology here was different because the customer had to scan their credit card, pressing on a screen the number of persons entering the store. The shopping mode of picking products down from the shelves was registered with a scale-based solution integrated into the shelves. Thus, once the persons leave the store, everything picked out is charged on the credit card that was registered (similar to a vending machine). In order to understand these characteristics of unmanned stores more clearly, the authors developed a model that visually presents these findings.

Unmanned solutions



Model 2. Unmanned solution spectrum.

The model contains data collected from the autoethnographies and interviews. Moreover, the authors categorized the stores' digital characteristics in this spectrum, as their characteristics have a further influence on the physical layout of the stores, making it easier to refer back to the visual representational model in the analysis. This model also, more specifically, shows the stances each informant has taken in operating unmanned stores. Thus, starting from the right store no. 5 was placed in the category in-between high and extreme tech, as it utilized RFID technology on the extreme tech end. However, there was a lack of servicescape usage. However, the integration of store technology connected assortment into intelligent cabinets, which gave it a peculiar outlook as seen in Appendix 3, picture C. Store no 3. is placed in the middle of low and mid tech categories as this store had more connectivity with the overall servicescapes and relied on digital price-tags and a phone app. Store no. 6 is also placed in the mid tech section as the store functionality is more integrated with a scale-based solution. Nevertheless, the solution only grants access to one person or a small group to the store at a time, limiting the number of distinct customers in the store at any given time. Lastly, store no. 1, 2 & 4 were added to the low-end technology as the finding in the autoethnography detected that their technologies utilized low technologies, referring to little digital integration of the store functionality.

4.2 The phygital settings of unmanned stores

The attempt to change the perception of servicescapes has been acknowledged. The examples given by Thompson & Arsel (2004) addresses the coffee shop culture changing due to Starbucks' innovative efforts with the servicescapes. Like Starbucks, unmanned stores try to change the perception of how to do the groceries. Doing grocery shopping in an unmanned store requires adjustments to the classic servicescape (Bitner, 1992; Aubert-Gamet, 1999). The servicescapes of the stores need to handle the physical and digital integration on another level than in a manned store because the customer expects a given service level, which attracts customers and keeps them satisfied (Torkzadeh et al., 2021). Hence, Hagberg et al.'s (2016) expansion on the idea of the retailer's physical arena as a setting makes sense to apply to unmanned stores. To them, the settings are changing rapidly with the digital integration in society, and they predict that B&M stores can benefit just as much from this as e-commerce can.

This paper found that the digitalization of physical arenas looks different, as displayed in model 2. The authors interpret the different levels of technology to be that way due to the complex technology brings to physical arenas. As seen in Appendix 3 (Picture A-D), the physical arena encompasses a multitude of shapes and in-store technologies and non-technological aspects from the different servicescapes analyzed in the autoethnography. For the authors it is clear that the phygital integration is important in understanding of the layouts of the store. E.g. in-store no.1 (Appendix 3, Picture D) and 2 (Appendix 3, Picture B), both the visiting authors were perplexed about the store's interior, which completely contradicts store no. 3 (Appendix 3, Picture A; Appendix 4 Picture C & D), Which is a more digitalized store first of all. Secondly, it has done a lot more to integrate the digital experience with what the customers see in the store. Thus, the authors interpret this as a clear sign that, to create a comparable shopping experience to the manned grocery stores, it is not enough for unmanned stores to just let people go into the store to pick stuff from the shelves and purchase it, as the customers are used to a certain level of service. Unmanned stores need to invigorate with digital integration, to change the perception of the servicescape as per Thompson & Arsel (2004), since this is the only option they have to bring up the service level without frontline personnel in the store (Torkzadeh et al., 2021).

So far, papers have mainly referred to particular technologies (Polacco & Backes, 2018; Sun et al., 2020; Gou et al., 2020; Wang et al., 2021; Denuwara et al., 2021), and interestingly, assessments of unmanned store technology acceptance were conducted through TAM and UTAUT models (Wang et al., 2021; Wu et al., 2021; Lin, 2022). Problematically, the papers do not necessarily address any unmanned store solutions to be a standardized solution, and this is because these papers focus on high-tech solutions instead what is accessible. Thus, what could be considered a normal unmanned store can vary according to each paper, making it more difficult to pinpoint these stores' norms or practices when talking about servicescapes. It may be just as difficult to

refer to a car as cost-effective and efficient if the customer does not know anything about cars. Technically any cheap car would fall into the category of cost-effective. However, if other aspects such as maintenance, repairs and fuel are expensive over time, the same “cheap car” would not be deemed efficient and convenient to drive. Thus, if the characteristics of a car are not addressed, then it makes it complicated to assess which models are the most cost-effective to buy. The same can be argued for with different unmanned stores when failing to identify their characteristics. Model 2 showcased major differences in the unmanned store spectrum with each level encompassing its own characteristics.

Moreover, multiple informants in the research have addressed these problems. The high to extreme technologies to not be financially viable (Informants 1,2 & 4) or for long-term usage due to the difficulty of maintaining and replacing broken items (Informant 8). Unlike previous papers, almost none of the informants utilized technologically heavy solutions such as IoT and AI (Matzner et al., 2018; Guo et al., 2020; Sun et al., 2020; Wang et al., 2021). However, informant 6 uses high and extreme tech in store no 5. Informant 6 supports the ideal of “*automate the full end to end operations. Because automating only the checkout only gives you small benefits.*”. The idea of unmanned stores' benefits or efficiency has been discussed academically, but not to a lengthy extent. On the other hand, generally in retail, Willems et al. (2017) addressed that digital screens in the physical settings would make certain improvements to efficiency, which are not present in this store, as seen in Appendix 3 (Picture C) and Appendix 4 (Picture A & B). Critically, what leads the belief of the store integration, could perhaps be too advanced for the unmanned store, and for the integration between physicality and digital yielding positive benefits is not as prevalent (Del Vecchio et al., 2023). Hagberg et al. (2016) mentions the inclusion of RFID tags is beneficial to organizations to keep track of products. Although the authors of the study consider RFID as extreme-tech and even though informant 6 is the sole user of RFID in their store, this leads the authors to believe that the academic focus towards the usage of extreme and high tech could be biased on the few existing samples (See Polacco & Backes, 2018 and Matzner et al., 2018). Thus, the critique and scrutiny of technology and its effect on unmanned stores do not measure up to the output it offers.

On the one hand, informant 6 argues there is more to adopting high and extreme tech to make end-to-end solutions streamless and viable. This contradicts Del Vecchio et al. (2023) of taking advantage of both the physical and digital to create an integrative and seamless experience, as informant 6 expects technology to be part of the solution more than stores physical characteristics. On the other hand, informants 4 and 2 argue that too much technology can become troublesome as they point out: “[...] *there's also an operational side of it, and it needs to run really effectively. And that's not always the case, that needs to be a part of the equation.[...]*”(informant 4) and “*where a lot of steps need to be digital. And that will take many, many years before we can have a streamlined process*” (Informant 2). The informants identified their boundaries of what they think a streamlined process can or cannot look like in their context. Therefore Del Vecchio et al.

(2023) reasoning on seamlessness by integrating the physical and digital is not as accurate in every case. The authors can interpret digitalization integration to make the end-to-end streamlined is not on par with what is believed to make the unmanned store efficient or viable in the first hand. As argued above, the most technological solutions are also the most expensive. This brings the return on investment to an unacceptable level, where it might take ten years instead of 6 months to get positive numbers (Informants 2 & 3). Thus, the high and extreme tech solutions are facing both an economic struggle and a balancing act to keep the phygital integration in the servicescape manageable while providing satisfactory service. The authors support these findings through the autoethnographies. As previously mentioned, the functionality of the stores is not dependent on advanced technological solutions but rather on how technology interacts with and within the servicescapes. This is more clear in the low to mid-tech unmanned solutions that opt for tech variants rather than focus on end-to-end optimizations.

The authors interpret the low and mid-tech solutions to offer certain benefits to the stores that use those formats, as they are cheaper to operate and require less technology maintenance besides digitally observing activity in the stores. Most noticeable is how the technology uses safety measures that the owners of the stores can utilize to combat malicious intent from customers. The safety measures are connected to the “door technology,” which requires an app, scanning a QR code to open the door or a credit card (More in 4.4), and adjacent to the door technology are the cameras. On the topic of the cameras, their functionality in unmanned stores are not what they were believed to be initially. Especially considering the data-collection potential mentioned by Sun et al. (2022). Informant 3 expresses, “[...] *it allows us to have an overview of the whole store having one 360 camera, being able to see what's happening in the entire store*”, it becomes evident to the authors that it makes it easier to maintain the store, as the spatial area of the store does not necessarily require a proper customer journey in the eyes of some (Informant 5 & 8). While having a simple layout of the stores can facilitate the simplicity of surveillance, the authors argue that this should not be used for an argument not to gather data, as the lack of other digital devices, as Willems et al. (2017) denoted to be helpful are nowhere to be seen.

In the autoethnographies, it is quite telling that store no. 3 and 5 are those going for the mid-high tech solutions. From the authors’ autoethnographic description of them, it is obvious that the authors are spending more time absorbing the servicescape and all of its features. Furthermore, these are also the ones that rely the most on both digital and in-store communication through touch screens and posters (Appendix 4 & 6). Especially store no. 1 and 4, which are considered low-tech, the descriptions are much briefer. Following the lean environment described by Bitner (1992), people spend little time shopping in them and do not make big purchases (Informant 8). As argued above, a satisfactory service level is important to make the customers linger around in the shop and get new ideas on what to buy (Du Gay, 2004). Deliberately planning on people spending as little time as possible in the store sounds to the authors like an unsound idea, and it goes against common literature on servicescape theory. Accordingly, these two contrasts might

merit a discussion over what the aim is for the individual store. Suppose the use and cost of technology can be justified. Technology can be used to engage customers (Torkzadeh et al., 2021) and influence the customer journey (Bitner, 1992) and satisfaction (Aubert-Gamet & Cova, 1999). Essentially, digital technology makes it possible to interact with customers in new ways and on new levels (Hagberg et al., 2016), making customers participants in the creation of the servicescape (Aubert-Gamet & Cova, 1999).

Despite the current technologies, a few of our informants acknowledged that the technology would determine the future of unmanned stores. (Informants 2, 4, 6, and 8). Informant 2 comments, “[...] of course when the main market is growing, our technology will be growing as well.”. Thus, their expectation of more well-established retailers leads the technological advances and drives down the technology’s price. This goes against common retail logic, where the leaders of the technological advancements should be the new entrants because they need to take advantage of these before the well-established players can outmaneuver them (Hollander, 1960; 1966; Levy et al., 2005). The authors argue that these relatively small shops compared to the larger supermarkets should make it cheaper and easier for store owners to make small-scale experiments to drive the advancements within unmanned retailing.

The authors interpret, as opposed to Informant 2, that there is a requirement for unmanned stores to remain flexible in adopting technological solutions but also to be wary of larger players catching up fast once they have adopted the technology. This puts the current unmanned stores under a certain time constraint before they are unable to break into the Big Middle with this technology, and this way, they have to aggressively drive the phygital innovations to the unmanned servicescape to avoid ending up in the “in-trouble” bracket (Levy et al., 2005, Model 1).

As displayed above, the digital characteristics seem to influence the store's design choices and the physical layout. Moreover, certain researchers believe front-line employees will become redundant in unmanned stores. Henceforth, the next chapter explores the role of the front-line employee and other actors in unmanned stores and how it influences the employee-to-customer relationship.

4.3 Actors in the stores

The topic of employees can seem like an odd one out when it comes to unmanned stores. These stores nonetheless need people cleaning them and restocking the shelves and cabinets. Interestingly all of our informants agreed that the employees were an important part of any unmanned system. Efficiency is the key to having employees in these stores informant 3 points out; *“So it allows you to be much more efficient, but it's also a different way of working. So it's more about making sure that the store looks nice, making sure to have a scheduled way of looking at the cameras and then you have to get to know our back office”*.

This efficiency gives the individual grocer extra time since they only need *“To come to the store to work is, you know, 2 to 3 hours a day”* (Informant 6). Informant 3 concurs *“we count that running a store, you should spend 2 hours per week in that store. So it's very low. So, our store owners often operate several”* and they continue *“[...]some of the clients that we've helped haven't been able to have time off for several years [...] they're being able to hang out with our kids and having a normal weekend”*. Adversely, the assumption that technology would take over in unmanned stores to make it more efficient through the automation of the processes in the servicescape (Denuwara et al., 2021). The authors in their store visits also met a temporary worker in the store no. 3. These results show that (1) the grocer who goes unmanned has a lot more time on their hands, (2) some grocers spend this time managing more than one store, and possibly having employees taking care of the manual labor (Store 3). Supported by Matzner et al. (2018), the authors contend that the current states of unmanned solutions are not in the stage of completely replacing or excluding the employees, as there are too many things in a store that need to be done in order for the store to be even presentable, something technology cannot necessarily replace.

Hübner et al. (2022) argue that employees tied down with routine work, in the case of unmanned stores, cleaning and refilling shelves, do not have the time or resources to help out with other service tasks because their schedule is already filled up. Hence, when the informants (1, 3, 6 & 7) are talking about having customer-service employees physically in the store, it must be a person with no other apparent tasks in the given period. The authors noticed this in the store no. 3, when the authors ran into an employee receiving groceries, while he was kind enough to answer a few short questions, it was obvious that he was time constrained and needed to get back to work.

Two stores in the autoethnographic data clearly show the importance of having employees in these stores, namely no. 2 and 3. In no. 2, the shop showed clear signs of either neglect or an untimely employee schedule. The author describes the noisy air conditioner in the autoethnography, which could be a sign that it needed maintenance, and how old receipts were flying around the shop when the air conditioner started, an additional sign that the shop needed some cleaning. Moreover, some stores had empty shelves and cabinets that needed refilling. In contrast to store no. 3, which was spotless, well-stocked, and contained great ambiance and atmosphere. With a deeper look at the autoethnographies, the mood in the two stores becomes apparent from the field notes. Inside store no. 2, the authors expressed being distant, disappointed, and apprehensive, as the authors noticed all of the negative aspects of the servicescape before anything else. They both contrast to the autoethnographies from store no. 3, where the authors both seem very engaged and vividly describe the positive aspects of the servicescape, even though the weather outside is very gloomy. Where store no. 3 seemed accommodating, as if they wanted customers to enjoy the experience and hopefully return. This would align with the argumentation of Aubert-Gamet & Cova (1999) and Nyrhinen et al. (2022), where the servicescape creates community linkage to the customers only when they interact with it. Once the customers deem that the servicescape provides value to their shopping experience, they will drift towards the store more often, in such a way that the

physical store's gravitational force pulls the community closer to it and each other. Hence the store became a social gathering spot for the community (Aubert-Gamet & Cova, 1999; Nyrhinen et al., 2022). Adversely, store no. 2 seems a bit neglected and does not care about people coming back, and the customers acknowledge this by leaving used receipts on the countertop. Both of these cases are great examples not just of the influences of the servicescape but also of the importance of the employees for the customer's experience, and thus also the communal linkages (Nyrhinen et al., 2022; Aubert-Gamet & Cova, 1999) as argued for above.

This compels the thought that there must be a spectrum on which it is possible to find the frontline employees' optimal working hours, that each store needs to keep in business on a given service level for the maximum turnover. Thus, it becomes difficult to distinguish between an unmanned store and a manned store. Alternatively, the distinction is on how much of a compromise on the service level each store owner is willing to take to maximize or minimize profit, taking the low-cost perspective employees in unmanned stores is something Denuwara et al. (2021) also emphasized. Thus, the authors are strengthening their arguments, but with the discretion that it is difficult to see how these stores can be called unmanned.

To Hagberg et al. (2016), actors are not merely customers and retailers anymore because of the digitalization of society. Moreover, the line between digital and physical actors becomes more blurred as smartphones and touchscreens become an important part of how customers and retailers interact or can interact with each other (Willems et al., 2017; Informant 6). The authors have noticed that phygital features are not mentioned as much in the interviews as initially expected, as most informants relied on the customers' smartphones and apps to support them in their endeavors. Informant 6 even mentions that implementing touch screens in stores could supplement customer engagement. Collectively, the author interprets that these new types of actors, whether the phone or the touchscreens in the store, effectively work alongside the employees in the unmanned stores today and most of the retailer and customer communication is going through these actors (Appendix 4 Picture D & Appendix 6 Picture C).

In the current state of unmanned stores, the author found two certain phygital actors to the stores, the digital screens and price tags, currently in use in two of the stores (Appendix 4, Picture B & C). to which Informant 6 addresses *“the idea with the screen is then to communicate for the consumer what products you have in there or what are their pricing”*. Further, the authors interpret these to be used strategically to make timed or personalized offers, something this paper will look further into in chapter 4.5.

However, when the authors were analyzing the pictures and autoethnographies deeper, it became apparent that the screens mentioned in Interview 6 were not working (Appendix 4, Picture B). Moreover, the only place where there seems to be any attempt at communication throughout the customer journey, besides the price tags, was in store no. 3. The significance is discernible when

looking into the customer journeys described (Pine II, 2019). Not only do the authors notice more details in store 3 than in the rest, but they also comment on the in-store marketing and communication efforts through monitors (Appendix 4, Picture D), something that is not found in any of the other stores, where the only communication were stickers on the door describing the process of the entrance.

Thus, while the initial thoughts on unmanned stores are that they should be embracing these new digital actors into their servicescapes to accommodate for the lack of physical actors (Hagberg et al., 2016), the reality is a bit different. Informant 1 mentions that they have not gotten to this point in their process yet, and maybe there is a truth in this, that many of these retailers simply have not reached this stage of their business development project yet, or maybe the technology is too expensive as is argued for in 4.2. Nonetheless, as previously mentioned, the phygital actors are not as prevalent as originally thought. However, something that is prevalent is the technology surrounding the exchanges of the servicescape. This will be the theme addressed in the next section.

4.4 Remaining in the Exchange

Exchanges in this paper are where digitalization should be thriving. Smartphones were created to ease the exchange of communication and make it as cheap and easy as possible, whether these are pictures, videos, banking information, or e-mails. Hagberg et al. (2016) put those mentioned above into three categories, communications, transactions, and distribution. These aspects are noticed in unmanned stores as the stores are “self-driven” in a way by being accessible throughout the hours of the day. Hence, why safety measures such as door technology were implemented to combat malicious intent, as previously mentioned in section 4.2.

The concerns voiced are on the proper identification of the customers, the validity of the payments and technical errors during the customer journey, and how these might have negative consequences for the store or the customers' perception of the store. The authors understood in what means the stores were getting ahold of customers, and that was to connect the door technology directly to an app or QR code that grants customers access to the unmanned store. The analysis indicated two interesting aspects of why companies are opting for using QR codes as the easiest solution to implement or an app as the more expensive and hairy solution to gain access to the stores. In the app, the use of e-id was a significant aspect in the Scandinavian unmanned stores, something previous literature did not explicitly address as an influence, considering previous studies conducted in China, Taiwan, and the United States (Sun et al., 2022; Wang et al., 2021; Polacco & Backers, 2018), as was the e-id consistent for the Scandinavian market to utilize, as to why it is consistent is an additional safety measure for e-banking services as mentioned by Buchmann et al.

(2014) that allows new market entrants to become trusted through the system eIDAS and the e-id serving as a personal identification amongst customers to ensure safe purchases to a trusted organization (Buchmann et al., 2014). The QR codes offer a simple yet effective solution as an E-id alternative. Customers can simply scan a code, enter a registered phone number in the web browser and confirm the authenticity of the number via a text message. The simplest way though is to do as stores 5 & 6 where the customer simply scan their credit card to gain access to the products in the cabinet, as stated in the introduction, consumers' are comparing them to a glorified vending machine (Denuwara et al., 2021).

Thus, there are several ways to identify the customer. This goes in line with Hagberg et al.'s (2016) description of the QR codes functionality of allowing specific access, but to what extent is not noted. Nonetheless, the technological problems that occur during the customer journey are one reason many current stores opt for a low-tech solution because it is deemed more reliable. Hence, the authors interpret that the security concerns are unwarranted in reality and is easily fixed with current solutions. Interestingly, because the apps are connected to the door technology, informant 3 commented on the increased possibility of giving the apps a means to communicate with customers.

How the store owners can communicate with the customers is what sets apps and QR codes apart in unmanned stores. On the one hand, informant 3 argues for the app to be widely accepted by its customers and allow additional features like push notifications to be open. In turn, creating a direct communication link to the customers, capable of suggesting not only convenient products but also a medium to directly interact with store owners to make complaints and presumably to build a relationship. On the other hand, informant 2 discusses that communication with customers or the lack of communication is the weakest trait when using QR codes “[...] when they close the website, they disappear. So we can't communicate with notifications” (Informant 2). The authors noticed differences between the approaches offered by using an app or QR codes. Meanwhile, the former offers a platform to fill the gap of not having the employee or service encounter on the spot to build a relationship. As Azza & Norchene (2017) pointed out, as a crucial aspect of the servicescape, the undertone is to have a means of communication at least. The latter simply loses out on the opportunity to communicate with the customers, as it misses out on the opportunity to create a social link (Aubert-Gamet & Cova, 1999) since the QR does not cater to the customer's needs in terms of accessibility.

When the authors initially visited the stores, they were met with two different modes of making transactions, physical payment terminals and digital payment systems connected to the app and QR codes. As previously mentioned in model 2, three stores combined QR codes with in-store physical tills, making it the most prevalent trait in the findings. Informant 1 argues that not everyone wants to tap in their bank-card numbers in an app. Hence, making it easier if they can use self-service technologies that customers already recognize from other larger brand stores.

Although the authors have already considered it to be low tech to begin with, which proves the point of the era of the unmanned store, if there is a hierarchy of unmanned stores, the QR codes and physical payment terminal are setting the viability standard by far, which could be considered the big middle (Levy et al., 2005) in this case, also aligning themselves with Hagberg et al.'s (2016) exchanges, as it simplifies the way to make purchases in the store with the app in this case. Even though it could be considered a platform as it does not only offer a digital payment system. This also makes the customer susceptible to additional promotional deals placed in front of them, as seen in Appendix 6 (Picture F). The authors argue that the app is perhaps the only way, so far, to create a linking value to the customer (Aubert-Gamet & Cova, 1999), due to the possibility to communicate. In contrast to the QR codes, as mentioned above, which is not looking to communicate with the customers.

One of the stores supplied an additional service related to Hagberg et al.'s (2016) distribution. At first glance, the authors believed it not to be relevant to an unmanned grocery store since they do not deal with any products that have gone digital, such as music or other intellectual property (Hagberg et al., 2016; Fuentes et al., 2019). This distribution was related to the customers' property, as there was a row of parcel lockers. The authors noticed it had a very physical presence in the store, and it is impossible to run these without a digital device to unlock them. These lockers are a great way to combine the physical and digital servicescape. Moreover, they cement that shopping, even on the internet, is a phygital endeavor with offline activities as well (Hagberg et al., 2016). An unmanned store with a click-and-collect system like this one (Appendix 5, picture E) is a way for the store to create value beyond its groceries. It creates a reason for the customers to come to the store, which has been one of the hurdles in the first place (Informant 3). The value co-creation between the shop and the logistics service provider (LSP) is a logical merger (Hagberg et al., 2016). Furthermore, this creates a further gravitational pull on the community, as argued in 4.3, making the shop even more valuable to the customers and the community (Aubert-gamet & Cova, 1999; Nyrhinen et al., 2022). What is important to note is what is in the stores and presented outwards that draws the customers to the stores. The next chapter will discuss what actions are taken in the store to entice the customers.

4.5 - Phygital offerings or just normal offers?

The literature (Parasuraman et al., 1985; Bitner, 1992; Aubert-Gamet & Cova, 1999; Hagberg et al., 2016; Azza & Norchene, 2017; Nyrhinen et al., 2022) seems to agree that in-store marketing is necessary, and so does all of the informants as discussed above. Nonetheless, several scholars agree that the digital servicescape should have an increasingly prominent spot for all retailers. Thus, a phygital servicescape must be competitive in the modern retail landscape (Pine II, 2019; Ballantyne & Nilsson, 2017; Willems et al., 2017). Following this thought, the offerings should

also be of a phygital character. Hence the stores with a more digital mindset should, on paper, figuratively and literally have the upper hand regarding this (Ballantyne & Nilsson, 2017; Pine II, 2019; Torkzadeh et al., 2021). The authors also acknowledged it in the autoethnographies, where the only places they received digital offerings were in store no. 3 and 5. The strength of the phygital offerings became glaringly obvious because of the complete lack of analog offerings in the other stores, and the simplicity and seamless nature of the phygital offerings that were given in the stores (Appendix 6, Picture F). Moreover, the chosen fundamental design options for the stores allow them to digitalize their assortment into their platforms (Appendix 7, Pictures A & B). The authors argue that these fundamental choices follow Del Vecchio et al. (2023) to take the best of both worlds and provide a seamless service to the customers. Not only is the focus of the store one part of the service, but the store displaying the products offered within the store on a digital platform is a strategic choice to be made. In a smaller sense, it is an appealing way to attract customers looking for specific products.

What this paper found, that all informants agree that physical offerings are part of their *raison d'être*, but also that they cannot stand alone so there are thoughts on how it should be carried out. *“combining visibility of the app, around in-print marketing as well so that you get a sense of a red thread and synergies across the store as well”* (Informant 3). This becomes interesting when referring back to e.g., Ballantyne & Nilsson (2017), that emphasizes that market spaces become more fluid with digitalization. Thus, physical offerings in stores can be offered on more platforms as retailers take different platforms into consideration (Hagberg et al., 2016), such as social media or digital marketplaces like Amazon. These platforms, alongside the rest of the internet which might be labeled a digital non-place because it inherits a lot of the same traits as the physical non-places (Augé, 1992; Aubert-Gamet & Cova, 1999 and Ballantyne & Nilsson, 2017). The relationship with non-places is that the consumers only have to be confronted with texts from legal entities (Aubert-Gamet & Cova, 1999). It can be very difficult to be noticed in a non-place if there is no concerted effort to get noticed. The authors also noticed in their research that all stores had their own webpage, but only store no. 1 had a presence on Instagram (as of 20 Apr. 2023). Moreover, the authors did not encounter any digital offerings as the retailers have not come around to implementing the digital offerings and digital servicescape online. It seems like an oddity that stores that promote technology and are leading a major transformation on how retail might be pursued in the future, does not have a bigger presence online and on social media. Since, this is where a lot of their customers are and it is a relatively cheap and easy way of reaching out to a lot of people. Digital offerings and servicescapes should be at the forefront of marketing efforts for B&M stores to give the consumer an omnichannel experience (Verhoef et al., 2015 and Ballantyne & Nilsson, 2017).

The paper will now turn its gaze on the different views on phygital offerings. The informants can be divided into two camps, one wanting to deepen the digital integration and one that does not. One of the reasons for this might be that the informants have different experiences or data on their

customers, as these two quotes show from informant 3: “ *You would be astonished how many of our users have allowed push notifications. So it’s around 80%, which is high*”. And from informant 2 “*They shut the notification down, they don't look into the app, then that is the reference we get from store owners as well*”.

It is obvious that professionals will think and act differently considering which of the two types of information they are getting. The authors see in the former that it can seem obvious to push the integration between the app and a technologically advanced store trying to expand the phygital offerings, personalize the experience and make it more seamless with the help of the technology. As for the latter, the phygitality of the offerings might be materialized as screens or monitors that can be used for communication and upselling but not as digital services. Nonetheless, the actions of the individual retailer will depend on the data they have at hand. Even with the same data, it can be interpreted differently, so it can be difficult to reach the same conclusion, no matter if the retailer is digitally inclined or not. This paper has found that services, like the app and parcel lockers, enhancing the communal link could interest retailers no matter their camp (Aubert-Gamet & Cova, 1999; Nyrhinen et al., 2021).

Moreover, The arguments proposed by Del Vecchio et al. (2023) in retrieving the best of both worlds may be difficult with the unmanned store phenomenon. Trying to get in or to stay relevant in the big middle (Levy et al., 2005) is more difficult than originally perceived as there is more to offerings than just integrating them to one sphere, which is causing more operational issues to the store than anything, which in turn contradicts Hagberg et al., (2016) that suggests that offerings should be offered in all channels in an omnichannel way, as the authors are seeing that these operators are currently struggling to maintain offerings at a good level.

5.0. Discussion Overview

This next section will continue with a discussion of the analysis as it is presented above, wrapping up the findings of the paper with the methodological considerations related to the paper's aim and questions.

5.1. Discussion

The former chapter presented the thematic analysis of the findings and analyzed through the lenses of servicescape, the customer retailer interface, and the retail dynamics. To further reiterate the research aim, The paper aims to explore the physical and digital servicescape characteristics of unmanned stores, and how the stores integrate these characteristics to drive customer engagement. This exploration will better understand the unmanned store as a novel phenomenon. To expand on the subject, the first question to be answered is: *Which physical and digital characteristics do the servicescapes of unmanned stores address?*

The literature on the concept of unmanned stores portrayed the unmanned stores to be technically highly advanced and to incorporate extensive technologies such as IoT, AI, Big data, and RFID (Polacco & Backes, 2018; Sun et al., 2020; Denuwara et al., 2021; Guo et al., 2020; Wang et al., 2021) that automates all parts of the processes. In hindsight, the authors displayed and analyzed in Chapter 4, Sections 1 and 2. that the case was not as portrayed in the literature. Therefore, the servicescape spectrum (model 2) was created based on the interviews and autoethnographies to display the stores' characteristics during the research. There is a discrepancy between the contemporary idea of unmanned stores as modern high-tech solutions and how they present themselves as everyday low-cost grocery or convenience stores. In the context of what niche they occupy in retailing, these stores have quite deliberately put themselves into competition with the small retail formats, which makes sense from a strategic perspective for two reasons. Firstly, a single grocer often owns a small store, and they have less financial muscle than the bigger grocery chains, thus because the unmanned stores bring in new technology to the retail landscape, it will give them an asymmetrical advantage for longer, compared to if they went for the big players immediately (Levy et al., 2005). Secondly, the variety of tech in the stores leads the store owners to use different safety measures in the stores, while the high and extreme are more reliant on the technology to ensure safety, as described with store no 5, having an open door policy. The mid to low tech are looking into door technologies and cameras to supply the safety measures within the stores. Moreover, the analysis displayed that the characteristics of the mid to low-tech are emphasizing what Augé, (1992) and Aubert-Gamet & Cova (1999) has been conforming to the notion of non-places, which is to create a linking factor as opposed to use-value.

Nonetheless, the stores' technological variety has been shown to influence the perspective on the frontline employee task on a micro level (Matzner et al., 2018) by removing or automating certain tasks, such as the cashier check-out. Scholars such as Denuwara et al. (2021) and Lin (2022) addressed the notion of the employee becoming redundant. However, what the analysis displays in Chapter 4, Section 3 is that there is a delicate balance between having an unmanned store and the consumers' desire to have in-person interactions with employees in the servicescapes. This is an argument supported by several scholars (Aubert-gamet & Cova, 1999; Ballantyne & Nilsson, 2017; Matzner et al., 2018; Nyrhinen et al., 2022). Adding to this dilemma, and as shown in 4.3, these unmanned stores do require employees to clean the shop, receive the products, fill up the shelves. As previously mentioned, also to help out as a physical characteristic of the store in order to inform and help customers with digital service. The current phygital integration of the stores does not offer any solutions to replace the work currently undertaken by employees with digital actors. This paper has shown that many stores do not offer the technology capable of communicating with the customers, which is the first thing that makes this step difficult. Only two shops offer the necessary technology, but they have chosen to focus solely on marketing their products through these actors. Hence, technically these stores are not unmanned, and as a counterargument to Denuwara et al. (2021) and Sun et al. (2020), the only cost-saving measures these stores have is the amount of time the employees spend in the store. Thus, cost-saving measures are on a spectrum and not a decisive conclusion.

To answer the second question of the study: *In which ways do unmanned stores' phygital infrastructure enhance customer engagement?*

The unmanned store domain opens new alleys for enterprising retailers. In Chapter 4, Section 4, the authors examined what strategies were implemented in unmanned stores. The analysis of exchanges displayed that safety measures create a safety bubble for the consumers to enter. Even though it requires credentials to enter, consumers can leave their identities outside of the store because it establishes certain boundaries, akin to a non-place (Augé, 1992; Aubert-Gamet & Cova, 1999) that keep the customers safe in the store and the store safe from the customers, kind of like in an airport. The previous sections displayed some ambiguity of keeping or removing the frontline employees, which makes other modes of communication and payment methods important for the stores. The analysis presented the app as the platform to make payments, communicate with the customers, and build bonds and relationships. This is in contrast to the QR code solution, which limited the functionality of building trust and bonds, going against Azza & Norchene (2017). Moreover, the informants and stores utilizing QR codes opted for a physical payment terminal, which this paper presented as a strategy for speed and efficiency and not communication and integration. As opposed to the vending machine variants of unmanned stores, just requiring the bank-cards but not adding any further bonding or relationship building approaches. Furthermore, the analysis displayed that the app is paramount to create a linkage to the stores, as opposed to QR

codes which focus primarily on the use-value than the linking value it has to the community, which is something Aubert-gamet & Cova (1999) points out as an important feature in the post-modern servicescape.

Beyond the ways to strategize in operating a store, the core aspect is what is in the stores, as presented in Chapter 4, Section 5. Previous researchers in servicescape address the importance of in-store cues and marketing, and concerning having digitalization at the forefront, the findings presented an additional ambiguity in-store marketing strategies in the stores (Parasuraman et al., 1985; Bitner, 1992; Aubert-Gamet & Cova, 1999; Azza & Norchene, 2017; Hagberg et al., 2016; Nyrhinen et al., 2022). Causing a divide into two camps. One camp addressed the futility of incorporating in-store marketing in the physical and digital space. In contrast, the other camp paralleled their strategies to follow Pine II's (2019) argument that retailers should boost their customer engagement by meeting individual customers' needs at any given time to create future reciprocal relationships.

Along those lines, the analysis presented rather an inadequate amount of strategies, as most of the people in the field of unmanned stores are not optimizing the physical and analog offerings. In contrast, to their digital presence, a few attempts were made to digitalize their assortment offerings by promoting via a smartphone's notifications and displaying assortments digitally as previously mentioned in Chapter 4, section 5. These are the instances the authors noticed to be in the forefront and having the upper hand when it comes to digitalization and driving the customer engagement, as omnichannel theory has intended it to do (Verhoef et al., 2015; Hagberg et al., 2016). However, the analysis did display a divided sense to this as well, and whether these efforts have any influence to the linking value as proposed by Aubert-gamet & Cova (1999), which should be considered regardless, as a strategy for the unmanned stores has a significance as a non-places on a physical and digital level (Aubert-gamet & Cova, 1999; Ballantyne & Nilsson, 2017). All in all, these efforts could be explained by addressing that the people involved with unmanned stores are still experimenting and trying to figure out the optimal way to operate the store and in how to increase the customer engagement. Nonetheless, one store did display an innovative step forward in engaging customers to the stores by implementing parcel lockers in the physical servicescape as an additional attribute to the customers engagement.

Regarding the research questions, these raise additional follow-up questions.

Can we call these stores unmanned? Furthermore, is a fully unmanned solution even desirable?

So, to answer the first follow-up question, the obvious answer is no. These stores are not 100 percent unmanned. A more nuanced answer is that they function even though no employees present for certain periods. As this paper has argued above, a customer can enter the shop, pick out

products, scan them, and pay for them unassisted as we have argued for in Chapter. 4. Essentially, they do not function completely autonomously, so a correct term might be to call them semi-autonomous or hybrid stores. While the current unmanned solutions would mostly be considered low to mid-tech enterprises, according to model 2, their technological features are for safety measures, such as cameras, door technology, and an apps based or QR based solutions connected to e-ids and phone numbers. These features make it possible to give customers access to the stores without an employee being present (Hagberg et al., 2016; Willems et al., 2017).

The second follow-up question can be answered from several different perspectives. It can be looked at from the financial perspective, e.g., Denuwara et al. (2021), where a fully unmanned autonomous store is the ideal solution due to the low-cost structure of the individual shop. Matzner et al. (2018) argue that technology will make certain tasks fully autonomous on a micro level. Contrarily, this paper contents that for this to be feasible, certain technologies need to mature and become cheaper, even though the in-store technologies are fairly well developed, they cannot replace employees at the moment. This argument extends to both the physical chores of the frontline employees, but also the services found in manned stores. Consequently, AI and AR technology needs to evolve to a level where customers can interact with it and get the service they are getting from frontline employees in manned retail stores today (Matzner, 2018; Sun et al., 2020; Guo et al., 2020; Wang et al., 2021; Butt et al., 2023). For this reason, it is possible to grasp the idea of a fully autonomous unmanned store with a high service level, yet the technology is still too immature. Yet, from the customer's perspective, an interpersonal service level is an important aspect of the customer journey, as this paper has clearly shown.

One might argue that removing the human-to-human interaction has to be done gradually, but as discussed above, there is no alternative. First of all, not enough people are utilizing the stores quite yet, as the need of employees pertains to the social aspect in explaining the digital elements. Secondly, the technology is not mature enough. Thirdly, because of technological immaturity, the service level of the customer journey does not match the manned competitors' service level. Thus, seeing fully automated stores in the big middle (Levy et al., 2007) might not be feasible at the moment nor wanted. In the meantime, retailers will experiment with digitalization and different levels of hybrid solutions until then. These hybrid solutions will follow the broad spectrum of more or less hybridization but also move vertically with how involved the employees are in the servicescape and service encounters. The most straightforward of these options would be to have unmanned features in a normal supermarket, having manned hours during normal opening hours, and then going unmanned during normal closing hours.

6.0 Conclusion, limitations and further research

In this section, the authors will present the conclusion of the paper and perspectivize it to the practical and theoretical contributions as well as for limitations of the study and provide suggestions for future research.

6.1 conclusions

The technology discussed in existing research, which they argue is being integrated into these stores, was not found to be as prevalent as initially believed. Instead, other cost-effective solutions that perform the same tasks in the store are currently utilized in contemporary unmanned stores focusing on safety measures such as cameras and door technology. On the other side, the physical characteristics remain in large unchanged, besides the frontline employee that was believed to be replaced. Interestingly, the frontline employees are still an integral part of unmanned stores due to tasks that cannot be automated yet, making their role a crucial physical characteristic of the unmanned store in comparison to digital actors such as digital monitors. In order to enhance customer engagement, the unmanned stores seem to have two domains to operate on and in the stores. Operating on the store proved to incorporate strategies before entering the store as the door technology requires either corroboration of identities through apps with e-id or QR codes requiring phone numbers. Moreover, the app is conceived as an all-encompassing platform to communicate, make payments and enter the store driving further engagement once the customer has a functioning app. The in-store marketing in the physical and digital space is not up to par. However, an instance of parcel lockers implemented to attract customers is an innovative step towards enhancing the engagement and visibility of the store.

In summary, the authors can conclude that the unmanned solutions we are seeing today have started incorporating the characteristics of phygitality into their servicescapes to varying degrees. However, these technologies are currently too expensive or immature for full integration. It would drive the breakeven time of the shop to unacceptable levels and compromise the service quality and customer engagement.

6.2 Practical and theoretical implications

As this paper explored unmanned retail stores' servicescapes, this paper may contribute both practically and theoretically.

In a practical sense, the paper displayed various types of technical solutions to the retail servicescape. For managers looking to implement unmanned solutions, the findings of this paper

propose that professionals are opting for stores based on low-tech with a focus on the safety measures that can identify the customers in the store. As the examples provided by the paper, both apps and QR codes show prominence. The approach suggested is to focus on the safety measures that need to be considered. Door and surveillance technology are paramount, and these should be linked to e-id's or a registered phone number via an app or a QR code. As no technology can guarantee the direct safety of the store, the authors believe that having customers identify themselves would presumably stop malicious intents by customers.

Regarding adoption of highly technological appliances, such as RFID, IoT, AI, and other highly technological appliances. The authors suggest that managers look more in-depth into the chosen technology and understand its implications for the context in which the manager wants to implement it. The findings provide a discussion as to why certain operators are not utilizing it, and it may be worth considering those discussions.

Theoretically, one of the methods utilized in this paper has been autoethnography, which has been a large part of the study to explore the phenomenon of unmanned stores. It presented multiple layers of analysis since the authors got to experience the phenomenon firsthand and later were able to put an analytical perspective on it. The autoethnographies make it possible to conduct research in environments where it is demanding to get a customer-based perspective. Thus the knowledge becomes focused on what the researcher is learning about their own experiences.

The paper provides a qualitative addition to the narrow academic field concerning unmanned retail solutions, emphasizing the need to qualitatively assess the technological solutions and their implications for the stores.

The last contribution that the paper is directed to the element of phygitality, as requested by Del Vecchio et al. (2023), as this sphere is having an intense development of the spectrum of both low-end technologies and high-end technologies. The authors believe that the unmanned stores will see the full effect of their phygitality once integrated with AR, Virtual reality or fully conversable AI, as for now the full spectrum of phygitality is not necessarily noticeable in unmanned stores.

6.3 Limitations

This paper is limited because of the novelty of the topic. The authors have decided not to pursue consumer values or perspectives directly from the consumers due to the lack of understanding of unmanned stores and their servicescapes theoretically. This would require certain sampling criteria that would not be feasible promptly. Furthermore, the authors chose to look solely at unmanned solutions and not hybrid solutions. This means operating as a normal grocery store throughout the day and after a certain time frame to complement the after-hours with unmanned features. As the

last limitation of the paper, the authors decided not to pursue unmanned stores outside of the Scandinavian region since visiting stores was the authors' criteria of traveling abroad to different countries outside of Scandinavia was not an option and thusly avoided.

6.4 Future Research

As for future research, the authors noticed that research on unmanned stores could be pursued in multiple instances. Firstly, a longitudinal study to measure either customer satisfaction or consumer values over time at a particular location or multiple locations in Scandinavia, this could open up a new dimension for the study to measure these parameters. Secondly, pursuing an actor-network theory or resource-based view regarding unmanned stores' supply chain management aspect would be of interest. The assortment of unmanned stores gets their produce from different suppliers. Hence, researching how the locally produced and locally delivered would impact the sustainable setting of unmanned stores based on the sustainable development goals. Thus, how much the emissions are released initially and after how much emissions are reduced, by adopting a more sustainable approach in the unmanned stores. Thirdly, the paper's authors noticed many claims about the technology utilized in unmanned stores. In contrast, the research proved the opposite, looking into whether IT-companies entering retail fields could exaggerate or tech-wash the innovations being applied to unmanned stores or in retailing in general.

7.0 Reference

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8.0 Appendices

8.1 Appendix 1. Interview Guide.

1. Can you tell a bit about yourself and the work you do with unmanned stores?

Theme: Unmanned stores

Unmanned stores phenomenon.

1. What would you highlight about unmanned stores?
2. What do you think are the core strengths/weaknesses of unmanned stores?

Theme: Servicescapes

3. What is the thought process on the store design?
4. What functions should an unmanned store have?
5. Which functions are the most important?
6. What kind of communication points do you have in your store?
7. What information do you have for the customer in-stores? - if any?
8. How do you communicate with your customers?

Digital servicescapes

- What kind of technology are you using?
- Do you see if technological aspects influence the customers?
- How do you consider the connection between the physical and digital aspects of the shops?

Customer understanding & customer influences

9. What are your primary customers?
10. Do you receive feedback from customers?
 - and if so, if you're allowed to briefly share what is mentioned?
11. How does traceability and data collection help you understand your customers?
12. How does the application influence customers' choices?

Theme Social

Actors- Service encounter

13. How do you explain the seamless experience and how it is made seamless?
14. How is the role of the employee reflected in the unmanned stores?
15. What gains/losses are made due to the lack of check-out cashiers?
 - a. Any loss on added-value?

Return to unmanned stores phenomenon;

16. . How do you think this hybridization of stores will evolve?
17. . How do you believe that unmanned stores will change the shopping behaviour of customers?
18. What do you want to achieve with the unmanned stores

Thank you for responding to our questions,
Is there anything you would like to add?

8.2 Autoethnography template

The researcher should in the context of and keeping with the traditions of autoethnography, describe the entirety of the trip to the shop. (Notes, audio recordings and writing the experience down post visit).

This description should be as thick and vivid as possible, in order to give the best possible chance of the later analysis of this autoethnography as strongly as possible.

In the descriptive process, the researcher should try not to describe it with analytical lenses but simply describe what comes to mind. That being said, it would be interesting to physically test or check certain features that might be interesting in a servicescape perspective so it can be described thoroughly.

Pictures / Observations to be taken:

- Infront of the stores
 - Branding
 - marketing
 - Entrance instructions
- In-store
 - Physical layout of the store
 - Aisles
 - Product placement and sequence of goods
 - In-store marketing
 - Communication
 - Physical payment tills
 - Visible technology
 - Customer journey indicator and signage
 - Digital devices
 - Scanners
 - Outliers (Broken things, trash, empty shelves).

Questions to ask customers in the store

- What do you think about the store
- How has your experience with this type of store been so far?
- What do you think about the technology in the store?

8.3. Appendix 3. Pictures - Servicescapes

A

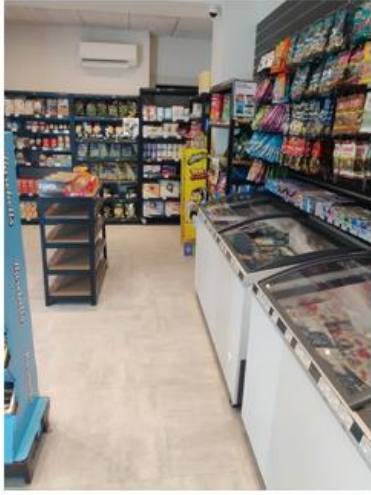


C



D

B

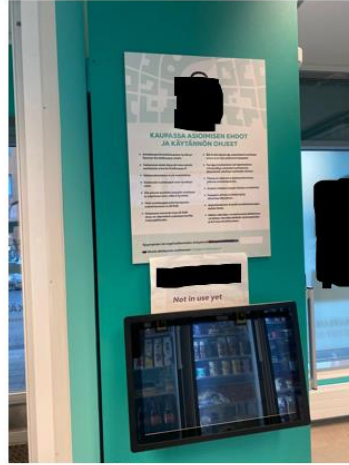


8.4. Appendix 4. Pictures - Instore-tech

A



B



C



D

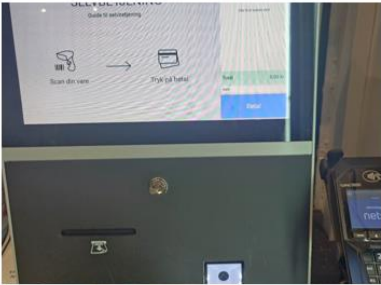


8.5. Appendix 5. Pictures - Physical tills and extra services

A



B



C



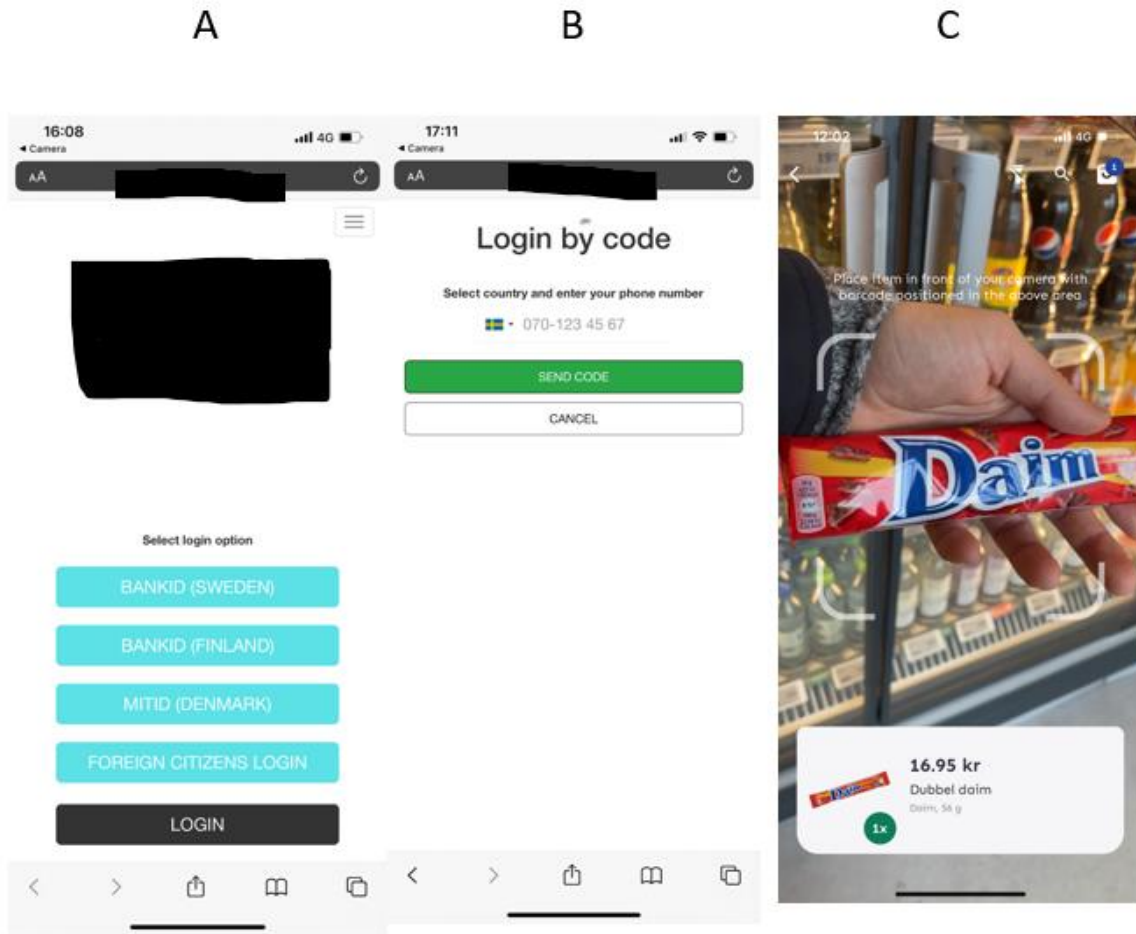
D



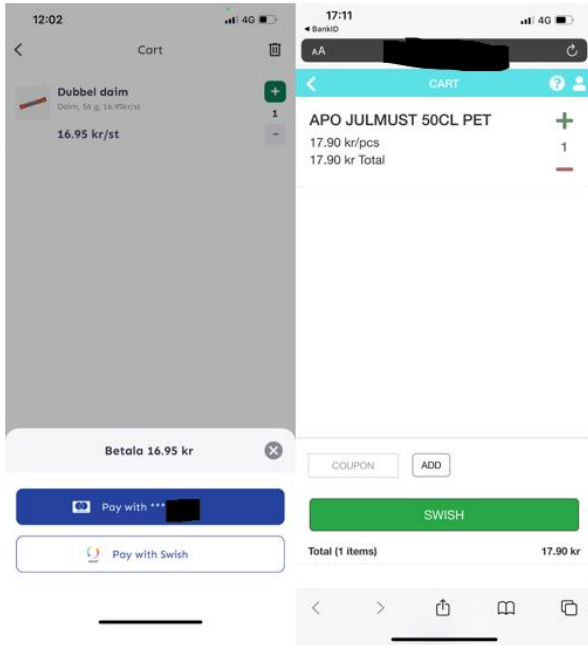
E



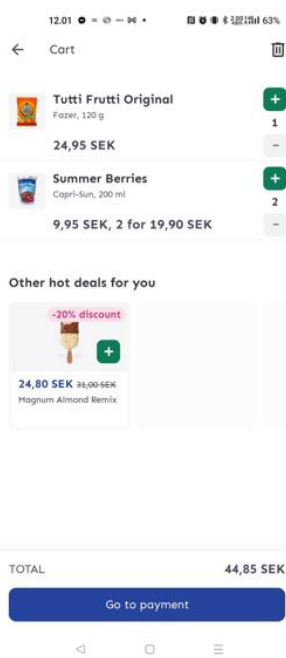
8.6. Appendix 6. Pictures - Application



D

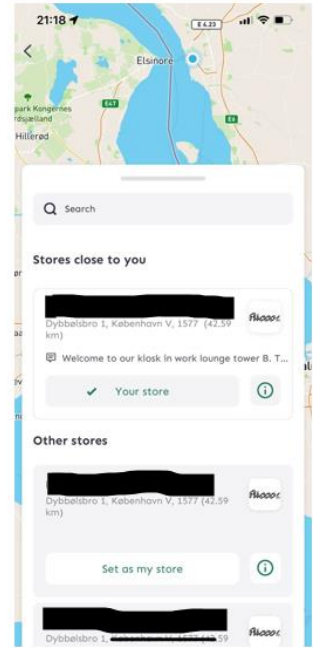


E



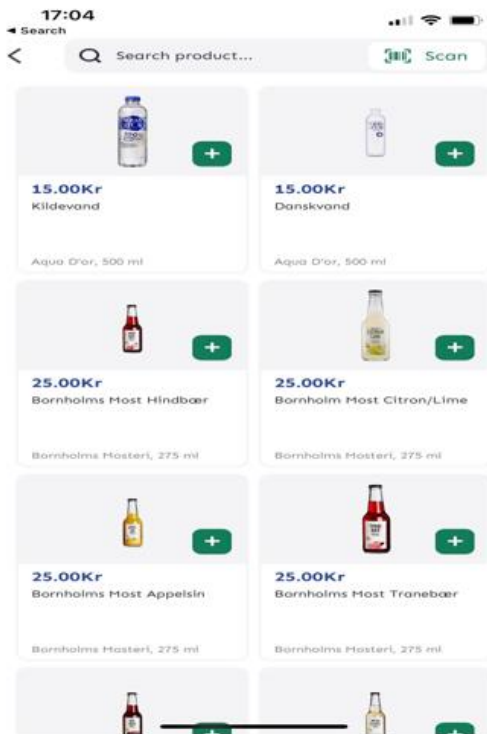
F

G



8.7. Appendix 7. Digitalized products

A



B

