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## Efficient Robots vs. Social Beings:

A sociotechnical study on Korean café-culture and novel technology in service.

Master's thesis in Science and Technology Studies (MSTS)

Supervisor: Thomas Berker & Roger Andre Søråa

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





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Studier av kunnskap, teknologi og samfunn (STS)

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- utføre avansert kunnskapsmekling i forbindelse med tverrfaglige prosjekter og prosesser



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Never would I have thought that I would go to Korea to study cafés and robots. I imagine that a younger me would find this notion ridiculous, in a funny way. This past year of studies has been the most demanding year of my life. With struggles of mental health and stress, I would like to take a moment to acknowledge myself. For going through with studies abroad, for taming my anxiety, and for finishing this one task. You did ok, Halvard.

Halvard Moe Krogstad.

8<sup>th</sup> of August 2022.





## Sammendrag:

«hvordan roboter brukes i sør-Koreanske kaféer og hvorfor?». I denne oppgaven undersøker jeg dette spørsmålet i en kvalitativ studie på Koreansk kafé kultur, ved å se på hvordan forskjellige komponenter er deltagende når endring skjer og den kompleksitet. Oppgavens introduksjon presenterer nasjonen Korea, et overblikk over leve-situasjonen i Seoul, et kortfattet innblikk i kaffens historie i Korea, hvordan Korea ble en tech-nasjon, definisjonen av en robot, og sist, fremheve tilskuddet denne oppgaven har for 'untact'- og HRI-forskning. Metodologisk, dette studiet benytter tre typer empirisk materiale: (1) Feltarbeid i Korea og erfaringer fra Seoul, (2) observasjoner av 6 kaféer; 3 robot-kaféer og 3 vanlige kaféer, (3) semi-strukturerte intervju av fire studenter fra Seoul. Informantene er presentert som sine egne individ i denne oppgaven, men de representerer også både kjernen av kafé-kunder og hverdagslivet hos studenter i Seoul. Den empiriske dataen er sentral i denne oppgavens forskning, fordi prosessen er inspirert av grounded theory, en induktiv metodologisk fremgangsmåte. Jeg benytter også teoretiske verktøy fra Science & Technology Studies: sosioteknisk perspektiv, domestisering, og delegering. I tillegg låner jeg Breaching experiments fra sosiologi-feltet.

Oppgaven er kronologisk strukturert inn i fire analysekapittel: (1) et dyp-dykk inn i Koreansk kafé-kultur, det travle livet til studenter, kaféen som en plass å studere på, Seoul's trange bosituasjon, og de materielle konfigurasjonene på kaféer. Dette utgjør den lokale konteksten for oppgaven. (2) Presentere det sosiotekniske materielle konfigurasjonene i Seoul-kaféer. Analysert gjennom å bli kategorisert og satt opp imot den lokale konteksten, for å finne ut av hvorfor kaféer benytter nye teknologier. Dette utgjør den materielle konteksten. (3) Analysere hvordan kunder domestiserer kaféer som benytter nye teknologier, basert på kaféenes hybridisering, smaken av produkter, og kundenes tekniske kompetanse. (4) HRI-analyse av breaching experiments, ved presentering av tre situasjoner hvor forventningene av sosial interaksjon blir brutt i en service setting, i tillegg til konseptet av å se for seg at brytningene skjer, og avvisningen av untact teknologi i en service setting.

Kaféer i Seoul tilpasser seg den lokale konteksten og studenters rutiner, ved en økende bruk av teknologi og en reduksjon i bruk av menneskelige ansatte, noe som resulterer i at kaféene er på nippet til å bli slike hybrid-kaféer, hvor linjen mellom kafé, hjemmet, og arbeidsplassen blir uklar. I mine funn, vises det at studenter, hoved-målgruppen, er splittet i sin domestisering av robot-kaféer, grunnet avvisning av interaksjon med teknologi i service, basert på mistillit og en forventning om at funksjonsfeil skal skje.



## Abstract:

*"How robots are used in South Korean cafés and why?". In this thesis I investigate this question through a qualitative study of Korean café culture, looking at how various components play a part when change occurs in Korean cafés and the complexity of it. The thesis' introduction present Korea as a nation, an overview of life in Seoul, a brief history of coffee in Korea, the birth of Korea as a tech-nation, a definition of a robot, and lastly highlighting this thesis' importance and contribution to 'untact' and HRI-research. Methodologically, this case study draws on three primary empirical materials: (1) Fieldwork in Korea and experiencing Seoul, (2) observations of 6 cafés; 3 robot-café and 3 regular cafés, (3) semi-structured interviews of four Seoul-based students. The informants are presented as their own individuals in this thesis but do also represent the core café customer-group and daily life of students in Seoul. The primary empirical data is central to this thesis' research as the process is inspired by grounded theory, an inductive methodological approach. Additionally, I utilize theoretical tools from the field of Science & Technology Studies: sociotechnical perspective, domestication, and delegation. I also borrow Breaching experiments from the Sociology field of study.*

*Chronologically, this thesis is structured in four analysis chapters: (1) a deep-dive into the Korean café-culture, the busy lives of students, the café as a study spot, Seoul's density and cramped housing, and material configurations of cafés. This constitutes the local context of this thesis. (2) Presenting the sociotechnical material configurations in Seoul cafés. Analyzed by being categorized and put up against the local context, figuring out why cafés make use of novel technology. This constitutes the material context. (3) Analyzing how customers domesticate cafés using novel technologies, based on the cafés hybridity, taste of products, and the customers technical competence. (4) HRI-analysis of breaching experiments, presenting three cases of breaching in social expectations of interactions in a service setting, in addition to the concept of imagined breaching and rejection of untact technology in a service setting.*

*The Seoul café is adapting to the local context and students' routines, by increasingly making use of technologies and reducing the number of human employees, resulting in some cafés becoming borderline hybrids, blurring the line between café, home, and workplace. Findings show that students, the target customer, are divided in domesticating robot-café, due to rejection of interacting with technology in service based on untrust and anticipatory fear of malfunction.*



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# 1. Introduction.

When Korea is mentioned, many think of advanced technologies, music, fashion, and innovation, but did you know that Korea has one of the most unique café cultures in the world?

In this thesis, I present a tale of young Seoulite students' routine and daily life, as I explore the various components interconnecting them with their strong café culture, acting as the backbone of urban socialization and representation of the contemporary modern society of Seoul. But what happens when novel technology is thrown into the mix, as cafés in Seoul evolve into human-less hybrids, built on the back of the fourth industrial revolution and the power of automation?

The thesis poses the question: *how robots are used in South Korean cafés and why?* And the main goal of this thesis is to investigate why the robots have appeared in Seoul cafés, what purpose do they serve, and how do customers respond as these sociotechnical material configurations are introduced in this peculiar café-culture.

Inspired by Thomas Parke Hughes' (1986) *seamless web*, this thesis is built around the notion of various components constituting change together, seamlessly. Changes in students' routines, in the local café, and in the society of Seoul – they are all organic, ever-changing, and interconnected with each other. In this thesis I bring the social components, consisting of culture, history, routine, and practice – commonly recognized as the background of change, to merge with the foreground of technology. With this approach, we are able to clearly see how no component nor technology is the sole reason for why change occurs, because change can be a much more flowing but complex process than what first meets the eye.

My motivation for this study was brought on by the numerous café-visits I made, in what felt like my never-ending search for any signs of robotic life in Seoul. To my surprise, robots are evidently *not* at every street corner in the digital capital of Korea. When my university-class started, with online lectures and the weekly assignments, I also found myself going to cafés for my studies instead of staying in my tiny Airbnb-apartment. Because even though the buzzing streets of Seoul were right outside my door, I felt both lonely and claustrophobic by staying inside all day. Being at the café however, around so many people while still being alone, gave me this refreshing feeling, like coming up from under water and gasping for air. The café therefore became the extension of my cramped apartment and part of my weekly routine, and it helped that at least the café was to be found at every corner in Seoul, compared to the robots. I later found that my school library funnily had a café-robot inside, which quickly became my go-to study spot and my introduction to what I in this thesis call the *robot-café*.

### 1.1. Korea – “All you need to know in four paragraphs”.

Korea (Korea = South Korea) is located at the Korean peninsula, sharing this region and only land border with their northern twin North Korea for these last 74 years. On a continental scale Korea is part of east-Asia, the second most populated subcontinent on earth.

Koreans love their coffee, and it is not just about grabbing a cup of coffee to enjoy – it’s a whole experience and feelings attached to this one cup. In modern times, there has been a café-boom in Korea, and many cafés are getting creative in order to attract customers and to compete with the bigger franchises like A Twosome Place and Starbucks. Everything from board game cafés and art cafés to racoon cafés and even a whole café dedicated to BTS, the famous Korean pop boy-band.

*The land of the morning calm*, as Korea often has been referred to, is also quite ironically famed for their “*pali-pali*”-culture, appreciating the quick, fast-paced and not-so-calm lifestyle. The Koreans appreciate effectiveness, it can be traced to every aspects of their lives, from individual routines to the rapid industrialization and economic growth the country has experienced in recent times.

Technology is a strong part of modern Korean culture and play a significant part in their daily lives. Most youth of today’s Korea are born into having technology around them and having technical competence has almost become an expectation for the population, rather than a hobby or interest for a few. During the covid-19 pandemic, the Korean government pushed the use of non-contact technology and phone-tracking apps out into the public, which seemingly got the ball rolling in Korea for what today is called ‘*untact*’ technology – non-contact solutions.

### 1.2. The Korean context: Living in Seoul, Coffee-culture, and Tech-nation.

In this thesis, I argue that it is crucial to understand the context of this curious country, as it paints a much clearer picture of why societal problems either do occur, are anticipated or even expected to occur in the future. In this introduction, I will *briefly* go over how Korea became a tech-nation, some facts about Korean living conditions and its aging population, and an introduction to the history of cafés in Korea and the rough outline of a rather unique coffee-culture springing to life. As I briefly go over these different topics, I argue that it will give the reader a greater sense and grasp of my findings in this thesis, where I go more in-depth on the urbanized lives of young Korean students living in the city of Seoul. Furthermore, these context’s also serve as additional components for my later analytical chapters, showcasing the complexity of my research question.

#### 1.2.1. Aging, Urbanization, Density.

Korea is a country with high population density and urbanized population, with cramped housing, and an increasingly aging population. And the capital city, Seoul, is no different in this regard, playing a pivotal role in the urbanization processes of Korea (Kim & Jang, 2014). The context of Koreans urban living conditions and the fact that it is an aging country is relevant for this thesis. That is because what this context provides is a sense

of understanding on how different social practices and societal problems both have appeared, are appearing right now, and can or will appear in the future society of Korea. In addition, it is most relevant for understanding the café culture of Seoul, as Emma Felton (2018) recognizes the café as a distinctly urban phenomenon.

In 2020, 82% of Koreans live in urban areas. Most of the Korea's population live in Seoul, a city having just under 10 million inhabitants (O'Neill, 2022). Due to Seoul's rapid growth these past decades, the city became fused with neighboring populated areas, Incheon and the Gyeonggi region, creating the *Seoul capital area*. In addition to Seoul being its own city, the Seoul Capital area is recognized as a *megacity* with a population of 25 million. By being ranked 6<sup>th</sup> of the largest metropolitans in the world, Seoul capital area is one of the worlds largest urban areas in the world (Statista Research Department, 2022).

Korea is a rather small country, as it is ranked the 107<sup>th</sup> country in the world by area, comparable to Iceland in size. However, whereas Iceland has a population of 370,000, Korea itself is sporting a population of close to 52 million people. That constitutes a population density in Korea of roughly 511 people per square kilometer, with Seoul having a population density of almost 16 thousand people per square kilometer (Yoon, 2022a). Because of the rapid population growth and urbanization of Seoul, housing eventually became in short supply. To meet demand, Seoul began construction of apartments and high-density housing. As the newly built apartment were of higher quality than other housing in Seoul, these high-rise homes quickly became popular for Koreans, making them the number one choice of housing in modern Seoul (Kim et al., 2012).

The country has since the 1960s been suffering from a declining fertility rate, with the looming prediction of a major decline of Koreas base population in the future (Kim, 2005). And as if on que Korea could last year, in 2021, report its first ever drop in base population from 2020, with a decline of 57,300 (Kamiya, 2022). With the prediction of radical population decline in Korea, there are additional predictions of a steadily rising median age of the Korean citizens nationwide. And as the median age goes up, the working-age percentage of the population will therefore go down (Kang, 2021), resulting in less viable workers per Korean citizen (figure 1).

Year	Estimated Population	Working-age Population (%)	Median Age
2020	51,836,000	72.1%	43.7
2030	51,199,000	N/A	N/A
2070	37,656,000	46.1%	62.2

Source: Statistics Korea

Figure 1: Statistics of aging in Korea.

### 1.2.2. A brief history of the Korean café culture.

It is said that the first ever café was in the city of Constantinople around the 15<sup>th</sup> century, being the first establishment to sell coffee to the public (Paajanen, 2019). For the Arabians, the café quickly became quite the popular cultural place, to drink coffee and to socialize. And because of the café's success in the cities, the café eventually spread to neighboring countries in the 16<sup>th</sup> and 17<sup>th</sup> centuries, all throughout Europe. Eventually, the café reached Britain and its various colonies in the late 17<sup>th</sup> century (Myhrvold, 2022).

For Korea, however, they had to wait until the late 19<sup>th</sup> century for the coffee to be introduced. It is said that the very first cup of coffee served in Korea was to the Korean king Gojong, in 1895 (Bak, 2005; Soo-mee, 2006). Coffee was firstly recognized as a status symbol in Korea, as the coffee had been introduced by the west as this western cultural drink. Therefore, coffee was highly exclusive to the elites, wealthy, and other high-ranking members of society. And it was not until later, when the instant coffee arrived with the Americans, that the masses were fully able to join in on the coffee craze (Jiawei, 2020).

It did not take many years after "the first cup" before coffee became popular on the peninsular region, as it started appearing in busy trading locations such as near the port of Incheon in the early 20<sup>th</sup> century (Soo-mee, 2006). And eventually, the first iterations of Korean coffee shops, or rather the *dabang* ("tea" "room"), started appearing as well. Originally, these dabangs had the purpose of holding tea ceremonies. However, after the coffee started to spread its roots in Korea, becoming popular among the Korean elite, these dabang-establishments eventually started to adapt, selling both tea and coffee. The dabangs was famed for their unique atmosphere, and to attend the dabangs became quite the special experience for the Koreans. These establishments quickly became a social spot, for different professions to meet and talk about politics, economy, culture, and the state of things (Bak, 2005; Jang, 2016).

During the 1960s, the commercialization of coffee at the dabang came to an abrupt, but temporary halt. Exported products such as coffee beans became prohibited by the dictator of Korea, President Park, in attempt to grow the Korean economy by only using domestic-produced products. The dabang still prospered as a social spot however, even without coffee, and in the 1970s they became wildly popular for young students as well, providing them with a feeling of freedom. This was also around the time were dabangs with certain themes started appearing, which eventually would become popular in Korea as themed cafés. It was not until the 1980s that the official café became popular in Korea. And even though dabangs in practice had the same purpose as the European cafés, these new cafés in Korea gave more focus on the various coffee types, becoming more specialized. By the 1990s, the café culture of Korea had already sprung to life. The café customers sought for a more professional and serious café-setting, with higher standards. Not long after, Starbucks arrived in 1999 to Sinchon in Seoul. The arrival of Starbucks brought on yet a new adaption to the Korean café culture, with additions such as take-out, self-service, and more customer autonomy in general for the customer. With this increase in customer autonomy, Starbucks also became a popular place for Koreans to go to for reading books or to study as well. And with Starbucks entering the

scene, becoming a huge success in Korea, various other foreign café-chains started popping up as well with their different styles of coffee and other unique attributes (Bak, 2005; Jang, 2016).

In these past couple of decades, Korea have experienced quite the café-boom, seeing the rise of the artisan coffee, where the cafés are giving special attention to quality, taste, interior, and atmosphere. By 2016, Korea had produced around 70,000 cafés. And as the café is distinctly an urban phenomenon (Felton, 2018), 18,000 of these cafés can be found in the city of Seoul, which consequently is most cafés per capita in the world, making it the café capital of the world. In addition to the number of cafés, Korea is also famed for their unique repertoire of café-themes (Nele, 2016), ranging from various animal cafés, roaming with cats or even domesticated racoons, to advanced robot-café, where there are no human baristas present.

### 1.2.3. Miracle, Industry, Technology: Birth of a tech-nation.

In this thesis, I throw around the notion that Korea is a tech-nation; technologically advanced, highly digitalized and automated, and one of the most innovative countries word wide. I therefore find it relevant to explain in short terms how exactly this came to pass, the miraculous journey Korea ventured from the 1950s and till today. Additionally, I think this brief history of the Korean economy, industrialization, and technological advancement, give a bit of an insight into the techno-culture of Korea and its capital, Seoul, and how it appeared.

Between 1953 - 2022, Korea went from being one of the poorest nations on earth, depending on foreign aid, before evolving into a developed country (Le et al., 2016), and ranking today in 2022 as the 10<sup>th</sup> largest economy in the world (e.g., Business Insider India, 2022). The period between the 50s - 90s, where Korea experienced the biggest economic change, have since been dubbed "*the Miracle of the Han River*" – pushed on by collective hope of a bright future and later credited to hard work, dedication, and sacrifice of the labor force (Cumings, 2005). And Korea was not the only nation experiencing an economic miracle during this time – Hong Kong, Singapore, and Taiwan, all had similar upturns. And together with Korea, these four nations have since been recognized as *the Four Asian tiger economies* (Le et al. 2016), having since been developed into what is called high-income economies (worldbank.org, 2022).

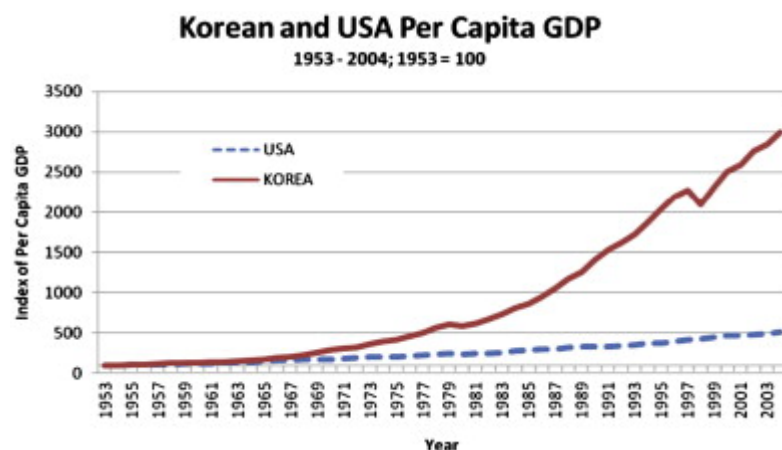


Figure 2: Korea and USA GDP 1953 – 2004.

To highlight the economic growth of Korea, figure 2 compares USA's GDP per capita, the world's strongest economy, with Korea's. During the time period of 1953 - 2004, USA witnessed a steady growth of 289% while Korea had an immense growth of over 1200% (Lee et al. 2008).

The question is then, how is industrialization and technology linked to this miraculous development of Korea? In the aftermath of the Korean War, Korea was effectively playing a rather late industrial catch-up with other, far more industrialized nations. Korea managed this, and relatively rapidly as well, by adapting a new mode of industrialization. Instead of taking the lead role in global innovation of technology, Korea took on the learner-role in order to narrow this industrialized gap, learning from outside their borders. This happened through the investment of technical assistance, self-teaching, adoption of foreign technology, and other methods such as simply copying or acquiring foreign licenses. By doing this, Korea was able to avoid foreign control of their industries while simultaneously achieving their technological independence. Therefore, the Korean industrialization happened almost exclusively through domestic companies instead of foreign-owned companies. However, Korea could not grow their investment in technological development by simply employing a learner-strategy without a grander strategy in mind. So, Korea essentially borrowed a page from the German handbook and invested their acquired knowledge into society, by transferring it from their now trained and learned expert engineers and into their education system. As the Korean society values education highly, a great wave of interest in technological development had then been triggered in a now rapidly developing Korea. Furthermore, through the successes of government subsidies in technological development, which were now bearing fruit, various entrepreneurs were then seen to leap at the opportunities in technology as well (Amsden, 1992).

Since then, Korea has become a major global actor in various technology industries. Most prominently known for their ICT (Information communication technology) and semi-conductor industries (Yeung, 2014), in addition to their increasing investment into the field of robotics (Kumar, 2021). Both in Korea and globally, these tech-industries are heavily represented by the Korean *Chaebols*, various famed industrial conglomerate families or individuals, such as the Samsung group, LG group, SK Hynix, and others (Yeung, 2014). And today, in 2022, Korea is sporting one of the world's fastest broadband internet speeds and coming in second best at national mobile connectivity in the world (worldpopulationreview.com, 2022), leading the race for highest robot density in the manufacturing industry as well as being one of the most automated countries (Sinha, 2022), and ranking 5<sup>th</sup> in the Global Innovation Index from 2021 (WIPO). And Seoul, Korea's digital capital, is located right in the center of it all (Lawton, 2022; Dayton, 2020; Marshall, 2016; Ramachandran, 2007).

### 1.3. What are robots and how did they appear in Korea.

In this thesis I will mention the word robot a lot, but what exactly is a robot? The word *robot* derived from the Czech word *robota*, which appeared around the 1920s (Jordan, 2016, p.3). The word was originally created to describe forced labor and slavery work,

used in protest and as a critique against the increasingly dehumanization that came with the modern age and its dull and dirty work (Jordan, 2016, p.30). Isaac Asimov brought the word and concept further, through his highly inspirational sci-fi-writing, and in the 1940s Asimov eventually coined the word *robotics*, known today as its entirely own discipline in science (Jordan, 2016, p. 31-32). Asimov is also much known for his *Three Laws of Robotics*, originally written as fantasy, but have later been highly influential in the community of robotics.

The definition of what constitutes a robot as a physical technology is somewhat disputed, however. Firstly, this technology needs to be a form of device. And some argue that for this device to be granted the robot title it needs to sense its surroundings, perform with logical reasoning through inputs, and to appear and act on a physical environment. Some also expect a robot to physically move for them to qualify as a robot. By failing to meet these qualifications, the robot simply becomes a machine (Jordan, 2016, p.4). In this thesis however, I use the term robot rather liberally but with these qualifications in mind. The robots I present in later chapters are not alike; some of them move around, some are stationary, and some are integrated into a bigger system, creating this bigger, automated system which utilizes one or more robotic devices.

In Korea, science on robotics started to slowly emerge already back in the 1980s, according to vice chairman of the KAR (Korea Association of Robot Industry) Yoo Tae Jun. And in 2003, as Korea have been seen to thrive in industries such as electronics and steel, "*the government selected the robotics industry as a new growth engine in 2003 and put in place diverse policy support*" vice chairman Jun says. To help push Korea into the global spotlight of the robotics industry, the Korean government have focused on enhancing the educational base of young Koreans. Through strategic investment in education, Korea had a goal to compete globally- and to catch up with already robot-advanced countries such as Japan, USA, and Germany (Edwards, 2014).

#### 1.4. The importance of this thesis.

According to Jochen Wirtz, the future is filled with service-robots. They will bring significant enhancement to the service of today. Customer experience, the quality of service, and productivity; robots will improve them all. Wirtz draws a line between the drastic impact the industrial revolution had on human lives, as he claims that a service revolution also has the potential of increasing human's standard of living significantly (Wirtz, 2021).

As predicted by Wirtz, the future of service looks robotic. However, the question is how will society receive this inevitable change? According to Jordan (2016), there is a lack in research on *human-robot-interactions* (HRI), when it comes to human responses to robots. Furthermore, Lee & Lee (2020) have raised a flag wishing for more studies on *untact* services in Korea (none-contact), as there has been a surge of service-robots these past few years.

Because there are holes in the research of both untact technology in service and in HRI with a focus on human responses to robots, this thesis contains an in-depth analysis of customers domestication of robot-café's and an analyzing HRI by drawing on breaching and delegation of technology.

According to Murphy & Schreckenghost's (2013) review-paper of 7 human-focused, 6 robot-focused, and 29 HRI-focused metrics, there are 42 (in total) metrics recognized in HRI-research. The metrics touched on in this thesis, for their relevancy to the topic, are **(1)** efficiency, **(2)** productivity/effectiveness, **(3)** human-robot-ratio, **(4)** task success, **(5)** reliability, **(6)** similarity (formal representation of capabilities and constraints with the artifact), **(7)** cognitive interaction (information exchange), and trust **(6)**.

Additionally, this thesis is important as it highlights the importance of the local context, the material context, and the various relevant components. These are important, in order to find out why robots are being used in Korean cafés and how robots are seen being used, as they are seen attempting to fit into the Korean service business and the Korean society.

### 1.5. Thesis overview.

- Chapter 1. Introduction of this thesis' research question. Brief introduction to various aspects of Korea which will be relevant going forward. Additionally, the importance of this thesis.
- Chapter 2. Theoretical framework for this thesis: Science & Technology Studies, Sociotechnical perspective, Seamless Web, Domestication theory, Breaching experiments, and Delegation.
- Chapter 3. Methodology used in this thesis: Qualitative approach, Alien approach, Primary empirical data; fieldwork and living in Seoul, Observations of 6 cafés, and Semi-structured interviews of 4 Seoul based students. Additionally, ethical consideration, and methodical weaknesses.
- Chapter 4. The Café-Life of Seoul: Constructing the local context from four core components; Seoul housing-situation, work-culture in Korea, Students daily lives and routines, and the café's physicality and practical solutions.
- Chapter 5. Busy Solution: Constructing the material context from categorizing four types of automated cafés and presentation of three real-life examples of cafés.
- Chapter 6. In the wake of the fourth wave. Combining local context and material context in domestication analysis of customers in the café.
- Chapter 7. Lack of Accountability: Analysis of HRI using breaching experiments and delegation of technology, drawing on the local context, the material context, and findings from domestication-analysis.
- Chapter 8. Conclusion: Summary of this thesis, re-visiting each chapter, the achievement of this study, and further research on this topic.





## 2. Theoretical framework.

In this chapter, I briefly introduce the interdisciplinary field of Science and Technology Studies (STS) and the sociotechnical perspective, serving as the lens of interpretation for the analysis of this thesis. Building on the sociotechnical perspective, I use the notion the *seamless web* to structure this thesis and as an approach to my analysis. Then, the domestication theory is presented, to showcase humans and technology's mutual reshaping of one another. Lastly, Garfinkel's breaching experiments in combination with Latour's delegation of artifacts is presented.

### 2.1. STS with a sociotechnical perspective.

Science and Technology Studies (STS) is an interdisciplinary field that puts knowledge about sciences and technologies in a cultural, historical, and social context to explore complex issues (Hackett et al., 2008). STS gives a sociotechnical perspective on the interactions between humans and technology. It is a critical perspective, in the sense that it attempts to unravel the various aspects of human and technology when digitalization-processes occur. When such processes happen, the sociotechnical perspective can be used to identify the changes between humans and technology, how these changes happen, who or what is creating change, as well as what changes are not happening – and evidently why they do not occur. And sometimes, when change happen through digitalization, unforeseen or unexpected changes or consequences can also take place (Ask & Søråa, 2021).

In chapter 4 I use this perspective in combination with the various relevant components to this thesis, creating the *local context* of Seoul. There are particularly two major reasons for the relevancy of the local context when applying a sociotechnical perspective in this thesis. Firstly, it is critical when assessing why digitalization happens at this exact moment in time, on this particular location, and in this specific culture and society. Secondly, highlighting the relevant components showcases how societal problems cannot not solved with technology alone (Ask & Søråa, 2021) – it is more complex than that.

In chapter 5 I look more directly at the technologies, the robots at the café, constructing the *material context* of these cafés. When looking at what work-tasks have been moved from a human to an artifact such as the robot for instance, a process of delegation is happening (Latour 1992). The local context of Seoul is relevant here, when looking at how these novel technologies are introduced and why, because it highlights which local practices are under the process of change and which of them are not (Ask & Søråa, 2021).

Lastly, when it comes to the delegation of human labor in the café, applying a sociotechnical perspective works as a critical tool for user-centered analysis, focusing on the café customer. And in chapter 6, HRI is the central topic. By applying a

sociotechnical perspective, it is possible to critically analyze both the expected as well as the unexpected consequences that technologies can have on its users, their daily lives, and their social practices (Ask & Søråa, 2021).

It is, however, important to make the distinction that the contextual components which are presented in this thesis – mainly the local and material contexts – should not be considered the background of why technological change occur. Changes in the café, the culture, and user's practices should rather be considered as a wave of change, together. This idea is brought on by Hughes' idea of the *seamless web* (1986), in the attempt of changing how we think about scientific and technological change. For this thesis, it is about bringing social components, commonly recognized as the background, to merge with the foreground of technology, making it possible to rethink certain problems in a holistic manner. Moreover, this web should be considered as something quite different than a network. Callon, in Hughes (1986), makes the distinction between the two. With networks, the organizers of such networks leave nothing to chance by keeping control over which actors are invited in. Hughes' web on the other hand, is constantly both affecting and affected by outside forces and environments. And historically, to navigate such webs therefore becomes the case of an ongoing push-and-pull, in attempt to reduce uncertainties brought on by these various components.

## 2.2. Domestication theory.

The theory of domestication is a model that works as a tool to both showcase and grasp how humans and technology both shape each other (Silverstone, Hirsch, and Morley, 1992). The theory borrows the main components of the more widely known metaphor of *domestication of animals* - taming animals, changing them, and making these animals conform to the needs of humans and society. Equally, these animals are also creating a change on how human lives and routine as well how society is produced. In the same sense that humans change animals and the changed animal in turn changes humans, Silverstone, Hirsch, and Morley theorizes that the same thing can be said about various technologies, in the meeting of humans and society.

The concept of the domestication theory emerged as this shift away from the linear and technologically deterministic understandings of new innovations, such as technological artifacts. Domestication took on the form of a theoretical framework and an approach to research of technology and the daily lives of the users. This dance between technology and users is described as a rather complex one, to place-find technology within the dynamics of society, the norms, laws, and rituals, and the user's lives and daily routines (Berker et al., 2006). Domestication should therefore be understood as neither a harmonious nor linear progression; domestication is both a dynamic and potentially conflictual process (Sørensen, 1992).

According to Sørensen (2006; Sørensen, Aune, & Hatling, 2000), the process of domesticating technology includes three important dimensions: *Cognitive*, *practical*, and *symbolic*. The cognitive dimension is the process of learning involved when understanding the functionality of the technology, taking the material context into

consideration. The practical dimension touches on how the technology fits into society, taking into consideration the local context in which the technology is both physically and metaphorically located. The symbolic dimension constitutes the broad notion of what the technology means for the users and how the users themselves make sense of this technology. Additionally, Søråa et al. (2021) advocates for a fourth, *social dimension* of domestication. A social dimension investigates how different users domesticate technology through social processes, such as when social relationships appear through human-technology-interactions.

At the center of the domestication analysis is what is called the 'active user'; attempting to unveil how this user should be conceptualized, regarding different context', practices, and everyday life, when they domesticate (Ask & Sørensen, 2019). And in this thesis, I make use of domestication theory to find out how users domesticate digitalized cafés and café-solutions, investigating if they become active users.

### 2.3. Delegation and breaching experiments.

Latour (1992) describes artifacts as objects that are being delegated certain tasks or responsibilities, shifting them from humans to artifacts. These artifacts, technologies like robots for example, can both delegate tasks with intention in mind, designed or scripted into the technology (Akrich, 1992), or even through unintended consequence. And artifacts are a prime example of what can be called sociotechnical material because delegating tasks through these artifacts highlights how objects act or behave in a comparable way to human action.

*Breaching*, or breaching experiments, is one of Garfinkel's (Turowetz & Rawls, 2020) ethnomethods – an analytical tool from sociology with the purpose of providing understanding and sense of everyday conversation amongst individuals. In Garfinkel's experiments, he tried to exhibit the "unexpected" behaviors that happens consciously, observing behavioral violations as well as the different types of social reaction that are caused by these violations, with the purpose of structuring what it is that makes different social reactions possible – structuring social reactions to *breaches* in social interactions. Garfinkel built the understanding of breaching on his famous "trust conditions" of social interaction. This condition of trust, according to Garfinkel, is in essence the rules or expectancies that weigh on all participants of an interaction to adhere to. To make sense of an interaction, mutually, participants must assume that other participants also adhere to these expectancies of interaction competently. If a participant is breaking this condition of trust, the breach evidently occurs (Turowetz & Rawls, 2020). The concept of breaching can also be applied outside of sociology.

In this thesis, I combine Latour's delegation with Garfinkel's breaching, as artifacts in this thesis are seen being delegated tasks that creates HRI between human customers and robots in cafés.



## 3. Methodology.

In this chapter, I explain which methods were used for this thesis. I use a qualitative approach, as my goal was to hear more about the thoughts, reasoning, personal stories, daily lives; what it means to be young Korean students, and evidently why the café is important in this group's lives. The primary empirical data is threefold: (1) by living and experiencing Seoul, I have gained in-person knowledge of how Korean café culture is practiced. (2) this led me to a series of observations at 6 cafés where 3 had robots working there, and 3 where more traditional cafés, and (3) semi-structured interviews of four Seoul based students on their experience with cafés, robots and automation. I will firstly describe these three primary data sources, and then I will additionally in this chapter explain how I did the analysis, ethical considerations, and lastly my methodical weaknesses.

### 3.1. Experiences living in Korea.

Thagaard (2018) puts emphasis on the importance of knowing who yourself are and where you have come from, and what that means in relation to your project, when conducting field studies. As such, my thesis is the result of my 5 months living in Korea as a Norwegian student. My field work consisted of living there for almost half a year, seeing, and experiencing the Korean culture through Norwegian glasses, and interacting with this culture and its people through various means. In a country as homogenous as Korea, with 98% being ethnically natives, me, as a blond Caucasian Norwegian tend to stand out, and receive a variety of different reactions. And on not too rarely, I experienced a clash of culture. In Huntington's famous civilization theory, he presents the idea that all though the world is increasingly becoming a smaller place, there are fundamental differences in each civilization of the world. And these experienced clashes of culture, I dare say, have been highly important for this thesis in highlighting various aspects that otherwise might have flown under my radar. And my experience as a foreigner, or *alien* as I have been referred to (e.g., YouTube video "*Why foreigners are alien in Korea*", April 26<sup>th</sup>, 2019), in Seoul can be summarized as such.

Culturally, Korea is known for its *different treatment* of foreigners, which is somewhat reflected in Korea's numerous failed attempts to push through an anti-discrimination law. And this is relevant, as some doors were opened for me namely because of my ethnicity while others were shut tight. An example of this was how many Koreans, in my experience, were unusually accommodating in my presence, always ready to help and go the extra mile. Another example was the great delay for foreigners to socialize in public for 4 and a half months of my total 5 months stay, because of the Korean government's refusal to recognize foreigners' vaccines taken outside of Korea. And lastly, to be present in Korea and conducting interviews, observing, participating, and experiencing – these elements have all been limited to some extent due to language barriers. As I do not speak Korean, and Koreans also tend not to speak English for the most part, I recognize a fair number of missed opportunities on my methodical approaches. However, with the

help of a *key informant* (Thagaard, 2018, p.67), a native Korean person, many opportunities opened for my fieldwork in Korea.

I became interested in the Korean café culture, mainly because as I found myself preferring to do studies at cafés rather than in my tiny apartment, I eventually got to visit a lot of different cafés in Seoul. Additionally, my original objective when I arrived in the city was to look for the robots used in service, such as cafés. Long days of traveling and visiting these robot-café constituted for many other, unplanned café-visits. And, when talking to the young Koreans, it quickly became apparent that the café is an important part of their daily lives; the café is like an extension of the home.

All observations and experiences are either used explicitly, in this thesis, or accounts for a more implicit, knowledgeable approach to the topic on cafés and the robots seen used in Korean service.

### 3.2. Observations of Korean cafés.

After choosing to focus on cafés, I started to map different interesting sites. In my 5 months in Korea, I conducted various types of observations. I did the café-observations at *numerous* sites (listed below), with reoccurring visits at three specific sites (Storant, B;eat, Starbucks). Observations happened over five months, in which I did further, in-depth observations at café Storant, with 5 visits in total. All observations were participatory observations, e.g., by being an active customer at the various cafés.

The observations took place at various cafés – both robotic and not

- *B;eat*, a fixed glass-box café with a robot inside which makes various beverages. I used this café routinely at my university library. The B;eat was also used and observed in other locations and cities, namely the Korean city Busan.
- A collection of various unnamed cafés, in my search for different robot-café. All made use of the robot barista to make beverages, as an assistant in an otherwise human-employed service environment.
- Popular café-chains in Korea: *Starbucks*, *Ediya Coffee*, *Caffe Bene*, *A Twosome Place*, *Tom N Toms*, *dal.komm Coffee*.
- *Café Onion*, a local café.

I selected one main site, café Storant, for in-depth observation, in the sense that I planned and made consistent visit with five observational settings over the span of a week. As the café was located far away from my apartment, crunching my observations was possible because I rented an Airbnb nearby the café. Because this café is open 24 hours 7 days a week, by staying nearby it was possible to visit anytime o'clock.

The in-depth case study was *Café Storant*, an automated café with self-driving robots and robot-baristas. A total of 5 planned, participatory observations (in addition to

unplanned visits without notes) were conducted. Most customer's uses of Storant were by students and others with laptops, which made it easy to blend in with my own laptop, taking notes. At Storant, customers are seated in walled-off booths, which also made it easier to not draw attention in which could sully my observations, given my stand-out appearance.

Another main observation site was at my university library (also found other locations), where the B;eat robot-café was stationed. It is a big box with glass-panes on each side, with a robot-barista sitting inside. I both observed others and used it myself *routinely* when studying.

Observations at other sites also took place, as listed above. Numerous big-chain cafés were frequently visited, in addition to various cafés in which utilized the robot-barista. These robot-café have not been given individual focus, mainly because all of them used the robot-barista in the same manner, as an assistant in a human-working environment. Lastly, I regularly visited the local café Onion – a traditional Korean café that emphasized the practice of artisan coffee and the value of handcraft.

### 3.3. Interviews – Café and Robots.

To investigate how café culture is done in practice, I decided to focus on the customer-group, and engage them as informants. As I arrived during covid, I felt it necessary to conduct the interviews online over the software Zoom. This choice was made mainly with the safety and comfort of the informants in mind. Additionally, the online interviews were easier to fit into the informants' busy schedules, as some of them happened late in the evening.

As our university program had a buddy program (which never met physically, because of the pandemic), I could use the mobile application Kakao to chat with my assigned Korean buddy. As I gathered, all buddies were proficient English speakers to some extent, which then also became a way for me to gather participants, in addition to being introduced to the network of a key informant.

I acquired four Seoul based students as informants, primarily recruited through my university's buddy program, connections, and further snowball method by asking informants if they knew other potential students I could talk to about this topic.

Since I had already done observations on robots in the service business at this point, I was set on talking about robots and service with my informants. Therefore, my interviews followed a *semi-structured form*, not following a strict line of questioning depending on the informant answers. The purpose of this was to help keep my horizons open and to see what direction the interview was going. During my first interview, it



became clear that my informant had much to add on the topic of cafés and interactions with humans versus machines. And evidently, the rest of the informants did as well; it was clearly topics of their interests.

Here, I would like to address as to why I did not recruit café-customers in the café itself. Why did I not go up to random people in the café, attempting to make conversation? Firstly, the obvious reasons of the still ongoing pandemic and the ever-present language barrier made this approach both difficult and reckless. But secondly, as I have read, going up to people relaxing at a café is not the way to do it in a big city like Seoul. In an attempt not to create situations where me as the researcher appear intimidating or intrusive, a more indirect approach was preferred.

### 3.3.1. Participants.

My informants for these interviews have been given the codenames Cam, Geon, Rin, and Ton. Because I build this thesis on qualitative data, I find it sensible to give each of the informants a short description. That is because, although me as the researcher have gotten to know these four informants very well, I find it relevant that the reader should get a brief introduction of these informants as well. See figure 3 on the next page.

<p><b>Cam “café-studies everyday”</b></p> <ul style="list-style-type: none"> <li>• Female.</li> <li>• In her 20s.</li> <li>• Studying French and Literature.</li> <li>• Café-visits are part of her daily routine.</li> <li>• Uses cafés mainly to study alone.</li> <li>• Efficiency, convenience, ambient noise, and method of ordering important for her café-visits.</li> <li>• Prefers ordering from machine/kiosk or phone.</li> <li>• Trust in service-robots being faster and more convenient.</li> <li>• No trust in service-robots making beverages and communicating with customers.</li> </ul>	<p><b>Geon “old fashioned guy”</b></p> <ul style="list-style-type: none"> <li>• Male.</li> <li>• In his 20s.</li> <li>• Studying Business.</li> <li>• Café-visits part of his daily routine.</li> <li>• Uses cafés mostly alone, to be out of the house, to study, and read.</li> <li>• Staff and their products’ quality important for his café-visits.</li> <li>• Prefers “the human touch” that service can provide and local cafés.</li> <li>• Trust in service-robots making quality beverages and being faster.</li> <li>• No trust in service-robots’ communication with customers and responsibility when error occurs.</li> </ul>
<p><b>Rin “tech-knowledgeable”</b></p> <ul style="list-style-type: none"> <li>• Female.</li> <li>• In her 20s.</li> <li>• Studying Engineering.</li> <li>• Café-visits twice a week.</li> <li>• Uses cafés mainly to study alone and to watch videos.</li> <li>• Wi-Fi, interior, charging, efficiency, and comfortable seating important for her café-visits.</li> <li>• Prefers ordering from machine/kiosk or robot when busy or her order is complex.</li> <li>• Trust in service-robots being faster, convenient, taking complex orders better.</li> <li>• No trust in service-robots’ communication with customers and responsibility when error occurs.</li> </ul>	<p><b>Ton “café-studies after midnight”</b></p> <ul style="list-style-type: none"> <li>• Female.</li> <li>• In her 20s.</li> <li>• Studying Global Economics.</li> <li>• Café-visits 2-4 times a week.</li> <li>• Uses café mainly to study alone, to help a pupil’s studies, and to meet friends.</li> <li>• Location, open after midnight, and ambient noise important for her café-visits.</li> <li>• Prefers studying at café over school and prefers ordering from machine/kiosk.</li> <li>• Trust in service-robots making her more comfortable and being faster.</li> <li>• No trust in service-robots’ communication with customers and responsibility when error occurs.</li> </ul>

Figure 3: Table summarizing all four informants, from the interviews.

### 3.4. Coding and analyzing the material.

After the online interviews were conducted and the audio-files had been transcribed, I started to read and re-read each of the participants transcripts and wrote a summary for each participant; effectively creating a persona attached to how they individually appeared in the interviews. This was done to acquire a more holistic understanding of the informant's individual tales.

In this thesis, the process has been inspired by Grounded Theory, which is an inductive methodological approach in which the empirical findings are central to the research. Moreover, the theory I develop is then supposed to play a descriptive role of what could be seen in my gathered data. By utilizing this approach, the hypothesis of this thesis is constantly being revised throughout the process, with the elements of my data shaping this progression in a more crucial way than, say, utilizing a predetermined hypothesis (Corbin & Strauss, 1990).

I have triangulated data from my observations and interviews. To combine and make use of two different methodical approaches is called triangulation. The purpose of triangulation is used throughout this thesis to strengthen my qualitative data, effectively verifying the contents of my gathered data. Additionally, I make use of statistical data e.g., of café consumers in Korea.

According to Hughes (1986), a rethinking of understanding science and technological change is necessary. I have built my thesis in the same manner, recognizing that there are many components to a topic in which either could or should be included. As a method for approach in all my three analysis-chapters, but mainly chapter 4, I actively make use of a conceptualized seamless web, with the purpose of not falling into the trap of explaining why one thing have led to another; societal issues are always more complex than they seem.

The technical coding process was conducted in the computer software Nvivo in addition to making use of many, many post-it notes. The approach to the coding uses a modified version of Grounded Theory, where the coding is separated into open, axial, and selective coding (Corbin & Strauss, 1990). For example, the efficiency the café guests required became an important code and later part of one of the discussion chapters of this thesis.

### 3.5. Ethical aspects.

Through fieldwork, online interviews, and observations in a foreign country, several ethical aspects have been considered. Firstly, in the field and throughout my observations, consideration to tread carefully as a visitor in a foreign culture was taken. My main approach was therefore to read up on- and attempting to follow Korean norms which apply in social interaction.

Additionally, for the participants of my interviews, all information of the participants rights was given both before and at the start of the interview. These rights consist of but are not limited to the right to withdraw at any given moment before the project has ended. The participant's consent was given verbally in the audio recordings. All participants have been anonymized in the transcripts and in the thesis, and the original audio recordings have been deleted from their main device and securely stored in NTNU's research server *NICE-1* up until the end of this project.

Furthermore, since I conducted interviews over the internet (Zoom-software), I had several ethical elements to consider (Thagaard, 2018). Therefore, no video recordings were taken, no IP-addresses have been collected, and all identifying emails have been deleted. None under the age of 18 have participated in this project's interviews.

### 3.6. Methodical weaknesses.

This thesis methodical approach has been heavily influenced by some unforeseen elements regarding my *alien status* in Korea. Mostly because some methodical approaches have either been difficult or downright impossible to pursue, the ever-present language barrier made an impact on the level of insight I could acquire in certain situations, and lastly due to the pandemic, which must be stated was comparatively being taken a lot more seriously than in Norway.

On my approach to the topic of robots in service, I wished to talk to both service employees that work alongside robots, manager that employ robots in service, and developers of service robots. Due to language barriers and problems related to covid, I neither got any responses on my inquiries nor was it ethical to make approaches in certain situations.

In my methodical approach to this thesis' research question, "*how robots are used in South Korean cafés and why?*", there are additional weaknesses. Firstly, the questions of my interviews – all though semi-structured – were not fully adapted to what eventually became this thesis' research question. And even though the nature of semi-structured interviews eventually helped me define the research question, it would in retrospect be preferable to approach the topic with more purpose. Additionally, I failed to recruit more than four informants, which preferably would be a number of five or seven. The weakness of having four informants is because in this thesis, more personal thoughts, and experiences, particularly in chapter 6 regarding human-robot-interactions, would strengthen this project. Moreover, since there was a lack of solid past service-robot experiences amongst some of the informants, their thoughts and preferences might damage the overall findings in this thesis. Because, even though their preferences are still highly relevant as to why some do not prefer robots in service, the case can be made that their thoughts are also not representable for actual experiences of HRI in service.



## 4. The Café-Life in Seoul – The Local Context.

In chapter 3, the relevancy of my “alien” status in Korea as a foreigner living in a Korea is presented. To straighten what that means to this chapter and the thesis as a whole, it has much to do with my own partaking of this very café culture in Seoul. The data I gathered in Seoul were through methods of observations, interviews, and field-work. However, it must be stated that during my almost half a year stay in Seoul, visiting and using cafés on a daily basis and even multiple times a day quickly became part of my routine. I found myself using the cafés in much the same ways as the natives. And because of my outsider status, both the natives and my own usage as well as approach to the Seoul café became subsequently highlighted to me. Therefore, I noticed myself forming a routine of visiting cafés, evidently for similar reasons as to what is presented in this chapter.

In this chapter, I present the Seoul café culture through observations, fieldwork, and Seoul-based students’ eyes. By connecting the dots of what constitutes as the pillars or core components of Seoul’s café culture, I eventually form what I in this thesis call the local context of Seoul – what it is that makes café-life in Seoul so unique.

### 4.1. The Café-culture of Seoul.

The café-business in Korea have been booming in the last decade (Muhammad & Sungplee, 2015), and by 2016 Korea had produced close to 70,000 cafés, with 18,000 of those located in the city of Seoul. Subsequently, Seoul have been dubbed the café capital of the world, as the city with the highest cafés per capita of the world (Nele, 2016). As a city with cafés at “every” street corner, and with a coffee-consumption that is five times higher than any of the Asia-Pacific regions (Muhammad & Sungplee, 2015), Korea has as a result acquired its wholly unique café identity and culture, even after opening up to the global market (Bak, 2005).

The café is an urban phenomenon (Felton, 2018), and is generally described by social theorists such as Habermas to play a vital role in the development of modernity (Laurier et al., 2001). In this regard, considering the vast density of cafés that are present in Seoul, the unique café culture found there also becomes a site for representation (Tumanan et al., 2014), as the cafés in Seoul represent more than just a cup of coffee.

But what exactly is this Korean or rather Seoul café culture, how can it be described? According to my findings, there are particularly four pillars making the contemporary café culture in Seoul unique: The busy and demanding work-culture in Korea, young Koreans and students’ lives and daily routines, the cramped and urban living-situation in Seoul, and the cafés and their physical presence itself.

## 4.2. The busy Seoulite life.

### 4.2.1. A never-ending evening.

The workplace culture in Korea is well known for its long workdays throughout the week. According to an OECD report from 2020, Korea implemented a major work-time reform between the years 2018 to 2020, decreasing the workhour limit per week from 68 hours to 52 (Hijzen & Thewissen, 2020), which includes 12 hours of paid overtime. This in theory meant that Koreans went from averaging a total of over thirteen and a half workdays, each day a week, to “only” ten and a half hour workdays post reform. However, this relatively fresh work-time reform seems to struggle a bit with the heavy set of cultural and historical norms and values that is deeply imbued in the Korean culture of today (e.g.; Kim, 2007; Kim & Park, 2003; Mordon & Bowles, 1998). Even though the longer workweek has been abolished by law, reducing it with sixteen hours per week on paper, it is still very much common in Korea to practice the pre-reform model of the workweek (Hijzen & Thewissen, 2020). In an interview by Expat Arrivals (October 2019), regarding life as an expat in South Korea, an American expat shares their experiences with how the work culture in Korea differs from the American one. The expat explains that in Korea there are expectations of longer working hours and a big emphasis on staying at work until the boss leaves for the night. This expectation can sometimes also apply to foreigners but is most often an expectation for Koreans at the workplace. The norm of working long hours is therefore still very much a common practice in the Korean workplace, as both the American expat as well as OECD can report. And laws despite, working overtime in today’s Korea is therefore still somewhat expected.

What makes the Koreans work these long hours on a weekly basis, and why aren’t more workers standing their ground and clinging to the recent work-time reform of 2018? A considerable part of the answer is as mentioned that this relatively modern worktime-reform conflicts with a set of cultural norms that stems from a Korea of old. And these norms, that are still very much present today, form what I have come to know as the Korean ethos of work and education. And to grasp this Korean ethos of work and education, there are particularly two components that should be explained, namely *Confucianism*, its values and their prominent role in Korean culture, and the Korean *Jeong*, which springs out of Confucian values.

#### 4.2.1.1. *Confucian values and Korean Jeong – Societal pressure & responsibility.*

Let us go back 2,500 years ago to ancient east-Asia. This is around the time Confucius, a Chinese philosopher, is said to have lived. Confucius is known as the father of Confucianism, an ancient belief system which is commonly recognized as a “school of thought” – prominent in many different east-Asian cultures as a set of unique values (Tan, 2013). One of these unique Confucian values are built upon the notions of sacrifice/self-sacrifice (*huisaeng*) and will (*euiyok*). The key understanding of these Confucian values is being useful to others or society, through self-sacrifice of one self’s body and interests. By following these values, one has an internal will to accomplish and succeed, and is simultaneously supposed to not be a burden to others around oneself, such as family, society, or even one’s own nation (Kim & Park, 2003). In modern Korea, these values still exist in the form of societal expectations of others as well as self-expectations put onto oneself. This is one of the drivers that makes Koreans work such

long hours or makes them dedicate themselves to studies from morning till night. From different external expectations and internal emotions, the Confucian values are ingrained in the Korean culture, seen turning into practices and norms as it forms this demanding work culture.

Another main reason for this Korean work ethos to have appeared, is the notion of the Korean *Jeong* (Chung & Cho, 2003; Kim, 2007). The word is challenging to describe as an alien to the Korean culture, but the core concept of *Jeong*, according to Sungmoon Kim (2007) is the existence of “familial affectionate sentiments”. It is something similar to a familial bond between humans or even objects. This bond and feeling are said to derive from Confucian values but have also become something uniquely Korean. One of these Confucian values is the value of sacrifice of oneself. *Jeong* incorporates this notion of sacrifice as taking a greater collective moral responsibility. And all though similar, where *Jeong* is perhaps more unique than the self-sacrifice in Confucianism, is that *Jeong* is all about the feeling inside that makes someone take a collective responsibility – the affection, sentiment, and bond between someone or something. Therefore, *Jeong* needs to be understood as a concept that is interwoven with the Confucian value revolving sacrifice and hard work, and not something separate.

#### 4.2.2. Busy student life – Super students of Seoul.

During my time in Seoul, it quickly became apparent that most Korean students dedicate noticeably more time to studies than what I have personally experienced in my home country Norway. From the start of my Seoul-stay, I kept seeing students studying at every café I visited, no matter the time of day. And as a night-owl myself, I quickly suspected that their daily studies went on long into the evening, as I kept seeing students going at it even after sundown.

When talking to some of my informants, they more or less confirmed my suspicions. Informant Ton explains that for her study routine, the school simply is not open long enough – “(...) *school ends around 9pm or 10pm, but it is too early for me because I usually study better at night.*”. Ton’s busy days were also reflected in how she and I planned our interview, as Ton’s only available timeslot was in the evening at 22:00. When asked about her day, Ton had been busy with both studies and part-time work from morning till evening. In the interview, Ton also explains how her busy schedule affects other aspects of her life. In her shopping routine, Ton explains that due to her busy schedule all the physical stores are closed when she has the time to shop, which is why she almost exclusively does her shopping online. And to keep her work and studies efficiency up, Ton is also carefully managing her phone-use to avoid distractions:

*“I usually use my phone at midnight, night, so I have to do my part-time job or the lectures, or studies before that, so it is better for me to just stay calm and shop online at night and midnight.”* – informant Ton.

And Ton as a Seoullite student is not an outlier when it comes to living the busy student life. One of my other informants, Cam, explains that she is also dealing with a similar situation – she has “*no time to shopping offline*” either – the studies and work comes first. Additionally, Informants Rin and Geon also hints at the notion of the importance of time-management and efficiency in their daily routine, but in a less extreme manner.



However, as mentioned earlier, this notion of a busy student life is not only apparent from my conversations with these young students. During my field-work and observations, the busy student life was also noticeable in my daily-to-day life in Seoul, from morning till after sundown and particularly noticeable at the cafés in Seoul. Because even though Korea is nicknamed "*the land of the morning calm*", the busy Korean workdays are anything but.

### 4.3. The ever-present café student.

The Korean café space is dominated by the younger adults and especially the students, according to my observations and participation in the various cafés throughout Seoul. My assumptions were strengthened through the responses of my four informants, and more or less confirmed by a study from Tumanan et al. (2014) on five domestic cafés in Korea. According to their study, 62.4% out of 274 respondents were university students, with the dominant customer group being between the age of 20-29 (72%). Additionally, Jiawei (2020) could report through a survey done at a Korean university that nearly 70% of students use coffee as an energy source, while over 50% consume coffee on the daily. Similar trends have more or less been going on in Korea since the 60s to 70s, as coffee surged in popularity amongst students as a stimulant, to stay awake during their demanding workdays (Bak, 2005).

From my findings, through my field observations in Seoul and my interviews, there are three groups of café customers that are more prominent than other customers in Seoul cafés. These three groups are the students, teenagers, and younger business suits, represented by the males, females, and others alike. Amongst this general group of the younger adult customers, there is a noticeable majority of the group that I have come to know as the "café student" – the student customers at the cafés. The café-student tend to stand out, because the students bring every study-prop imagined to the café; Laptop, tablets, headset or earbuds, books and notebooks, binders, stationery, and even bookstands to prop up their books. Who needs a workplace at home when customers can just turn the local café into an office? Additionally, most if not all Seoul cafés are equipped with a WIFI for customer use.

As mentioned, there is also a heavy representation of other younger Seoulites at the cafés. The young business customers, dressed up in suits, blazers, and skirts, all attire in the darker section of the color range of course, as is the norm in Korea (Snyder, 2014). This group will either rush in and out of the café, take-away style, and maybe pull out their laptop/tablet for a quick work-session. From my experiences there is no doubt that this group, "the suits", consist of the most rapid customer-visits to the café, as I would consider this business customer the stark opposite of the stationed café-student in this regard. And then there is the teenagers, using their leisure time for socializing, maybe some light reading, or perhaps going on dates. This teenage group of customers should be considered to overlap with the "off-duty" café student. The same could apply to the young business customers as well. However, regarding my understanding of the rather *busy workweek* in Korea, I am inclined to assume that this particular customer group have any abundance of leisure time to spare outside of the weekends (90daykorean.com, 12<sup>th</sup> of May 2022). In addition to these three defined customer groups, consisting of mostly younger customers, there have also been observed a decent

amount of socializing groups of “none-business” women, assumed from their casual attire. Small families have also been observed, where all family members are representing different age groups. All though these two latter groups exist, and should be mentioned as a recurring customer group, they do not represent the majority of the Seoulite café customer; the young ones seem to dominate the Seoul café space. It is the power of youth, and especially the power of the café student.

#### 4.3.1. Students’ café-routines.

Students are ever-present at Seoul-café, but how exactly does the café fit into their weekly routines and what are they using the café for? In the interviews with my four informants, they shared how the café fits into their busy schedules.



Figure 4: A regular day at a café in Seoul. (TripAdvisor).

The café-student is someone seen to use the café mainly for studies (see figure 4). Whether that is to read a book, type on their laptop, or scribble some notes, they are a prominent feature to the café-interior. Why are they so easy to spot? Except for their laptops and such, they are easily noticed because the café student tends to linger in the cafés for longer hours throughout the day – from morning till evening. And as mentioned earlier in this chapter, my informant Ton is one of these night-owls. Ton explains that one of the reasons she uses the cafés as a student is because:

*"I won't usually study at school because I can study better when there are more noises, because I like to just hear the sounds to wake me up. But in school it is too quiet. And also, for working hours, school ends around 9pm or 10pm, but it is too early for me because I usually study better at night. So, I usually go to café where it works after or before 12pm."*  
 – informant Ton

Another informant presented earlier, the informant Cam, explained that she goes to cafés “almost every day”, and mostly to do her studies. And when Cam goes to the cafés for studies, she prefers to go alone. Informant Geon is not exception either, as he goes

to cafés daily in his usual week – it has been incorporated into his daily routine. Geon also does his studies at the café, and mostly alone. Additionally, Geon thinks is true for most young students in Seoul that the café is an integral study-spot for them – “(...) *mostly like those in their 20s study in café and read books. It works the same for me. I go to cafes, and I do research, and I study.*”. Informants Rin and Ton, however, were “only” visiting the café around two times per week, but with an asterisk attached to their weekly visiting number as it depends. Rin explains that her semester is currently already over, which is most likely the reason for her lesser number in café visits compared to the other informants, as she also uses it for studies. And for Ton, the semester ending has almost had the exact opposite effect compared to Rin; Ton’s number of café visits has interestingly gone up from her usual two times a week:

*“I think I go twice a week, but these days after the exams I do the part-time job of teaching students. Teaching students by teaching students in café, so I think I go four times a week.”* – informant Ton.

Both Rin and Ton were also using the café as a study spot. And for Ton, the café even became a study spot for her “pupils” sometimes – the juniors she was tutoring, in-between her regular studies. However, Ton was also the only informant that when asked, considered the café as more of a meeting spot, to socialize, than a study spot. For Ton, the café was a place where she could hang out with friends. And she is not alone in that regard – Cam and Geon also occasionally go to cafés for other, socializing reasons than to study there alone. For Cam this can happen after she and her friends have been out on a restaurant, to continue their socializing – *“To study I go to café alone, but after restaurants I go to café with friends, just for conversation”*. For Geon it is *“Mostly to study or just chill. Just chill outside because we are social beings you know”*. The social aspect of the café, to just *being* in a public space, seems important to Geon.

Clearly, the café is a popular place for these informants to do their studies, but as Geon, Ton, and Cam mention the café amounts to more than *just* coffee and studies – the place itself is an important part in their daily lives.

#### 4.4. The “*third place*” and a hybrid space.

##### 4.4.1. The outline of a hybrid space.

The idea of the café as being more than a place for customers to just grab a cup of coffee is not a revolutionary thought. According to Oldenburg & Brissett (1982), the café can be described as a “third place” – the two former places being the home and the workplace. In the *third place*, the café can serve as a home away from home, by providing their customers of accessibility, neutral ground, and conversational activities. In addition, the third space offer the customer a unique public gathering venue, where customers do not have to act the host while simultaneously being offered to stay and linger, a place making them feel a sense of ownership towards their own space in the café (Tumanan et al., 2014).



Figure 5: Starbucks as a classic example of the third place; *conversational activities and a unique public gathering venue.*

However, because of the quite unique café culture that is present in Korea, where students seem to use cafés routinely, particularly for doing studies while being alone, Korean cafés are seen adapting to *Students actual café-use*. In this regard, the third place becomes extended – it evolves.

To explain how Korean cafés becomes something more than a third place, I draw on the example of Korean gaming cafés. In Korea, the internet/gaming cafés, or *PC-bangs* as they are called, are seen to be highly popular amongst young Koreans. However, these venues do not look like regular cafés in their appearance, even though they provide most of the characteristics in Oldenburg’s third place. Mostly, this is because the PC-bang appear more as a *hybrid-space* than simply just a third place. The PC-bang is seen to have different material configurations than a regular café, so-called liminal qualities (Beavis et al., 2007). The PC-bang-café provides the customer with all sorts of gaming equipment whilst removing many traditional aspects of what makes a café the third place, e.g., removing seating orientations made for conversation, seen in figure 5.

This type of *hybridity*, seen in the PC-bang, is starting to make its way into regular Korean cafés as well. Many cafés found in Seoul, in some way or other, is seen to have some liminal qualities that challenge the café as a third place, where according to Tumanan et al. (2014) the café was built around the main activity conversation, for instance. In figure 6 I showcase how the PC-bang and a Korean café configured specially for studies can appear physically similar, such as being oriented in rows and having a dedicated “private” space. But the question is, what is it that pressure cafés to become more *hybrid*?



Figure 6: left picture shows a café adapted to studies; right picture shows a PC-bang.

#### 4.4.2. Cramped housing in Seoul.

*"In Korea we have less place to sit home, so mostly people go to cafés or somewhere. And mostly they go to café, and they spend time with their friends, and they study in café. And mostly like those in their 20s study in café and read books. (...) It is a good place for it, because as I told you we have less place to meet our friends and we barely go to someone's house or someone's apartment, our friend's apartment. So, mostly people gather in café, and they have their conversation."* – informant Geon

According to informant Geon, cramped housing is an important aspect to the usage of cafés in Korea for young Seoulite students. And as Geon refers to, he is not alone in feeling like this. In Muhammad & Sungplee's (2015) study, on factors of customer preferences in Korean cafés, the duo found that the limited space in Korean homes *encourage* Koreans to go out and stay at cafés and socialize. This is mostly due to the majority of Seoul-based families living in high-density apartments instead of spacious family homes (Kim et al., 2021). Therefore, Seoul has a density of over 16 thousand people per square kilometer, which is due to the rapid urbanization and the high demand for more housing (Yoon, 2022a; Yoon, 2022b). In comparison, my hometown Trondheim has a population density of 557 per square kilometer, which is around 28 times less than Seoul.

When living in Korea myself, I also made use of the café for similar reasons as Geon states. My Korean living-situation was a rather tiny apartment in middle of Seoul's concrete jungle, surrounded by humans from every angle and with buzzing streets right outside the door. Even though I have an introverted personality and I am quite used to staying inside and working from home in Norway, without feeling bothered by this lifestyle, I felt rather lonely and claustrophobic when staying inside all day in Seoul. In some way, Geon's words of us humans being "*social beings*" therefore resonated with my Seoul-experience. And that is partially why being outside, at cafés alone, quickly became part of my daily routine during my 5 months stay in Seoul.

#### 4.5. Material configurations and practical solutions.

The cafés in Seoul are slowly adapting to the busy, hard-working culture, by providing venues and options that makes these long days more achievable. The café is subsequently also used for socializing, which means that it is not all about work and no play. And in a way, the café can be said to act as a refugee for young Koreans home situation as well. Metaphorically, the Seoul café can therefore be found in a funny spot between leisure, workspace, and home. However, using cafés in such a manner, as study spots, meeting spots, to read, to feel at home, and various other activities, would not be possible without the café having material configurations or practical solutions which make this use possible.

To fully understand the Korean students routinely visits of cafés, the cafés practical solutions is important. Because, according to Schatzki et al. (2001; Shove et al., 2012), practices and how Koreans routinely make use of the café is also a material question as well, called the material configurations of practices. In an example by Reckwitz (2002), playing a game of football can be rather difficult without ball and goalposts, as these materials act as indispensable "resources". And in the same manner, Seoulite students routinely visiting the cafés would also prove difficult without the café itself – and by extension so would their activities at the café without any practical solutions available.

Informant Rin is a great example of how the material configurations of a café matter, as the café is seen adapting to her actual use of the café while she is also incorporating her weekly routine and practices *with* the café:

*"Before the semester ended, I just went there to study. In my house there is no internet, I have to go out to study and watch some videos or download something. Or I just go there for fun, if I don't want to stay at home for a whole day."* – Informant Rin.

For Rin, she can use the café as a study spot when school is in full play, and one of the reasons is because the café provides internet to its customers. However, as the café has internet and her home does not, she is seen to transfer some practical home-activities to the café, such as downloading and watching videos. And for Rin, the café also looks to be a refugee from home as well; a place to go and have fun, to be outside.

The Korean café has some liminal qualities in a similar sense to the Korean PC-bang, I argue, because of two vital reasons. Firstly, for Koreans the café-space means more than just a cup of coffee. The café act as both a public and a private space at the same time, making it a social place. It also acts as a refuge from the bounds of their home, which creates a feeling of "home away from home". And additionally, it is part of many Korean students' the daily or weekly routines. Secondly, for some Koreans these cafés also serve *practical functions*, which extends beyond being a place to acquire beverages, strike a conversation, or pull up a book (Muhammad & Sungplee, 2015). The café fits into students' routines as both their main study spot, hangout spot, and a refugee from their homes, even though they are alone. Findings show that the Seoulite students go to café, with a *lesser* need for conversational engagement and a *higher* need for practical solutions, in which adapt to their actual use of the café.

#### 4.6. Seamless café culture.

Habermas said that the café plays a vital role in the development of modernity. And all though he is not wrong, by applying a sociotechnical perspective on the Korean café culture, the Seoul café is much more complex than that. The routines and practices of students, their demanding work-life-culture built on societal pressure and willful self-sacrifice in the name of Jeong, and their urbanized and dense living-situations in which encourages Koreans to go outside into the social gathering places. The café is therefore not so much a vital role in the development of modernity, as it simultaneously is a product of the Korean modernity itself.

As not to mislead, the café culture of Seoul needs to be understood as a seamless web; a combination of several components, both social, cultural, physical, technical, historical – all interwoven, together. By this manner of thinking, there is no certain background for why Korean café culture have become this way, only a set of components that together have created a *wave of change* in this massive, urban service industry – namely the café.

Seoul café culture is therefore affected by all these social, physical, and cultural components, while also impacting these components itself. And this café culture, its physicality and uses, become a window into society, creating the definition of the *local context* of Seoul. These components, together with this local context of Seoul, seen forming this culture around cafés as well as unraveling what it is that makes this culture form.

#### 4.7. Summary – The Café-Life of Seoul.

In this chapter the main goal was to define and explore the café culture of Korea, and specifically in the city of Seoul. Through my findings, I recognized four “main pillars” in which amounted for the core components of what makes the café culture in Seoul so unique to this city. The first **(1)** component is the culture of hard work, self-sacrifice and strong outside pressure from family and society, which is a drive for young Koreans leading busy lives. This component is unique for Asian countries, in which Confucian values are still holding strong, and it is also uniquely Korean as they have their own version of Jeong – a collective responsibility to provide for those around. The second **(2)** component is the Seoulite students’ lives and routines, and how the café plays a significant role in their lives. Students are dominating the café-scene in Seoul, and to learn about their daily lives and routines in which involves the café and how they use and rely on it, a window into this Seoul café culture is created. The third **(3)** component is the density of an urbanized city, where the majority of Seoul citizens live in cramped housing. With a growing need to get out into the city, and a feeling of encouragement to socialize at local cafés, the students living situation play a significant role in their use of cafés and it fitting into their routines. The fourth **(4)** and last component is the materiality and practicality of the café, as a physical space. Social scientists who have researched the café, refer to it as a *third place* – something uniquely different from home and workplace. The Seoul café takes this third place one step further, into obscurity, as it increasingly blurs the line between it being strictly a café, a home, or a workplace.

Seoul café culture is painted bright in the colors of these four components, as they appear to help define its uniqueness. And as presented, the components that constitute

the Seoul café and its use must be seen in a holistic manner – tied together. The café culture of Seoul becomes a window of representation into the society of Seoul and students' lives, as the café evidently is seen to be so central in their daily lives and routines. And it is the uniqueness of it all that in turn creates a *local context* for Seoul, which is important going forward in this thesis.

The fourth component (4) of my findings in the local context will be the focus in chapter 5 chapter, as I construct the material context.





## 5. The Busy Solution – The Material Context.

In the previous chapter, I presented how the café and its respective culture in an urbanized Seoul mean so much more than just a cup of coffee to the young Seoulite students. Acting as a social meeting ground, a space of leisure activity, a refuge from the tight confinements of school, home, responsibility, and last but not least, the café acting as a prime study spot.

This chapter consist of two parts. (1) First, the *fourth café wave* is presented. This wave is the fourth major evolution of the café, making use of novel technologies, automation, and similar strategies of sustainability as found in the fourth industrial revolution. (2) Second, data from in-depth observations and fieldwork in Seoul is presented, as I highlight *four types of cafés* seen in Seoul. They are categorized as Type 0 (no automation), Type 1 (assisted automation), Type 2 (conditional automation), and Type 3 (full automation). This constitutes for the *material context* of this thesis.

### 5.1. Introducing the Seoul Café 4.0.

It is not an overstatement that modern Korea is one of the more famous countries worldwide when it comes to implementing robotic solutions, especially in the industrial sector. As the country with the highest robot density per human worker in manufacturing in 2020, working with a robotic presence is therefore not unheard of in Korea. Therefore, with the wave of the fourth industrial revolution finding its roots in Korea, robots have since been rather normalized in the industrial sector. But how about the use of robots in the Korean service sector, is there any evidence of robots being used in Korean service businesses? And if so, how are they being used, what purpose do they serve, and most importantly for this thesis: are there any implications or noticeable outcomes of the robots being used in a service setting, such as a café, regarding the interactions between human customers and these novel technologies – these café-robots?

#### 5.1.1. The fourth industrial revolution and the fourth coffee evolution.

The fourth industrial revolution, or simply 4.0, have in tandem with the digital transformation had a massive impact on the way businesses work in the 21<sup>st</sup> century around different parts of the world. 4.0 started as a model for manufacturing and production in the industrial sector – a model of sustainability, economic growth, and streamlining, which it achieved through the usage of big data analytics, artificial intelligence, IoT (internet of things), and innovative use of sciences and advanced technologies such as autonomous robotics and smart sensors, to name a few. The way 4.0 works is essentially to rethink the production process and to make it more communicative, basically creating an intelligent network of machines based on ICT (Information and communication technology) (Sung, 2017; Ghobakhloo, 2020).

This rethinking has since become a modern concept, used outside of the industry sector as a business model, in order to reach goals such as economic sustainability. Today, the concept of 4.0 is slowly seeping into the service business and is reshaping how services are provided ([i-scoop.eu/industry-4-0/](http://i-scoop.eu/industry-4-0/), n.d.), and one of these 4.0-service businesses are the robot-café in Seoul.

### 5.1.2. The four café-waves.

With the 4.0 as a business model in service-businesses, such as the café, the economic and social sustainability aspects are especially focused. Economic sustainability is gained through more efficient solutions whilst cutting cost of production, and social sustainability is gained through identifying customer-related impacts, such as quality of service, customer wellbeing, etc. (Ghobakhloo, 2020). The surge of robot-café in Korea from 2019 (e.g., nypost.com, June 6<sup>th</sup> 2019; Funko, n.d.) and onwards is a great practical example of 4.0 taking its roots in the service business. This shift in the service sector also has its term in the coffee-world; it is known as the 4<sup>th</sup> wave of cafés (or the fourth wave of *coffee*, as the consumption of this dark bean-juice have not always been at its most popular in cafés).

Cafés have been through four evolutionary waves – evolutions of coffee-making and café practices. The first wave, around the 1800s, is commonly known as the commodity coffee and can be called the traditional coffee culture, and was mostly consumed in the home, bought from supermarkets. Coffee was dealt in bulk as for demand, but it also lacked some quality. The second wave of coffee started around the 1970s and is recognized by the start of coffeeshop culture and a surge of popularity in cafés, also known as the era of branded coffee chains (e.g., Starbucks). This is around the time when coffee shops started to publicize where the coffee itself came from as well as testing the waters with some high-quality coffee variants. The third wave of coffee – which is where most cafés find themselves today – is based on the consumers and manufacturers appreciation of high-quality coffee. It is the age of artisan coffee for the cafés, with micro-roasting and handcrafted coffee are seen as a staple of quality. These days, however, it is now being recognized a *fourth wave café*, which is the adoption of the 4.0-strategies into the café. After the fourth wave's appearance, it has since been seen in the bigger cities of the world, such as Tokyo, New York, Berlin, and around the year 2019 this new wave eventually reached the city of Seoul (Korhonen, 2020).

1 <sup>st</sup> wave – Commodity coffee:	2 <sup>nd</sup> wave – Coffee-brand era:	3 <sup>rd</sup> wave – Artisan coffee:	4 <sup>th</sup> wave – Coffee 4.0:
<ul style="list-style-type: none"> <li>❖ 1800s</li> <li>❖ Store-bought</li> <li>❖ Bulk for demand</li> <li>❖ Lack of quality</li> </ul>	<ul style="list-style-type: none"> <li>❖ 1970s</li> <li>❖ Café popularity</li> <li>❖ Brands</li> <li>❖ Starbucks</li> <li>❖ <i>Some</i> high-quality options</li> </ul>	<ul style="list-style-type: none"> <li>❖ Most cafés today</li> <li>❖ The value of hand-craft</li> <li>❖ Micro-roasting</li> <li>❖ High-quality</li> </ul>	<ul style="list-style-type: none"> <li>❖ Some cafés starting to appear</li> <li>❖ 4.0-strategy</li> <li>❖ Automated production</li> <li>❖ Efficient</li> </ul>

Figure 7: table showcasing the four waves of coffee.

## 5.2. The four types of digitalized cafés.

When visiting different kinds of robot-café in Seoul, there seemed to be three variants of robot-café (with an additional fourth café-type, making use of digital ordering methods). All three robot-café made use of a main beverage-making robot, *the robotic barista*; a big robot arm that makes beverages by moving a cup around to the designated dispenser-machines, filling the cup with the precise measurements of product as the process has been programmed to do.

And all though the creation of a beverage follows an exact recipe, the formula for how a robot-café is supposed to be set up does *not*; the different cafés are either utilizing the various robots in different ways or delegating several other tasks to other types of robots. And in some cases, the café simply eliminates the café-facility all together, such as seating and the general physicality of what constitutes the café-space.

In this part I present the three types of robot-café that I have observed in Seoul in greater detail, with a fourth additional non-robot café that utilize digital ordering methods – the *Type 0*. The purpose of categorizing them is to differentiate between what tasks are delegated to the robots and this automation process, and how the café with various robots' function in practice. Furthermore, the cafés physical space is also taken into consideration when categorizing the cafés, such as design, layout, and interior, as this will be important later. And lastly, defining the role of the humans in the café, both customer and café-employees, are also of relevance. Therefore, this categorization of automation is meant to distinguish how cafés utilize various 4<sup>th</sup> wave café solutions and what it looks like.

### 5.2.1. Type 1 (Symbolic use of robots in cafés – assisted automation).

The first type of robot-café that I observed makes use of only the robotic barista, the beverage-making robot. The café-robot was here observed to having an assistive role, working alongside the human baristas', in which the customer makes orders to a human barista and the robot receives the instructions from this human and creates the coffee. The human then assumes the role as a "mediator" between the customer and the robots, as well as doing other tasks that are not specific to 'making' coffees, taking food orders or cleaning for instance. Behind the big glass panes, the customer can observe the robots' making drinks.

In terms of automation the robots play an assistive role to the cafés work environment, in addition to appearing as a symbolic technology, a curiosity, or adding to the 'cool-factor' of the café space in general. In the picture below to the left (figure 8), the robot-part of the café space is captured.



FIGUR 8: On the left: *Type 1* – Robot-barista with an automated assistive role in the café. On the right: *Type 2* – Robot-barista and Delivery-robot in a conditional automated café.

### 5.2.2. Type 2 (Several robots central in the café – conditional automation).

The second type of robot-café takes it one step further, in the direction of non-human dependency. There is more than one type of robot involved in the process, each with designated roles to fill; one robotic barista to make the coffee and another robot using mobility to deliver it directly to the customer's table. Additionally, this automation-process also make use of a self-served payment kiosk, to handle the customer's order.

The robots and machines collectively try to eliminate the tasks of the human employee, each of them being delegated specific tasks that the human would otherwise do – ordering coffee, making coffee, delivering coffee. This is, however, not a human-less process just yet, as I have observed. Robots used like this in the café still need attending to, as does the café facility itself; cleaning, maintenance, checking up if the process runs smoothly, occasionally helping customers, mainly elderly, that are struggling with the technology.

These were all still human applied tasks, and the occasional human-override of the robots makes this a conditionally automated café. In the picture above to the right (figure?), the robot barista has just finished loading the delivery robot with drinks.

### 5.2.3. Type 3 (One/single robot in a glass-case – full automation).

The third type of the Korean robot-café attempt to remove the involvement of human café employee all together, simply by removing the facility of the café. Without a café space, a lot of human applied work fade away, with the exception of maintenance work. The café achieves becoming a Type 3 – full automation café – by being an all-in-one café form-factor, as this variant of robot-café comes in a big glass-cased box. The robot baristas task is to sit inside the box and make beverages for the customer. The robot-café have a payment kiosk integrated for the customer to interact with, and it can also take orders from mobile applications, as another task have been delegated to technology.

When it comes to where these types of robot-café are located, as they have no physical café space like in a traditional oriented café, they are placed at certain 'busy' and

purposeful spots with lots of potential human traffic, such as a library for instance. These cafés manage to be remote, unmanned, and to connect with customer phone-applications because they utilize 5G technology. By being connected with a base station, the café sends status reports in case of any errors occurring, making it so no unnecessary check-ups are needed like in the Type 2 café.

Since human override is seemingly not possible in the type 3 café this café appears to practice full automation with a non-human-dependency. The picture (figure 9) below on the right shows one of these glass-box cafés stationed at a library.



Figure 9: Two different variants of the *type 3* 'glass-box' robot.

#### 5.2.4. Type 0 (no automation).

I have also made the choice to add a type 0 – a non-automated café – in this categorization. These are *traditional cafés that make use of technologies which eliminates the human-interaction-part of the ordering-process for the customer*, drawing on 4.0 solutions such as big data. These cafés manage this by making it possible to place orders with a phone application. An example of this is the *siren order*-application at the popular café-chain Starbucks in Korea (Jae-hyuk, 2018), placing orders with the smartphone and picking up the order by oneself, seen in figure 10. And in this category, for consistency's sake, being able to choose between a human and a self-service machine in a traditional café would also constitute as a type 0 café.



Figure 10: A Starbucks customer using the Siren order application on their phone.

The Type 0 have been added, even without the use of robots and automation, because technology innovations like the *Siren order method* at Starbucks is relevant for two major reasons. Firstly, Starbucks is a very popular brand in Seoul, as it is the city with the greatest number of Starbucks in the world (Yuummy Pascal, foodly.tn, n.d.). Secondly, this way of ordering, in the same manner as an ordering kiosk would be, is *similar* to human-less services provided by the robot-café. While Siren order does not quite remove the customer being greeted by the human barista, in addition to a human making the drink, the customer experience of *using technological innovation to gain efficiency* is related to the topic of robot-café.

<b>Automated café types:</b>	<b>Robots/machines utilized:</b>	<b>Service-humans present:</b>	<b>Human interaction:</b>	<b>Observed café-facility description:</b>
<b>Type 0.</b>	❖ None	Yes – only humans present	Limited – interaction reduced through phone and machine	Open space – classic café-look, human stationed behind a counter.
<b>Type 1.</b>	❖ Robot-barista	Yes – more humans than robots present	Yes – interaction in ordering	Open space – semi-classic café-look, human and robot stationed behind a counter
<b>Type 2.</b>	❖ Robot-barista ❖ Kiosk ❖ Delivery-robot	Partially - one human occasionally present once or twice per day	No – through phone or machines	Enclosed seating-booths. No counter with humans behind. Utilitarian café-look for easy delivery-robot movements.
<b>Type 3.</b>	❖ Robot-barista ❖ Kiosk	No human present	No – through phone or machines	No facilities – no seating/borrowed seating options. All-in-one glass-box form factor

Figure 11: Table showcasing the four types of automated cafés.



### 5.3. The efficient cafés.

In this part I focus on the type 2 and 3 robot-café, with comparative examples from the type 0 and type 1 cafés. By presenting the type 2 *café Storant* and the type 3 *café B;eat*, two real world examples of automated cafés found in Seoul, I investigate how they both can be claimed to appear as 4<sup>th</sup> wave cafés. Here, I use my own observations in combination with how these cafés describe themselves to explain how these cafés both physically appear, how they are designed, and how they function.

#### 5.3.1. Technology enables efficiency, cost-reduction, and time-save.

According to the [iscoop.eu](http://iscoop.eu) (n.d.) info page regarding applied 4.0-strategies in service businesses in general, the customer experience is said to be central. The key points mentioned are the efficiency and cost-effectivity, the time saving, and innovative services that adds value to the services provided. With the 4<sup>th</sup> wave of cafés rolling into Seoul, several of the key points in 4.0-strategies are seen taken into consideration through various means.

##### 5.3.1.1. Cutting Cost.

The type 2 & 3 cafés manage to cut significant cost by applying 4<sup>th</sup> wave café solutions. By min-maxing (minimizing weakness, maximizing strengths) cost and efficiency, both the type 2 & 3 cafés attempt to become economically sustainable service businesses.

*Café Storant*, a type 2 robot-café in which I conducted observations and participated in myself, save cost by delegating formerly human-applied tasks to robots, machines, and automation. These are tasks such as ordering, producing beverage, and delivering said beverage to the customer's table. Additionally, *Storant* also cut costs by only having occasional human check-ups of the café instead of having employees present at all hours. By delegating tasks to automated systems and robots instead of human employees, a significant cut in wages have been made.

*Café B;eat*, a type 3 robot-café that comes in a glass-box, makes further reduction in cost compared to the type 2. The *B;eat* is seen to minimize additional costs by removing the café-facility itself, thus cutting the related facility-costs. It also manages to minimize cost by removing routine check-ups, rendering them redundant with its use of 5G technology to constantly deliver live status reports of the glass-box café, in case of error.

##### 5.3.1.2. Time waits for no one.

The type 2 & 3 cafés manage to enable time-saves for their visiting customers by applying 4<sup>th</sup> wave café solutions. By increasing the efficiency of these cafés, through various means, the customer either get their beverage faster or these cafés are seen to accommodate for time-pressed customers.

*Storant* uses a system of several robots, machines, and automation to further the mission of becoming fully automated, and one of *Storant's* core elements is to save the customer some time. Additionally, as *Storant* is *nearly* fully automated, the café stays

open 24-hours a day, making it a great option for customers with an otherwise full schedule.



Figure 12: Picture shows the four core components of Storant's smart café-system (Storant website).

The B;eat also utilize the robot barista for faster beverage production. To reduce time in case of errors occurring, B;eat uses 5G technology to for instant reports compared to Storant's routine check-ups. And by being located at purposeful locations, such as 'busy spots', the café usually finds the customer before the customer finds the café. As with Storant, the B;eat does not have a closing time either, depending on where it is located.

Additionally, both the café types 1 & 0 are seen to either delegate beverage-making to robots (type 1) or to delegate the placing of an order through a smartphone application (e.g., Starbucks' Siren order) to data-systems (type 0). Both solutions appear faster for the customers, compared to regular cafés, as the beverage is made faster (type 1), and the customer need not queue to make an order (type 0).

It needs to be stated, however, that both the type 1 & 0 are dependent on human employees and these employees' productivity-level. In business strategy, it is a common struggle to get employees to behave exactly as expected (SimpleStrata Team, 2019). Therefore, by employing robots the type 2 & 3 can circumvent this type of human-related uncertainty and inefficiency.

#### 5.3.1.3. Interior, design, innovation – The robot-café script

To innovate how the Koreans use cafés, both the type 2 & 3 make use of design and interior to either accommodate or guide the customer in how these *new* café-types are supposed to be used.

Inside of café Storant, there are rows and rows with spacious booths. It has a clean, but industrial look, clearly designed for the vehicular robot to easily navigate through the café. In these private booths, the customers are seen to be sitting with their laptops and books. However, it is not quite comparable to customers sitting with their laptop on for example a Starbucks; at Storant, it is like the customer has their own cubicle, as seen in some offices. As the waiter is a robot, where the customer is served directly at their booth, the customer is not expected to get up from their seat unless they want to place another order.

B;eat, as mentioned, does not have a café-space in the same manner as cafés usually have. This glass-box café is put at purposeful locations and is mainly designed to provide a beverage on the go. An example of this is the B;eat being observed at a busy mall.

However, as observed these B;eat cafés are seen to be placed in various interesting locations, which effectively borrows the facility of where it is put. An example of this is the B;eat being found at a university library. As the norms of silence and calm behavior usually comes with a library, the B;eat was therefore seen to borrow the library's etiquette. And in this setting, the customer did not take the drink on the go.

#### 5.4. Busy Solution – Summary.

In chapter 5, I investigate why robots are being introduced to the Seoul café scene and how they are being received by customers. What I found was that 4.0 services, known as the 4th café wave, are on the rise globally, and eventually hit the tech-nation of Korea in 2019. Throughout this chapter, I construct the material context as I look closer into the technological configurations of these innovative cafés. My findings of digitalized, automatized cafés in Seoul were then separated into four categories: Type 0 (no automation), type 1 (assisted automation), type 2 (conditional automation), and type 3 (full automation). The purpose of categorizing the cafés was to highlight the variety in their use of robots and automation, comparatively.

I then presented real-world examples of both 4th wave cafés in addition to cafés making use of some 4th wave solutions, gathered from my observations, field-work, and interviews.

The first café presented was the café Storant, a type 2 café, which made use of several robots and an automated system, with the purpose of both becoming economically sustainable in addition to being tailor-made for Seoul's local context; considering how students actually use the cafés in Seoul when they study. This includes providing a private space and silent options, available WIFI, and open 24-hours.

The second café presented was the café B;eat, a type 3 café, which consisted of one robot sitting in a big glass case and serving the customers quick and reliable beverages. This café also had the purpose of being economically sustainable, while also fitting into the local context of Seoul, as it considered how busy young Koreans can be and noticing a market opening up for a quick coffee without lingering. B;eat could also be placed at purposeful spots, such as the library, where the B;eat borrowed both its seating options and the expected norms of library-behavior, as an extension to its lacking physical space and interior-design.

The third café is not so much about the café, but more about the ordering-option of one. Starbucks in Korea has an ordering-app called Siren Order, removing the human interaction of placing an order by doing it on the phone. I chose to present this option for three reasons: because it uses the same ordering method as Storant and B;eat, because it is a great example of big mainstream cafés adapting to the unique café culture in Seoul, and lastly because Starbucks is popular in Korea, hence also popular with my informants.



## 6. In the wake of the fourth wave.

Till now I have presented *the material context*: the 4<sup>th</sup> wave café and its business-strategy, the different types of cafés found in Seoul categorized by level of automation and of technology-usage, and an in-depth look on some real-life examples of robot-café, their functions, put up against the local context.

And to summarize, the main drive of 4<sup>th</sup> wave cafés exists are clearly the economic sustainability that they provide, achieved through automating and delegating former human-applied tasks to technology. However, the cafés presented are still dependent on customers actively using them. This is the *social sustainability* aspect of service.

In this part, I investigate the café customers domestication of the cafés presented. To see if or how customers domesticate these digitalized cafés, I make use of the domestication-theory. This theory has three dimensions of domestication: practical-, symbolic-, and cognitive domestication, and they must be understood as woven together, in order for domestication to fully take place. Additionally, in line with the use of a sociotechnical perspective and how Hughes (1986) argues for the seamless web, other contextual components are taken into consideration when domestication happen. The components from chapter 4: *The local context* and the Seoul café-culture; the Korean work-culture, students daily routines, Korean housing situation, and the cafés physicality. And building on the café's physicality, the components presented earlier in this chapter: *the material context*; the robots and machines, physicality of the cafés, delegation of technologies and possibilities/limitations.

### 6.1. Domestication of a hybrid-space.

In chapter 4 I present the idea that the Seoul café is an extended third place, with some liminal qualities that makes the appear as a hybrid-space, as it acts as both a home, workplace, and café for Korean customers. In this part, I present how the robot-café take this unique hybridity of Seoul-café's one step further, and how this play a role when the robot-café's are being domesticated by the customers.

Tumanan et al. (2014) argue that it is critical for future domestic cafés to aggressively match the local customers' needs in order to survive in the service business. That is, as Tumanan explain, because the Korean café-customers favors brands that addresses their local needs. And Muhammad & Sungplee (2015) are inclined to agree with Tumanan et al. The duo recognizes the trend of new Korean cafés appearing, seen providing the customer with an alternative space other than being cafés made just for drinking coffee. And it does indeed seem that some of the robot-café's presented so far, having appeared since 2019 in Seoul, may perhaps be the future cafés that Tumanan et al. proposed, seen to be aggressively matching the local needs of the hard-working and busy students' lives. But is it working?

### 6.1.1. Storant – tradition meets modernity.

Café Storant recognizes the market for adapting to the young Koreans busy lives, as the type 2 café is observed to create a never-closing physical space with a purpose. Bak, in Tumanan et al. (2014), explain that privacy is important to Koreans. And in a café, walled off seating areas is therefore said to represent Koreans traditions and culture through physicality. And as Storant have their customers seated in walled off booths, these walls accommodate for work and studies in peace and quiet. Additionally, as the walls represent privacy and Korean tradition, and the robots provide efficiency and non-humanness, café Storant is in a funny spot between tradition and modernity – the café describes itself as a “*future-oriented cultural space*” (Storant.co.kr/about-us, n.d.).

Consequently, this is how café Storant is observed to be practically domesticated. Storant for the most part is seen to host students or laptop-users/book readers in general, as it can deliver endless hours in a private space (Figure 13). The observed downside and perhaps the most solid argument for whether Storant can appear as *more office than café* is the phenomenon that many customers are sometimes seen buying only one cup of coffee but staying in their booths for hours on end.

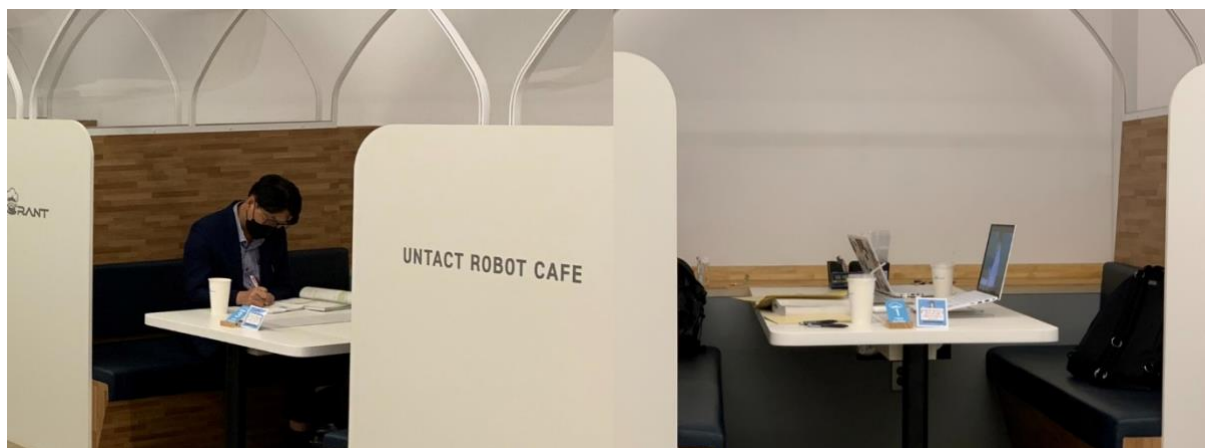


Figure 13: Young Koreans using café Storant as a workplace.

As Storant is open 24-hours a day, the café was observed to be housing groups of students even when it was getting darker outside. And there seems to be a market for longer opening hours when it comes to café and studies. In the last chapter my informant Ton expressed similar needs in her daily or rather nightly routine:

*"(...) school ends around 9pm or 10pm, but it is too early for me because I usually study better at night. So, I usually go to café where it works after or before 12pm."* – informant Ton

Ton as an individual have never been to Storant, as the locality of a café is an important aspect to Korean café culture. Nevertheless, Ton is representing a customer group that are domesticating café in this way.

### 6.1.2. B;eat – neither library nor café.

In a similar vein, the type 2 B;eat adapts to the Korean market by removing the usual café-facility, with no seating area or roof overhead. Because the B;eat effectively function as a big vending machine, these cafés serve as a pick-up-and-go for a quick beverage, depending on where the B;eat is located. And as mentioned, the B;eat have also been observed at a university library. By “borrowing” the silence of the library-space, it became the perfect environment to both study and enjoy a coffee.

Customers using the B;eat in this manner is quite simply how the practical domestication of this robot-café happens. At the mall or other locations with traffic the customers were seen to just pop by and grab a quick drink from the B;eat, then going on their merry way seemingly routinely. And at the library, the B;eat was seen to function more as a regular Korean café; students bought their drink from the robot, went back to their table, and continued their studies. Two of my informants Rin and Ton have also used the B;eat at their library's, as they are seen to be practically domesticating it:

*“I do like robots in the library, because library is supposed to be really quiet inside. And when we deal with the robot, they don't have to talk, we just touch the screen. So, it is really convenient.” – Informant Rin*

In this quote, Rin is also expressing how she is personally symbolically domesticating the *library-b;eat* (B;eat specifically located at a library). Rin make sense of this robot-café, because it provides silence and ordering is a non-vocal process. And for her this café-innovation is also quite convenient. Therefore, the library-b;eat has a purpose for Rin – a reason to be used. And informant Ton share similar sense-making of the library-b;eat as Rin, as Ton symbolically domesticates the robot-café.

*“(...) library is a really quiet place and people would have to stay quiet, but if there is a human people have to wait in line and order food, so that communication process would produce a lot of noise. But if it were robots ... I actually, did it all on app (on phone application), we can do the service order only on app, so that was very quiet and fast. And I didn't have to wait in line, because when the receipt came it appears or just pops up on the phone, I just have to go and get that (the drink ordered). So, it was very quiet and fast process.” – Informant Ton*

Ton put emphasis on how she sees the process as “very quiet and fast”, and how she also uses her phone to connect with the café, saving the hassle of queuing. As cognitive domestication sometimes starts with the understanding and learning of the technology, these two informants are also seen to approach this robot-café with some already acquired technical know-how, with competence in using ordering kiosks and phone applications for ordering.

### 6.1.3. Starbuck's Siren order – convenience without automation.

The importance of adapting to the local context of Seoul have reached the Korean Starbucks branch as well, as they have introduced placing orders through a smart phone application. In essence, no automation is taking place with this app. However, through

this method of ordering the customer can use their newly obtained time formerly placed in queueing, to other tasks – maybe studies perhaps?

Two of my informants share how they make sense of this quite popular feature of Starbucks cafés found in Seoul:

*“Starbucks has siren order. When I go to popular café, for example Starbucks, I use siren order with my phone. And I think it is very good service for the people because for the popular café there are a lot of people in popular cafes. So, it is more convenient to order with the phone.”* – Informant Cam.

*“When I go to Starbucks, in Korea we don’t have to order to the clerks. We can just order with our phones. We can save our time.”* – Informant Geon.

For Cam, Siren order makes it more convenient to order because the café is busy with people. Therefore, Cam domesticates the siren order symbolically, by placing a meaning to this feature, practically, as she recognizes her need for a feature like this in a crowded location, and cognitively, by conveniently using her phone – a familiar technology – for ordering. And for Geon the domestication process is similar, however he sees the feature more specifically as a time-saving feature.

#### 6.1.4. The purposeful space.

Muhammad & Sungplee (2015) emphasizes the importance of cafés following trends and providing an alternate space for their customers but done “correctly”, which is variable. Their study found that Korean customers’ positive impressions from just a first-time visit to a café could generate positive judgements, remembering it as a functional or practical place.

Café Storant appear as a crossover between café and office, and the same can be said with the library-b;eat and its accommodation as both these cafés provide their customers with an alternate but purposeful space. The Korean fast-paced “*pali-pali*”-culture is being further highlighted with the addition of Starbucks’ Siren order. With one of Korea’s biggest café-chains seen adapting to fit into the local context of Seoul by using innovating order-placements, Starbucks have enabled other functional uses of their cafés for their customers – with more time to spend on other tasks.

As presented, and in line with Muhammad & Sungplee’s (2015) findings, the customers domestication of these cafés has in major part depended on the café’s functional aspects. Simultaneously, the customers seen domesticating these cafés are also granting them a personal purpose – whether it’s the fast option, the silent option, the convenient option, or perhaps the only option, when the café stays open after midnight.



## 6.2. Robo-taste.

Since the third wave of coffee arrived in Korea around the start of 21st century, customers have had the pleasure to enjoy the quality taste of artisan coffee – drinks made from high-quality beans and made by high-quality craftsmanship at cafés. In a Korean study from 2015 (Shin et al.) regarding the most influential components of café-service for Korean café-customers perspectives, findings show that the products taste is the most influential factor for a customer when determining a café's *quality of service*. And the taste was also the most influential component for the customers loyalty to the cafés.

The importance of taste is also reflected in my findings, as informants Geon, Rin, and Cam mention its importance in varying degree when choosing a café. Geon says that *"First of all, the quality. The product itself, the quality of the product. Like coffee, coffee beans."* For Rin, the duration of her stay at the café is dependent on the coffee's quality *"in my case if I love their coffee then I stay there for two hours."* And for Cam, taste depends on why she is visiting the café *"noise, it is more important to studying. But for my date with my friends the taste is more important"*.

Some Koreans seem to have a certain standard for the drinks taste, when choosing to sit down at a café for studies or pick up a coffee during the busy rush. And in line with Shin's (2015) studies, the robot-café are apparently also experiencing the pressure from customers for good tasting coffee. The chief executive of the fully automated café B;eat addresses in an interview that their robot-café *"uses the same beans and high-end espresso machine as regular shops"* (Eun-Jung, May 8<sup>th</sup>, 2019). Café Storant are also seen attempting to remove any doubt regarding robot-made coffee on their website – *"A 'smart barista' prepares coffee and beverages in precise proportions to provide consistent taste."* (storant.co.kr). And as the type 1 cafés, which are purely using the robot-barista for the beverage-making, those café-types would also be making consistent taste in products.

The robot-café consistency in production is recognized by some of the informants. Informant Ton, regarding the library-b;eat, comments on the preciseness of robot-made beverages:

*"I felt like every person who experienced that robot would feel the same taste because it use specific amount of ingredients, whereas people can variate from when they make it in the cafes."* – Informant Ton.

And for informant Geon a robot's precision could mean better tasting coffee:

*"(...) the robots, they measure more precisely than humans, so I think when they make the products, they could be a better tasting than humans."*  
– Informant Geon.

However, informant Cam is not fully convinced by robot-made coffee:

*"(...) for making a coffee I prefer a human because for now I don't trust the robot to make a coffee."* – Informant Cam.

Ton and Geon express optimism towards robot-made coffee, displaying grounds of acceptance by cognitively domesticating the robot-café – a premise in further symbolic and practical domestication. Meanwhile Cam shows signs of not being ready to accept the robot-café. Cam's skepticism in coffee made by robots may stem from her inexperience with robot-café, as she mentions no prior experiences with robots in service. And if this is the case for Cam, robot-skepticism could very well exist for other Koreans too – a hurdle in which they are not quite ready to tackle, in favor of artisan-made coffee.

### 6.3. Simplicity for the young, complexity for the old.

*"I've heard that there is saying in Norway that "Norwegians born with ski in their feet", and I've been thinking that "Koreans born with technology in their hand". We [Koreans] are so used to being surrounded by all kinds of technologies" – From a conversation with a native Korean.*

Korea is often described as a techno-nation. Their modern and strategic push in education of advanced science and technology, such as robotics, have- and still are producing a young and technologized generation – *born with tech in their hand*. In 2017, Korea launched the NSP-strategy (New Southern Policy) where one of the main goals were to ensure a sustainable future. To achieve this, Korea set their mind to further developing what Seoul is already excelling at, namely technology and culture. Under the NSP policy description, enhancing innovation growth in smart technologies and in new industries is one of the future goals for prosperity in Korea (Presidential Committee, NSP, 2017).

One of these new industries where smart technology is being utilized is the robot-café. However, while technological innovation is presently said to being developed for a sustainable future, are the Koreans of the today managing to keep up with this rapid development? In this part, I look at how the *none-human ordering process* is being domesticated by some present-time Koreans, and evidently why there are some implications to this change in present times.

#### 6.3.1. Delegation of taking orders – domesticated or not?

Eric Laurier (2001) writes about a human baristas' experience behind the counter when taking orders from customers. Laurier describes the process of ordering as something unique for the barista, as the customer flip through indecisiveness of what to order – example: *"Three skinny lattes, one large and two mediums, no actually, make that two lattes, skinny, and one mocha, large."* As this process become delegated to technology, customers vary in their use and understanding of this now digitalized process.

The ordering-process in the café-type 2, 3, and 0 is delegated to technology. It is possible to either order by phone or machine.

*"If there are a lot of people, then I would rather choose kiosk. Because I don't want to stay in line if I have to talk to the real person in the shop, but if I use kiosk then it takes my options real well. Very simple, if I order*

*a coffee but I don't want milk, but I want soymilk, and I don't want chocolate sirup, and I want chocolate chips, then using kiosk is more efficient, really. And if there is a lot of people talking to someone, it takes longer time"*

– Informant Rin.

Complicated orders are both easier and faster to place, according to Rin. This is her way of making sense of- and using the digital ordering process in the café on a hectic day in Seoul. These are examples of practical and symbolic domestication, by both using this process actively and making sense of this technology and the café on a busy day. Additionally, Rin is both accepting this ordering process cognitively and she is also domesticating it cognitively – learning more about how this ordering-process works – by using it *actively*.

Earlier, I mention how both Cam and Geon understand the Siren order – the phone ordering at Starbucks – as a faster and more convenient method of ordering. And in my interview with Cam, she states that her preferred method of ordering is through kiosk. Meanwhile, Geon on the other hand states that if he is given the choice, he would prefer ordering from a human:

*"To be honest, I prefer to go to cafes with humans. I think I will prefer, because it is all about emotions you know. When we go to café, we are not only buying the product itself, but also service. So, when they greet us with hospitality I would go to that café again, in the near future. (...) I would go to a café with kind clerks, not the cafes with robots."* – Informant Geon.

While Cam is an active user of Siren order, Geon may not be. Even though they both are seen making sense of the technology and both understands how it function as well, Geon consciously make the choice of visiting human-applied cafés instead. For him, there is a lack of emotion and hospitality which only humans can provide. Coincidentally, on the aspects of emotions, the situation is the exact opposite for Cam:

*"because when my feeling is bad and when the staff is not friendly to me, my feelings will be worse. So, I prefer to use the kiosk"* – Informant Cam

Cam is therefore seen to domesticating the siren order option for an additional and perhaps most vital reason – to manage her feelings. Interestingly, this is also what Geon does – managing his feelings – which evidently makes him not able to fully domesticate these cafés as he remains an *unactive user* of the automated or none-human cafés.

### 6.3.2. Robot-café's user manual.

It is not everyday the customer need to follow a 6-step guide on how to use the café. In figure 14 is a picture of one of the first things the customer sees upon entering the type 2 café Storant. The steps are as follows:

1. Order at kiosk after checking a vacant table for its number.
2. When the drink arrives, please take it out after the robot stops completely.

3. Straws and stirring sticks for the drinks can be found at the self-service bar.
4. For additional orders, please use the kiosk again.
5. After you are done, clean the table with wet tissues.
6. After tidying up the table, please separate the garbage.

Additional info on the page: The customer should not change positions of tables or chairs so that the self-driving robot can move smoothly. And it is also possible for the customer to order by phone, so they can remain seated and not use the ordering kiosk. On the bottom of the page the wi-fi passwords can be found in addition to a phone number for customers to contact, in case of any concerns.

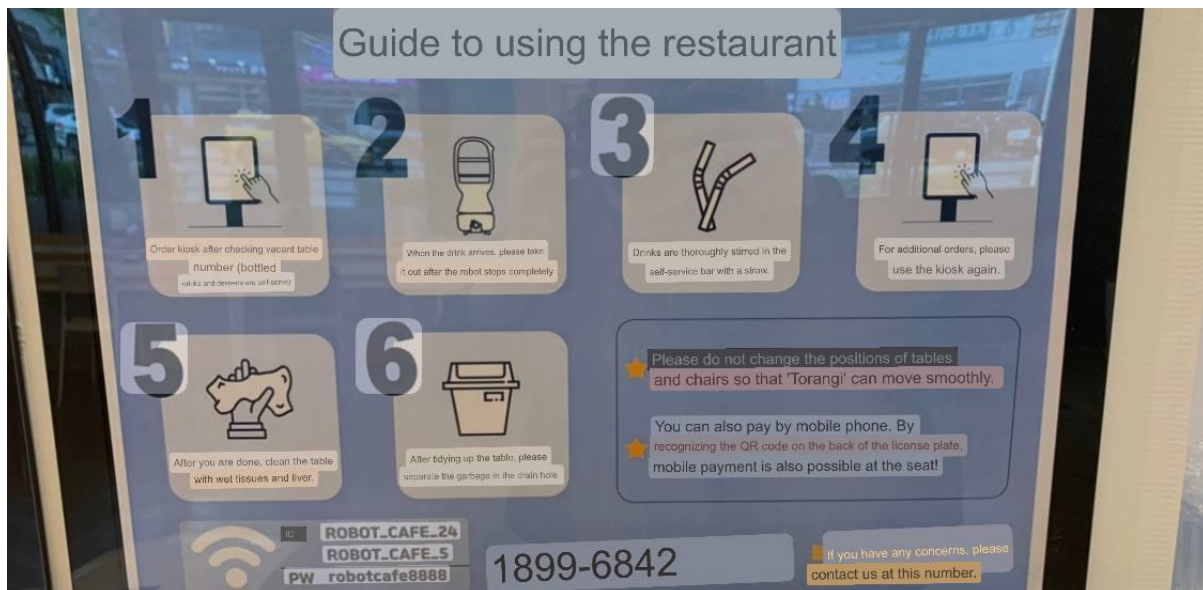


Figure 14: The 6-step guide on how to use Storant, a conditionally automated café.

### 6.3.3. Technology for the future, not for the present.

Korea is an aging country, with a median in 2020 of 43.7 and a predicted median age of 62.2 in the year 2070 if no changes occur. And with the rapid advancement in technology and innovation in the modern age, the divide between the older generations' technological competence is more serious than the general publics. In fact, Korean national statistical index show that the divide of the older generations tops the list of information-weak groups all together (Jun, 2020).

A crucial aspect for an individual to domesticate technology is approaching it, attempting to learn it, or being intrigued by it. I suggest that a generation born with technology already in their hand, molded by an education focused on technological innovation, and being brought up in one of the most digitalized cities in the contemporary world – this generation is equipped with the necessary technical know-how that the older generations are not. An advantage for the younger Seoulite generations, on the topic of domesticating the 4<sup>th</sup> wave of cafés. So, where does that leave the old guard of Seoul?

*"When I went to grandma's recently, she told that she had problems using the kiosk. So, maybe if the robots replace that there might be more difficulties regarding the people that are older." – Informant Ton*

Individuals, like Ton's grandmother is struggling fitting into the technological progression of Seoul. To make use of the automated cafés, or even "sneak" in the queue at Starbucks by ordering with the phone, Ton's grandmother is being left out – and she is not the only one, as Geon have both heard and seen similar problems rising in Korea:

*"(...) and elders, you know, mom's generation, and they told me "Oh, it's tricky. It is a bit bothersome to order things with robots like kiosk or". We have a few cafes that we have to order without humans, and I think it is even so, clerks are needed."*

*"We can see those problems in Korea, because the elders do not know how to use the kiosk or machines properly. So, we in our 20s or 30s, we are fine, we are fine. Or teenagers. And they can use it in an easy way, because they are early adapters you know. But those in their 40s or 50s, grandparents, or grand-grands, they are going to struggle a long time. We could see and we can still see these situations." – Informant Geon*

Geon explain that he regularly sees young Koreans breeze through these machines with ease, but *grand-grands* and even Koreans in their 40s are seen left struggling.

It becomes increasingly clear that the automated, robot-café's target customer groups are indeed the younger generations. By removing options for human-applied service in these cafés, a barrier of sorts is put up, keeping the older generation out or even those who lack the technical competence. Evidently, and by observing these cafés, domestication of them seem unlikely – with one exception.

#### 6.3.4. Social dimension of domestication.

In one of my in-depth observations at Storant, an older customer was observed visiting by herself. At this particular time, because Storant is a *conditionally automated* café (type 2), one service worker was present. As this older woman was seen struggling with the touch screen and process of ordering (see figure 14), the service worker with nothing special to do in this almost fully automated café swooped into this customers rescue. By observing, the service worker helped this older customer thoroughly as they had all the time in the world, carefully guiding the customer through the process. After helping, the service worker was on stand-by through the whole process until the older woman had received her drink.

In Søråa & Fostervold (2021), a fourth dimension of domestication is suggested, in addition to the three – cognitive, symbolic, practical. By showing how technology is part of a woven-together network, in which help shape the domestication of technology, a *social dimension* exists. Within a robot-café such as Storant, a network of different actors and artifacts are seen working together and in relation to one another. Robots make coffee, for other robots to run around on the floor making deliveries, and humans are seen making way for the delivering robots as they go.

With the service worker helping the older lady, I suggest that there is a social domestication at play. While this worker only appears at small intervals maybe once or twice a day, they were available to guide this customer through the process properly and without any seemingly rush. And as presented earlier, it is exactly the approaching of

these machines due to the lack of technical know-how that may seem to keep older customers or others barred from entering these types of cafés. Since the service worker was teaching this older lady how the process works, they become an actor that help shape domestication of robot-café Storant – their presence serves the purpose of bridging the gap between the uninitiated. According to Kosuge & Hirata (2004), this is a method to help smooth over complicated automation processes, by using human-human-cooperation in the execution-phase, e.g., to help initiate.

On another occasion, this service worker was observed stepping in and helping a customer as the delivery-robot was attempting to driving off with the lid of their coffee-cup. And it seems that just by having a human service worker present at Storant, to help and follow up on both the struggling customers and the “misbehaving” robots, customers are increasingly domesticating and creating a relation to this specific café.

#### 6.4. The Busy Solution – but for who?

Korean cafés are seen adapting to the busy life of Seoulite students and the younger generations, by delegating formerly done human applied tasks to robots, machines, and other technological innovations. And in their busy lives, the 4<sup>th</sup> wave of cafés is understood as a solution to busy life; providing faster service than their traditional, human applied competitor and accommodating their customers work- and study routine, providing them with an enhanced hybrid space. Consequently, these cafés are not only delegating tasks to robots, as it is now in the customers hands to learn and adapt to the new ways of making orders and navigating these cafés.

So far, by looking into how some individuals are domesticating these type of digitalized cafés, various implications have become apparent. An example is Geon, a young Seoulite student, with the preference of human-applied service and ordering to a human barista instead of a robot or kiosk, even though he inhabits the technical ability in using this technology. Geon mention that he is not only buying a coffee, but also a service – implying that there is a lack of service provided with a machine. An additional example is Cam, which both can- and actively use technology for ordering. However, Cam states that she does not trust the robots in making her drink. There seems to be several divides, and not only between technical competence or older and younger generations, when it comes to these 4<sup>th</sup> wave cafés. The buying of a service, feeling cared for by other humans, and the customer feeling seen might be one divide. Another might be the lack of trust in the robots for various reasons, such as in the drink-making process as Cam mentions.

#### 6.5. Summary – In the wake of the fourth wave.

My goal in this chapter was to see how customers domesticate robot-café. The strategy of the robot-café was clear, as they were adapting to how their target customer-group were observed using the café; routinely, as a refugee from home, going alone, doing studies, using the WIFI, preferring silence, staying for hours on end and past midnight, to name the most prominent aspects. The question was whether these cafés was being used; and the simple answer is yes. However, it comes as no surprise that individuals are not all alike, and to generalize these cafés were being used by many customers, but for different reasons.

I systematically looked at how customers domesticated these cafés as a hybrid-space, the quality of robot-made beverage, and based on the customers technical competence. Most customers were seen domesticating robot-café based on its hybridity and its practical options, as they draw on the local context. This is the most critical case of domestication found, because customers used these cafés as an alternative space to home and school. The practical functions of these cafés were also the most influential part in their domestication.

Taste of robot-made products on the other hand were not enough to matter much for customers when visiting these cafés and was seemingly not why customers visited robot-café.

When it came to technical competence, it was clear this is one of the backbones in why robot-café have a chance of surviving in Korea. From what I found, none from the target customer-group struggle with using digital ordering-methods. Even in cases where individuals appeared reluctant to use robot-café, they showed still high acceptance of non-human ordering. Most likely, this is due to the high focus technology appearing in modern Korea, where younger generations are born with technologies in their hand.

There were, however, two clear divides in the robot-café customers, hindering them from domesticating these cafés. The first group were the older generation, as due to rapid modernization these past 60 years in Korea, it now seems that innovation is made for the current and coming generations, and not the past generations as they were found to lack the competence-level needed to use these technologies. The second group was an internal split inside the main target-group of customers, namely the students. Traces of disconnect between social interaction, in need of communication, and being "social" and feeling good were found, hindering some individuals in wanting to interact with robot-performed services. And with the lack of want also comes the lack of these customers domesticating robot-café.





## 7. The Lack of Accountability.

### 7.1. Untact interactions.

*Untact* is a term that was created in South Korea, where the prefix “un” meaning “no” and adding the word “contact” – untact meaning *no contact*. The word is used in the sphere of service business, to describes the non-contact or *untact interactions* between customers and the service employees. Some examples of untact services are self-payment kiosks, automatic dispensers, online shopping, or automated ‘human-less’ cafés. The spread of untact services is a result of the 4.0-model being applied in the service business (S.M. Lee & D. Lee, 2020).

So far, the untact services of type 2 café Storant, Type 3 café B;eat, and various Type 0 cafés, which have untact options available (mobile ordering, kiosk ordering), have been presented in greater detail.

#### 7.1.1. Human-Robot-Interaction.

HRI, or *human-robot-interactions*, is a research field which is becoming increasingly more important in the modern world as societies are further digitalizing in different sectors. In the field of HRI, there are particularly three components highlighted; design, understanding, and the evaluation of systems in which humans and robots interact (Goodrich & Schultz, 2008). Before, interacting with robots regularly were reserved for those with related jobs, such as those working in the industrial sector. In modern Seoul, however, robots are seeping into the average humans’ daily lives, expected to perform various tasks ranging from healthcare work to automation in the home, office, or the local café (e.g., Kosuge & Hirata, 2004; Lee & Lee, 2020; Kwon et al., 2022).

Toni Waefler (2021) suggests that the cardinal difference between humans and robots seems to be the human understandings and sense-making, such as common sense, context, and other social cognitions and processes of negotiation (Frith, 2008). Robots however lack this unique ‘human’ decision-making, which is based on social processes’, contexts, and other situations. None the less, robots are seen being utilized in service work such as the robot-café in Seoul – to interact with customers and to provide an adequate and satisfactory service. Evidence, however, show that when robots enter the sociotechnical space, where processes of social process meet with technology, certain unexpected situations can arise for customers.

### 7.2. Human versus Robots in service.

To make use of cafés with robot’s, untact technology, and other digitalized solutions, there is in place an assumption on the café’s side that the customer must acquire the basic knowledge to use this technology, and also have an inner drive to acquire this knowledge – to want to learn. As presented in chapter 5, many untact cafés use similar system. By learning one system, one might have “learned them all”, in a sense.

In chapter 5, my findings showed that there is a divide between the older and the younger generations when it comes to technical competence. However, my findings showed that even though some of the younger generations *have* the technical ability, it does not equate to them neither using the technology nor preferring it to non-technologized options in service. Therefore, there are traces of another divide, not just between technical competence, but also between preference. In domestication theory, it is crucial for customers to be active users in order for domestication to happen.

So far, we have seen that for the informants Geon and Cam, certain preferences make them distant to robots in service for instance. For Geon, he mentions that by using a untact technology the service-aspect is missing from the transaction – the “human touch” is lost. And for Cam, there is a lack of trust in robots making drinks – a lack of trust in robotic service perhaps?

Even though robots in service are seen to symbolize efficiency for many, for some groups these technologies also symbolize something that’s lacking and is untrustworthy. In this chapter, the goal is to investigate further *what makes such a divide possible* in the target group of efficient café solutions, namely the busy and hard-working students and their unwillingness to become active users, by looking at the responses of customers in HRI-situations.

### 7.3. Delegation & Breaching Experiments.

Untact cafés delegate tasks formerly done by human service employees to various novel technologies, creating a non-human-contact relationship between customer and the café. When humans and robots interact, both social and technical errors are seen occurring sometimes, leading to what perhaps might be called sociotechnical errors. In this part, three cases of breaching are presented, as customers and robots interact in a service-setting.

Breaching is Garfinkel’s ethnomethod from sociology, expanded in this thesis with Latour’s delegation – recognizing technology and robots as its own actor or participant in HRI. Breaching is built on *conditions of trust*, which in essence are the expectations or rules that weigh on all participators of a social interaction, as they must adhere to these conditions competently. When participants of interaction do not, breaches occur. By presenting cases of breaches, it is possible to observe the behavioral violations happening and it is also possible to structure the various types of reactions to these breaches.

#### 7.3.1. HRI: *café Storant & B;eat*.

In the robot-café, tasks and responsibility is delegated to various robots and technologies. This is a brief overview of what main tasks are being delegated to the robots at café Storant and B;eat.

At café Storant, tasks of beverage making and delivering beverages to designated tables are delegated to two service-robots; barista-robot and delivery-robot. As it uses kiosk- and mobile-ordering, the ordering-process is delegated to the customer themselves and to the digital system that “talks” to the barista-robot. At Storant, the customer interacts

with the ordering-kiosk/phone and system, the delivery-robot, and the barista-robot, as it is part of the social interaction through the interchange of ordering and service-transaction.

At café B;eat, tasks of beverage making and delivering of beverage is both delegated to the one barista-robot. Ordering is done through the kiosk/console at the café or with phone and is delegated to the customer themselves and the system in which processes the order. At B;eat, the customer interacts with the ordering-console/phone and system as well as the barista-robot.

### 7.3.2. Analysis of untact breaching experiments.

In Walsh (2000), the importance of a customer's expectations for a service business is explained. Walsh explains that service providers rely on customers and their expectations to establish a service-standard. And according to Tumanan et al. (2014), findings show that there is a considerable group of Korean café customers which find staff-interactions important to the services a café provides; informant Geon also fits into this group.

As traditional cafés usually provide human-human-interactions between the customer and the barista, there might forelay service-expectations on the customer side akin to what these human-human interactions provides. With the untact shift found in some Korean cafés, the customers' expectations of human-provided services are being "traded away" for efficiency, fast service, and an untact experience. In this part, I analyze three cases of breaches in expectations to find out why these breaches occur, and how customers respond to them.

### 7.3.3. Critical failure – 3 cases of untact breaching.

Even though robots are being observed to move around, provide options, make products, or produce prompts, these are not autonomous decisions made by the robot – an automated system does not correspond to being technical autonomous. Robots are therefore great examples of sociotechnical technologies because they have been programmed to perform prescribed actions by humans in order to substitute the decision-making of humans. However, as Waefler so neatly puts it, "calculating and thinking are not the same" (2021, p.31).

And in this part, a collection of situations from my observations in the field and shared stories from my informants are presented, showcasing what critical failure looks like when humans interact with "non-thinking" robots.

#### 7.3.3.1. *Delivery-Bot versus Bubble Wrapper.*

While conducting in-depth observations at the type 2 café Storant, several odd situations happened during visits. And without exception, all involved the humans interacting with the robots.

In one situation, the delivery robot got one of its wheels caught in a piece of bubble wrapper. This happened during some maintenance work, as the workers had put some

tools and equipment on the floor right in the usual path of the delivery-robot (see figure 15). In my field-notes, the situation started with a couple ordering some drinks from the machine. After ordering, one of them goes back to the table while the other wants to see the coffee being made and is seen following the robot back to their table, filming it. This is the point where the robot gets stuck. Earlier that day, the robot was seen to navigate around this obstacle by using its sensors, but for some reason the sensors did not pick up the bubble wrapper on the floor this time around. So, the robot gets stuck, and is seen to stutter a bit. Now, the customer who was following the robot does not react for some reason and just keeps filming it. This goes on for a while, as the robot's attempts to move are but futile at this point. Eventually, the maintenance workers notice its struggle, as they arrive to their equipment.

It is a strange situation for a couple of reasons. First, what would happen if no one came to help the robot, how long would it have taken for customers to react if no one was there to see the bot struggle. Additionally, even though the bot has sensors the bot clearly has an Achilles heel. Another thing to note on is that it was noticeable more interesting to watch it struggle than to help the robot, both for the customer which was following it and filming it but also for me as an observer.



Figure 15: Delivery-Robot versus Bubble Wrapper: "its wheels caught in a piece of bubble wrapper".

### 7.3.3.2. *In the back of beyond.*

At informant Rin's university they have the type 3 robot-café B;eat, located at their library (the library-b;eat). And usually, Rin is happy with this robot. It is both fast, efficient, and quiet according to her, which makes for a good addition to a library for busy students. However, it is not all fine and dandy according to Rin, as she explains that sometimes there are a lot of difficulties with the library-b;eat:

*"Sometimes there is a lot of problems with the robot. It's always, well sometimes we have to call the human worker to fix the robot at least once a week. That's what I have seen."* – Informant Rin

Even though the Beat-developer boasts of the café having 5G-connectivity, which is meant to fix issues quickly, Rin still feels she must call to get this robot-café up and running again. And these problems are not exactly saving Rin some time and giving her the “quick caffeine fix” in which the developer promised either:

*“First phase is I put the coins inside and it did it’s coffee, and the second phase is it finished making the coffee, but it was still inside the case. (...) it was still in the box and the robot didn’t really give me the coffee or take the coffee out. So, I was staying there more than ten minutes in front of the robot.” – Informant Rin*

Out of reach, in the back of beyond, Rin can clearly see her coffee through the café’s glass panes going colder by the minute as the robot refuses to give it to her. And it is quite interesting to note that now, instead of picking up a fast and silent drink in between the busy studies, the student is now seen calling maintenance in a library, halting their studies, and it all seems to suddenly fall apart.

#### 7.3.3.3. *The confused coffee-customer.*

This ethnographic vignette is a shortened version of my in-depth observational notes, taken from the type 2 café Storant. In this vignette is the confused café customer presented, as they are having trouble with receiving their order from a delivery-robot.

19<sup>th</sup> of October 2021, 2<sup>nd</sup> observation, time: 11:00 (AM):

*“A customer is ordering his drink. From the looks of it he has been through this ordering-process before, because he picks his table before ordering and handles the ordering machine quickly and confidently, without double-checking his table-number; a common tell for newcomers at this establishment from my observations (see figure 14 in chapter 6 for the ordering manual).*

*For some reason, even though this is not this customer’s first Storant-rodeo, he does not pick up his drink when the delivery-robot pulls up next to his personal booth and table. Now, because the robot has a voice line being played on its integrated speakers and because it is a rather chunky piece of machine, it is both visually and audibly hard to ignore. As the robot uses sensors, it will drive off only after registering that the drink is picked up from its vessel or when it’s waiting-timer runs out. Therefore, because the customer is choosing not to pick his drink up for whatever reason, the robot kept at it for several minutes with its voice lines going, before eventually leaving this customer’s booth, still holding this customer’s drink.*

*After making a delivery the robots are programmed to go back to their designated charging spot – which is what this robot eventually did. After about a minute or two later the customer gets back up from his seat and looks around with a confused expression on his face. He then walks to the*

*charging station and eventually returns to his booth with his drink; the same exact drink he was provided earlier by the robot.*

*Another couple of minutes go by, after he got seated with his eventually acquired drink, before the robot appears for a second time next to this customer's booth. This time, however, the robot is holding nothing; no drinks are aboard the robot's delivery-tray. As a reaction, he gets up from his seat and looks awfully confused at the robot. Both the robot and the customer are just "staring" at each other, so to speak, neither one of them presumably understands why this situation is occurring. And it is the same procedure as last time the robot was there, as it is standing outside this customer's booth for several minutes and waiting for the customer to pick up their drink – except there are no drink to be picked up. Eventually, the robot drives off to its charging station and the customer sits down, and neither the robot, the customer, nor me are left any the wiser."*

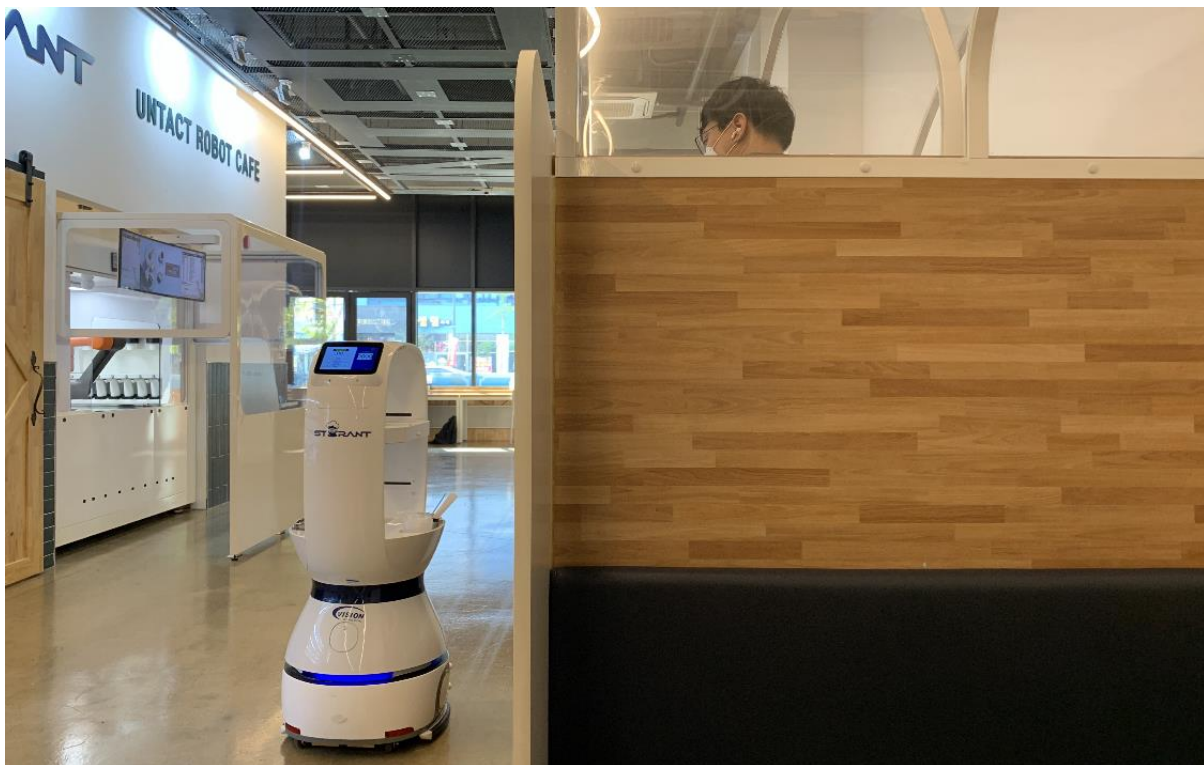


Figure 16: The situation between the delivery-robot and the confused customer: "As a reaction, he gets up from his seat and looks awfully confused at the robot (...)"

#### 7.3.4. Causes of breaching.

Three cases of breaching have been presented; (1) *Delivery-Robot versus Bubble Wrapper*, (2) *In the back of beyond*, and (3) *The confused coffee-customer*.

The critical failures that happened in the three presented cases was: (1) The robot not being able to either move due to the bubble wrapper on the floor, not being able to unstuck itself, notify nearby participants, or to make sense of the situation that is occurring and understanding the potential consequences this can have on the customers. (2) The barista-robot is done making Rin's beverage, but due to an error the robot is not delivering the drink as it is now visibly stuck inside. The robot lacks the awareness of

what is occurring and is therefore seen to hold Rin's drink hostage for what seems to be indefinitely. (3) Another communicational problem, as with Rin, as a customer has a problem with the drink being served. The robot is not able to take customer-comments, as it lacks both the options to do so but also is not able to understand its surroundings and reading the customers body language.

#### 7.3.5. Reacting by using exit/repair-strategies.

An exist-strategy is according to Wigmore (2014) an *"approach to terminating a situation in a way that will maximize benefit and/or minimizing damage"*, and a repair-strategy is the resolving of a conversational problem of speaking, hearing, and understanding. These terms are mostly used in a business-context or in human-human-interactions but used here to highlight how customers react when sudden failure strikes, as they attempt to either exit or repair these various situations in the best way they know how.

The confused coffee-customer is an example of "fixing" the situation by essentially just "accepting" the insolvable, as he collects his drink from the stationed robot after a while even though there seems to be some problem related to either his drink or this process. Powerless with the lack of communicational options, he is also handling the following situation similarly. As the robot returns with no drink, he is observed to neither speak nor touch it. Instead, he gets up from his seat and just looks confusingly at it, waiting.

And waiting, observing, and assessing the situation seems to be another common strategy customers are used to minimize the damage whilst still getting their products. In Rin's situation, as she is not receiving her drink, she attempts to just wait the error out. Perhaps the robot will realize its mistake after some time has passed?

*"(...) it was still in the box and the robot didn't really give me the coffee or take the coffee out. So, I was staying there more than ten minutes in front of the robot."*

– Informant Rin

However, after over 10 minutes without no response from the robot, Rin also "accepts" that she is essentially powerless before the robot. Due to no communication-options between her and the robot, she takes responsibility of the whole situation herself and calls a human maintenance-worker.

Then there is the bizarre bubble-wrap situation, where the delivery-bot tangles itself stuck. All though the customer saw the robot get stuck, they are seen to not attempt helping it, but they keep on filming the situation with their phone for a good while before someone else helps the robot. In this situation, the customer filming is perhaps fascinated, wondering "what will the robot do now?" or "will it manage to solve this situation alone?" – it is hard to say. However, what is known is that this customer too is seen to use the same tactic as the two former cases – wait, observe, assess – but perhaps for different reasons.

And lastly, the feeling of helplessness that can make a customer simply give up. A situation happening to myself, as I tried the library-b;eat for the first time, was that the

buttons on the ordering touch-screen was blank; ordering by typing the correct number corresponding to what beverage the customer wants. As these numbers were blank, I felt a sense of helplessness as I stood there trying to press randomly on the touch-screen. After some tries, I chose to give up this venture, both because it did not seem to lead anywhere and because I were now effectively hogging this café-robot.

#### 7.4. Breaches of norms, expectations, and trust conditions.

*"I think I prefer more humans, because maybe there would be more faster response with a flexible actions. If they make mistakes, they may correct them more faster, and make more actions flexibly."* – Informant Ton.

Garfinkel developed what he called the 'trust conditions' over 70 years ago, which is a prerequisite for cognitive sense-making in interaction. As presented earlier, regarding Waefler (2021), robots do not inherit the same sense-making ability as their human overlords. And in the cases presented, the robots' lack of cognitive sense-making becomes apparent. The robots' show inability to competently recognize various components to their interactions, in which human employees would be both expected to competently understand and trusted to act swiftly in case of error.

The first component of interaction being highlighted by these cases of breaching is the lack of ability for the customer to freely communicate and voice concerns to the robots. In the breaches presented, the HRI-situations with both Rin and the confused coffee-customer lacked a means for them as customers to convey questions or notify the robot of their mistake. Various ways of communication are integral parts of interaction. By reading both of Rin and the confused customer's reactions to these situations, their expectations and trust in the robots delegated task-fulfillments are being violated, causing breaches. This is apparent in the situation depicted in figure L (page ?), as no words are spoken but the confused coffee-customer's stare presumably has several questions attached.

Another component being highlighted in the cases presented is the robots lack of situational awareness and the noticing of body language and other social cues. With the confused coffee-customers situation, by not picking up the drink could perhaps mean that something wrong has happened to his order. A human employee would be expected to raise some questions as to why the drink is not being picked up. Rin also experienced her body language being "ignored" by the robot, as Rin is waiting over 10 minutes to get her drink while the robot is not aware of her frustration at all. Another situation is the robot getting stuck in the bubble wrapper. Seemingly, the robot is not quite aware of itself being stuck. Additionally, this delivery-robot was not seen to "ask" anyone for help either; no alert to notify bystanders for help.

Not noticing context and irregularities, and having limited physical flexibilities are the final components that are highly visible by investigating the three breaching-cases. Context and situational awareness are similar components, but since these robots are applied to be a faster and more efficient service than the ordinary, human-applied cafés, the robots' lack of contextual awareness are breaching other expectations that are placed on them. In the bubble wrapper case, the robot needed humans to intervene for it to get unstuck. And because this delivery-bot not having a system of notifying



bystanders of its troubles or a physical way to unstuck itself, the robot will simply just stay there and wait, causing delay and interruption in the customers day and routine. Similar contextual awareness is lacking for Rin's library-b;eat, as a technical irregularity happens. The robot is not aware of the situation that it is causing and the effects that it might have on its target customer group, when error occurs. Because now, Rin wasting over 10 minutes of her busy study-routine – if not more – waiting on this robot to give Rin the drink.

Summarized, there are evidently several components that make service-robots breach expectations and norms in interactions with human customers. This is due to the robots' lack of cognitive sense-making, resulting in them not being able to either communicate flexibly or process situational information, noticing when irregular situations occur or how the customer is acting, and understanding the context of the environment it belongs and the implications an error could have on the customer.

The cases presented are therefore showcasing violations of behavior that results in breaching of customer expectations in a service-interaction. Customers are seen to have *similar* expectations to the service-robots as they would have to human employees, at least in some degree. These expectations that customers place on the robots in interactions, is due to them being delegated a service-responsibility in the absence of the human employees, in addition to the robots being used in interactional roles directly with the customers.

#### 7.4.1. The delegation of responsibility.

By investigating the actual usage of artifacts – the service robots in this instance – the delegation of responsibility between the customer and the technology becomes highlighted, such as when technology substitutes the human employee in the Korean café. In all three of the breaching-cases, various responsibilities formerly held by the human employees is formally delegated to technologies in the café. However, I would make the argument that some responsibilities are being removed while others are being implicitly shifted towards the customer themselves, based on these three cases.

The delivery-robot, present in two of the cases, is delegated the task of providing the customer their beverage directly. However, this robot is not being delegated the responsibilities of a waiter carrying the customer's order, but only the task of delivering it. According to an info-page on the duties and responsibilities of a human waiter (resources.workable.com, n.d.), these includes both welcoming, seating, taking orders, communicating, in addition to a good waiter being able to make quick decisions, having great interpersonal skills, and being friendly towards their customers. It goes without saying that the robot does neither of these things for the time being, and it certainly is not expected to perform all of them either. Perhaps applying a delivery-robot was never meant to spark expectations related to human waiters, even though it is officially called a waiter-robot. However, the situation becomes seemingly complicated for the customers when the illusion of a waiter is present but the actual responsibility of one is not.

In all three cases of breaching, responsibility is also observed to be shifted on to the customers implicitly. The robots are delegated with tasks tied to the production and transaction-handling, performing deliveries, and with the B;eat's 5G technology the café is supposedly also in theory completely self-reliant on its system. However, as technical

errors evidently occur, the responsibility to repair or handle the situation suddenly falls in the customer's lap. In **figure A** from chapter 5 (page ?), the user manual of how to use café Storant is not mentioning robots getting stuck in bubble wrapper, robots providing the wrong beverages, or similar unexpected issues. It is these situations that create breaches in the customer's service expectations, as the customer is left with unforeseen and spontaneous responsibility of dealing with the robots themselves. To avoid breaching, it is suddenly implied that customers need to adapt to the robot-café by holding an eye on the delivery-bots in case of error. In a similar vein, in Rin's situation, to avoid breaching it is implied that the customer takes on the responsibility of notifying a human maintenance worker to fix the café, while in a traditional café this would be the human staff's responsibilities.

## 7.5. Consequences of broken vows.

According to Jordan (2016), trust is one of the only recognized metrics of HRI-research with a focus on the humans' responses – measured namely by the humans' levels of trust in robots. This is a bit different than Garfinkel's trust-conditions, as the type of trust Jordan mentions is steered towards not expectations of interactions, but a more overall measure of how the human responds to the robot in HRI.

In this part, I present how not only experiences breaches implicate the domestication process and becoming active users of robot-café. Evidently, it seems that some customers who have never had an interaction with actual robots in service are experiencing imagined breaching situations. To investigate this, I look at whether the customers overall views on robots are seen to impact these imagined breaches.

### 7.5.1. Emotionless robots.

All four informants view robots to be *emotionless beings*, as the informants are seen to attach different feelings to robots. Informant Cam perceives robots in general to be "Emotionless" and she feels "(...) a little bit cold to the robot because they have no feelings". And the other three informants agree with Cam with the perception of robots as these emotionless technologies as well. Informant Geon thinks that "(...) robots are good, when it is used properly. So, it is good, but I don't think they have emotions.». Informant Rin adds that "(...) sometimes they (the robots) are unlearned. (...) yes, they're not really educated.", as Rin points to various technical problems related to robots. Informant Ton shares that robots can appear as threatening to her – "I think I feel more that the robots are emotionless. Like, kind of threatening? Because all though it is very fast, it does not have any emotions that can deal with human minds (...)".

Even though all informants agree on robots being emotionless, they feel somewhat differently to how the robots' emotionlessness manifest in themselves. For Cam, this creates a feeling of coldness towards the robot. For Geon, he has positive feelings towards the robots, as they can have instrumental value. Rin feel skeptical towards the robots' competence level. And Ton shares that the lack of social cognition in robots can make it appear threatening towards her. The question then is, how does the informants' views on robots play a part in their level of trust in the services provided by these robots.

### 7.5.2. Lack of domestication-motivation.

There seems to be some hurdles that informants need to overcome, in order for them to fully accept and domesticate these robots. Informant Cam is the customer-type that usually prefers ordering from a kiosk instead of a human, but during our talk about robots Cam seems a bit unsure as she reflects on what ordering through a robot is lacking:

*"For making a coffee I prefer a human because for now I don't trust the robot to make a coffee. And for coffee, many people agree to communication when making a drink or a coffee with the customer and the barista. So, it is more important to communicate in the café" – Informant Cam.*

The distrust Cam experiences could be because she thinks of the robot as emotionless and have cold feelings towards it. Similar to Cam, Ton also has trust issues regarding the robot:

*"(robots) makes me uncomfortable because I can't even complain or say comments to the waiter, even like thank you or, there is no response. Or maybe if the food goes wrong and maybe the waiter makes mistakes there is responsibility problems. So, those elements make it very uncomfortable for me, if it is on the service robots (the responsibility)."*

*"(...) there may be a lot of flaws when I communicate with robots, and the response maybe be different from what I thought. So, I would just prefer humans" – Informant Ton.*

For Ton, she has an issue with having trust in robots' ability to communicate and she also harbor some uncertainty on who the responsible party is when a mistake happens, creating an imagined breach quite similar to the three physical cases of breaching presented earlier. Because tasks and services in traditional, human-applied cafés had a clear responsible party before, when it comes to the use of robots Ton is now rendered unsure. This skepticism towards robots, communication, and them being delegated tasks of service, is also shared by Geon:

*"If we have to ask them something, but the robots, I don't think they cannot work properly and they have to get feedbacks from us, but it is better to give the feedback to the clerks than robots. That would be tricky, when we can only communicate with robots. I think that would be tricky." – Informant Geon.*

Tricky is the word Geon chooses, when describing how he imagines a robotic service-interaction. However, the issue on informants' level of trust in robots is not just regarding communication and response. Geon is also worried of the robot's physical presence in the café:

*"It is like a stereotype where it should be humans or clerks, and (instead) they are running a café on robots. Why? To be honest, they are moving,*

*and I am afraid if they pour something. What if they pour coffee on the floor or on the customers? I am a little bit worried of it. And as I told you, it is literally weird."*

*"I have felt that "oh what if the robot comes to me?" (...) Yes, like it drives over me or bumps into me. I am just afraid of it (the robot)"*

– Informant Geon.

Geon imagines robots at cafés to be physically threatening, both if the robot malfunctions but also if the robots somehow manage to hurt him. As Geon mentioned, he thinks of robots as rather practical if used right. But from what he implies here, he does not trust them to function properly all the time, as he imagines himself being on-guard for malfunction. And Ton is also showing a distrust to a robot's physical presence, as she also feels a bit threatened by them:

*"Like, kind of threatening. Because all though it is very fast, it does not have any emotions that can deal with human minds, or in an emotionless state." – Informant Ton.*

Ton explains that because robots lack cognitive processing, they appear threatening to her, perhaps by performing actions?

### 7.5.3. Consequences of imagined breaching.

The informants, particularly Geon and Ton, show some levels of distrust towards robots in service. Such feelings and emotions towards robots in service appear as obstacles, when customers struggle to cognitively domesticate robot-café. The interesting part, I find, is that customers like Geon and Ton do not necessarily have to experience breaching-situations in service themselves in order to feel this way. Geon and Ton both showcase how these imagined breaching-situations are actually expected by them; some are expecting to experience breaches, due to their impression of cafés with robots. By this understanding, the informants are predicting that something unexpected is going to happen, perhaps making distrust grow in their relation to robots in cafés. The root of distrust in HRI, as these findings show, stems from the communicational problems, robots' lack of social and physical awareness, and their non-cognitive functions/"decisions". But perhaps most of all, the distrust seems to fall onto the lack of responsibility, which suddenly have disappeared from the service-setting, together with the human employees. I think Ton describes this feeling of distrust best as she feels uncomfortable because as a customer, she is unsure who the responsible party is when the robot or system breaks down or makes a mistake.

As presented, robots are for the most part delegated the responsibility of performing tasks, but not the full responsibility that human employees previously held in the café. In the three cases of breaches, responsibility is also seen to be implicitly pushed over on the customers, which create jarring customer experiences. Collectively, findings in this chapter show that errors in untact and robot-café do indeed happen, and for some customers there exists a lack of trust and accountability of robots. Additionally, experiencing breaching-situations physically is not a necessity to keep customers away from robot-café – *imagined breaches* seem to be just as effective in making customers

hesitate, or perhaps even more so since customers experiencing imagined breaches are not giving these robots the chance to be prove themselves otherwise.

### 7.6. The divide grows larger.

To revisit the posed question from the start of this chapter, by looking at what is creating this divide between some student customers making use of robot- and untact-café solutions and other *not* making use of them. And so far in this chapter, I have found that some customers seem to struggle with trusting robot-provided service, finding the lack of accountability threatening or uncomfortable. Interestingly, bad physical experiences with robots are not needed to make the young customers choose a side in this divide either – for some, just imagining the situation is enough to steer away. The importance of the customers feelings and emotions in both a physical and imagined HRI is therefore one of the critical aspects to this divide occurring. However, for other customers like informant Rin, who have experienced a physical breach herself and have also witnessed several occurring, seem to be content in using these café-robots even though she has seen what can happen and knows how it feels. And this is perhaps one of the components that makes a difference, that creates this divide; the anticipatory fear of something bad happening versus having the experience and knowledge of what this something is.

### 7.7. Summary – Lack of accountability.

In this chapter, I have investigated the implications that customers experience when using robot-cafés. And additionally, the divide between active and non-active users becomes clearer. My approach was therefore to look at HRIs between customers and cafés, and how these robots and other technologies, presented in this chapter as untact-technology (none-contact), sometimes create breaches of expectations for the users/customers.

Here, I presented three cases were customers experienced breach of expectation. Breaching, Garfinkel's ethnomethod which is based on his 'conditions of trust', looks at the participants of an interaction, where there is an implicit trust put on each party to adhere to social rules and what constitutes normal behavior. And breaking these rules, is what causes a breach. By borrowing the concept of delegation form Latour's ANT-toolset, I have chosen to recognize robots as worthy participants of interaction, because robot-cafés are seen delegating interactional tasks to their robots, creating HRI-situations between them and the human customer.

In the three cases presented, breaches happen due to the breaking of expectations in which the customers are adhering to, but the robots are evidently not. Customers have these expectations not only because the rule of interaction is broken, but also because the robots have been delegated roles where expectations of other services than simply making and bringing coffee are expected. This includes for the most part customers option to communication and voice questions or concerns with the employees at the café. In short, the customer experiences an illusion of a waiter being present, but the actual service of one is evidently not, which create jarring situations for the customer.

In this delegation process, where robots are given tasks to perform in the stead of human employees, responsibility of performing these tasks are transferred to the robot. However, as I found there is also implicit responsibility put on the customer themselves in HRI's. This occurs because if a breach happens, the customer is incentivized to fix the situation themselves in the best way they know how. If that entails waiting in the hope of the robot eventually figuring it its error out, which it most likely cannot, or intervening and working "with" the robot, is then purely up to the customer themselves.

As I found, the consequences for breaches can create a lack of trust in robots and also in HRI in general. And when there is a lack of trust, the customers willingness to use the robots can falter, resulting in not wanting to use these cafés. However, what I did not expect to find was how a customer imagining breaches can be just as effective in not wanting to use the cafés, if not more effective. I have been calling the imagined breaching, for a lack of a better term, because all though no breaching is taking place, some customers picture situations playing out badly in their head, if they ever find themselves in an HRI in a café. Through my findings, the reason for this lay in the robots' lack of accountability if something goes wrong, in addition to the distrust some customers already harbor towards robots. In turn, their distrust makes them feel uncomfortable in the HRI-situation, or at least they imagine they would feel this way. The reason why the imagined breaches might be more consequential than the actual breaches experienced, is because the customer is then experiencing anticipatory fear, whereas the customer already using the robot-café might have become used to the robot-uncertainty. Therefore, a divide is appearing, consisting of those willing to attempt domesticating the robot-café and those who evidently are not willing to attempt.



## 8. Conclusion.

### 8.1. How are robots used in South Korean cafés and why?

At the start I posed the research question of this thesis; *how robots are used in South Korean cafés and why?* The main goal in this thesis have therefore been to investigate why robots have appeared in Seoul cafés, what purpose do they serve, and how do the customers respond when sociotechnical material configurations, such as robots and other technologies, are introduced in this unique café-culture and delegated tasks in a service-setting.

And as I have highlighted, when investigating this question and exploring the different relevant components, the answer is rather complex – as it should be. The short and seemingly up-front answer is that robots are used by cafés to substitute human-performed tasks. For the most part, the robots are making beverages in the stead of a human employee. Other tasks robots are delegated to perform are delivering coffee straight to the table of the customer. Then, I extend the question in my thesis by also adding technologies other than robots, including phones and kiosks, which were seen being delegated to take orders. As for why robots are used, they are employed by the service businesses to achieve economic sustainability, by saving costs on production-cost and salaries to human employees, as well as streamlining the café process through automation. But this answer only scratches the surface. As this thesis' methodological approach is a modified version of grounded theory, my empirical findings are central. Moreover, the theory I develop play a descriptive role, highlighting my empirical findings. And as seen, this approach has led me to constantly revise my hypothesis, as elements in my data have shaped this thesis' progression. The result, as I have discovered, is that the research question of this thesis has opened a box much more complex, consisting of many different components. Let's take a look at the more prominent findings.

To answer the research question, I first took a deep-dive into the café-culture of Seoul. Here, my findings showed *at least* four pillars that, in symbiosis of each other, upholds this unique culture. The relevant components found were Seoul cramped housing situation, the students' daily lives, routines, and how they use the cafés, the strong work-culture in Korea with a noticed duality of sacrifice through societal pressure and self-responsibility and will to provide, and the cafés practical solutions and material configurations, which later in the thesis constitute the robots and other technologies used in the cafés. And as per now, the thesis still had not gotten to the robot-part of *why robots*, but we have thus far acquired a hint as to why robots would be introduced. What I found the local context of Seoul to reveal, was how cafés in Seoul are adapting to how customer actually use them. As most café customers were found to be students, and because we can see them using the café routinely for studying alone, we can now see how hybrid cafés which are tailored to this type of use could be useful for some.

Originally, I was supposed to look specifically at the robots. However, the local context revealed that the whole café's design and interior i.e., its material configuration, was actually a sociotechnical material itself, filled with other materials too, such as the robot. That is why I then delved into the materiality of how the entire café was configured, in order to answer the how-question of robots being used in cafés. In this part, findings showed that robots were used in various ways by the cafés, and additionally the cafés themselves took on different appearances depending on how they made use of the robot; the B;eat-café were strictly utilitarian and the Storant café were filled with



various practical solutions. Findings in my data also showed that phones and kiosk were popular amongst customers, seen to be delegated the tasks of taking orders. Therefore, by categorizing them, the different compositions of how cafés make use of robots and technologies became highlighted, as some managed to become fully automated. And what I found the material context to reveal, keeping the local context in mind, was how robots were used to cut cost of drift to save money, create time-save for the busy customer through efficiency with automation/technology, and use interior and design elements to both meet with how customers are actually using the café in their routines, e.g., studies or escaping from their home, but also shaping how customers *should* use the café.

Through the study of Tumanan et al. (2014), domestic cafés in Korea have an incentive to meet with the local context head on in order to stay relevant and competitive. And my findings were corresponding, as my field-studies found the robot-café to be used by students studying. These cafés were for the most part domesticated through their hybridity i.e., their deviation from regular cafés. Students were seen to domesticate hybrid cafés practically, as the café was seen fitting into their lives and filled their needs, symbolically as it became understood as a convenient solutions in their routine, and cognitively as they were actively seeking kiosks and phone-ordering. And the library-beat was no exception, as students domesticated this café, using it as a café and library simultaneously. Starbuck's mobile order, Siren Order, were also found to be domesticated by students. Mostly as a convenience and time-saving feature, but in true as a feature of the café's hybridity and meeting with the local context. Taste was found to be a lesser important aspect in the domestication process of robot-café, according to my findings. In the last part of my domestication analysis, findings showed that young customers find it *easier* to be able to domesticate technology in cafés and to make them part of their routine. This was because these student customers already inhabit a certain technical know-how. But this was not the case for older customers, which was seen lacking in technical competence, hindering them in the crucial step cognitively domesticating such cafés, making the rest of the domestication-process difficult. However, I found that with a human employee's help and serving as a support system, older customers could also take part in the technologized cafés. Perhaps the most interesting find in this domestication analysis, were that some of my informants simply rejected the technology, even though they had the technical competence needed. Kiosks- and phone-ordering were something all student-informants could make use of if they wanted, but findings showed that due to other reasons, some students put up a front against interaction with technology in favor of human employees. Therefore, I noticed a divide in the target customer-group for robot-café; those who domesticate and those who reject.

To investigate the aspect of customers actively avoiding HRI, even though most of my findings showed that these robot-café and those alike are close to tailor-made for the student customer-group, I analyzed HRI-situations where errors occurred. The purpose of looking into situations going wrong, was to open up the process and find out how the human responded and what makes them respond this way. By using Garfinkel's breaching experiments mixed with Latour's delegation, I analyzed three cases of technical and social breakdown, resulting in breaches of expectations. My findings showed that the breaches mainly happened due to a mismatch between the robots' lack of social cognition and the expectations that customers put on a café supposedly provided service. To be more specific, the customer essentially lacked a way to communicate and convey certain issues, the robot lacked a situational awareness to "see" what was going wrong, and by extension the robot also lacked both the physical and the cognitive means to be flexible. Customers were therefore found to react in different ways to these breaches, but the common denominator in all three cases was "to wait and see" if the problem would eventually solve itself, without luck it must be added. An interesting find was that all though robots were used in cafés to perform tasks

in the stead of human employees, some of the responsibilities formerly held by the human employees were seen transferring onto the customers themselves. If a robotic malfunction happened for instance, I found the customer stepping in and “taking care” of the situation; calling human maintenance in case of malfunction or helping robots become unstuck from bubble wrapper. The consequences of for these breaches happening were found to be a lack of trust in the technology, or rather an expectation of something possibly going wrong due to experiencing it. Perhaps the most surprising find in this thesis was how some customers, in which had no former experience with HRI’s, would assume breaches to occur, and on that basis would actively rejecting getting into HRI’s. These imagined breaches, for a lack of a better term, happen because all though no physical breach is taking place, customers would explain that they pictured themselves in HRI situations where breaches happen. And per my findings, these type of imagined breaches could be *just* as effective in hindering domestication to occur as the actual breaches taking place, if not *more* effective as these customers are not seen to be willing in learning or accepting this technology. By investigating the reason for this, my findings showed that the imagined breaches mostly occur due to the robots’ lack of accountability when something goes wrong. The robot is assumed to not take responsibility of an error or misunderstanding happens, which through my findings is evidently the case. An additional reason, I found, was the distrust that customers harbored against robots. And by extension, the feeling of distrust in a service setting were found to make customers feel uncomfortable. The reason why the imagined breaches might be more consequential than the actual breaches experienced, is because the customer is then experiencing anticipatory fear, whereas the customer already using the robot-café might have become used to the robot-uncertainty. Therefore, a divide is appearing, consisting of those willing to attempt domesticating the robot-café and those who evidently are not willing to attempt.

## 8.2. What did this study achieve?

This study on Korean café culture also highlighted that Seoulite students’ café routines can function as a window into the contemporary society of Seoul. This is because Seoul cafés both functions as a ground for spectating the development of modernity, in addition to it also being the product of contemporary society. As such, I have been able to highlight how even in a tech-nation such as Korea, it is not a given that service-robots in cafés will be accepted by the customers.

And lastly, this study achieved adding a new perspective to the lacking studies on untact services in Korea and of HRI-research, focusing on how human responds to robots. This is achieved by analysing how humans domesticate robots in a service-setting and by adding valuable research on individual cases of breaching in HRI-situations, in addition to the aspect of humans’ anticipatory fear and untrust of robots, which is found to create a lack of motivation for humans to interact with robots.

## 8.3. Further Research.

This is not the end of research on this interesting café-culture found in Korea, nor is it the end for research on these café-robots either. Throughout my study, I experienced several hurdles in which this thesis would have taken a drastically different approach to this very topic. Two approaches in particular were already planned and ready to set in motion but halted by the pandemic. The first approach, my wish was to indulge in the developer-side of the Korean café-robots, and perhaps match their visions with the study on Korean café-culture. This idea came about while talking to a very passionate Chinese robotics-engineer, which had bright eyes for the robotic future of service. In the second approach, I wish I could have talked to owners who have employed robots in service and owners who have not and are opposed to the idea. The idea sprung into my lap as I was eating tacos at a restaurant in Korea, where the owner of the restaurant and I had a

long chat on the topic of robots in service. This owner was both fairly up to date on the topic of robots in service and also strongly opposed to the idea; both for his service and the future, and I would really like to see how another restaurant owner argued for the opposite. Mixing an optimistic engineers' opinions with an opposed owner of a service business would also be interesting.

And if one thing is for certain, it is that robots are entering society at Mach speed; faster than I ever imagined myself. And as I have now acquired some knowledge on the topic of service-robots, I have also realized the value of research on this topic – no matter how niche.

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