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The Impact Of digitalization on Customer Satisfaction in Grocery Stores

A survey of international students Experience with self-checkout at Prisma, K-Citymarket, and Lidl

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ABSTRACT:

The grocery retail sector has seen a dramatic transformation over the last few decades with the digitalisation of the industry, and self-checkout has gained popularity in Finland. Adoption of self service technologies has become common in the grocery industry to gain cost and efficiency benefits. Meanwhile, the ranks of international students have increased markedly, creating a large customer base that is culturally and linguistically diverse, and visits large format grocery stores regularly. They interact with self-checkout systems, but are limited in their ability to communicate in Finnish, don't know how to do business in the local retail culture, and may not be as tech savvy as the rest of the population. The SERVQUAL service quality model was used to examine the relationship between service quality and customer satisfaction in the case of international students in self service stores (Prisma, K-Citymarket and Lidl) in Finland, measuring the difference between customer expectations and perceptions from five dimensions such as, tangibles, reliability, responsiveness, assurance and empathy.

A quantitative survey method was conducted and a structured questionnaire was used and distributed via international student network on social media platforms. The ratings of expectations and perceptions for each service quality statement were on 5 point Likert scales and analysed using SERVQUAL gap analysis, which calculated the difference between the two scores for each of the five dimensions.

The results indicate that the self-checkout systems in Finnish supermarkets did not fall short of the expectations of the international students with respect to all five SERVQUAL dimensions. System reliability, staff responsiveness and perceived transaction security were the areas that had the best scores, and staff courtesy towards international customers scored the highest of the individual factors. Empathy especially for international customers was the lowest rated dimension, indicating a lack of understanding of the perspective of other people. Language options were rated above average, but most of the respondents indicated limited skills in Finnish, therefore language accessibility is an important issue. Retailers are thus encouraged to increase their multilingual interface options, offer language specific visual instructions and make better policies on inclusion clear to customers all of which will enhance satisfaction and long term customer loyalty.

KEYWORDS: Digitalization, customer satisfaction, Quantitative survey, international student, Grocery store, Self-checkout system, SERVQUAL Gap, Expectation, Perception

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Declaration of Use of Artificial Intelligence (AI) Tools in Thesis

The authors would like to mention the following AI tools that used in the production The author would like to express his gratitude to the following Artificial Intelligence (AI) tools that the author used in the preparation of this thesis in accordance with the guidelines for academic integrity of the University of Vaasa.

ChatGPT from OpenAI was used during the early stages of the thesis for initial ideas, thesis structure, and guidance.

Google's Gemini was used as a tool to help identify keywords and search strings to identify relevant academic articles in the Tritonia database.

Grammarly's grammar, spelling, and language suggestions were used to enhance clarity, accuracy, and readability of the written text.

The author alone did everything in his research to design methodologies, to collect data, to develop the survey, and administer it, analyze the data, discuss the five dimensions, and conclude the research. Moreover, any learning from the use of YouTube videos regarding Microsoft Excel and Microsoft Word was limited to technical knowledge, which did not add to the intellectual content of this thesis.

The author is responsible for the accuracy, originality, integrity, and content of this thesis.

1 Introduction

Two decades of continuous evolution in the retail grocery sector have been marked by a significant shift towards digital technologies, reshaping the shopping experience. Self-checkout systems (SCS) are one of the most prominent technologies that have manifested as a direct result of digitalization in physical grocery stores, and which is having a profound impact on how customers interact with retailers (Demirci Orel & Kara, 2014).

Self-checkout terminals are being widely used in Finland by the major grocery retailers, including Prisma, K-Citymarket, and Lidl, to streamline their checkout process, minimize wait times, and boost service efficiency. These technologies are intended to simplify the customer experience, but they work best when the user is accepting of the technology, it is easy to use, and the cultural and language setting in which it is implemented is familiar.

The experience of international students in Finland is the focus of this study because of their cultural diversity, their varying levels of experience with Finnish language user interfaces, and their differing backgrounds in digital retail systems. The goal of the research is to explore the level of satisfaction as a lens to better understand customer experience in multicultural retail environments through digitalisation.

1.1 Background of the Study

Digitalization for the industry is defined as the use of digital technologies in all areas of the retail business, inventory management, pricing, payment systems, and customer sevice(Reinartz et al., 2019). Self-checkout is one of the major facts of this change, in which customers use scanners to bag and pay for their purchases without the help of a cashier. As customers demand for autonomy and contactless shopping continues to rise, and COVID-19 has increased the pressure on labour costs, retailers worldwide have invested heavily in self-service technologies (Demirci Orel & Kara, 2014).

Finland is known as one of the most technologically advanced countries in Europe the population is generally open to technological innovations, and the penetration rate for the internet and mobile payment is high. The S-Group, with its Prisma chain, as well as the Finnish grocery group Kesko, with its K-Citymarket, and the German checkout system store Lidl, are the main actors in the Finnish grocery market. Companies have introduced self-checkout in most of their large format stores in Finland, but the chains vary as to the payment options and language choices they offer, as well as the self service interface design.

Concurrently, with the growth of international students in Finland, there is an increasing number of international students studying in universities and universities of applied science throughout the country. These students tend to visit big supermarkets close to the campus or in student residences for shopping and use the self service checkout a lot. However, their experience could be very different from that of the native Finnish shoppers, as language barriers, lack of knowledge about product categories, and customer service expectations are different depending on the country of origin(Lin & Hsieh, 2011). For retailers looking to cater to a more diverse customer base, knowing how these international student view and interact with self service terminals is thus both relevant and important.

1.2 Research Gap

Existing literature on self-checkout systems and customer satisfaction has largely focused on general consumer populations in mature retail markets, with substantial research conducted in the United States, the United Kingdom, and emerging economies such as Turkey and China (Huang & Nusrat, 2024), and (Demirci Orel & Kara, 2014). These studies have explored variables such as perceived ease of use, perceived usefulness, technology readiness, and service quality, often grounded in the Technology Acceptance Model (TAM) and the SSTQUAL scale (Lin & Hsieh, 2011).

However, two significant gaps remain in the current body of research. First, very few studies have examined customer satisfaction with self-checkout systems within the specific context of the Finnish grocery retail sector, despite Finland's leading position in retail digitalization and the distinctive characteristics of its three major grocery chains. Second, and more critically, the experience of international students, who represent a culturally and linguistically diverse consumer segment, has been largely overlooked in the SST literature. Most studies treat consumers as a relatively homogeneous group, failing to account for the moderating role of cultural background, language proficiency, and prior exposure to similar technologies in shaping satisfaction outcomes (Ben Mansour et al., 2022).

This research seeks to address these gaps by focusing specifically on international students' experiences with self-checkout systems at Prisma, K-Citymarket, and Lidl in Finland. By comparing satisfaction across three different retail environments and isolating the perspectives of a multicultural consumer group, the study aims to provide novel insights at the intersection of digitalization, cross-cultural consumer behaviour, and grocery retailing.

1.3 Research Objectives

The primary objective of this study is to investigate the impact of digitalization, specifically the use of self-checkout systems, on customer satisfaction among international students shopping at Prisma, K-Citymarket, and Lidl in Finland.

To achieve this overarching aim, the study pursues the following specific objectives:

1. To examine how international students perceive the ease of use, reliability, and efficiency of self-checkout systems in the three selected grocery chains.
2. To identify the key factors, such as language options, interface design, payment methods, and staff support, that influence international students satisfaction with self-checkout experiences.
3. To compare customer satisfaction levels across Prisma, K-Citymarket, and Lidl, identifying differences and similarities in the self-checkout experience offered by each chain.
4. To provide practical recommendations for grocery retailers in Finland on how to improve their digital checkout services to better serve international and culturally diverse customers.

1.4 Research Question

To guide the investigation, the study is structured around one main research question and three supporting sub questions.

Main Research Question: How does the digitalization of grocery retail, in the form of self-checkout systems, influence customer satisfaction among international students at Prisma, K-Citymarket, and Lidl in Finland?

Sub-questions:

1. What aspects of the self-checkout experience do international students value most when shopping at these grocery stores?
2. What challenges, including language barriers and technical difficulties, do international students face when using self-checkout systems in Finnish grocery stores?
3. How do customer satisfaction levels with self-checkout systems differ across Prisma, K-Citymarket, and Lidl from the perspective of international students?

1.5 Structure of the Research

The thesis is organized into different chapters to provide a clear and logical flow of the research process and findings.

Chapter 1: Introduction presents the background of the study, identifies the research gap, outlines the research objectives and questions, and explains the overall structure of the thesis.

Chapter 2: Literature Review explores existing academic research on digitalization in retail, self-checkout technologies, customer satisfaction theories, and the role of cultural and linguistic factors in technology adoption. The chapter establishes the theoretical framework guiding the empirical investigation.

Chapter 3: Research Methodology describes the research approach, design, and data collection methods. It explains the choice of a quantitative survey targeting international students in Finland, justifies the sampling strategy, presents the questionnaire structure, and discusses the techniques used for data analysis as well as ethical considerations.

Chapter 4: Results presents the empirical results obtained from the survey. The chapter analyses respondents' satisfaction levels with self-checkout systems at Prisma, K-Citymarket, and Lidl, compares findings across the three chains, and interprets the results in light of the theoretical framework.

Chapter 5: Discussion dis about over all SERVQUAL dimensions, which are the strongest area and similar talking about responsiveness, likewise it’s weakest area.

Chapter 6: Conclusion summarises the key findings of the study, discusses their implications for retailers and future research, acknowledges the limitations of the study, and offers practical recommendations for improving the self-checkout experience for international customers in Finland.

2 Literature Review

2.1 Digitalization in a Grocery Store

Digital technologies have revolutionized the grocery retail industry. Retail stores that once used just physical shopping carts and people behind the cashier are now incorporating a wide range of smart systems, including electronic point-of-sale terminals, mobile apps, loyalty apps, and self service checkout (SSC) stations. To appreciate the nature of this shift and how each of the parts affects the shoppers journey in the store is essential to positioning the self-checkout phenomenon within a broader strategic context.

2.1.1 Building Blocks of Digitalization in Grocery Retail

Digitalization in grocery retail is the process of the systematic use of digital tools and data driven processes in the retail value chain from pre-sales through to the store interaction with the customer. Smart, interactive in the store technologies offer brick and mortar retailers a variety of ways to engage with their customers, while also providing a means for retailers to collect behavioral data about consumer expectations, needs, and preferences, as described by (Vojvodić, 2019) Such an operational efficiency, combined with an improved consumer experience, is the strategic rationale behind digitalization in grocery contexts.

To the field of smart retail stores, (Chen & Chang, 2023) build on these understandings and apply a situational factor framework, outlining both technology unique value factors and common value factors that are enhanced by digitalisation. Their research shows that consumers willingness to adopt and adopt new technologies, or technology readiness, can impact the value they get from a smart in store environment and, in turn, impact their purchase intentions. For the Finnish grocery market, in which digital usage is generally high, this indicates that general interest in self-checkout is high, whereas certain groups, such as international students who lack knowledge of the Finnish language on the app, may have further challenges.

Through qualitative focus group and interview studies into a Finnish environment (Ylilehto et al., 2021), three salient factors that influence customer shopping experiences when engaging with innovative technologies are channel choice, value dimensions of convenience and enjoyment, and social interaction. The fact that these factors are highlighted the importance of recognising the need for a digital technology to be effective in all respects and not just one. A fast self-checkout kiosk that fails to present the content in the language of the customer is less useful for driving adoption of the technology, and therefore less enjoyable for customers.

2.1.2 Self-checkout system

Self-checkout systems are automated checkouts that allow customers to scan, bag, and pay without a cashier. They are among the most visible and behaviorally influential types of retail digitalization, and mark the end of the shopping moment in a transaction. (Špička & Dvořáková, 2026) offer empirical evidence based on transaction level point of sale data for a Czech retail chain, showing that the introduction of self-checkout has a significant impact on shopping frequency and monthly sales per consumer they call this effect a frequency dominance effect because the reduction in transaction costs is primarily observed in terms of increased visit behavior, rather than changes in basket composition. This diself checkout system puts system not simply in an auxiliary role, but one that is also driving fundamental changes in shopping behavior.

(Aguirre Reid et al., 2024) conducted their research on SST in hypermarkets in Germany and identified two different types of system, self scan and self-checkout. They found that trust, perceived usefulness, and especially enjoyment were important factors in determining the acceptance of SST, especially for first time users. For experienced users, on the other hand, the balance tips the other way, they are more interested in the benefits and trust needed for long term use, and novelty and enjoyment fall away. This is highly relevant for international students in Finland, of whom many could be experiencing Finnish systems for the first time when they arrive.

According to (Vojvodić, 2019), who conducted a pilot survey of food retailers, it is necessary to present the visitors of the stores with the new technology in smart retail spaces, and to make them actively use the digital space to achieve a sustainable adoption of system. Design and staffing of supermarkets are also affected, for instance, a human attendant near the bays for self-checkout is used as a transitional support in some Finnish supermarket chains to bridge the gap between traditional and automated checkout.

2.1.3 Customer Training and Adaptation

The common wisdom in SST literature is that the adoption process is not a quick one, but it involves time for customers to learn, experiment, and recalibrate their behavior. (Roy et al., 2018) Combine TAM and TRT to prove that perceived ease of use and perceived usefulness do not directly lead to positive customer attitudes unless customers already have a certain level of technology readiness. This has specific consequences for international consumers who may not have previously had to use self-checkout systems in their home country's retail stores.

In article (Ferreira et al., 2023) found that in a large Portuguese supermarket chain, user satisfaction and perceived usefulness are the two most influential factors for continuance intention, with technology readiness positively influencing perceptions. Importantly, their results indicate that ease of use does not directly influence continuance intention, but rather it does through satisfaction and perceived usefulness as mediators. This indicates that a user will not consistently use a system, even if it seems very simple, unless a real value is obtained, a fact that is directly relevant to the case of Finnish grocery stores, where speed and efficiency are the major driving forces behind the use of system.

Similarly, (Alves et al., 2025) find that technology utility factors are significant in affecting the customer technology experience, which further impacts perceived service quality and perceived risk in the context of shopping in Auchan supermarkets during COVID-19. They point out in their conceptual model that customers perceptions of the service utility and the quality of their experience are what will drive customers to stick or walk away from their self-service systems. For grocery retailers introducing self-checkout, it shows how essential it is to incorporate support, user interfaces, and error-recovery features into a successful customer training system.

In a Sports Retail SELF-CHECKOUT SYSTEM context, (Ingale et al., 2024) posited that a personality trait, openness to experience, which is linked to intellectual curiosity and tolerance for novelty, is one of the strongest predictors of service quality perceptions in a sports retail context using Dabholkar's attribute based model. Their findings indicated that self-service checkout is less trustworthy to low openness customers, which may lead them to feel frustrated instead of empowered. This personality dimension, combined with cultural familiarity, forms the basis of the international students' trajectory in adapting to their new environment of system. This personality dimension interacts with the cultural familiarity of these international students to produce different routes to adaptation in their new environment.

2.1.4 Self-Checkout Design and User Experience

Everything from the screen layout to language options, payment methods integrated with the checkout, weight checking reminders, and error messaging can have an impact on the ease of the customer experience or the challenge. Smart retail stores need to provide the unique value that technology can deliver in addition to the common value that customers want from any retail store is product availability and price transparency Chen and Chang (2023) argue. If the design of the interface does not meet the needs in either of these areas, then the customer is frustrated.

Roy et al. (2018) conclude that perceived adaptiveness and how responsive and capable of adjusting to individual user needs a system seems to be an important influence on smart retail technologies acceptance by customers. If the self-checkout system is used in a customer base that is linguistically diverse, it becomes concrete in terms of having multiple language possibilities. In general, grocery stores in Finland have offers in Finnish and Swedish and sometimes English, but other language native international students may face menus in a language they are not familiar with, undermining the adaptiveness dimension.

The authors of (Ingale et al., 2024) found that the most significant factors influencing the quality of the SELF-CHECKOUT SYSTEM service are perceived control, ease of use, and reliability, and ease of use had the highest explanatory variance. Their results confirm that simplicity of the interface is not just a matter of form but function of a cumbersome screen navigation, confusing error messages, or interrupted weight which checks all detract from the ease of use and ultimately, customer satisfaction. (Vojvodić, 2019) also mentions that customers are more likely to accept new retail technologies if they feel they have control over them and they know what they will do when they interact with the technology.

In (Ylilehto et al., 2021) it is highlight the importance of convenience and enjoyment as value dimensions that are integrated in the shopping experience with technology. A technically efficient, but emotionally frustrating, self-checkout system does not provide the aspect of enjoyment that is needed for continued use. This utilitarian need and pleasure is especially relevant to the international student population, where every step in the checkout process adds to perceived cultural differences in the retail environment.

2.1.5 Self-Checkout as a Value Driver

However, in addition to the individual transaction, systems represent strategic value drivers for grocery retailers. The results shown by (Špička & Dvořáková, 2026) indicate that the adoption of system can positively influence shopping frequency as a behavioral consequence, which has a direct revenue impact. They take an economics perspective on transaction costs, believing that if it takes them less time and effort to check out, they will go more often, even if they do not purchase more products when they do. For grocery companies in Finland that operate in overlapping stores, offering convenience by leveraging self-check-out system is a valuable competitive edge to transform once customers into regulars.

According to (Chen & Chang, 2023), smart retail technologies include situational factor empowerment, which refers to technologies that improve the shopping context, thus indirectly improving purchase intentions by creating a positive context. Within this context, system is not just about cutting the cost, but it is a situational improvement tool that elevates the overall in the store experience.

The authors of (Cuesta-Valiño et al., 2023) in their analysis of supermarket digitalization in an omnichannel setting, involving more than 2,000 Spanish consumers, they state that the rational and emotional dimensions of consumer experience are both key factors in both satisfaction and engagement. According to their structural model, the strategies of digitalization among them indirectly affect customer loyalty through their impact on experience quality. With this diself checkout system, selfcheck-out becomes part of a larger loyalty management system and is not just an operational capability.

2.1.6 Customer Satisfaction — Increased Loyalty and Store Choice

Consistent with other findings in the self-checkout literature, a positive relationship between customer satisfaction and outcome customer loyalty behaviours, such as repeat visit and store preference, has been found. Based on multiple linear regression, (Alves et al., 2025)found that customer satisfaction with self-checkout positively influences customer loyalty towards the retailer, which is mediated by the customer technology experience and perceived service quality. The study was carried out in a supermarket environment, and the environment at Prisma, K-Citymarket, and Lidl in Finland is the same.

In the context of mobile self-scanning, (Ferreira et al., 2023) diself-checkout systemver a similar phenomenon and satisfaction serves as a key element to continuance intention, which is strongly associated with loyalty behavior. Their findings indicate that satisfaction with self-service in grocery retail is more than just a fleeting, temporary attitude it is a continuous attitude that influences the subsequent decision to enter a grocery store.

Similarly, (Cuesta-Valiño et al., 2023) contribute an important nuance, showing that two dimensions of the consumer experience, emotional and rational, lie between digitalization and loyalty. Satisfaction could be achieved purely on efficiency grounds, with a fast but improve experience, but without establishing the emotional connection that is the basis for long term loyalty. Making efficient, reassuring, and user-friendly designs for grocery chains aimed at international students, as a new and increasing customer group, could be crucial in turning them into loyal customers.

Among experienced users of self-checkout system, the level of trust is even more important for sustaining continued use, even more so than the fun dimension that is important to their initial use (Aguirre Reid et al., 2024). The trust and loyalty relationship is important when it comes to store choice for international students, as once they have a bad experience with one chain store, perhaps because of language difficulties or technical issues, they may be more inclined to shop at a store they perceive as more accessible than the one that failed them.

2.1.7 Operational Benefits — Cost and Time Savings

Self-checkout systems are known to provide grocery retailers with some very tangible operational benefits, primarily reduced staff costs and increased throughput during peak periods. Smart retail technologies enable retailers to benefit from operational efficiencies, but also improve the customer experience, making technology better and developed an investment that is not just about saving money, but about getting more from the customer as well, as highlighted by (Vojvodić, 2019).

Smart retail stores with lower staffing levels have lower labour costs and a competitive price, which further enhances the value proposition for consumers with price sensitivity, such as international students, as noted by(Chen & Chang, 2023). At this level, the business model of operating system and the value proposition for the consumer are tightly coupled.

(Špička & Dvořáková, 2026) offer causal evidence that the adoption of self-checkout system yields neither higher average item prices nor makes transactions more complex at the checkout, while also boosting shopping frequency. In highly volume retail formats like K-Citymarket hypermarkets, it could be that the profit resulting from more transactions from the use of a self-checkout system is more than the investment in installing and maintaining the terminals.

(Ferreira et al., 2023) point out that the adoption of self-service technologies has emerged as a means for retailers to enhance the customer experience while also cutting operational expenses and the objective that is not necessarily mutually exclusive. Long lines at the traditional cashier lanes, particularly at large grocery stores in Finland during rush hours, are a real pain point to the shopping experience for international students, so the time saving cost element is especially relevant for them.

2.1.8 Service Quality and Performance Improvements

In the context of the self-checkout system, service quality refers to how well the terminal performs its service sector as well as how well the service experience is managed by the attendant. The study conducted by (Ingale et al., 2024) Using a different structural model reveals that ease of use, enjoyment, and openness to experience are the key factors that influence service quality, while reliability and perceived control also have a significant impact. They found that some customers at retail stores will be upset by the technology rather than delighted by it because they believe that it is less dependable, explaining the difference in performance that can occur when systems fail or provide unwanted prompts.

According to (Alves et al., 2025), perceived service quality is one of the most important mediators between the customer technology experience and loyalty, and improvements in service quality have downstream effects on customer loyalty beyond the transaction. (Roy et al., 2018) further support this by showing that better functionality, which shows how well the smart technology functions compared to other methods and which is also a strong driver of positive customer attitude. In the grocery retail sector, best practice is embodied in self-checkout system lanes that handle transactions faster than a cashier line, and consistently, without needing frequent support from the attendant.

Secondly, (Aguirre Reid et al., 2024) added a temporal dimension to understand service quality by demonstrating that the perceived benefits and trust for experienced system users are more important than novelty and fun. The shift in time suggests that service quality needs change according to the level of customer experiences when customers are new to the service, usability and error free service are of paramount importance, while as they become more experienced, consistency, reliability, and responsiveness to failure are a greater concern. When planning to upgrade their grocery stores to a system, it is important to take both dimensions into account due to the diversity in the experience level of their customers.

2.2 Customer Satisfaction with the Self-checkout System

The dependent variable that is used in this thesis is related to customer satisfaction. Understanding the theoretical backgrounds of this phenomenon, its specific measurement in the setting of SST, and the factors that affect it in the grocery self-checkout are essential for the understanding of international students' experiences in the grocery store in Finland.

2.2.1 Customer Satisfaction in General

Customer satisfaction is a broad term that is defined as the evaluation of the product or service experience by the customer against his or her expectations. Satisfaction is divided into two components for grocery stores it is transactional element and store visit element. In a supermarket omnichannel study, (Cuesta-Valiño et al., 2023) show that rational and emotional aspects of the consumer experience both have distinct impacts on satisfaction and engagement, and that none of these is enough to capture all the variance in consumer loyalty.

The study examines satisfaction in retail and concludes that there is a direct and positive link between service quality, satisfaction, and consumer spending as higher satisfaction equals higher spending(Nisar & Prabhakar, 2017). The relationship between the quality of service, customer satisfaction, and customers behavior is the key relationship in the literature of system although it is a digital environment, not the traditional retail world.

(Alves et al., 2025) directly apply this logic to physical system settings, finding that satisfaction with self-checkout in the supermarket leads to tangible loyalty actions.

As (Lee, 2020) investigates omnichannel consumer response and concludes that integrated promotion and integrated information access are the most highly correlated with customer satisfaction among the omnichannel characteristics, indicating that information are more and consistency across service touchpoints are important. In this context, in the self-checkout system, it means that there is clear, consistent, and multilingual information on the screen that customers can be guided through the checkout process without confusion.

2.2.2 Theoretical Approach to Self-Service Technology Satisfaction

Three widely used models are presented on the theoretical treatment of satisfaction with self-service technology and another is the Technology Acceptance Model (TAM), Expectation Confirmation Model (ECM), and Dabholkar's attribute based model. (Roy et al., 2018) Combine TAM with technology readiness theory, finding that perceived ease of use and perceived usefulness influence customers attitudes towards smart retail technologies, and that technology readiness is a moderating boundary condition. In the context of the self-checkout, TAM theorizes that a user attitude toward the terminal should be positive if they believe it is easy to use and useful, ultimately leading to actions like reusing the terminal. In the self-checkout context, TAM suggests that the easier the terminal is to use and the more useful the terminal is, the more positive the attitude will be, and the higher the behavioral intention to use the terminal will be, specifically reusing the terminal.

According to, (Ferreira et al., 2023) On the other hand, build a model that combines technology readiness and service quality within TAM and conclude that the perceived usefulness and satisfaction together are predictive of mobile self-scanning application continuance intention. The direct positive influence of perceived quality on satisfaction and the indirect positive influence of ease of use on satisfaction through satisfaction indicate that perceived quality is the more influence on system satisfaction, which suggests that the Finnish grocery chains need to focus on perceived quality more when they are considering SST improvement.

Similarly, attribute based model of satisfaction with SST explicitly served as a basis for the development of (Ingale et al., 2024). (Ingale et al., 2024) contend that customer control, ease of use, reliability, enjoyment, and personal interaction are the main attributes that influence satisfaction with SST. Their empirical results, based on the support that all five dimensions of the attributes have a positive impact on the service quality, and ease of use and openness to experience have the highest effect sizes. The Dabholkar framework is especially suited for discussing satisfaction in the self-checkout system as it was created specifically for an environment where the person is interacting with a self-service retail and contains both utilitarian and hedonic dimensions.

Prior SST models did not adequately account for an additional theoretical dimension as well as trust that (Aguirre Reid et al., 2024) added. They found that trust in SST technology is a key determinant for both prospective and experienced users, and that it becomes even more important once they have actually used SST technology. The results are relevant to the study of international students who may have higher uncertainty when using Finnish system because they have language challenges and lack knowledge about the retail formats in Finland.

2.2.3 Drivers of Customer Satisfaction with Self-Checkout

The literature contains several specific attribute-driven drivers of customer satisfaction that are activated by different psychological mechanisms and have different levels of importance for various customer segments. The following subsections discuss three drivers that have the closest connection with the research questions addressed in this thesis ease of use and reliability, speed and time saving, language accessibility, and cross-cultural factors.

2.2.3.1 Ease of Use and Reliability

User friendliness is generally the most predictive factor of customer satisfaction in various study settings and methods. According to (Ingale et al., 2024)Ease of use has the highest variance inflation factor this model and it is the most significant factor of service quality in the self-checkout setting. Perceived ease of use is also a key factor in the TAM model of smart retail technologies acceptance, as it directly affects the attitude of customers and indirectly affects the perceived usefulness, which is also identified by (Roy et al., 2018).

(Ferreira et al., 2023) further argue that ease of use does not directly influence continuance intention, but rather its ease of use influences satisfaction and perceived usefulness and then perceived usefulness influences usage behavior. This mediated route indicates that ease of use is the most important factor determining the mechanism by which ease of use affects system adoption has its positive satisfaction experiences are recalled and factored in when people make a decision to visit a store for the next time they plan to purchase a product. Every interaction that results in frustration or error is a negative satisfaction episode that reduces interaction frequency, which ultimately lowers usage intent for international students who are limited in their Finnish language skills and use the interfaces of Finland. Each time an international student with limited Finnish language skills encounters something that leaves him/her frustrated or makes a mistake, it is an interaction that results in a negative satisfaction episode that reduces interaction frequency, which in turn lowers interaction frequency and usage intent for the international student using the interfaces of Finland.

The second critical driver is reliability as the extent to which the system performs without unexpected failure, or it stops working. (Ingale et al., 2024) conclude that reliability is one of the key positive predictors of customer service quality, and also observe that unreliable systems could lead customers to feel frustrated and to think that the technology is not reliable. (Aguirre Reid et al., 2024) Identify trust as the essential long term usage determinant for experienced SST users, which is closely related to their perception of reliability. This is supported by (Alves et al., 2025), who demonstrate the significant impact that perceived risk of reliability has on the customer's technology experience, with lower perceived risk making a significant contribution to reducing satisfaction.

2.2.3.2 Speed and Time Saving

One of the most common reasons for the use of self-checkout is the efficiency of time. The behavioral evidence offered by (Špička & Dvořáková, 2026)corroborates the interpretation that the adoption of system that leads to an increase in shopping frequency, which can be interpreted as something becoming easier to shop for, as more frequent shopping trips are undertaken. The frequency dominance effect suggests that if you can speed up the checkout process, the customer will not only be pleased with the service in the here and now, but will develop a newfound attitude toward the store as a whole.

According to (Chen & Chang, 2023), there are two distinctive value dimensions of smart retail stores that can't be achieved by the traditional staffed checkout format in highly traffic situations which is speed and reduced waiting time. A key value driver for international students with time constraints, such as time spent on schoolwork, is the ability to complete grocery shopping quickly. In SST settings, perceived usefulness, which includes one of the key components, time efficiency, is a key factor that leads to satisfaction and continuance intention, according to (Ferreira et al., 2023).

The article mentions that it is perceived benefits mainly time saving that is the main satisfaction factor for experienced users, even more than enjoyment and novelty. (Aguirre Reid et al., 2024) This indicates that as international students get over the initial hurdle of adaptation, their degree of satisfaction with the self-checkout will be more and more dependent on the timeliness and accuracy of transaction processing(Aguirre Reid et al., 2024). Those grocery chains in Finland that invest in making their checkouts faster, with faster barcode scanners, weight platforms that respond more quickly, and payment systems that are easier to use, will likely reap similar satisfaction dividends from the more experienced international student users.

Furthermore, (Ingale et al., 2024) speed has been identified as one of the key attributes in the framework of aticle, and it is a positive predictor for service quality along with ease of use and control. Their findings do highlight that speed is not just a contextual convenience, but it's one of the dimensions of a high quality self-checkout experience for customers.

2.2.3.3 Language Accessibility and Cross-Cultural Factors

Language accessibility is one of the areas of customer satisfaction that has been marginally examined in the literature and has been identified as a critical factor when the customer base comprises customers who speak languages other than the dominant local language. (Roy et al., 2018) recognize that perceived adaptiveness is one of the key factors that influence smart retail technology acceptance. One of the most tangible forms of adaptiveness is the availability of language options and if a system defaults to a single language and offers no alternative from then, it is a clear sign of low adaptiveness to multilingual users.

Technology readiness is included as a moderating variable by (Chen & Chang, 2023), which demonstrates that the higher the technology readiness, the more value is added for customers as a result of in the store smart technologies. Language barriers in system interfaces are a frustrating challenge for international students, who may have a strong educational background and a digital native perspective and are therefore very well prepared to interact with digital systems. The combination of high technology competence and low language accessibility results in a type of customer dissatisfaction.

In the qualitative study in Finland,(Ylilehto et al., 2021) Identify social interaction as one of the three essential elements that influence customer shopping experiences when they use innovative technologies. If language is a barrier to effective interaction with an system, it is not simply slowing the process but it is taking the social aspect with it, leaving international students without any effective human support or helpful digital guidance. This double lack of social and informational inclusion is a specific form of social and informational exclusion experienced in the retail sector.

Perceived control, defined as the customer's sense of control over his/her own checkout process, is a positive indicator of the service quality of the self-checkout system as described by(Ingale et al., 2024). When prompt information on the screen is not understandable, language barriers directly affect perceived control, as customers lose control of the situation and become dependent by standers instead of autonomous agents who can act on their own. According to(Alves et al., 2025) Perceived risk is one of the most important variables in the prediction of SST satisfaction, and the riskiness of not knowing the language interface makes this element even more difficult. The research conducted in two different cultures consistently confirms that uncertainty avoidance and information processing in a second language develop cognitive load and perceived risk in service encounters (Roy et al., 2018; Vojvodić, 2019).

2.3 The Finnish Grocery Store Market

Three big companies, the S Group (Prisma), the Kesko Group (K-Citymarket), and Lidl Finland, make up most grocery sales in Finland, and the market is highly concentrated. Finland's high level of retail and digital literacy, as well as the concentrated nature of the market, warrant the study of the system and user experience of self-checkout systems, particularly in this context.

2.3.1 Overview of Prisma (S Group)

The S Group, Finland's largest retail cooperative group, has Prisma as its flagship hypermarket format. Large grocery stores, usually supplying suburban and regional people, called Prisma stores, have a full selection of food and non-food items. The S Group is a customer oriented cooperative in which the customer owner has shares in the profits of the cooperative through bonus return, which directly relate to the dimension of satisfaction with loyalty(Alves et al., 2025; Cuesta-Valiño et al., 2023).

One of the early adopters in Finland is Prisma stores, where banks of system terminals are set up at the exits of most of the big stores. The S Group's digital ensures that SELF-CHECKOUT SYSTEM is integrated into a wider omnichannel retail environment(Chen & Chang, 2023). The depth of this digital ecosystem offers opportunities to students from abroad (various payment methods) and challenges.

The interface, which normally is offered in Finnish and Swedish, can also be found in English in some areas, due to the constitutional bilingualism of Finland and the commercial significance of providing service to the Swedish speaking community. The availability and easy access to English language interfaces directly influence international students satisfaction with the customer, since their first language is usually not Finnish or Swedish (Ingale et al., 2024; Roy et al., 2018).

2.3.2 Overview of K-Citymarket

K-Citymarket is the hypermarket concept of Kesko Corporation, the second largest grocery store chain in Finland. K-Citymarket stores are large format stores featuring a full range of food sections and a large non-food section, similar to Prisma. The K Group runs Finland's largest customer loyalty program, K-Plussa, which combines the accumulation of points on digital platforms for grocery, hardware, and specialty retail.

The number of self-checkout terminals in K-Citymarket's customer interest is similar to that of Prisma, taking up a high percentage of checkout capacity. When customers have a positive relationship with the store technological environment, (Riegger et al., 2022) write, technology driven personalization via retailer owned in store screens which creates relational customer experiences. The K Group's investment in smart retail technologies aligns with a customer experience strategy that aligns with(Vojvodić, 2019) smart retail transformation framework.

Strikingly, K-Citymarket has kept more of its cashier lanes staffed than some other stores, with the brand positioning itself as one that offers higher levels of service through the human presence of staffed cashiers (Vojvodić, 2019). The provision of staffed alternatives at K-Citymarket to those students finding it difficult with the system may be significant when compared to stores where the only available checkout system is available or where this is the main checkout system.

2.3.3 Overview of Lidl Finland

Unlike S Group and Kesko, Lidl is not a consumer cooperative or a publicly traded company with a long history in Finnish society, but a European retail model, geared towards operational efficiency and competitive prices. The store format and product range at Lidl are smaller and simpler than those offered by Prisma and K-Citymarket, and the store layout is more standardised than at the latter two supermarkets.

The result of (Špička & Dvořáková, 2026) that the main reason for customers to adopt system is to reduce the time they spend shopping and increase their shopping frequency is highly relevant to Lidl's business model where Customers shopping for Lidl tend to visit more often for simple grocery shopping, and any time they spend less in the checkout line will directly support their behaviour. Indeed, with no employees on the ground, smart retail stores can compete on price by cutting labor expenses, which is exactly what Lidl has done with its pricing model and philosophy, according to (Chen & Chang, 2023).

Lidl Finland's system terminals have always had a more streamlined interface than the Finnish competitors, which is partly due to the European standardization approach of Lidl. Lidl's self-checkout system interface could be more or less accessible to international students based on the language or languages that are available and the clarity of the prompts on the on the screen interface. In an SST study performed in a German hypermarket, similar to Lidl, (Aguirre Reid et al., 2024) conclude that trust and perceived usefulness are central to sustaining the use of the checkout systems, a finding relevant to the present analysis to evaluate the international students' confidence in Lidl's checkout systems after repeated visits.

Lidl self-checkout system interactions are more transactionally pure, as Lidl did not have a loyalty program, or a similar one, that was as integrated as S-Bonus or K-Plussa, meaning that customers are not navigating a loyalty card scanning process and an activating of a diself-checkout system process at the same time when shopping at Lidl, which could simplify the Lidl shopping experience for a customer less familiar with the Finnish loyalty ecosystem (Alves et al., 2025; Cuesta-Valiño et al., 2023).

2.3.4 International Students as a Consumer Segment in Finland

International students are a unique and increasing consumer group in the grocery products sector in Finland. The international student population in the universities and universities of applied sciences of Finland is large and growing, with a focus in cities such as Helsinki, Tampere, Turku, Oulu, and Jyväskylä. The following characteristics describe this population and influence their grocery and customer experiences which is low level of Finnish language skills, irregular and limited budget, buying food at large format self-checkout system for price sensitivity, and a high level of digital literacy with low knowledge of the Finnish retail conventions.

International students, generally young, well-educated, and digital natives, are high on the technology readiness dimension, as identified by (Chen & Chang, 2023). But technology readiness is only part of the equation when it comes to having positive satisfaction with system, high technology readiness does not mean that people will not be frustrated by accessing self-checkout system interfaces in an incomprehensible language. Specifically, (Roy et al., 2018) Identify perceived adaptiveness as an important acceptance factor, and language accessibility is one of the most important factors of adaptiveness for international students.

In a qualitative study of Finnish consumers (Ylilehto et al., 2021), Channel choice is found to be an important factor in the adoption of retail technology, as the agency to choose the channel between system and staff checkout is a type of agency that affects technology satisfaction. (Ingale et al., 2024) Emphasize the autonomy component as a key aspect of service quality when using self-checkout, and if international students are compelled to use it because staffed checkout is not available during peak times, but they lack the language proficiency to confidently navigate it, it can be a better technology experience.

The cross-cultural aspect of the international students with self-checkout system experience is related to a larger body of literature on the use of technology in unfamiliar cultures. The authors of (Ferreira et al., 2023) state that the desire for interaction which has the opposite effect on technology readiness in SST contexts. This preference for human contact might be even stronger for international students who have to deal with language barriers like for example, a cashier who speaks English may be deemed more satisfying than a Finnish language system terminal, even if the latter is technically faster. The preference dynamic will have implications for satisfaction comparisons between the three chains, as the three chains have different ratios of employees per store and have different linguistic facilities in the system.

The researchers (Alves et al., 2025), conclude that perceived risk is a significant moderating factor of SST satisfaction and that international students have a heightened risk landscape in the environments of system in Finland, including the risk of choosing the wrong language, having an age verification prompt that is not in their preferred language, or triggering a weight check error that requires staff intervention, which are more likely to occur when the interface language is not familiar. This consumer group would likely benefit from disproportionate satisfaction gains from mitigating this higher risk through provisions like better interface design, visible language selection options, and multilingual staff at the system supervision (Ingale et al., 2024; Roy et al., 2018).

2.4 Literature Review Summary

A literature review conducted in this chapter confirms that digitalisation in grocery retail is no longer an ancillary or additional service but plays a key role in the functioning and service of stores. (Vojvodić, 2019) Describe this transformation in terms of smart retail adoption frameworks, emphasizing that the adoption of in-store technologies relies on the capacity and expectations of users who interact with the technologies. (Chen & Chang, 2023; Ylilehto et al., 2021) also show that customers value digital retail on both functional and hedonic levels, and that convenience, fun, and social engagement are intertwined in determining the overall shopping experience. At the heart of this shift lies the use of self-checkout systems, and there is empirical evidence about their impact on shopping frequency (Špička & Dvořáková, 2026)and trust, perceived usefulness, and enjoyment on self-service technology adoption and retention (Aguirre Reid et al., 2024).

Taking a holistic view of customer satisfaction at the self-checkout, a fairly consistent array of attribute level drivers can be identified and extend across a range of retail contexts and methodologies. Based on the attribute based model (Ingale et al., 2024) come up with a list of five dimensions of self-checkout sysetm service quality, namely ease of use, reliability, speed, perceived control, and enjoyment. (Roy et al., 2018) and (Ferreira et al., 2023) incorporate these attributes into the Technology Acceptance Model (TAM), which shows that perceived ease of use and perceived usefulness are the main factors that relate interface quality to customer satisfaction and post purchase use. (Alves et al., 2025) build on this picture by showing that customer satisfaction with SST has a direct and positive relationship with the customer level of satisfaction with the retailer, and hence, long term store preference. This is supported by (Cuesta-Valiño et al., 2023) who confirm that both the rational and the emotional aspects of consumer experience are determinants of consumer loyalty in omnichannel supermarket contexts, moving the concept of the self-checkout system satisfaction away from the single transaction to the wider concept of experience.

Finland is a particular and unique context for these dynamics in the grocery market. The three chains analyzed in this thesis are quite different in their store formats, their integration of loyalty programs, and their technology deployment philosophies, and therefore, their satisfactions for customers with similar needs are likely to be different in terms of the self-checkout. The way retail technology is introduced in the customer sense of agency to the shopping experience influences the relational quality of the experience, which is important in all three chains, as (Riegger et al., 2022) demonstrate. International students, as a consumer group who are highly technology literate and low in Finnish language proficiency, are a consumer group that has an impact on customer satisfaction that is determined by both the drivers described in the literature, as well as language accessibility and cultural adaptiveness of the systems they experience. Perceived adaptiveness is a factor cited to explain acceptance (Roy et al., 2018) Social interaction is one of the critical value dimensions, which is directly connected when international students are exposed to Finnish language interfaces without providing multilingual support.

The analysed literature clearly shows that there is a lack in the research literature on the satisfaction of international grocery shoppers with the self-check-out system when using a foreign language, and that previous research has not compared the experiences of self-checkout in different grocery chains from the consumer point of view. These frameworks, introduced by(Alves et al., 2025; Ferreira et al., 2023; Ingale et al., 2024; Roy et al., 2018) provide conceptual tools for exploring these questions, while the Finnish market context is explored by (Ylilehto et al., 2021) and the cross store comparative logic provided by (Chen & Chang, 2023; Cuesta-Valiño et al., 2023; Špička & Dvořáková, 2026) which provide the empirical foundation. This thesis further contributes to both the satisfaction literature in the field of self-checkout system and to the study of the role of digitalized retail environments on internationally mobile consumer populations, developing on these premises to tackle the identified gap.

3 Research methodology

The research method used to investigate the influence that digitalization of grocery retail, in this study through self-checkout systems, has on customer satisfaction of international students in Prisma, K-Citymarket, and Lidl in Finland is described in this chapter. The chapter discusses the research method and the philosophy used, explains the data collection method using a structured survey questionnaire, describes the analytical method used in the research, and discusses the validity and reliability of the study. All methodological decisions are explained and supported based on existing customer satisfaction, service quality, and self-service technology literature.

3.1 Research Method

The empirical research part of this thesis was carried out as a quantitative survey. This was selected as it is a systematic and efficient way to gather structured comparable data from many respondents. The research instrument used in this research is the questionnaire, because it is assumed that the answers are easier to obtain by carrying out a simple survey compared to more complex responses, for example, interviews or focus groups. If the goal is to reach as many participants as possible, preferably with different national backgrounds, age groups, and years living in Finland, then it is best to use a questionnaire distributed electronically. The questionnaire was filled anonymously (except for the 8 background questions) to enable analysis of the impact of demographic characteristics, including age, gender, country of origin, Finnish language skills, and frequency of grocery shopping on the satisfaction of the respondents with self-checkout systems.

The quantitative research design was utilized as it yielded answers that are clear, structured, and simple to make statistical conclusions from, as opposed to qualitative research designs. The quantitative survey method is also in line with the prevailing methods in SST and customer satisfaction studies. Using a purely quantitative research approach, a structured administered questionnaire was used to explore the service quality, customer satisfaction, and customer loyalty for SST, as studied, and they found that this method is best suited for testing theoretically derived relationships between constructs(Shahid Iqbal et al., 2018) . Building on the research conducted by (Ingale et al., 2024) a structured questionnaire was designed and administered to 330 respondents, with system being used to analyze the relationships between the dimensions of customer satisfaction.

The study is based on the paradigm of positivist research, which is based on a theory that social phenomena can be studied objectively based on measuring social phenomena from the empirical level, and the results of the study can be expressed as a general relationship between variables. The study is deductive in nature as theory is first developed based on the SERVQUAL framework by (Parasuraman et al., n.d.), and on the satisfaction literature about self service technology, and then tested against the empirical data gathered from the study population. Moreover, the deductive quantitative designs used in (Amiri et al., 2025; Taufique et al., 2024), for their SST and technology acceptance model studies, respectively, mirrored the suitability of deductive quantitative designs for the study of satisfaction in the retail technology context.

The SERVQUAL model, as created by (Parasuraman et al., n.d.), and modified for self-service technology environments, is the theoretical approach used to guide the study. The SERVQUAL is a tool for measuring the gap between customer expectations and perceptions of actual service delivery for five dimensions of service quality like Tangibles, Reliability, Responsiveness, Assurance, and Empathy. The gap approach is especially applicable to the present study since the customer expectations of the international students who enter the Finnish grocery store have been shaped in their home countries, and the satisfaction of the international customer depends on whether these expectations are met or exceeded by the system. The modified SERVQUAL instrument used for SST contexts is similar to that used by(Shahid Iqbal et al., 2018), which adapted

SERVQUAL to 7 dimensions of SST service quality, and to (Ingale et al., 2024), who used a modified instrument from Dabholkar's attribute based SST service quality model to measure the satisfaction of customer in retail contexts.

The study design adopted in this research was a cross-sectional study, in that the data were collected from the target sample once. This is appropriate since the goal is not to measure satisfaction changes over time but to measure current levels of customer satisfaction and compare them across the contexts of the store. In consumer satisfaction research (‘Measuring Satisfaction of Customer and Quality of Services Using a Mediated Moderation Analysis’, 2023; Taufique et al., 2024) A cross sectional survey design was used to gather similar data to test the structural relationships between the constructs of SST satisfaction. The study is also comparative in nature, as the results of international students experiences are gathered at Prisma, K-Citymarket, and Lidl at the same time, so the results can be compared systematically to see if the level of satisfaction and the factors which influence it vary between the three chains.

3.2 Data Collection

The survey was built using Webropol survey and had a total of 28 questions split into two sections. The questions in Section A (Questions 1 to 8) are background questions, and Questions 9 to 10 are general questions related to the usage of digital services. The questions ask about the demographic characteristics, ability to speak Finnish, frequency of grocery shopping, preferred store location, and patterns in using digital services. Section B consists of 18 experience questions (Q11 to Q28) which are presented across the five SERVQUAL dimensions which are Tangibles (Q11 to Q13), Reliability (Q14 to Q17), Responsiveness (Q18 to Q21), Assurance (Q22 to Q25), and Empathy (Q26 to Q28), each representing both the respondent expectation and his or her perception of the service attribute described. All questions are set in English, which can be easily read, understood, and answered without language barriers to international students. English was chosen as the language of the survey to make it accessible, easy, and fair for all students, regardless of nationality or educational background.

In the Section B questions, answers were given on two measures for each item 1 an Expectation rating as to what they would expect if they had a great digital grocery service, and 2 as a Perception rating as to what they actually experienced at Finnish grocery stores. The ratings were made on a 5-point Likert scale (1 is strongly disagree, 5 is strongly agree). The dual rating design is the hallmark of the SERVQUAL gap analysis methodology created by (Parasuraman et al., n.d.) To ensure comparability with previous consumer behavior studies, (Taufique et al., 2024) adopted a similar five point Likert scale in their extended TAM study, and (Tian et al., 2023) used the same scale format in their study of TAM and the Theory of Planned Behavior.

The key analytical formula used for the data collected in Section B is the SERVQUAL Gap Self-checkout system.

$$\boldsymbol{Gap\ Self-checkout\ system\ =\ Perception\ (P)\ -\ Expectation\ (E),}(1)$$

Where,

P = respondent rating of actual experience (1 to 5)

E = respondent rating of prior expectation (1 to 5)

A negative gap(P- E < 0) indicates dissatisfaction and an area for improvement.

A zero or positive gap (P- E ≥ 0) indicates that expectations were met or exceeded.

The overall SERVQUAL self-checkout system for each dimension is the mean gap between the 18 experience items of the dimension; the overall service quality system is the mean gap between the 18 experience items. This formula will compare the levels of satisfaction for the five dimensions, and for the three grocery store chains (Prisma, K-Citymarket, and Lidl), and will help identify in which dimension and which grocery store the greatest expectation and perception gap exists from the perspective of international students.

The sample size was determined following the traditional sample size formula for an unknown population, like that used in other consumer research in Finland:

$$\textit{Necessary Sample Size} = (\textit{Z-self-checkout system})^2 \times \textit{StdDev} \times (1 - \textit{StdDev}) \div (\textit{Margin of Error})^2 \tag{2}$$

Where,
Z-self-checkout system = 1.96 (95*%* confidence level)
Standard Deviation = 0.5 (recommended for an unknown population)
Margin of Error = 0.07

To ensure a high level of statistical certainty in the results, a 95% confidence level was chosen, which equates to a Z value of 1.96. This study has a clearer cut target population compared to those studies that aim at a totally unknown national population. Based on the data from institutions that are available for public use, the number of international students at the University of Vaasa in 2024 was approximately 621, and at VAMK (Vaasa University of Applied Sciences), approximately 681, which brings the estimated number of international students in Vaasa to approximately 1,302. The known finite population size makes it possible to calculate the sample size using the finite population correction formula, which is used in this study:

$$n = (Z^2 \times p \times q \times N) / (e^2 \times (N-1) + Z^2 \times p \times q), \tag{3}$$

where, $N = 1{,}302$, $Z = 1.96$, $p = 0.5$, $q = 0.5$, and $e = 0.07$.
When applied to this formula, it indicates that about 186 respondents are needed. Since the participation in the survey was voluntary and the snowball sampling was used, at least 100 completed responses were chosen as the minimum number of respondents, which is consistent with the minimum recommended by (Hair et al., 2019) in the context of PLS-SEM. The actual reachable population is larger than that of Vaasa alone, as the

survey also got international students in other cities of Finland via common WhatsApp and Facebook networks this also adds strength to the minimum target of 100 respondents. This research aimed to achieve at least 70 usable answers, which were also based on the research of (Hair et al., 2019), which uses PLS-SEM models, with a minimum of 100 cases. A margin of error (MOE) was determined with the formula.

MOE = √[Population Proportion × (1 − Population Proportion) ÷ Sample Size] × Z-self-checkout system **(4)**

The survey was made available via a number of targeted channels online, targeting international students living in Vaasa, but also international students in other cities around Finland. The researcher, being a member of the concerned student communities, personally posted the survey link in the following groups The Facebook group "Vaasa Nepalese Society", The Facebook group "Nepalese in Finland," and through the networks of the association "University of Vaasa Student Union". The survey was distributed through Facebook, WhatsApp groups of international students from different countries, Instagram, and Messenger. Personally approached other international students from various national backgrounds to ask them to share the survey among their peers within their own networks to facilitate a snowball sampling effect to reach other students. The decision for this platform is to approach was based on the fact that an informal social media list is the most active way for international students to be reached in Vaasa, as opposed to formal institutional email lists. Considering the geographic distribution of international students in several different places in Finland, and their use of digital communication platforms, online digital distribution is suitable for this population. A consumer survey research that achieved good results with the online social media and community platform distribution was carried out by a consumer survey research carried out by (Rahman et al., 2022), and (Ūsas et al., 2024) on a digitally active group of consumers. The target group included international students (students in a Finnish university or university of applied sciences whose main language is not Finnish or Swedish) who have personally bought food in Finland and who have experienced or used digital food services at least once. In a similar way, (Shahid Iqbal et al., 2018) conducted their SST study only with the active users of SST, and applied a purposive sampling method to ensure that all of the respondents had first-hand experience with the SST they were evaluating.

Distributed through the social media channels and student networks as mentioned above, to an estimated audience of more than 150, including around 100 members of the Facebook groups Nepalese in Vaasa and Nepalese in Finland, and around 50 members of the WhatsApp groups, plus individual contacts through Instagram and Messenger. Seven data sets are currently available, and data collection is ongoing. The response rate will be formally calculated at the end of data collection, following the formula below, Response Rate (%) = (Completed responses / Number of people reached) x 100. Once the entire data set is collected, a response rate calculation will be provided and discussed in Chapter 4. The self-selected and unobtrusive nature of the social media distribution makes a response rate realistic, consistent with other online survey research studies with student sample populations(Rahman et al., 2022).

3.3 Data Analysis Method

If quantitative data is not processed, then it is not interpretable. In this regard, data obtained in the survey were analyzed descriptively, through SERVQUAL gap analysis and by statistical comparison. The raw data were organized using Webropol, and charts and graphs were created. Statistical values were calculated, and tests were conducted.

First, the frequencies and distributions of the answers to the background questions in Section A were examined and presented in tables and with the help of descriptive statistics to get a clear picture of the composition of the sample. This is the first step that follows the line of (Subramanian et al., 2014), who performed descriptive statistics to be followed by a structural model in their study of the Chinese retail customers.

Secondly, the responses in Section B were processed using the core SERVQUAL gap analysis. The mean Gap Self-checkout system (P - E) was subsequently calculated for all the respondents for each of the 18 experience items and then aggregated by SERVQUAL dimension (Tangibles, Reliability, Responsiveness, Assurance, Empathy) to give five Gap Self-checkout system for each dimension. A negative mean gap self-checkout system reflects that ordinary people perceptions were lower than what they expected for this dimension, which means they were not satisfied. A self-checkout system of zero or positive means that they were satisfied with average or higher than their expectations. According to ('Measuring Satisfaction of Customer and Quality of E -Services Using a Mediated Moderation Analysis', 2023), who employed PLS-SEM to examine the relationship between service quality and customer satisfaction, and those who investigated the dimensions of service quality among three ecommerce providers used similar dimension level aggregation to determine which dimensions of service quality are most critical to dissatisfaction(Dhingra et al., 2020).

Third, cross store comparison was performed by calculating the dimension level and overall SERVQUAL gap self-checkout system separately for the respondents who mainly shopped at Prisma, K-Citymarket, or Lidl. This allows for an analysis to be made to identify if there is a bigger or smaller gap between expectations and perceptions between each chain and the various service quality dimensions for the international students. The one-way ANOVA was used to determine if there were significant differences between the mean gap self-checkout system for the three store groups, followed by the Tukey HSD test, which was used for determining which specific chain pairings were responsible for the overall difference. In their extended TAM study (Taufique et al., 2024) used a similar group analysis to examine structural model paths in various shopping scenarios.

Fourth, to gain insights into possible background variable interactions, selected background variables were used to perform subgroup analyses. Not all the survey questions were examined in relation to each background variable only the cases in which the answers to the survey question were clearly related to a specific background attribute, example language skills in the Finnish language or country of origin, were described and presented in more detail. In some cases, higher Finnish language proficiency is clearly associated with lower ratings in the perception of the Empathy and Tangibles dimensions in these cases, the relationships between the dimensions were investigated in more detail by using tabulations and correlation analyses. Questions that had answers that did not seem to depend on background variables were studied using a general approach. This selection of background variable analysis methods follows the approach given by (Goutam et al., 2022) to highlight the analysis of the subgroups that provided the most theoretically relevant results.

3.4 Validity and Reliability

(Heale & Twycross, 2015) define validity as how accurately the study results describe what they are intended to be measuring, and reliability as the consistency of the method. If the results are a true reflection of what the researcher is trying to measure, then the study is valid, and if the same results can be achieved if the study is conducted again under similar conditions, then it is reliable. Both of these are very significant aspects of research, as if they were not valid and reliable, it would be impossible to draw any conclusions from the study, and the results would not be dependable.

This study is supported by a number of design decisions. The questions used in the questionnaire were designed as much as possible to be understood and answered exactly as intended, to minimize misunderstandings with the questions, and ensure all respondents interpreted and answered each question as intended, irrespective of English language proficiency. The study focuses specifically on retail shopping and the investigation of the construct validity of the instruments used for measuring service quality(Parasuraman et al., n.d.), a framework that has been extensively validated in service quality research contexts over the past 30 years, and therefore has a high level of content validity in the field of consumer survey research. (Hung-Joubert, 2017), The rating of Section B items further enhances the construct validity by making the operationalization of the gap construct SERVQUAL between expectation and perception as direct and transparent as possible, without leaving too much room for interpretation as to what is being measured.

The internal consistency of the measurement scales and the clarity and neutrality of the survey instrument provide support for the reliability of the study. The questionnaire was completed anonymously, and only background variables that were not identifying were collected, which eliminated any social desirability bias that respondents may have had to answer in a way that would please the interviewer. The fact that no incentives or rewards were offered to those who responded to the survey allowed it to be assumed that honesty was the rule, which was the case for (Shahid Iqbal et al., 2018) In their service quality study, they said that if there were no incentives, then response bias would be reduced. In the same kind of studies for consumer satisfaction, (Taufique et al., 2024) and (Bhattacharya & Mulay, 2024) presented Cronbach's alpha as the main reliability coefficient, continuing the tradition in the research field.

The sample size was determined by applying one of the statistical formulas that has been tested, so that the sample size is adequate and contributes to the validity of the results. The size of the margin of error for the research will be based on the final number of people sampled, and conclusions will be drawn with due consideration to this margin of error. The sampling approach involved targeting international students in multiple cities in Finland via various online channels and was to ensure that the results were as representative as possible within the population, and not a convenience subsample of the international student population.

The limitations of the study design, which is cross sectional and conducted in a single country and segment, are recognized and acknowledged, and the findings of the study can only be applied to the international student population in grocery retail in Finland. Also, the topic of this study digitalization of grocery retail and international student consumer experiences is still evolving with the development of technology and store policies, so the results may change in future studies. This, however, does not affect the reliability of this study, since the conditions would not be the same as they were when this research was carried out. (Rahman et al., 2022) point out that one country, one context designs are often used and have been argued for in exploratory comparative consumer research with the main purpose of uncovering patterns within contexts and differences across groups. The results from this thesis are thus generalized with caution to the international student population in grocery retailers in Finland, and it is noted that the results would need to be replicated between countries for broader generalizability.

4 Results

This chapter summarizes and analyzes the empirical results gathered in this study from the survey of international students in Finland. The survey aimed the students who already shop at Prisma, K-Citymarket, and Lidl, with a specific focus on their experiences with self-checkout at these three big grocery stores. A total of 141 responses were received, but not all respondents answered every question, and thus, the number of respondents answering each question is reported when they vary from 141.

There are two major sections to the chapter. Eight background questions follow, each with a corresponding figure and table, in Section 4.1, containing the demographic and contextual profile of the respondents. The main research questions of the study are then findout with in Section 4.2. The modified SERVQUAL framework was used to measure the main research questions. Each service quality statement was rated by the respondents using a five-point Likert scale for expectation and perception. As in other consumer survey analysis, each of the statements in Section 4.2 is accompanied by two figures and one table, the first of which displays the distribution of responses, the second displays the values underlying the responses, and the third compares the means for the expectation and perception items to provide insights into the gap in service quality.

4.1 Background Question

The items listed below were added at the beginning of the survey to build a profile of the respondents in terms of their demographics and contextual profile. The following variables serve as background for the analysis of the main findings and give a better overview of the sample characteristics.

4.1.1 Age of the respondents

The survey collected age data from the 141 respondents. The age group with the highest number of respondents is 46.4%, n = 64, was 25 to 29 years, followed by 30 to 34 years old is 23.9%, n = 33, Respondents aged 20 to 24 constitute 16.7%,n = 23, those aged 35 and above represent 10.1%,n = 14, and the smallest group, those under 20, accounts for just 2.9%,n = 4.

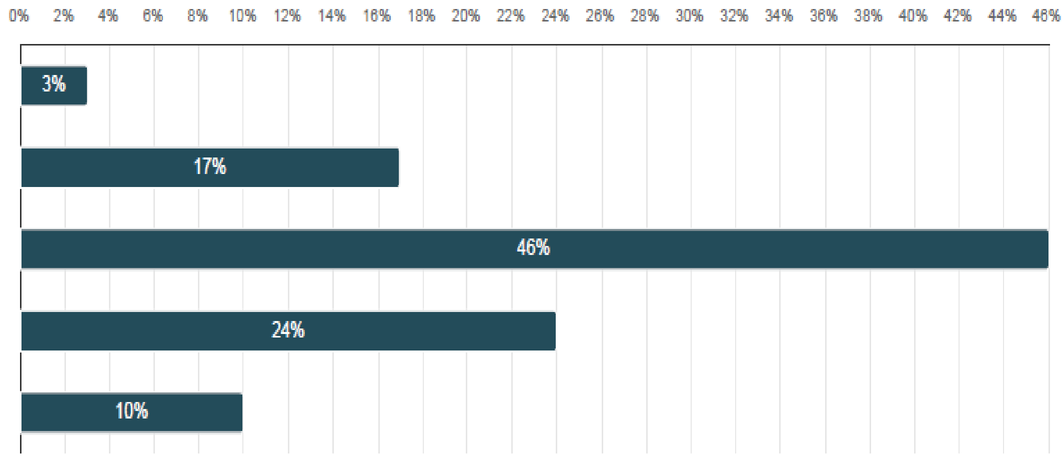

Figure 1: Distribution of respondents by Age Group

The age distribution of the respondents is also indicative of the typical age structure of postgraduate and doctoral students as seen in the age distribution of international students studying masters' and doctoral programmes at universities in Finland. The age distribution indicates that the respondents represent the adult population, who have already had some experience of shopping, and are probably already aware of self service technologies within their own countries, although perhaps not within the Finnish retail context.

	n	Prosentti
Under 20	4	2,9%
20-24	23	16,7%
25-29	64	46,4%
30-34	33	23,9%
35-above	14	10,1%

Table 1: Age Distribution of Respondents.

4.1.2 Gender of the Respondents

126 respondents, gender information was provided. The majority are 63.5%, n = 80, identified as female, and 36.5% identified as male n = 46, as presented in Figure 2 and Table 2. None of the respondents indicated Other or Prefer not to say. The significant gender disparity, in favor of women, could be due to the nature of the programmes offered by the institutions surveyed that are popular among women, who also tend to have higher participation rates in consumer satisfaction surveys.

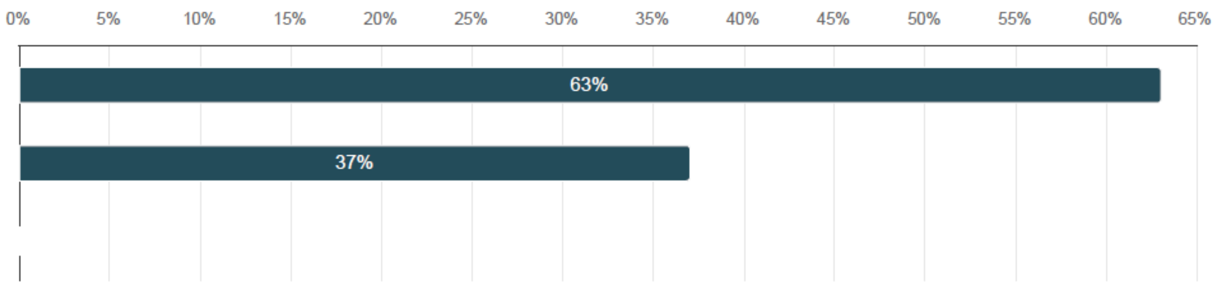

Figure 2: Distribution of Respondents by Gender

	n	Prosentti
Femle	80	63,5%
Male	46	36,5%
Other/ prefer not to say	0	0,0%

Table 2: Gender Distribution of Respondents.

4.1.3 Country or Region of Origin

Figure 3 and Table 3 show the distribution of the respondents by country or region of origin. The majority of the sample consisted of students from South Asian nations like Nepal n = 78, 57.8%, Bangladesh n = 19, 14.1%, India n = 17, 12.6%, and Pakistan n = 16, 11.9%. These four groups of the South Asian community make up about 96.4% of the respondents. The other respondents are two students coming from Ukraine, and one student each from Nigeria, other Asian countries and other European countries.

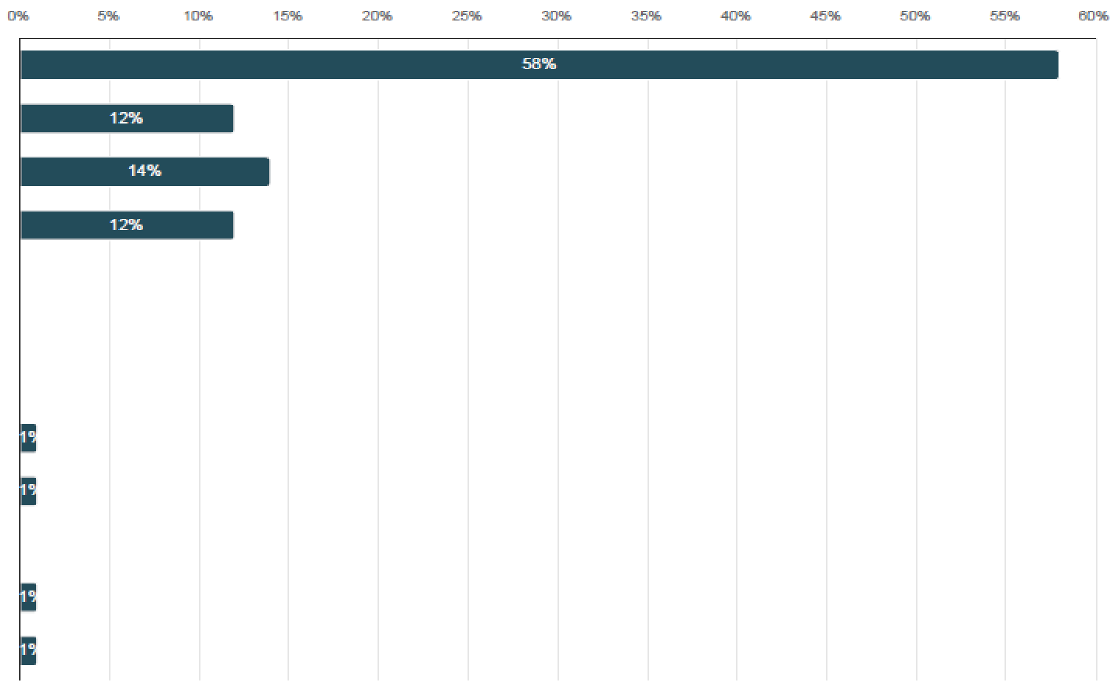

Figure 3: Distribution of Respondents by country or region of origin.

It is not surprising that this is the case as there are a high number of Nepalese, Bangladeshi, Indian, and Pakistani students enrolled in universities of applied sciences and universities in Finland. This concentration should be recognized, however, that the results are for the purposes of interpreting the findings as potentially underrepresented in this sample are perspectives from East Asian, European, and African international student populations.

	n	Prosentti
Nepal	78	57,8%
India	17	12,6%
Bangladesh	19	14,1%
Pakistan	16	11,9%
Vietnamese	0	0,0%
China	0	0,0%
Russia	0	0,0%
Ukraine	2	1,5%
Nigeria	1	0,7%
Other African countries	0	0,0%
Other Asian countries	1	0,7%
Other European countries	1	0,7%
Other	0	0,0%

Table 3: Country or Region of Origin of Respondents.

4.1.4 Length of Stay in Finland

131 respondents reported on the length of stay in Finland. The results show that the majority of the respondents are fairly recent arrivals are 35.9%, n = 47, have lived in Finland for up to six months, and 35.1%, n = 46, for one to two years. Another 9.9%, n = 13, came within 6 months of the survey. Altogether, about 81% of the respondents have stayed in Finland for two years or fewer.

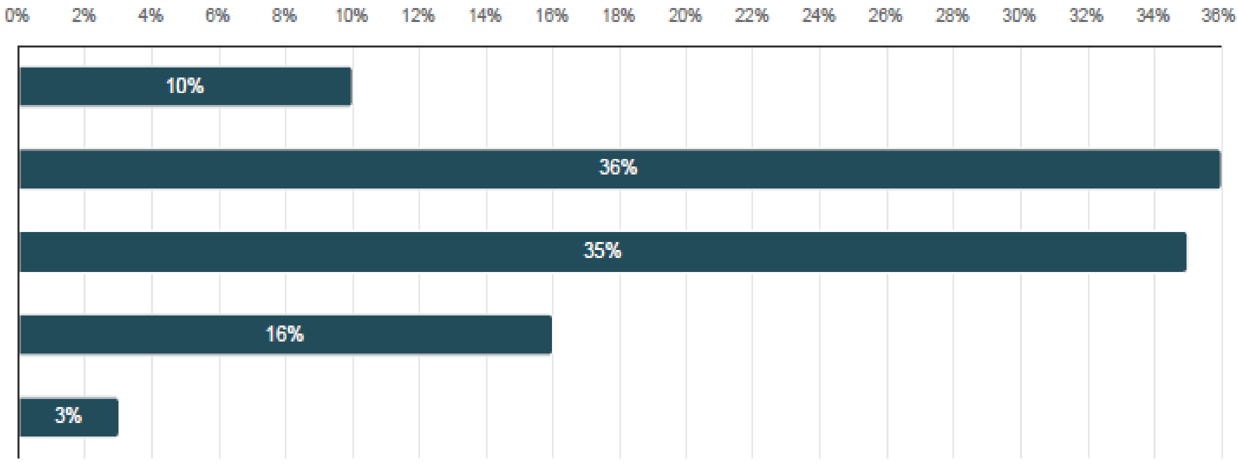

Figure 4: Distribution of respondents by length of stay in Finland.

A small proportion is 16.0%, n = 21, have been living in Finland for 2 to 4 years, and an extremely small proportion is 3.1% ,n = 4, for more than 4 years. Most respondents are at early or transitional stage of cultural integration with relevance to interpretation of experiences with Finnish language interfaces and unfamiliar retail conventions at SCO terminals.

	n	Prosentti
Less than 6 months	13	9,9%
6 months – 1 year	47	35,9%
1–2 years	46	35,1%
2–4 years	21	16,0%
More than 4 years	4	3,1%

Table 4: Length of Stay in Finland.

4.1.5 Finnish Language Skills

The level of proficiency in Finnish language was assessed by 123 respondents on a five-point scale, 4.1.5. The largest group, 40.7%, n = 50, stated that they knew only basic phrases and 26.0%, n = 32, said that they had no knowledge of the Finnish language whatsoever, as presented in Figure 5 and Table 5. Another 25.2%, n = 31 identified as beginners A1 to A2 and 8.1%, n = 10, as intermediate B1 to B2. Significantly, none of the respondents reported advanced or fluent C1 to C2 levels of Finnish.

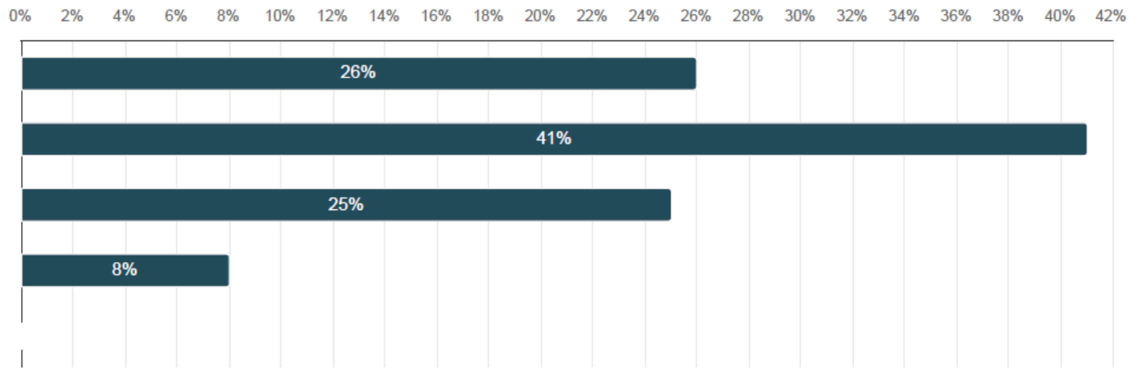

Figure 5: Self-assessed Finnish language proficiency of respondent.

The results are relevant to the research are 91.9% of the respondents use the Finnish language less than fluently or not at all. The language barrier can be a significant problem when using service at Finnish grocery stores, as the self-checkout interfaces are mainly in Finnish with a small number of Swedish language options at some chains. This checkout system also serves as a solid basis to explain the language learning challenges described in the following section.

	n	Prosentti
None at all	32	26,0%
Basic phrases only	50	40,7%
Beginner (A1–A2)	31	25,2%
Intermediate (B1–B2)	10	8,1%
Advanced or fluent (C1–C2)	0	0,0%

Table 5: Self-Assessed Finnish Language Proficiency of Respondents.

4.1.6 Frequency of Grocery Shopping

139 respondents provided 4.1.6 Shopping Frequency data. Figure 6 and Table 6 indicate that there is a clear difference between the number of times participants shopped during the month, with 36.0%, n = 50, shopping 2 to 3 times per month and 23.7%, n = 33, shopping multiple times per week. A further 21.6%, n = 30, shop once a month or less. 16.5%, n = 23 of respondents shop once weekly and only 2.2%, n = 3, never go grocery shopping personally.

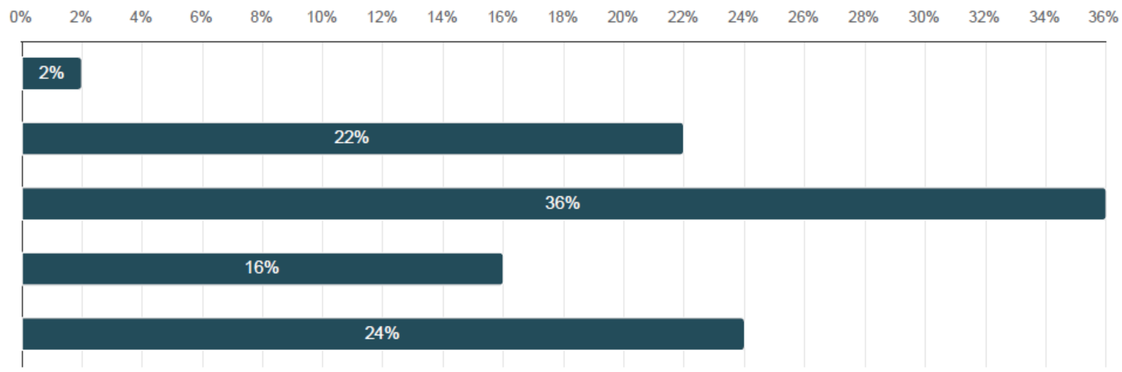

Figure 6: Frequency of grocery shopping in Finland

The relatively high occurrence of shopping which is nearly 40% shop at least weekly, implies that the respondents have frequent and repeatable experiences with the grocery retail environment and the self-checkout system. This level of exposure offers a sound basis for the satisfaction evaluations reported later in this chapter because opinion is based on real world experiences instead of single experiences.

	n	Prosentti
Never	3	2,2%
Rarely (once a month or less)	30	21,6%
Sometimes (2–3 times a month)	50	36,0%
Often (once a week)	23	16,5%
Very Often (multiple times per week)	33	23,7%

Table 6: Frequency of Grocery Shopping in Finland.

4.1.7 Stores Visited

People were asked to mark out the grocery stores they typically visit, they could choose more than one. This question had 141 respondents who answered and 486 selections of the sample total. Lidl was the most visited store, with 84.4%, n = 119 of the respondents choosing it. Lidl was the most visited store, as presented in Figure 7 and Table 7. S-Market and Prisma tied at 79.4%, n =112 each. K-Market was selected by 32.6%,n = 46, and where 34.8%, n = 49, selected Others. K-Citymarket was the least selected of the three stores in the focus of this study only 22.0%, n = 31 and Alepa 12.1%, n = 17. The highlighted three retailers in this study are the ones focusing on the three retailers.

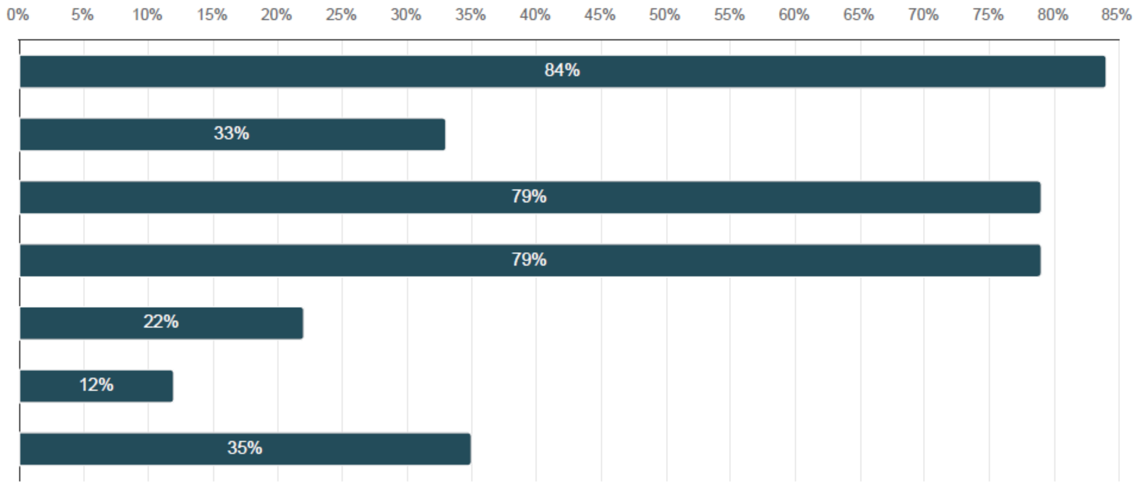

Figure 7: Grocery Store Regularly visited by Respondents (Multiple Selections Permitted)

As Lidl, S-Market, and Prisma are all well known brands with a wide store rollout in university towns, their high visits are not surprising. The stark difference in the rate of visits to K-Citymarket has practical implications for this study the findings for K-Citymarket may apply to a smaller subgroup of respondents who have first-hand experience of K-Citymarket self-checkout system.

	n	Prosentti
Lidl	119	84,4%
K-Market	46	32,6%
S-Market	112	79,4%
Prisma	112	79,4%
K-Citymarket	31	22,0%
Alepa	17	12,1%
Others	49	34,8%

Table 7: Grocery Stores Regularly Visited by Respondents

4.2 Actual Research Questions

This section provides the results of the key research questions for the study. Each service quality statement was assessed by respondents on two measurements expectation, and perception, with a 1-to-5-point Likert scale, ranging from very disagree to very agree. Particularly of interest in analysis is the gap between perception and expectation a positive gap would mean the experience was better than the respondents expected, a negative gap would mean the experience was not as good as the respondents expected.

The eighteen statements are presented within the five SERVQUAL service quality dimensions, but are analysed one by one, just like in other thesis research. The overall distribution of responses is analyzed first figure and then the exact proportions and average values are summarized table, and the expectation and perception means are directly compared figure to identify the gap in service quality.

The first three statements sections 4.2.1 to 4.2.3,assess the tangibles dimension, which encompasses the physical characteristics of the equipment, the visual characteristics of the interface, and the clarity of the instructions.

4.2.1 Modern-Looking Equipment

Respondents rated both their expectations and their experiences with self-checkout machines and digital terminals on a five-point scale 1 = strongly disagree, 5 = strongly agree, in this statement. There is modern looking equipment at self-checkout machines and digital terminals. In figure 8 displays the distribution of responses, and Tables 8 and 9 show the percentages and averages for the underlying responses, respectively. Figure 9 compares the means of expectation with the means of perception.

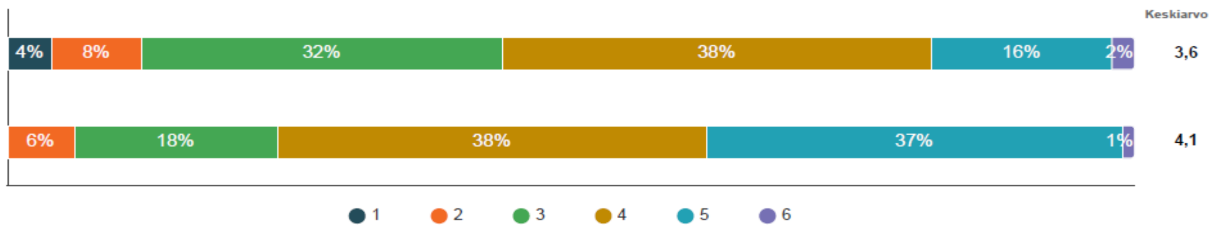

Figure 8: Distribution of responses to ” self-checkout machine and digital terminals have modern-looking equipment (an additional 2.1% of expectation ans 1.4% of perception response selected a sixth scale point, omitted here for clarity).

There is an overall upward shift from what is expected to what is perceived. On the expectation side, the responses were focused in the mid and upper middle range, with 38.3% choosing 4 and 31.9% at the neutral 3. The gap between the distribution of perceptions and expectations was positive (+0.5) with a mean perception self-checkout system of 4.1, while a mean expectation self-checkout system was 3.6, and no respondent at all rated their perception at the lowest point. This means the physical appearance of the self-checkout terminals in Finland was more than what an international student would probably have expected, and a definite advantage of the self-checkout experience.

	1	2	3	4	5	6	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	3,6%	7,8%	31,9%	38,3%	16,3%	2,1%	3,6	4,0
Perception (What the customer actually gets)	0,0%	6,4%	17,7%	37,6%	36,9%	1,4%	4,1	4,0
Yhteensä	**1,8%**	**7,1%**	**24,8%**	**38,0%**	**26,6%**	**1,8%**	**3,9**	**4,0**

Table 8: Expectation and Perception Response Distribution for “Self-checkout machines and digital terminals have modern-looking equipment”

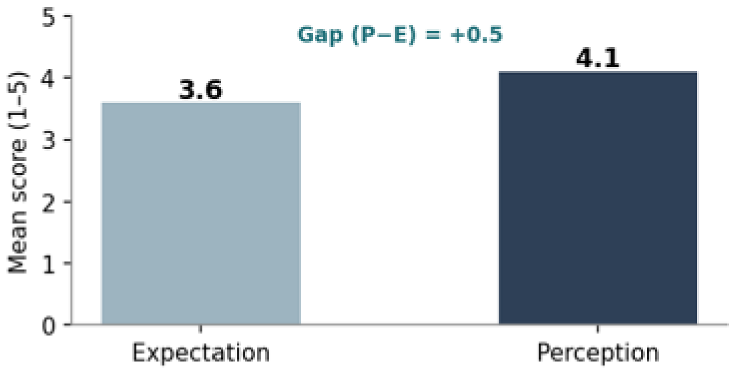

Figure 9: Expectation vs. Perception Mean self-checkout systemres for ”self-checkout machines and digital terminals have modern-looking equipment” (Gap=+0.5)

4.2.2 Visually Appealing and Easy-to-Read Screens

The statement shows that screens and interfaces of digital services are visually appealing and easy to read which was rated by respondents on a five-point scale 1 = very little, 5 = very much, both for their prior expectations and their actual perception. The overall distribution of the responses is displayed in Figure 10, the underlying percentages and averages are included in Table 9 and means for both expectation and perception are compared in Figure 11.

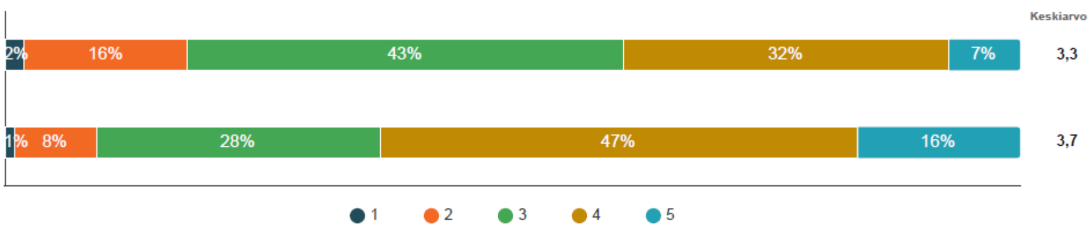

Figure 10: Distribution of Response to ”The screen and interface of digital services are visually appealing and easy to read.”

The distribution is more moderate than the equipment item. Responses to the Expectation scale were clustered around the middle point 3 (43.3%), and only 7.1%

selected the highest rating. Perception responses increased, with significantly more choosing 4 (47.5%) and 15.6% choosing 5, meaning the actual experience of the on-screen interface was rated higher than they had expected.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	1,4%	16,3%	43,3%	31,9%	7,1%	3,3	3,0
Perception (What the customer actually gets)	0,7%	8,5%	27,7%	47,5%	15,6%	3,7	4,0
Yhteensä	1,1%	12,4%	35,5%	39,7%	11,4%	3,5	4,0

Table 9: Expectation and Perception Response Distribution for "The screens and interfaces of digital services are visually appealing and easy to read"

The gap between the expectation and perception means is positive (+0.4). Although positive, the absolute self-checkout system results are lower than the equipment item, which indicates that the interface of the equipment is perceived as somewhat less impressive and may be an area for interface improvement.

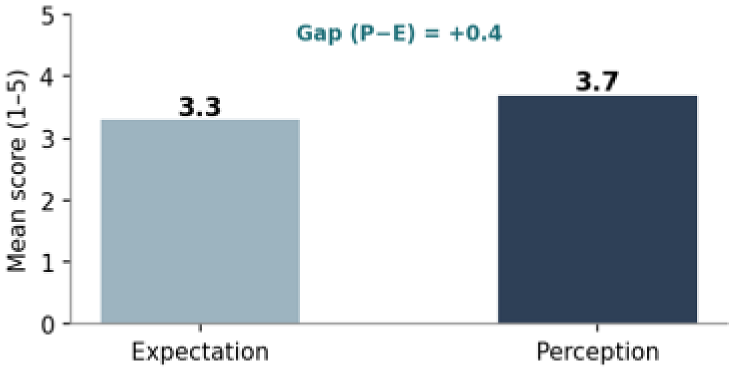

Figure 11: Expectation vs. Perception Mean Self-checkout system for "The screens and interfaces of digital services are visually appealing and easy to read" (Gap = +0.4).

4.2.3 Visual Material Aids Understanding

Respondents rated this statement, Visual material, like signs, product illustrations and instructions on the screen, aids understanding of the use of digital services, on a five point scale 1 = strongly disagree, 5 = strongly agree, both before and after the presentation. Overall distribution of responses is shown in Figure 12, underlying percentages and averages in Table 10, and comparison of the expectation and perception means in Figure 13.

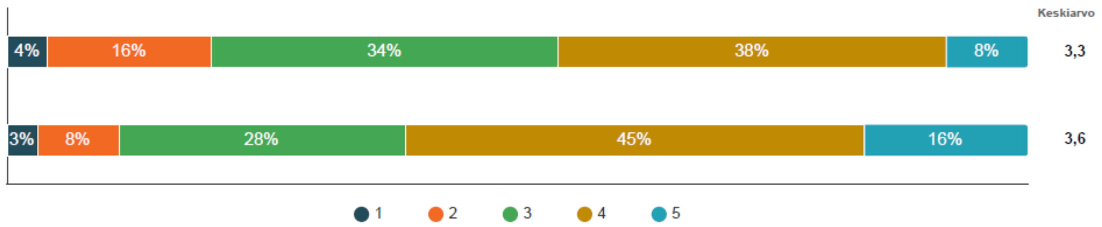

Figure 12: Distribution of Responses to " Visual material such as signs, product images, and on-screen instructions help you understand how to use digital services"

Expectation responses are widely distributed across the neutral and upper middle ranges, with 34.0% of the distribution at point 3 and 38.3% at point 4. Perception responses once again moved upwards, with 44.7% rating it at 4, and 16.3% at 5, though a small proportion (2.8%) still rated their perception at the lowest level.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	4,3%	15,6%	34,0%	38,3%	7,8%	3,3	3,0
Perception (What the customer actually gets)	2,8%	7,8%	28,4%	44,7%	16,3%	3,6	4,0
Yhteensä	3,6%	11,7%	31,2%	41,5%	12,1%	3,5	4,0

Table 10: Expectation and Perception Response Distribution for "Visual material such as signs, product images, and on-screen instructions help you understand how to use digital services"

This item had the smallest positive difference between the expectation mean and the perception mean (+0.3) on the tangibles dimension. This means that in the store teaching signage and visual support are adequate, but not strong. The slight improvement in this component is probably due to the language barriers mentioned in Section 4.1.5, which suggests that visual support alone is not making up for the lack of adequate text instructions.

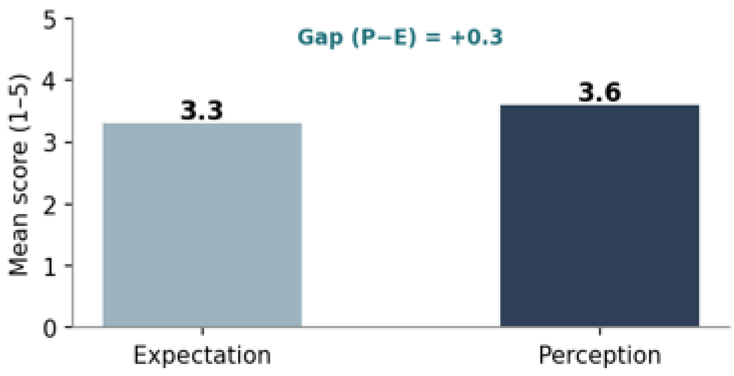

Figure 13: Expectation vs. Perception Mean Self-checkout system for "visual for "Visual material such as signs, product images, and on-screen instructions, helps to understand how to use digital services" (Gap = +0.3)

The next four statements sections 4.2.4 to 4.2.7, quantify the reliability dimension that deals with the capacity of digital services to do what they are supposed to do reliably and accurately.

4.2.4 Performs Tasks Correctly the First Time

This statement Digital services work the first time, was self-checkout system by the respondents on their previous expectation and actual perception on a 5 point scale 1= strongly disagree to 5= strongly agree, according to the following, responses for overall distribution are displayed in Figure 14, underlying percentages and averages in Table 11, and a comparison of expectation and perception mean in Figure 15.

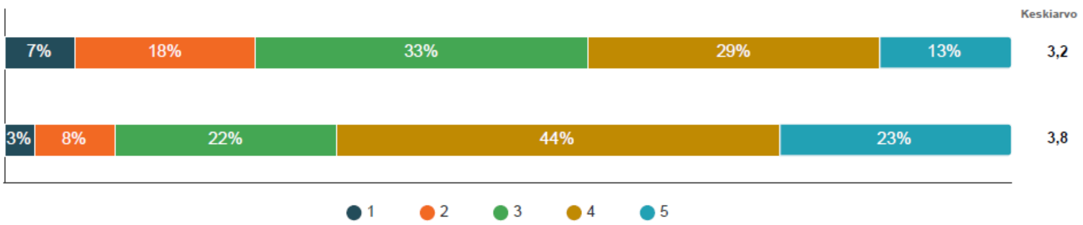

Figure 14: Distribution of Responses to ”Digital services perform tasks correctly the first time”

The result of this statement was one of the largest changes in the survey. There was some degree of caution in the expectation responses, with 17.7% choosing point 2 and 7.1% the lowest point, which was the highest of all low end expectation responses. It is not surprising that this warning is appearing, as respondents are not used to working with these systems. However, there were more positive responses for perception, with 44.0% choosing 4 and 22.7% choosing 5.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	7,1%	17,7%	33,3%	29,1%	12,8%	3,2	3,0
Perception (What the customer actually gets)	2,8%	8,5%	22,0%	44,0%	22,7%	3,8	4,0
Yhteensä	5,0%	13,1%	27,7%	36,6%	17,8%	3,5	4,0

Table 11: Expectation and Perception Response Distribution for “Digital services perform tasks correctly the first time”

The largest positive gap (+0.6) in the entire reliability dimension is the expectation mean of 3.2 and a perception mean of 3.8. When it came to self-checkout systems, international students were moderately confident that they would work the first time, but during their experience, the self-checkout systems were found to be a great success with respect to their first time reliability.

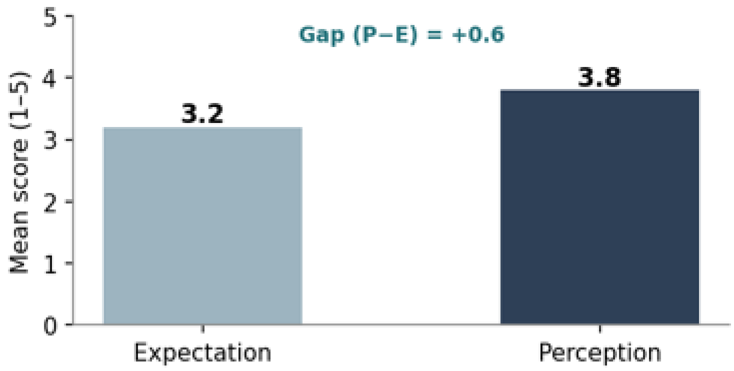

Figure 15: Expectation vs. Perception Mean Self-checkout system for ”Digital services perform tasks correctly the first time” (Gap = +0.6)

4.2.5 Accurate Scanning, Pricing, and Payment

The statement Digital services can accurately scan products, calculate prices, and process payments, was rated by the respondents on a five point scale 1 = strongly disagree, 5 = strongly agree, both for their previous expectations and their experiences with the digital service. Figure 16 shows the distribution of responses, Table 12 shows the underlying percentages and averages, and Figure 17 compares the means of the expectation and perception.

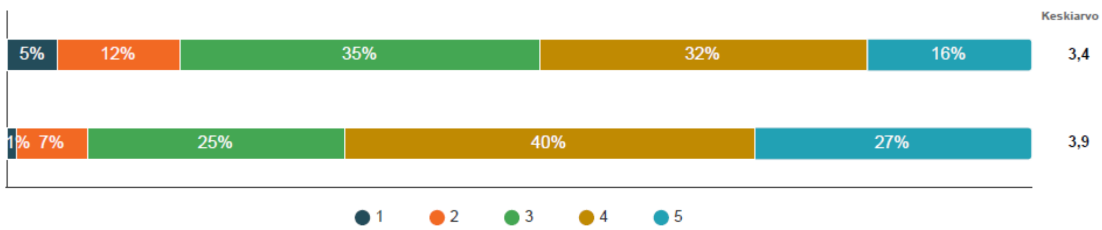

Figure 16: Distribution of Responses to ”Digital services accurately scan products, calculate prices, and process payments”

Expectation responses are mostly grouped at point 3 (35.0%) and point 4 (32.2%) in the distribution. Responses to perception moved distinctly up, with a 40.3% response in the highest rated category of 4, and at 27.3% response in the highest rated category of 5, only 1.4% responded to the lowest level of perception.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,0%	11,4%	35,0%	32,2%	16,4%	3,4	3,0
Perception (What the customer actually gets)	1,4%	6,5%	24,5%	40,3%	27,3%	3,9	4,0
Yhteensä	**3,2%**	**9,0%**	**29,8%**	**36,3%**	**21,9%**	**3,6**	**4,0**

Table 12: Expectation and Perception Response Distribution for "Digital services accurately scan products, calculate prices, and process payments"

The gap between the expectation mean (3.4) and the perception mean (3.9) shows high confidence in the core transactional accuracy of the systems (+0.5). This is heartening, because a key technical role of self-checkout is scanning and payment, and respondents certainly feel that this is a reliable function.

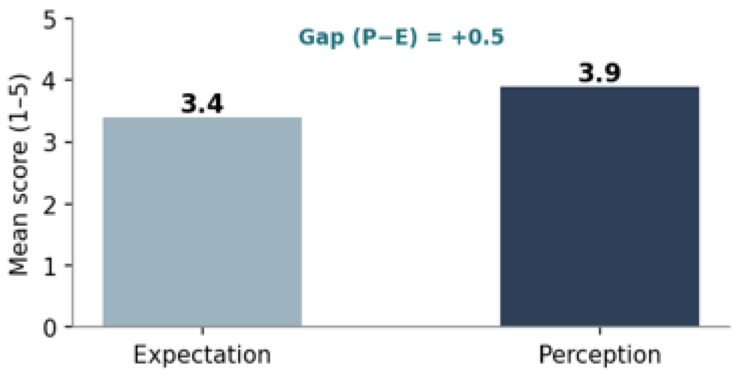

Figure 17: Expectation vs. Perception Mean Self-checkout system for "Digital Services accurately scan products, calculate prices, and process payments" (Gap = +0.5)

4.2.6 Sincere Interest in Solving Problems

Respondents rated their previous expectations and actual perceptions of this statement on a 5 point scale 1 = strongly disagree, 5 = strongly agree, as follows, when I face a problem with a digital service, the store shows sincere interest in solving it. Figure 18 shows the overall distribution of responses, with the underlying percentages and averages shown in Table 13, and the means of expectation and perception are compared in Figure 19.

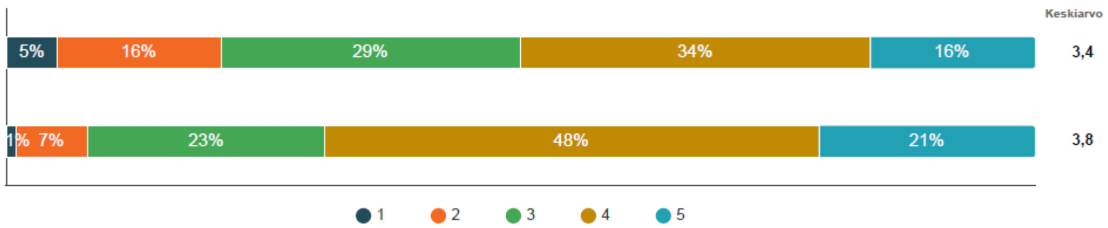

Figure 18: Distribution of Responses to "When I face a problem with a digital service, the store shows sincere interest in solving it"

Responses that matched the student expectations were distributed across the scale, with the highest self-checkout system being 4 (34.0%), and many responses were at point 2 (15.6%). Perception responses focused mainly on point 4 (48.2%), with an additional 20.6% at point 5, being the highest individual concentration in that point for this item.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,0%	15,6%	29,1%	34,0%	16,3%	3,4	4,0
Perception (What the customer actually gets)	0,7%	7,1%	23,4%	48,2%	20,6%	3,8	4,0
Yhteensä	2,9%	11,4%	26,3%	41,1%	18,5%	3,6	4,0

Table 13: Expectation and Perception Response Distribution for "When I face a problem with a digital service, the store shows sincere interest in solving it"

A positive gap (+0.4) occurs when the expectation mean is lower than the perception mean. The moderate to positive gap indicates that problem resolution typically works as expected, although it does not perform as well as the systems do the first time around.

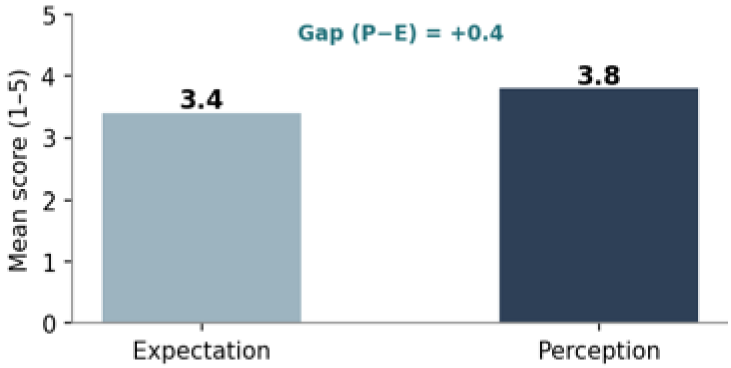

Figure 19: Expectation vs. Perception Mean self-checkout system for "When I face a problem with a digital service, the store shows sincere interest in solving it" (Gap = +0.4)

4.2.7 Services Delivered Exactly When Promised

The statement "Online orders, delivery times, and promised services are fulfilled exactly as promised," respondents rated their previous expectation and perception of the statement on a 5 point scale 1 = strongly disagree, 5 = strongly agree, with 4.2.7 being the same for both. The overall distribution of responses is shown in Figure 20, their underlying percentages and averages are reported in Table 14, and the means for expectation and perception are compared in Figure 21.

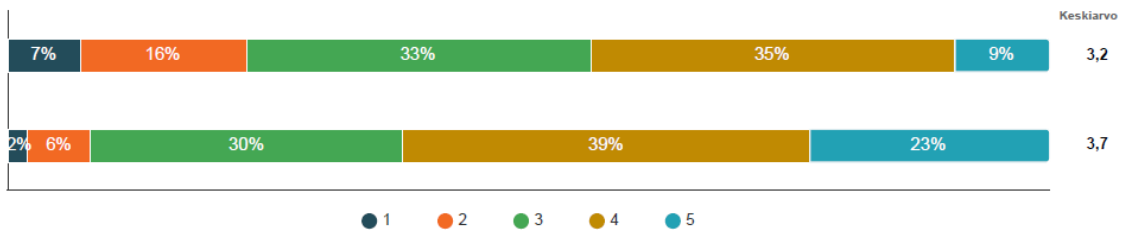

Figure 20: Distribution of responses to "Online orders, delivery time, and promised services are delivered exactly when promised"

Responses to the question of expectation were more reserved, with 33.6% of the respondents at the neutral level and 8.6% at the best possible rating. Perception responses rose up with 39.0% at point 4 and 22.7% at point 5, which means that the timing reliability was perceived better than expected.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	7,1%	15,7%	33,6%	35,0%	8,6%	3,2	3,0
Perception (What the customer actually gets)	2,1%	5,7%	30,5%	39,0%	22,7%	3,7	4,0
Yhteensä	**4,6%**	**10,7%**	**32,1%**	**37,0%**	**15,7%**	**3,5**	**4,0**

Table 14: Expectation and Perception Response Distribution for "Online orders, delivery times, and promised services are delivered exactly when promised"

The gap (+0.5) shows that the wider digital service ecosystem is more reliable than the international students expectations were initially, with an expectation mean of 3.2 and a perception mean of 3.7, across all reliability items.

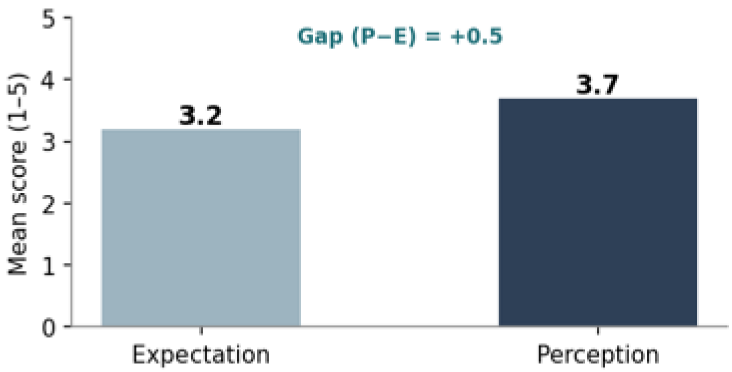

Figure 21: Expectation vs. Perception Mean self-checkout system for "Online orders, delivery time, and promised services are delivered exactly when promised" (Gap = +0.5)

The next four statements items 4.2.8 to 4.2.11, are related to the responsiveness dimension, which relates to the willingness and speed of staff to offer help, this is an important dimension, as there are staff members working behind the self-checkout.

4.2.8 Staff Quickly Available at Self-Checkout

Staff are immediately available when you need assistance at self-checkout or other digital services was rated on a 5 point scale 1 = strongly disagree, 5 = strongly agree, to compare against what the respondents think is the expectation. The overall frequency of responses is given in Figure 22, underlying percentages and averages are provided in Table 15, and expectation and perception means are compared in Figure 23.

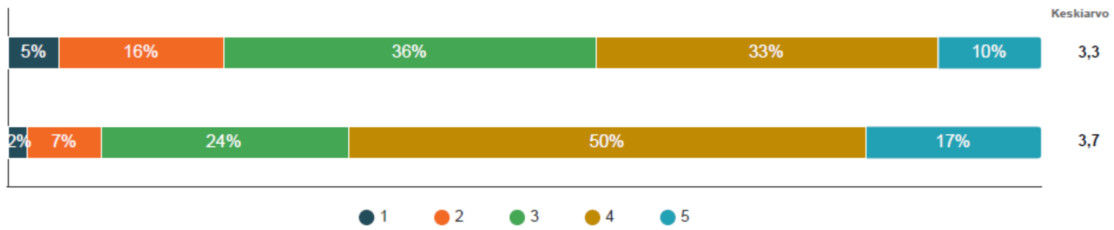

Figure 22: Distribution of Responses to "Staff are quickly available when you need help at self-checkout or other digital services."

Responses at the neutral point 3 (35.7%) were highest, followed by the responses at point 4 (32.9%). Responses to the perception scale climbed significantly, with a significant 50.4% of people choosing point 4, which was the highest number at any point for this item, and 17.0% at point 5.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,0%	16,4%	35,7%	32,9%	10,0%	3,3	3,0
Perception (What the customer actually gets)	2,1%	7,1%	23,4%	50,4%	17,0%	3,7	4,0
Yhteensä	3,6%	11,8%	29,6%	41,7%	13,5%	3,5	4,0

Table 15: Expectation and Perception Response Distribution for "Staff are quickly available when you need help at self-checkout or other digital services"

This positive gap (+0.4) is the result of the expectation mean of 3.3 and the perception mean of 3.7. The high clustering of the numbers at point 4 at the perception side suggested that self-checkout staff availability is perceived by international students as adequate.

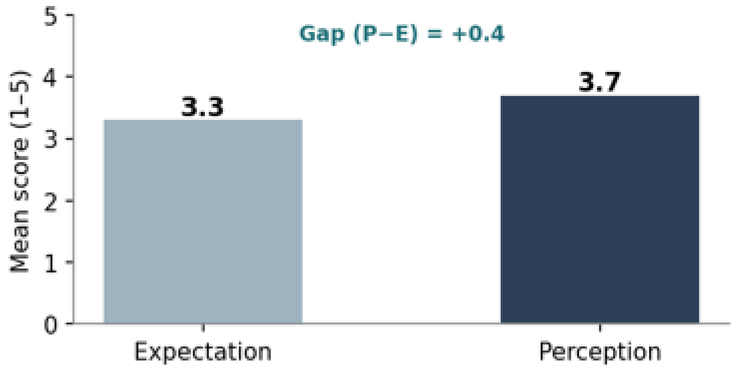

Figure 23: Expectation vs. Perception Mean self-checkout system for "Staff are quickly available when you need help at self-checkout or other digital services." (Gap = +0.4)

4.2.9 Staff Willing to Help International Customers

This statement was rated by respondents on a five-point scale 1 = strongly disagree, 5 = strongly agree. Store staff are willing to help international customers with digital services. The overall distribution of responses is shown in Figure 24, the underlying percentages and averages are presented in Table 16, and the means of the expectations and perceptions are compared in Figure 25.

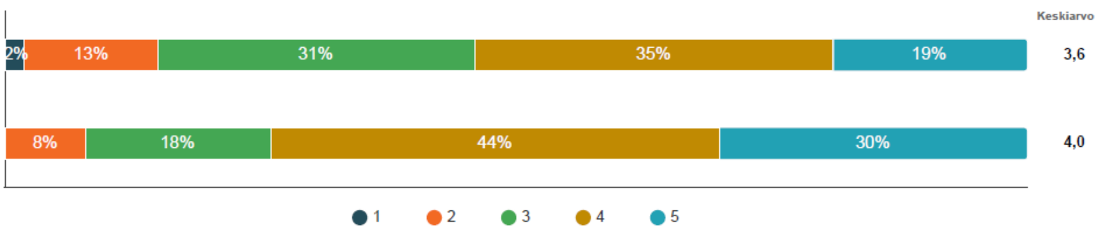

Figure 24: Distribution of Responses to "store staff are willing to help international customers with digital services"

This response generated very high self-checkout system responses on both dimensions. The expectation responses were already positive, 34.8% at point 4 and 19.1% at point 5, and the perception responses were even better, 44.0% at point 4 and 30.5% at point 5, no respondents rated their perception at the lowest point.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	2,1%	12,8%	31,2%	34,8%	19,1%	3,6	4,0
Perception (What the customer actually gets)	0,0%	7,8%	17,7%	44,0%	30,5%	4,0	4,0
Yhteensä	1,1%	10,3%	24,5%	39,4%	24,8%	3,8	4,0

Table 16: Expectation and Perception Response Distribution for "Store staff are willing to help international customers with digital services"

This item had an expectation mean of 3.6, a perception mean of 4.0, a gap of +0.4, and a survey perception mean of 4.0. It is a good finding, especially in view of the existing documentation of the language barrier issues, as it indicates that the staff's readiness to help at least in part for the language barrier at the level of the interface.

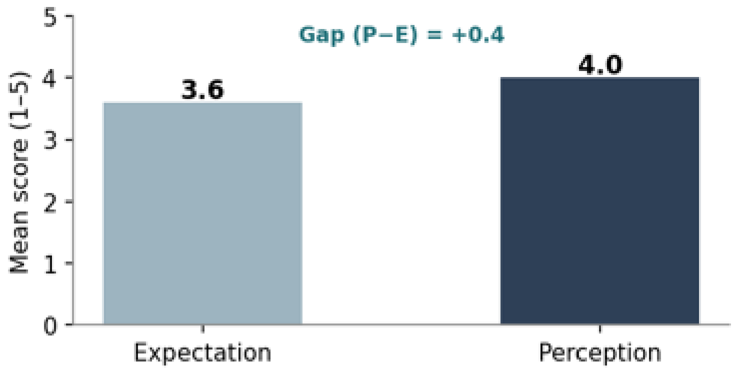

Figure 25: Expectation vs. Perception Mean self-checkout system for "store staff are willing to help international customers with digital services" (Gap = +0.4)

4.2.10 Clear Communication of Service Timing

The statement 'Digital services clearly tell me when services will be performed' was rated by the respondents on a scale of 1 to 5 (1 = strongly disagree, 5 = strongly agree) for their prior expectations as well as their perception. Figure 26 shows the overall distribution of responses, the underlying percentages and averages are reported in Table 17, and Figure 27 compares the expectation and perception mean.

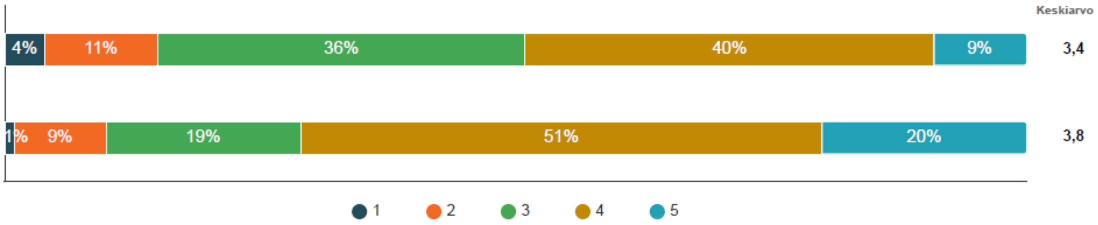

Figure 26: Distribution of Response to ”Digital services clearly tell me when services will be performed”

People's expectation answers reached their max at point 4 with 40.4%, and just 35.5% at neutral point. Responses to perception focused even more strongly on point 4 (51.1%) with 19.9% on point 5, showing that the experience of the communication of timing information was more positive than predicted.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	4,3%	11,3%	35,5%	40,4%	8,5%	3,4	3,0
Perception (What the customer actually gets)	1,4%	8,5%	19,1%	51,1%	19,9%	3,8	4,0
Yhteensä	2,9%	9,9%	27,3%	45,8%	14,2%	3,6	4,0

Table 17: Expectation and Perception Response Distribution for “Digital services clearly tell me when services will be performed”

The expectation mean is 3.4, and the perception mean is 3.8, with a positive difference of +0.4, suggesting that there is a positive perception of digital services ability to communicate timing and queue information among international students.

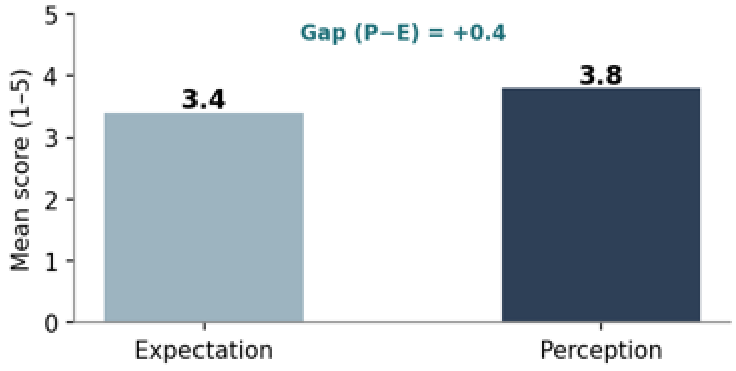

Figure 27: Expectation vs. Perception Mean Self-checkout system for ”Digital services clearly tell me when services will be performed” (Gap = +0.4)

4.2.11 Staff Never Too Busy to Help

Respondents rated their previous expectations and their actual perception on a 5 point scale (1 = strongly disagree, 5 = strongly agree) on this statement, staff are never too busy to help you with digital service problem. Figure 28 shows the distribution of the responses, Table 18 shows the underlying percentages and averages, and Figure 29 shows a comparison of the expectation and perception means.

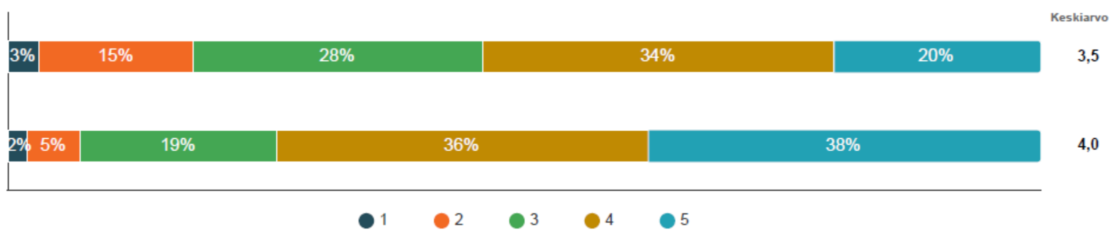

Figure 28: Distribution of Responses to ” staff are never too busy to help you with digital service problems "

Responses to the expectations sections are distributed throughout the scale, with 14.9% of the respondents responding to question 2 which is 34.0% to question 4 (high).

Perception responses turned strongly positive, with a high percentage (38.3%) choosing the highest self-checkout system of 5, and 36.2% at point 4.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	2,8%	14,9%	28,4%	34,0%	19,9%	3,5	4,0
Perception (What the customer actually gets)	1,4%	5,0%	19,1%	36,2%	38,3%	4,0	4,0
Yhteensä	**2,1%**	**10,0%**	**23,8%**	**35,1%**	**29,1%**	3,8	**4,0**

Table 18: Expectation and Perception Response Distribution for "Staff are never too busy to help you with digital service problems"

The gap between the expectation mean and the perception mean (+0.5) shows that staff accessibility is actually a strong point of the Finnish grocery self-checkout experience, with a high concentration of top ratings. This is an important checkout system that helps address concerns about language interface issues because the human is seen as being readily available.

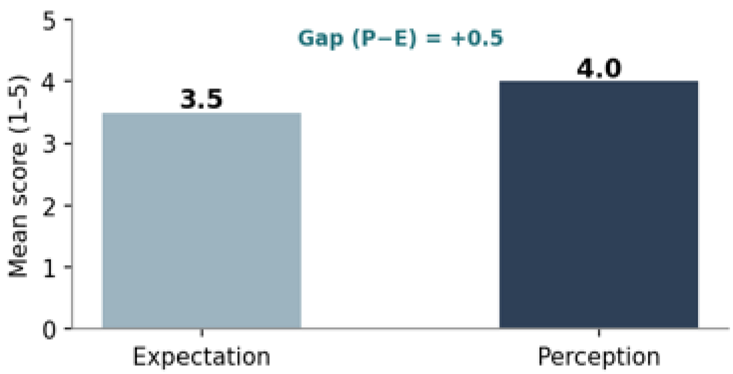

Figure 29: Expectation vs. Perception Mean Self-checkout system for "Staff are never too busy to help you with digital service problems" (Gap = +0.5)

The next four statements 4.2.12 to 4.2.15, reflect the dimension of assurance, which involves how assured customers are in the security, competency, courtesy, and confidence that the service environment provides.

4.2.12 Feeling Safe with Digital Transactions

The following statement was rated by the respondents on a five-point scale (1 = strongly disagree, 5 = strongly agree) both before and after using digital services. I feel safe and secure when using digital services for transactions. Overall distribution of responses is shown in Figure 30, underlying percentages and averages are shown in Table 19, and means of the expectation and perception are compared in Figure 31.

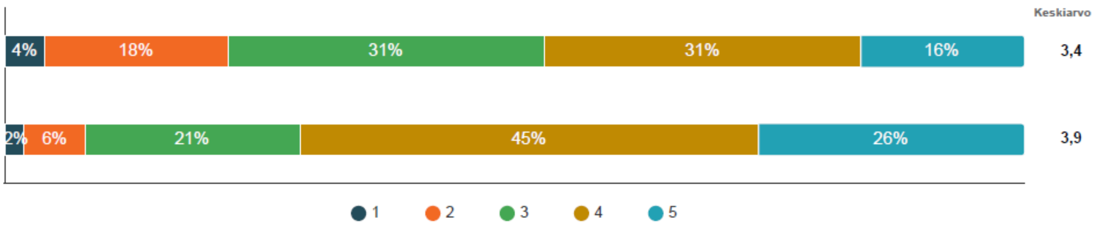

Figure 30: Distribution of Response to "I feel safe and secure when making transactions through digital services"

Responses to the question of expectation were more evenly distributed, and 18.4% and Perception responses definitely ascended with 45.4% at point 4 and 26.2% at point 5.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	4,3%	18,4%	30,5%	31,2%	15,6%	3,4	3,0
Perception (What the customer actually gets)	1,4%	6,4%	20,6%	45,4%	26,2%	3,9	4,0
Yhteensä	2,9%	12,4%	25,6%	38,3%	20,9%	3,6	4,0

Table 19: Expectation and Perception Response Distribution for "I feel safe and secure when making transactions through digital services"

A positive gap of +0.5 is observed here, showing respondents feeling of being safe when making digital payment at self-checkout in Finland, which is a crucial factor in encouraging cashless and contactless payment adoption among international student users.

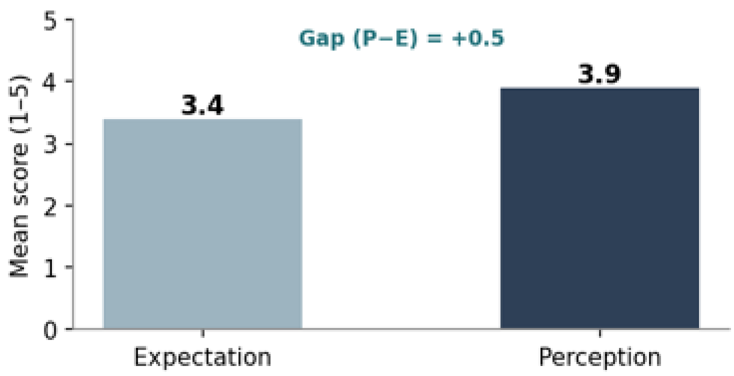

Figure 31: Expectation vs. Perception Mean Self-checkout system for ”I feel safe and secure when making transactions through digital services” (Gap = +0.5)

4.2.13 Staff Courteous to International Customers

The statement Finnish grocery store staff is always polite to international customers, was rated by respondents both according to their previous expectation and their actual perception on a 1 to 5 scale (1 = strongly disagree, 5 = strongly agree). The overall distribution of responses is shown in Figure 32, the underlying percentages and averages are shown in Table 20, and the means of the expectation and perception data are compared in Figure 33.

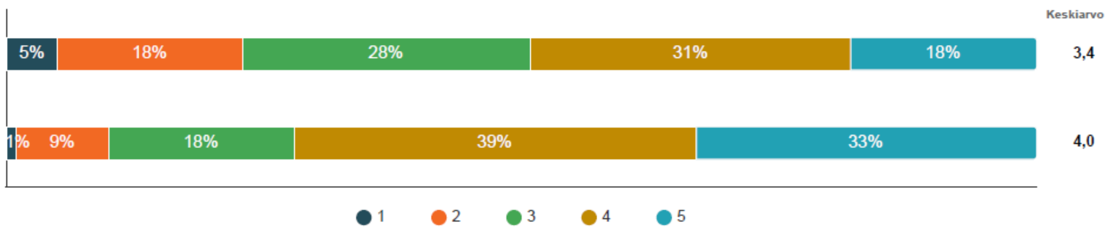

Figure 32: Distribution of Responses to ”staff at Finnish grocery stores are consistently courteous to international customers”

Responses to the question of expectations were somewhat mixed, with 18.4% at point 2 and 39.0% at point 4, and 33.4% at point 5, with only 0.7% at the lowest point. Responses to the question of perception were overwhelmingly positive, with 33.4% at point 5 and 39.0% at point 4, while only 0.7% rated their perception at point 2.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,0%	18,4%	27,7%	30,5%	18,4%	3,4	3,0
Perception (What the customer actually gets)	0,7%	9,2%	17,7%	39,0%	33,4%	4,0	4,0
Yhteensä	2,9%	13,8%	22,7%	34,8%	25,9%	3,7	4,0

Table 20: Expectation and Perception Response Distribution for “Staff at Finnish grocery stores are consistently courteous to international customers”

This item had the highest self-checkout system difference between the expectation and perception, with a positive difference of +0.6 on the assurance dimension at a mean of 4.0. The high perception mean indicates that discrimination or rudeness is not a key concern for this sample, and that the interpersonal behaviour of staff is well recognised as a strength of the grocery retail experience for international customers in Finland

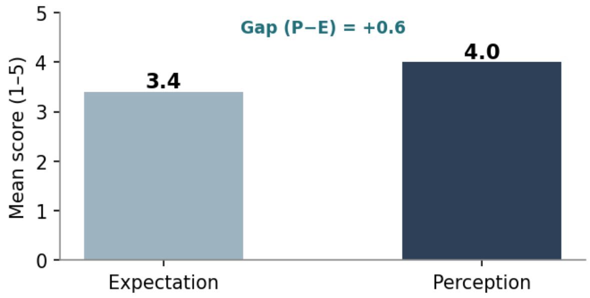

Figure 33: Expectation vs Perception Mean Self-checkout system for ”Staff at Finnish grocery stores are consistently courteous to international customers” (Gap = +0.6)

4.2.14 Staff Knowledge about Digital Services

Respondents rated this statement on a five-point scale, from strongly disagree 1 to strongly agree 5, with regard to their previous expectation and perception, staff have the knowledge to answer my questions about digital services. The overall distribution of responses is shown in Figure 34, the underlying percentages and averages are in Table 21, and the mean of each expectation and the mean of each perception are compared in Figure 35.

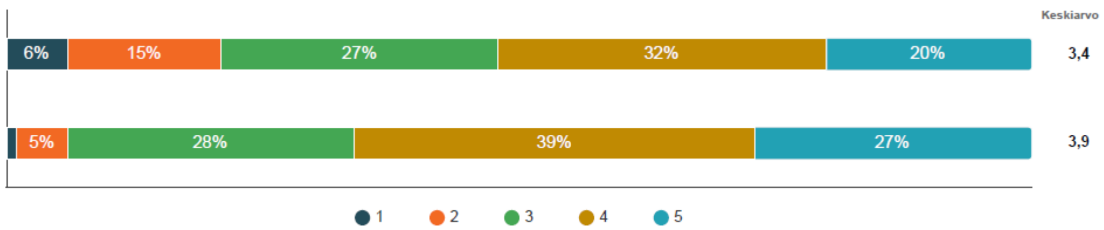

Figure 34: Distribution of Responses to ”Staff have the knowledge to answer my questions about digital services”

Responses to the question of expectation were distributed throughout the range, with 31.9% of them at point 4. Perception responses find to the extremes at point 4 (39.0%) and point 5 (26.9%), with a small middle cluster at the neutral point (28.4%).

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,7%	15,6%	26,9%	31,9%	19,9%	3,4	4,0
Perception (What the customer actually gets)	0,7%	5,0%	28,4%	39,0%	26,9%	3,9	4,0
Yhteensä	3,2%	10,3%	27,7%	35,5%	23,4%	3,7	4,0

Table 21: Expectation and Perception Response Distribution for "Staff have the knowledge to answer my questions about digital services"

Positive differences (+0.5) between the expectation mean (3.4) and perception mean (3.9) indicate high levels of confidence in staff competence when it comes to using the digital tools they have in their stores.

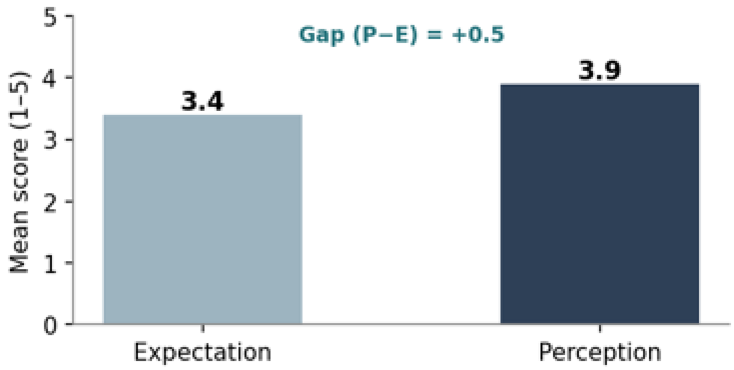

Figure 35: Expectation vs Perception Mean Self-checkout system for "Staff have the knowledge to answer my questions about digital services" (Gap = +0.5)

4.2.15 Staff and Design Instil Confidence

This is part of the statement, The behaviour of staff and the design of digital services give me confidence, which was rated by respondents as to how confident they were before and after participating in the event on a five point scale (1 = strongly disagree, 5 = strongly agree). The overall distribution of responses is shown in Figure 36, the underlying percentages and averages are reported in Table 22 and the means of expectation and perception are compared in Figure 37.

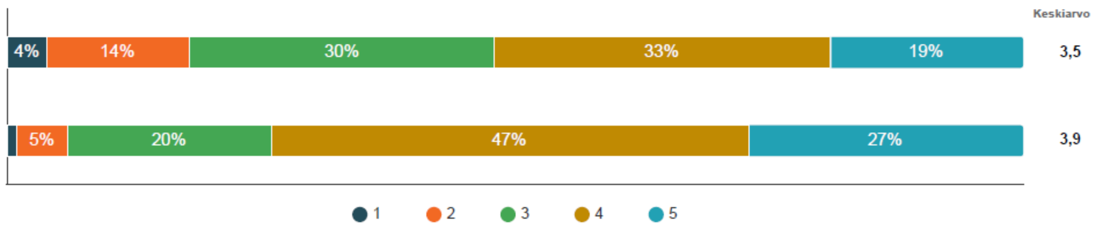

Figure 36: Distribution of Responses to " The behaviour of staff and the design of digital services instil confidence in you"

The highest expectation responses were at point 4 (33.5%) and at the neutral point (30.0%). Perception responses increased in the upward direction with 46.8% at point 4, and 26.9% at point 5.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	3,6%	14,3%	30,0%	33,5%	18,6%	3,5	4,0
Perception (What the customer actually gets)	0,7%	5,7%	19,9%	46,8%	26,9%	3,9	4,0
Yhteensä	2,2%	10,0%	25,0%	40,2%	22,8%	3,7	4,0

Table 22: Expectation and Perception Response Distribution for "The behavior of staff and the design of digital services instil confidence in you"

The gap between the expectation mean and the perception mean (+0.4) indicates a positive overall impression for store environments and staff to build international customers' trust.

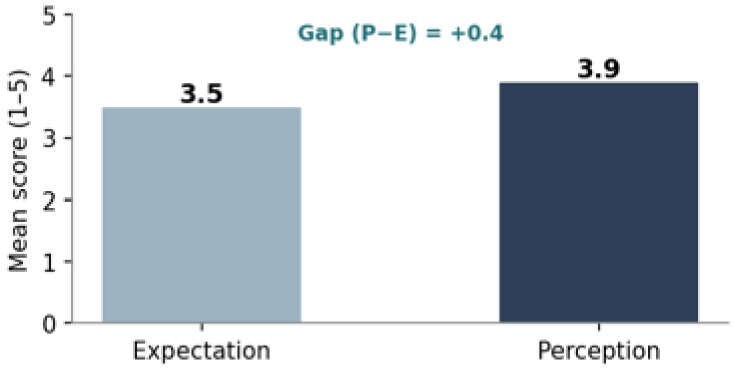

Figure 37: Expectation vs Perception Mean Self-checkout system for ” The behaviour of staff and the design of digital services instil confidence in you” (Gap = +0.4)

4.2.16 Language Options Meet International Needs

The statement Digital services offer language options to accommodate the language needs of international customers, was assessed by the respondents on a five point scale (1 = strongly disagree, 5 = strongly agree). Figure 38 shows the overall distribution of responses, Table 23 shows the underlying percentages and averages, and Figure 39 compares the means of the expectation and perception.

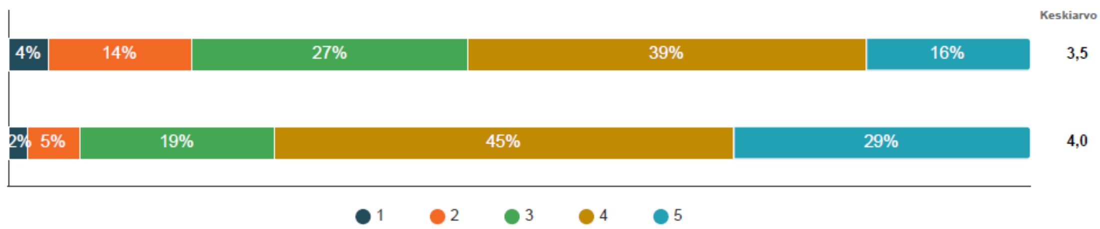

Figure 38: Distribution of Responses to ”Digital services provide language options that meet the needs of international customers”

Expectation responses peaked at point 4 (39.0%), with 26.9% at the neutral point. The perception responses were definitely trending upward, with 45.4% at point 4 and 29.1% at point 5; this means that the average respondent perceived that the language options were meeting student needs better than expected.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	4,3%	14,2%	26,9%	39,0%	15,6%	3,5	4,0
Perception (What the customer actually gets)	1,4%	5,0%	19,1%	45,4%	29,1%	4,0	4,0
Yhteensä	**2,9%**	**9,6%**	**23,0%**	**42,2%**	**22,4%**	**3,7**	**4,0**

Table 23: Expectation and Perception Response Distribution for “Digital services provide language options that meet the needs of international customers”

This results in a positive gap between the expectation and perception means (+0.5). This is a remarkable, considering the documented limited multilingual interfaces at some of the grocery retailers in Finland. The high perception self-checkout system could be due to the adaptation in the form of translation apps, which were seen in the digital services usage findings, or positive experiences at certain retailers, most likely Prisma, which is widely considered to have the most extensive English language self-checkout interface of the three studied chains.

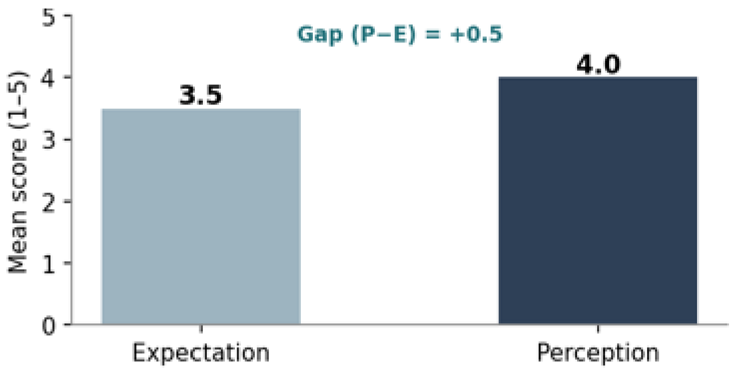

Figure 39: Expectation vs Perception Mean Self-checkout system for ”Digital services provide language options that meet the needs of international customers” (Gap = +0.5)

4.2.17 Understanding International Students' Challenges

The statement, Finnish grocery stores are aware of the unique needs of international students, was rated on a five point scale (1 = strongly disagree, 5 = strongly agree) prior to their visit and after. The overall distribution of responses is shown in Figure 40, the underlying percentages and averages are reported in Table 24, and overall expectation and perception means are compared in Figure 41.

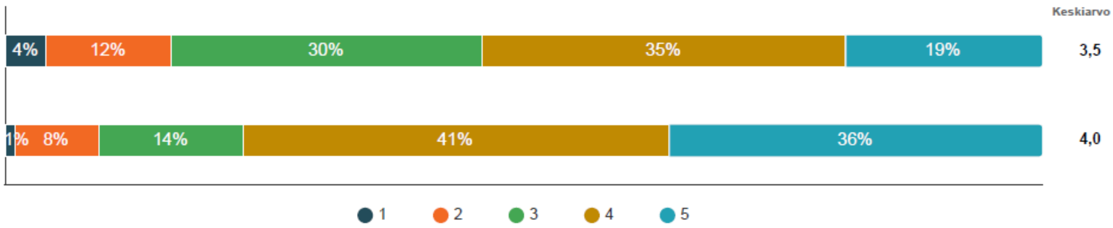

Figure 40: Distribution of Responses to ”Finnish grocery stores show that they understand the specific challenges international students face”

Responses to the question of expectation ranged from the top of the middle range. Perception responses turned sharply positive with 40.4% at point 4 and a notably high 36.2% at point 5, but a significant decline was seen at the neutral point as compared to expectation.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	4,3%	12,1%	29,8%	34,7%	19,1%	3,5	4,0
Perception (What the customer actually gets)	1,4%	7,8%	14,2%	40,4%	36,2%	4,0	4,0
Yhteensä	2,9%	10,0%	22,0%	37,6%	27,7%	3,8	4,0

Table 24: Expectation and Perception Response Distribution for “Finnish grocery stores show that they understand the specific challenges international students face”

The difference between the expectation mean and the perception mean (+0.5) is somewhat unexpected based on the previous findings of the Language Barrier. It might indicate that the customers appreciate the fact that efforts have been made by the store employees and the layout to make the store more familiar to international customers, even if the technology interface is still not perfect.

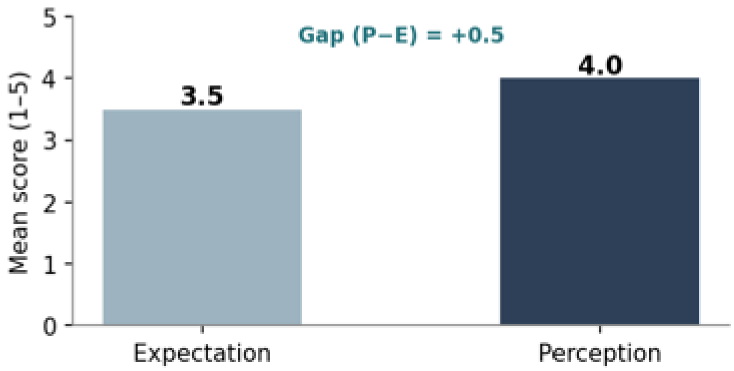

Figure 41: Expectation vs Perception Mean Self-checkout system for "Finnish grocery stores show that they understand the specific challenges international students face" (Gap = +0.5)

4.2.18 Prioritising International Customer Needs

The statement, Finnish grocery stores pay attention to the interests of their foreign customers, was rated both before and after the experience by respondents on a scale of (1 = strongly disagree, 5 = strongly agree). Figure 42 displays the overall responses, Table 25 shows the percentages and means of the responses, and Figure 43 the expectation and perception means.

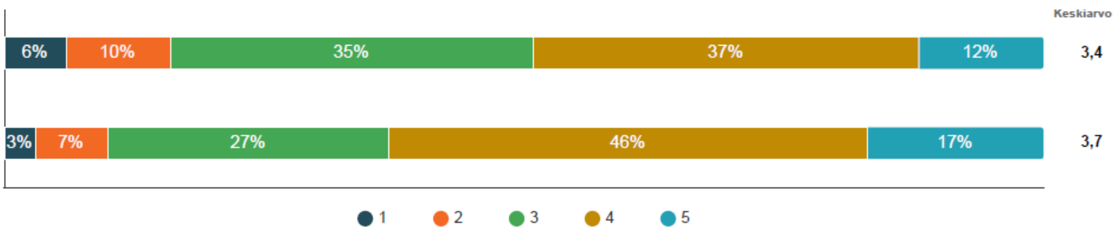

Figure 42: Distribution of Responses to " Finnish grocery stores prioritize the needs of their international customers"

Responses with the highest expectations were at point 4 (36.9%) and the neutral point (34.7%). Perception responses rose higher, but not by as much as other empathy responses which is 46.4% were rated at 4, and 17.1% were rated at 5, the lowest number of responses that were rated at the top.

	1	2	3	4	5	Keskiarvo	Mediaani
Expectation (What the customer thinks they will get)	5,7%	10,6%	34,7%	36,9%	12,1%	3,4	3,0
Perception (What the customer actually gets)	2,9%	7,2%	26,4%	46,4%	17,1%	3,7	4,0
Yhteensä	4,3%	8,9%	30,6%	41,7%	14,6%	3,5	4,0

Table 25: Expectation and Perception Response Distribution for "Finnish grocery stores prioritise the needs of their international customers"

The respondent's perception mean was 3.7, and the expectation mean was 3.4, which resulted in the lowest mean self-checkout system in the perception dimension from the empathy section and one of the smallest mean self-checkout system in the survey (+0.3). This indicates that if staff courtesy and language options are satisfactory, then grocery chains in Finland are not yet seen as prioritising the needs of their customers as a target group, which is the area that can be improved the most.

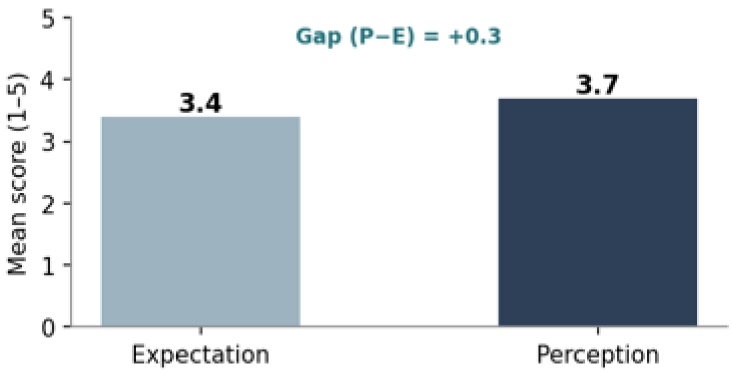

Figure 43: Expectation vs Perception Mean Self-checkout system for " Finnish grocery stores prioritize the needs of their international customers" (Gap = +0.3)

5 Discussion

In this chapter, the findings from Chapter 4 are interpreted and put into perspective by linking them to the theoretical frameworks and previous studies reviewed in Chapter 2. The main research question and three sub questions that guided this study are the following, How does the self-checkout system of grocery retailing affect customer satisfaction of international students at Prisma, K-Citymarket, and Lidl in Finland? The chapter is organized along the five dimensions of the SERVQUAL (tangibles, reliability, responsiveness, assurance, and empathy) and ends with a summary of the overall results and implications.

A consistent finding from all eighteen survey statements is that the students perceptions of the quality of the self-checkout service were higher than their expectations, with positive expectation perception gaps between +0.3 and +0.6 on all five of the SERVQUAL dimensions. This overall result is a theoretically meaningful result. Satisfaction happens when the Perceived Service Quality is equal to or exceeds the expectations, which means a positive Gap will result in a satisfactory service encounter, according to the SERVQUAL framework created by Parasuraman, Zeithaml, and Berry. Uniformity in the positive gaps on all dimensions gives a unified message that Finnish grocery self-checkout systems, overall, are meeting and surpassing the expectations of international students.

5.1 Tangibles: Physical Appearance and Visual Interface

The tangibles dimension had consistent positive gaps on all three dimensions (+0.5 for modern looking equipment, +0.4 for visually appealing screens, and +0.3 for clarity on screen instructional materials). The finding that hardware appearance was above average is consistent with the overall focus grocery retailers in Finland have been given for updates to their physical retail stores as part of their overall investments in digitalisation(Reinartz et al., 2019). It is worth noting that the gap was slightly lower for on screen visual quality (+0.4) and was the lowest for instructional visual material (+0.3). According to (Chen & Chang 2023), smart retail technologies need to be able to provide unique technology and driven value like speed, while also providing common retail value like pricing transparency. Although it appears that the terminals are technologically advanced, the relatively poor performance on the visual information dimension indicates that the language barriers are not fully overcome by the information architecture on the screens. This interpretation follows from the language proficiency data in Chapter 4, which revealed that 91.9% of the respondents were limited or had no skills in the Finnish language. According to (Ylilehto et al., 2021), visual support in a store is most useful when it is used as a replacement for verbal communication, which is not the case if the visual material is based on written words in the Finnish language.

Ease of use, which includes interface clarity and legibility, navigational logic, was identified by (Ingale et al., 2024), as the design dimension with the greatest explanatory variance in predicting the quality of the checkout. The present results indicate that Finnish grocery companies have progressed in this direction, compared to the initial expectations of the students, but there is still room for further investment in the visual guidance, in the form of icons, at the level of the self-checkout terminal, intending to further reduce the gap between the two.

5.2 Reliability: System Accuracy and Consistency

The largest deviation for the individual dimensions, particularly in the survey in general, was the reliability dimension. It's an important result for the substance. Reliability is the most fundamental aspect of the service quality a customer can expect from an automated terminal and is considered the key element in the satisfaction of SST (Parasuraman et al., n.d.). The situation of international students who might otherwise feel uncomfortable approaching the Finnish self-checkout areas, due to language barriers and unfamiliarity with the retail formats, is comforting to know that this is something that does not need to be tried more than once.

This finding is similar to (Ingale et al., 2024), who found that one of the most significant positive predictors for the quality of services was reliability and that unreliable systems create frustration and a loss of trustworthiness. Trust in SST is also a key factor in continued use, as noted by (Aguirre Reid et al., 2024), especially among experienced SST users. This is particularly important because this high first time reliability result is not only a reassurance to the new users entering the system for the first time, but it also reminds the more experienced users of the positive trust relationship they have with each other.

The results for two other categories were good, scanning and payment accuracy (+0.5), and delivery of promised services on time (+0.5). These were also endorsed by causal evidence gathered by(Špička & Dvořáková, 2026) In transaction data from the point of sale, they found that the use of self-checkout systems does not make the transaction process more difficult, but rather makes it easier, which leads to more frequent visits to the store. The present findings support that foreign students who were initially unsure if the terminal had the ability to process their transactions correctly reported that the scanning, pricing, and payment processing processes were perceived as more accurate than they had expected. Maintaining and improving this technical reliability is a key part of grocery chains in Finland to ensure that international students goodwill and their regular use of the grocery chain are secured.

In the context of mobile self-scanning,(Ferreira et al., 2023) found that ease of use and reliability had no direct impact on intention to continue use, but rather were mediated by satisfaction and perceived usefulness. Therefore, the findings of the present study can indirectly be used in store loyalty in the future, that high reliability perceptions lead to satisfaction, and that satisfaction is the most important antecedent of continuance intention and repeat patronage(Alves et al., 2025). These same grocery retailers in

Finland are not only addressing an operational issue, but are creating a strategic environment in which this expanding customer base will stay loyal.

5.3 Responsiveness: Staff Availability and Willingness to Help

The gaps for the responsiveness dimension were uniformly positive with staff availability (+0.4) to service timing communication (+0.5), and staff never too busy to help (+0.4). Overall, the item staff is never too busy to help with digital service problems, had one of the highest absolute self-checkout system of the entire survey, with a perception mean of 4.0. This is especially significant in the context of the language interface issues noted elsewhere in the study.

(Roy et al., 2018) has found that perceived adaptiveness the ability of a retail technology system to adapt to individual consumers need is one of the most significant factors influencing smart retail technology acceptance. Where the digital interface is not very language adaptable, human staff take a compensatory adaptive role. The present results indicate that this is present in Finnish grocery stores, as the staff is willing and able to serve the customer, which seems to compensate for the shortcomings of the Finnish language or Finnish dominant interface design.

In Finland, (Ylilehto et al., 2021) found three key elements of a positive customer technology experience in innovative retail settings social interaction, the technology usability,and the customer satisfaction with the service. That in very automated checkout situations, the availability and availability of helpful and ready personnel preserves the social aspect of the retail experience. This is confirmed by the present results, the responsiveness dimension was among the best in the food service sector, indicating that food service companies in Finland have managed to achieve a balance between automated and human food service in the self-checkout lane. This approach is similar to (Vojvodić, 2019), who found that having an attendant with knowledge of the technology near the self-checkout system is a transitional support model that can increase the number of new users and users who are hesitant about using self-checkout.

5.4 Assurance: Security, Competence, and Confidence

At the item level, the highest individual gap was in the assurance dimension, when staff at Finnish grocery stores are consistently courteous to international customers, reaching a gap of +0.6 and a perception mean of 4.0. In addition, all four assurance items (digital transaction security, +0.5; staff knowledge, +0.5; staff behaviour and design instilling confidence, +0.4; staff courtesy, +0.6) had a greater than average number of high absolute self-checkout system in the study, exceeding a self-checkout system of 3.9.

The fact that the international students are satisfied with the security and safety they experience when using a digital transaction system to access the self-checkout in Finland is especially strategic. According to(Alves et al., 2025) Perceived risk is the strongest negative predictor of SST satisfaction and customer loyalty. Based on their research, (Aguirre Reid et al., 2024) found that trust in the SST system becomes more significant the longer users are using the grocery retail systems in Finland, and this is even more likely to be a loyalty driver as international students experience the grocery retail system in Finland for a longer period of time. The high digital security perception is particularly noteworthy in the backdrop of Finland's overall reputation for being a technologically advanced country with a strong digital infrastructure, which can also foster positive security perceptions(Reinartz et al., 2019).

Staff's attitude towards international students (+0.6) is a positive exception, and a useful reminder to offset concerns of discrimination or unfriendly attitudes that international students may have when they arrive. In the Dabholkar attribute based model, which identified five key drivers affecting customer satisfaction, personal interaction was noted as one of them, and it was seen that positive interpersonal experiences between the staff and the customers have a significant impact on the overall perception of service quality. In the attribute-based model of Dabholkar, he identified five key drivers affecting customer satisfaction, and personal interaction was noted as one of them. Positive interactions between staff and customers have a significant impact on the overall perception of service quality. The current finding indicates that it seems to be a success in this dimension for the staff of grocery stores in Finland, and that one of the best assets in the grocery retail experience for international students in Finland is the interpersonal climate at the checkout counter.

5.5 Empathy: Language Accessibility and Understanding of International Needs

The empathy dimension including language options, understanding of the difficulties faced by international students, and prioritising the needs of international customers yielded the most complex and set of findings in the study. The absolute perception self-checkout system and gap size were smaller for all three empathy items compared to the self-checkout system and gap size for the assurance and reliability dimensions. Specifically, Finnish grocery stores prioritise the needs of their international customers had the lowest gap in the full survey (+0.3), and the lowest perception mean of the empathy items (3.7).

This is in line with the theoretical work that has been done in the field of cross cultural service encounters. (Roy et al., 2018) confirmed that language related issues in retail technology interfaces have a direct impact on the customer perceptions of adaptiveness, which is the feeling of the system having been tailored to the customer specific situation. This is a reflection of the failure in the customisation dimension of SST quality, as noted by (Lin & Hsieh, 2011) In their SSTQUAL framework, the system ability to address the needs of various users.

Interestingly, the language options item also generated a relatively high positive gap (+0.5), which is surprising as 91.9% of respondents had limited or no Finnish skills. Possibly this was because some users faced language problems because they used translation apps, or because more experienced users in Prisma, which is believed to have the most complete English language interface of the three chains examined, responded more positively to the language options. This interpretation is consistent with (Chen & Chang, 2023) who reported that technology ready consumers are skilled at using the technologies that are available to them to attempt to make up for the limitations of the native interface, thereby augmenting the value they experience from the service encounter despite the suboptimal nature of the native interface.

The empathy dimension lowest self-checkout system is when stores actively focus on the international customer, with the operational goodwill rating being strong. The strategic commitment self-checkout system is also strong, but the gap between the two indicates the need for further development. In a study conducted in a supermarket omnichannel environment,(Cuesta-Valiño et al., 2023) showed that the emotional side of the customer journey is critical and different from the rational efficiency side, influencing long term loyalty. This emotional level perception of being treated well and not just tolerated is a perception, and the empathy results indicate that the grocery operators in Finland are not yet successfully making the operational sense of goodwill, resonate on the emotional level with the perception of inclusion for international students.

5.6 Cross-Store Comparison: Prisma, K-Citymarket, and Lidl

The survey design was not designed to allow for a statistically valid item by item comparison across the three store chains, however, the store visitation data and contextual findings provide relevant information about satisfaction comparisons. Despite being the most visited store by far (84.4%), qualitative contextual evidence presented in Chapter 4 suggests Lidl is also linked to increased, this is consistent with

Lidl's more limited multilingual interface offering. Both Prisma and S-Market were accessed by 79.4% of respondents, and evidence from the study suggests that Prisma provides the most user-friendly access to English language self-checkout. The third least visited chain is K-Citymarket (22.0%).

The patterns match the theoretical argument of (Aguirre Reid et al., 2024) which indicates that trust is a key factor in where people choose to shop in the long run when using SST, if there is an occurrence of a negative experience at one chain self-checkout, particularly one based on language issues, that can lead to a change in the long run store choice. Part of this distribution of store visits might have been self-selection because the international students trust the more user-friendly digital system of a chain that they feel they can navigate, especially from a non-Finnish background. The interface and accessibility decisions made at the supermarket level by the chain have strategic importance in terms of market share in the international student market, as revealed by the research conducted by (Demirci Orel & Kara, 2014) on the effect of supermarket satisfaction of the users on store loyalty, which was found as a direct effect of service quality perceptions at self-checkout.

5.7 Theoretical Implications

Theoretically, this study can be used to extend the application of the SERVQUAL framework to self-service retail, which has not been extensively examined in previous research, especially in a cross cultural and multilingual environment. The study illustrates the applicability of the five dimensions of SERVQUAL in the SST environment, including culturally diversified consumers, and demonstrates that the most sensitive cross-cultural dimension of SERVQUAL is empathy. The results complement the satisfaction literature on SST by offering empirical data that the human aspects of the SST experience, namely the responsiveness, assurance, and interpersonal courtesy of the staff members, are not the rubout of the self-checkout system, but are key components of the experience of satisfaction. This supports and extends the arguments of (Vojvodić, 2019; Ylilehto et al., 2021) regarding the continued importance of social interaction in automated retail environments.

From a practical point of view, the results provide four concrete recommendations for Finnish grocery retailers. The first step would be to provide more multilingual interface options, especially to have English as the default or easily selected language on all system terminals, which would resolve the most structurally important cause of dissatisfaction in the empathy dimension. Second, the use of icons, without any language, at the terminal level would increase the tangibles dimension, especially for the weakest gap. Third, the strengths found in staff responsiveness and assurance in this study should be proactively sustained and promoted to the international customers as part of the retailers' service offering. Lastly, grocers should consider making their intention to include international customers more explicit, by introducing explicit service design features like multilingual welcome signs, English language staff badges, or even established support channels that indicate a strategic rather than just operational approach to international customers. The emotional aspect of the retail experience was found to have its own unique influence in developing loyalty (Cuesta-Valiño et al., 2023) and is likely to amplify this emotional aspect for international students when there is a structural signal of inclusion.

5.8 Summary of the Discussion

To sum up, this chapter has highlighted that digitalisation of grocery retail has created a largely positive satisfaction experience for international students, as there are positive gaps in the expectation and perception matrix for all SERVQUAL dimensions. Technical reliability, staff assurance, and interpersonal courtesy are the most important strengths, and they far outperform expectations by significant margins. The area that needs improvement the most is the empathy dimension, specifically recognizing the importance of international customers and committing at the strategic level to include them, as well as providing options for customers to access the interface in their own language. The human side of the customer experience, serviceability, helpfulness, and manners, is a major counterbalance to the downsides of the predominantly Finnish language digital interfaces, and is a unique aspect of the grocery self-checkout environment in Finland. The results have both theoretical and practical significance, and provide a basis for further investigation on the issue of cross cultural SST satisfaction in multilingual retail settings.

6 Conclusions

This thesis aimed to study the impact of grocery retail digitalisation on customer satisfaction among international students in Prisma, K-Citymarket and Lidl in Finland. The literature review created a theoretical framework for digitalisation, self-service technology and the SERVQUAL model of service quality, while the empirical part involved a quantitative study on 141 international students, with their answers analysed by the SERVQUAL logic of the expectation and perception gap. This chapter brings the study to a conclusion. It starts by summarizing the SERVQUAL gaps, followed by an answer of the proposed research questions, some practical recommendations, limitations of the study, and directions for future study.

The main study question and three sub questions were set to help guide the study.

Main Research Question: How does the digitalization of grocery retail, in the form of self-checkout systems, influence customer satisfaction among international students at Prisma, K-Citymarket, and Lidl in Finland?

Sub-questions:

1. What aspects of the self-checkout experience do international students value most when shopping at these grocery stores?
2. What challenges, including language barriers and technical difficulties, do international students face when using self-checkout systems in Finnish grocery stores?
3. How do customer satisfaction levels with self-checkout systems differ across Prisma, K-Citymarket, and Lidl from the perspective of international students?

All eighteen of the survey items are summarized in Figure 44 in order to provide a single perspective of the SERVQUAL expectation and perception gaps in the context of the five service quality dimensions. The light blue bar represents the mean expectation self-checkout system, what students believed they would receive, and the coloured red bar the mean perception self-checkout system, what they actually received, the light green bar represents the difference between the two. The figure displays the main result of the study, namely the coloured perception bar, which is always longer than the grey expect bar, so that in all cases the perception bar is longer than the expect bar, ranging from +0.3 to +0.6. The empathy dimension, although still positive, has the lowest mean gap (+0.4), which is driven down by the low gap on prioritising international customers needs (+0.3), whilst the reliability and assurance dimension displays the highest mean gap (+0.50) for both.

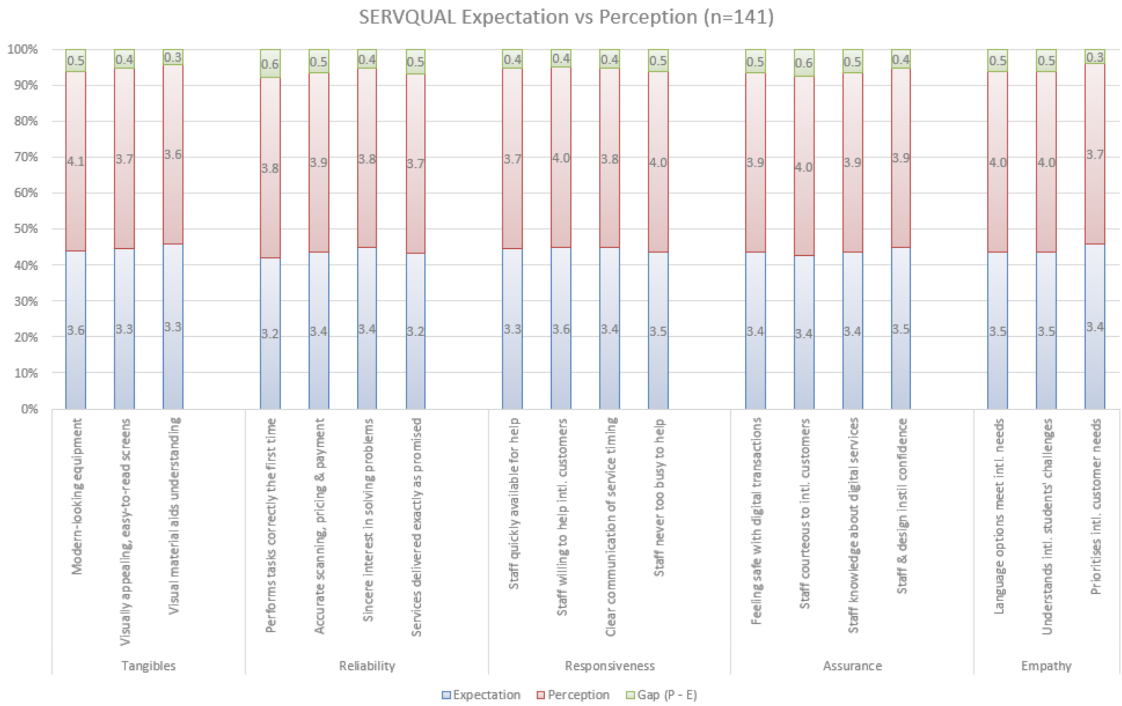

Figure 44: SERVQUAL Expectation vs Perception Gaps for Self-checkout Service Quality among International Students in Finland(n=141)

6.1 Answer to the Research Questions

Main Research Question

Self-checkout technology in grocery retail has a positive overall effect on customer satisfaction of international students in Finland. The perceptions always met or surpassed the expectations on each of the eighteen items included in the SERVQUAL, revealing the effectiveness of the Finnish grocery self-checkout systems in meeting or exceeding the expectations of international students. These technical aspects of the systems technical accuracy and the interpersonal nature of staff encounters are especially highly rated in the reliability and assurance dimensions, which show the strongest positive impacts. However, the weakest point, still positive, is the empathy dimension, i.e., the intention of the retailers to treat international customers as a separate and appreciated segment, which is still not matched by the goodwill of individual employees.

Sub-Question 1:

International students find reliability of self-checkout, courtesy and accessibility of staff members, and security of transactions to be most valued. These priorities are in line with highlighting ease of use, reliability, and trust as the most prominent factors influencing service quality in self-checkout settings. The most highly rated dimensions in absolute terms are the staff's responsiveness and assurance, suggesting that the human side of the experience is paramount to this group, as well as the technical characteristics of the terminals themselves.

Sub-Question 2:

The main challenge is language, 91.9% of the respondents do not speak Finnish well, but the self-checkout equipment of most Finnish chains is mainly in Finnish, and supports multilingual to a lesser extent. This barrier is most evident when comprehension of text is necessary, such as error messages, weighing prompts for fresh produce, and age verification prompts. That one language interface is a structural problem in adaptiveness for multilingual users. In addition to the interface itself, the empathy results indicate that the students feel that chains have yet to institutionalise them as a strategic group of customers.

Sub-Question 3:

Although this study did not design a chain by chain statistical comparison, the evidence based on the context reveals a hierarchical profile of satisfaction. Against language accessibility, Prisma is perceived most favourably, Lidl is the most visited chain but suffers most from language related friction, whereas K-Citymarket, despite its hypermarket format, is the least visited chain and is in the middle position. The differences in service quality in self-service chains directly affect the loyalty of the store and future store visits.

6.2 Recommendations for Finnish Grocery Retailers

Based on the results, four practical suggestions are presented to Finnish grocery retailers to enhance the self-checkout process for foreign consumers.

First, expand multilingual interface options: To begin with, increase the multilingual interface options. The most significant driver of dissatisfaction in the empathy dimension would be solved in cases where English is the default language or is prominently available on all self-checkout terminals, thereby decreasing the need for third party translation apps.

Second, invest in language neutral visual guidance: Second, get some visual support in the language. The tangibles gap, especially the visual information item, yielded the weakest tangibles gap, and icon based, image led instructions at the terminal level would reinforce the tangibles dimension and would help users regardless of their level of language.

Third, maintain and communicate the human support strengths: In the present study, the strengths of responsiveness and assurance are identified, and they should be actively supported and integrated into retailers service proposition to international customers, as they currently make up for the limitations in their interfaces.

Fourth, signal strategic commitment to inclusion: Retailers should make their welcome more explicit, such as providing multilingual sign at the store, staff badges in English, or pathways for support to make it clear what goodwill is being offered on the ground, and turn it into a welcoming gesture with a personalized and emotional message of inclusion. The emotional aspect of the retail experience has a different impact on loyalty.

6.3 Limitations of the study

The results must be interpreted with a few limitations in mind. Firstly, the sample is geographically and demographically focused, as most participants have originated from South Asian countries (Nepal, Bangladesh, India, and Pakistan), and have lived in Finland for less than 2 years, which may result in less generalisability to international students from East Asia, Africa or Europe who may have a different background and familiarity with self checkout systems and different levels of technological readiness. Second, the cross sectional, survey based design does not allow causal inferences, nor validity of perceptions across time. Third, comparisons across chains are based on data on visitation which has been used to inform the comparison, but is not statistically controlled and should be viewed as indicative, not conclusive. Lastly, reported expectation and perception self-checkout system are prone to recall and social desirability biases of survey research.

6.4 Suggestions for Future Research

The restrictions indicate some possible future research areas. A longitudinal study would be able to assess the change of expectations and perceptions of international students over time as they gain experience and language proficiency, and test the hypothesis put forward that trust is a more powerful factor to motivate loyalty over time. A survey with a chain specific routing or an experimental design could enable a statistically controlled comparison of Prisma, K-Citymarket, and Lidl and could separate out the effect of specific interface features for example the availability of an English language mode on satisfaction measures. More studies are needed to expand the sample to include international students from various geographic areas, and to explore other service technologies in the grocery setting that were mentioned by the respondents in this study but not investigated in detail. This combined study would contribute to the understanding of the self service satisfaction of cross cultures in the growing multilingual retail scenarios.

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Appendices

Appendix 1. Webropol Forms Survey

"The Impact Of digitalization on Customer Satisfaction in Grocery Stores: A survey of international students Experience with self-checkout at Prisma, K-Citymarket, and Lidl"

1. What is your age gap ?

- ◯ Under 20
- ◯ 20-24
- ◯ 25-29
- ◯ 30-34
- ◯ 35-above

2.What is your gender?

- ◯ Femle
- ◯ Male
- ◯ Other/ prefer not to say

3.What is your country of origin?

- ○ Nepal
- ○ India
- ○ Bangladesh
- ○ Pakistan
- ○ Vietnamese
- ○ China
- ○ Russia
- ○ Ukraine
- ○ Nigeria
- ○ Other African countries
- ○ Other Asian countries
- ○ Other European countries
- ○ Other

4. How long have you lived in Finland
?

- ◯ Less than 6 months
- ◯ 6 months – 1 year
- ◯ 1–2 years
- ◯ 2–4 years
- ◯ More than 4 years

5. How would you rate your Finnish language skills?

- ◯ None at all
- ◯ Basic phrases only
- ◯ Beginner (A1–A2)
- ◯ Intermediate (B1–B2)
- ◯ Advanced or fluent (C1–C2)

6. Do you personally do grocery shopping in Finland?

- ◯ I do most of my own grocery shopping
- ◯ I share grocery shopping with my family or partner
- ◯ someone else does the shopping for me

7. Which grocery store do you regularly shop at? (Select all that a)

- ☐ Lidl
- ☐ K-Market
- ☐ S-Market
- ☐ Prisma
- ☐ K-Citymarket
- ☐ Alepa
- ☐ Others

8. How often do you do grocery shopping in Finland?

- ◯ Never
- ◯ Rarely (once a month or less)
- ◯ Sometimes (2–3 times a month)
- ◯ Often (once a week)
- ◯ Very Often (multiple times per week)

9. Have you ever used any digital service at a Finnish grocery store ?

- ◯ regularly
- ◯ occasionally
- ◯ only once or twice
- ◯ never

10. How often do you use each of the following digital services? (One rating per row)

SCALE: 1= Never/ 2= Rarely/ 3= Sometimes/ 4= Often/ 5= Very often

	1	2	3	4	5
Self-checkout machines at the store	○	○	○	○	○
Mobile loyalty apps (e.g., S-mobiili, K-Ruoka, Lidl Plus)	○	○	○	○	○

	1	2	3	4	5
Online grocery shopping (ordering food online)	○	○	○	○	○
Home delivery services from grocery stores	○	○	○	○	○
Delivery robots (eg, Starship robots in Vaasa)	○	○	○	○	○
Digital coupons or discount apps	○	○	○	○	○
Online product information search (when packaging is in Finnish)	○	○	○	○	○
Translation apps (Google Translate, Google Lens) in stores	○	○	○	○	○
Cost-monitoring or budget apps for Groceries	○	○	○	○	○

11.Self-checkout machine and digital terminals have modern-looking equipment.

	1	2	3	4	5	6
Expectation (What the customer thinks they will get)	○	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○	○

12. The screens and interfaces of digital services (apps, self-checkout) are visually appealing and easy to read.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

13. Visual material (signs, product image, on-screen instructions) help you understand how to use digital services.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

14. Digital services (self-checkout, mobile apps) perform tasks correctly the first time

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

15. Digital services accurately scan products, calculate prices, and process payments.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

16. When I face a problem with a digital service, the store shows sincere interest in solving it.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

17. Online orders, delivery times, and promised services are delivered exactly when promised.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

18. Staff are quickly available when you need help at self-checkout or other digital services.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

19. Store staff are willing to help international customers with digital services.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

20. Digital services (apps, websites) clearly tell me when services will be performed (eg, delivery time queue waiting).

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

21. Staff are never too busy to help you with digital service problems.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

22. I feel safe and secure when making transactions through digital services.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

23. Staff at Finnish grocery stores are consistently courteous to international customers.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

24. Staff have the knowledge to answer my questions about digital services.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

25. The behavior of staff and the design of digital services instill confidence in you.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

26. Digital services (apps, self-checkout, websites) provide language options that meet the needs of international customers.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

27. Finnish grocery stores show that they understand the specific challenges international students face.

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○

28. Finnish grocery stores prioritize the needs of their international customers

	1	2	3	4	5
Expectation (What the customer thinks they will get)	○	○	○	○	○
Perception (What the customer actually gets)	○	○	○	○	○